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76 DP Budgets, p. 52. Also: to rent or to buy?, microprocessors, and mass transit systems...

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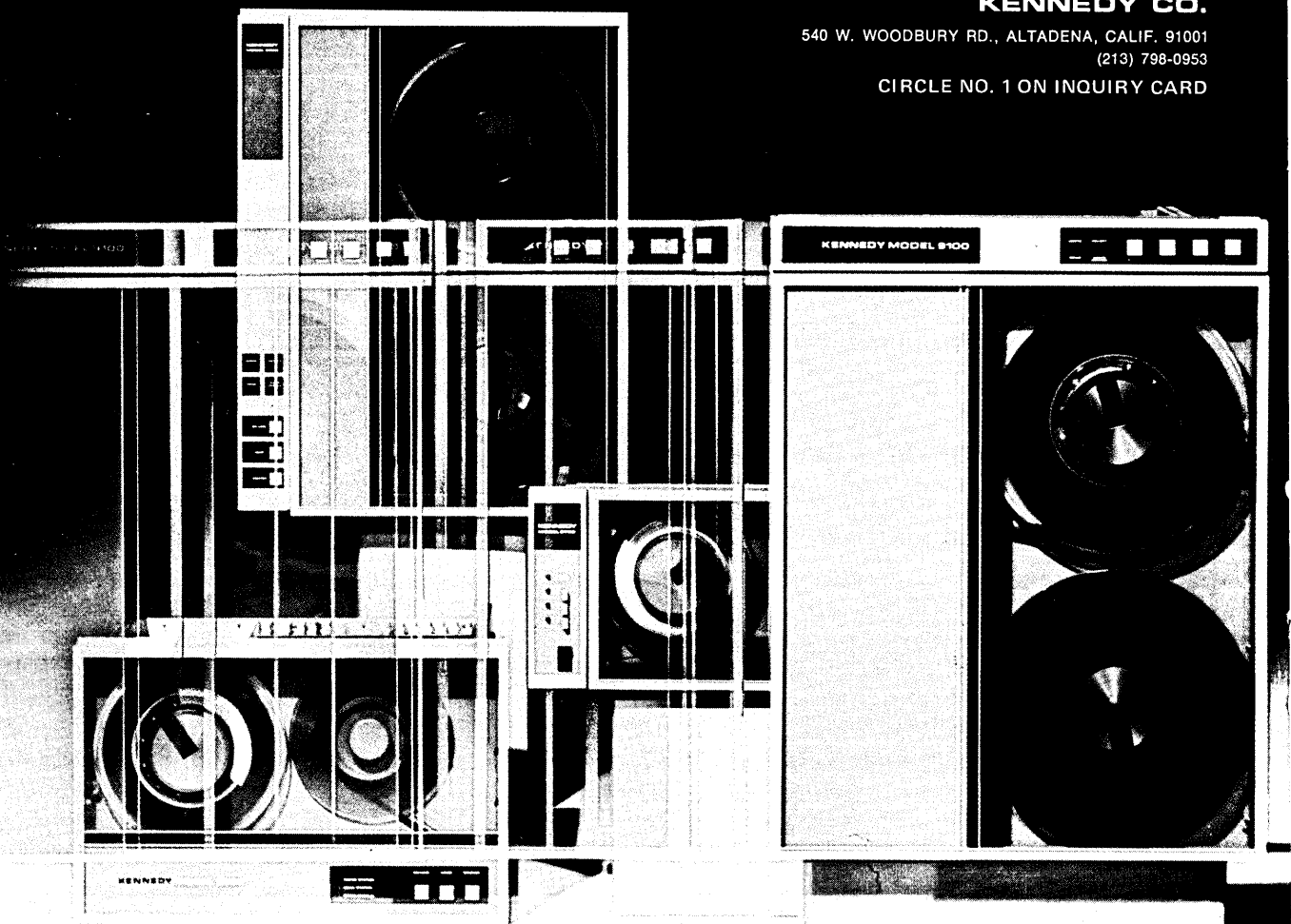
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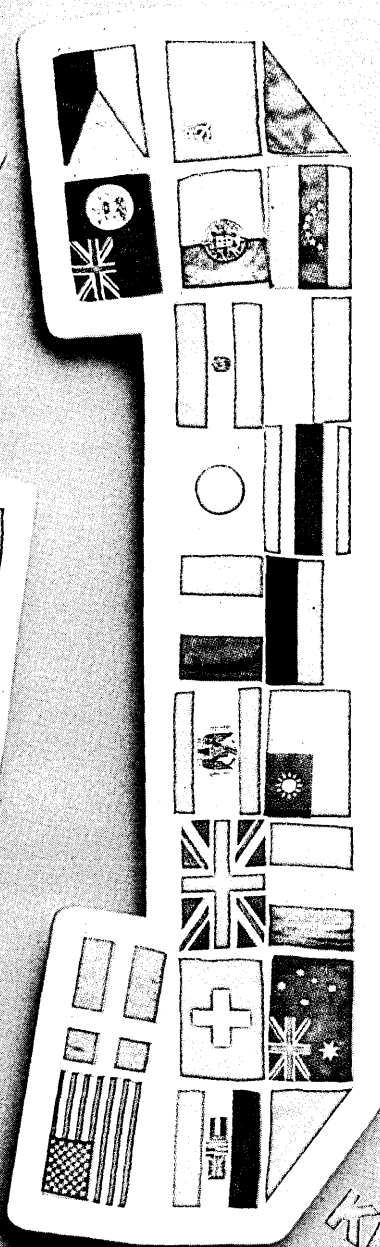
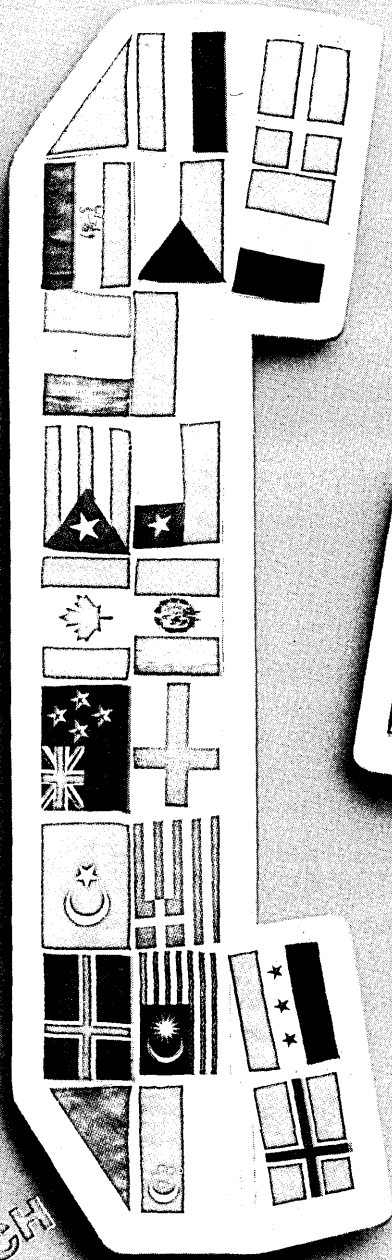
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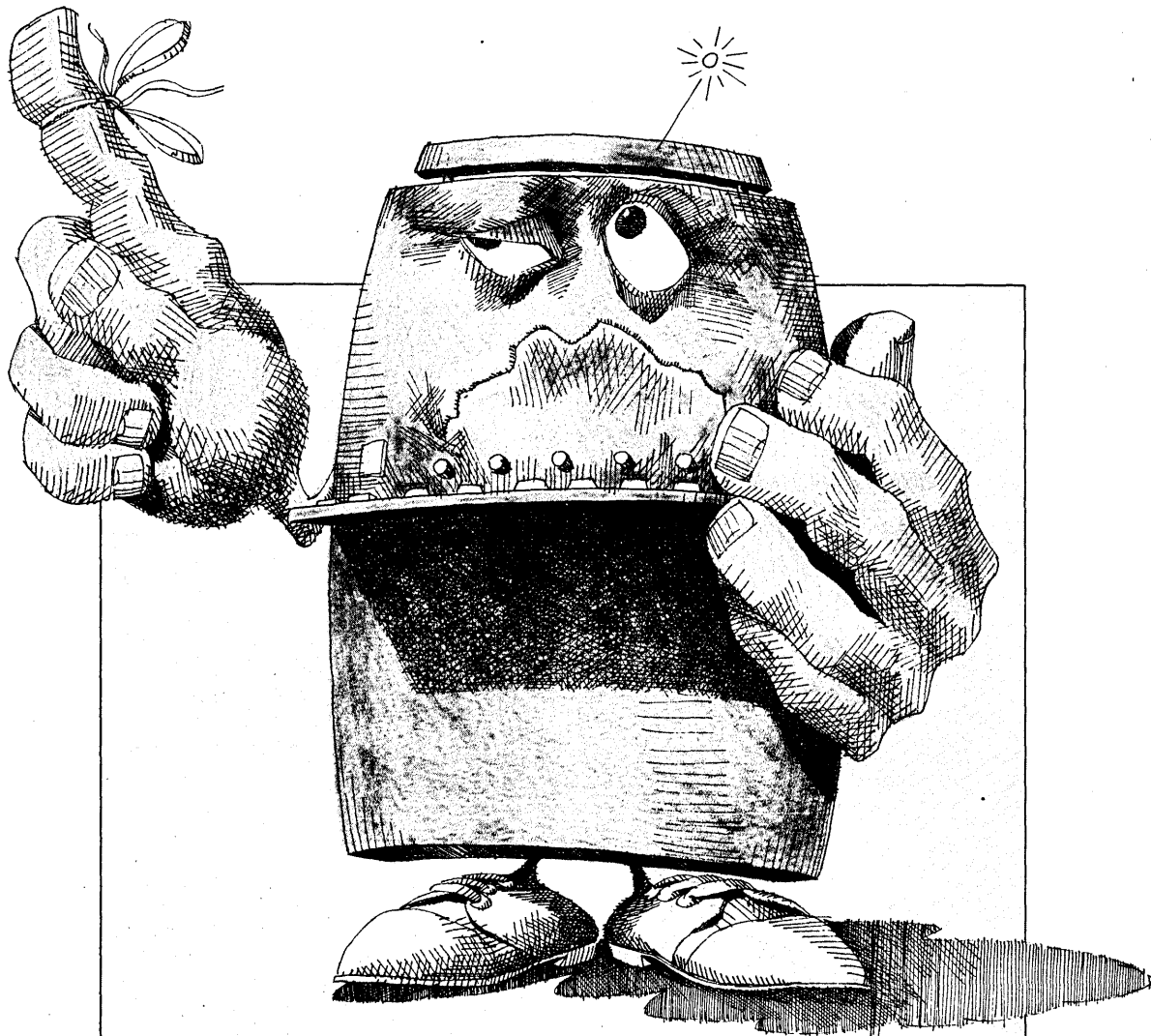
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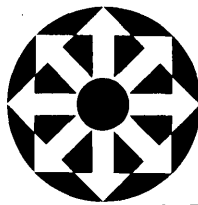
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FEBRUARY 1976

FEATURES

Dp Spending for 1976

Data processing managers have managed to wrest 10% increases in funding for their computer operations in 1976. Thanks to a slight dip in the rate of inflation, this may give them just a little bit of breathing room this year. The money will be spent carefully. Since it's late in the product cycle of most mainframe lines, increases there will be slight. But even shops so strapped for funds that they regularly use both sides of printed forms are finding ways to shake loose some money for teleprocessing applications, which, as last year, is the big growth area.



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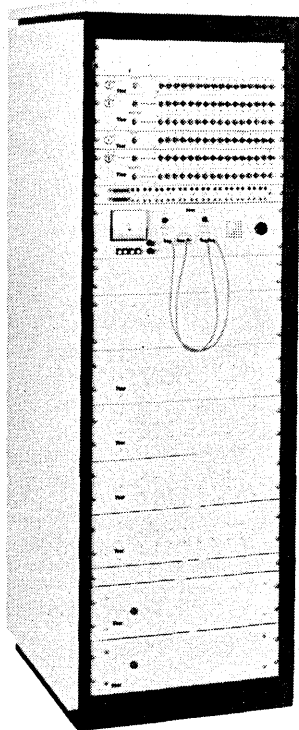
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letters

Interns vs. civil war

Your editorial on "Civil War in the Corporation" (Nov. '75, p. 45) highlights an important problem in all organizations that find themselves heavy users of dp services. The techniques of how to bridge the communication gap between the dp and operating departments takes the form of many different solutions, probably none of which are unique.

At Liberty Mutual, among the techniques we have adopted to minimize the problem (you never solve it completely), is to offer an "internship program" in the dp organization for those operating departments willing to release qualified and knowledgeable personnel for a one to two year sojourn in the dp organization.

We put such individuals through our regular programmer training course, locate them in an applications area working on systems relating to their own department's operations, move them into an analyst position to give them a feel for design considerations, and return them to their own department at the end of the agreed to time.

If we have done a good job, we then have in most cases an understanding individual in the operating department that we can direct interdepartmental communications through. In at least three of our large operating departments such an individual has assumed the title of Director-EDP Systems, and our relations with both individual and department are smoother due to the "internship program."

PAUL E. KEATING
*Assistant Vice President
Liberty Mutual
Boston, Massachusetts*

A message from Baby

It amazes me that you would print the forum "You've Come a Long Way, Baby" by Robert L. Patrick (Dec. '75, p. 193). He needs to see his shrink, and the sooner the better.

To begin with, he seems to be hung up on "seasoning" for people. Does he mean salt, pepper, and monosodium glutamate, or does he mean prepared for the urn?

After 35 years in the business world, I have concluded that almost no managers are any good. When Patrick writes about "thousands of hours tinkering with cars, motorcycles, . . . and the like," and then implies that the

tinkerers have "experience in group dynamics," I can see why. Please tell that boob Patrick that you can get more experience in group dynamics by raising a couple of kids than by tinkering with cars. . . .

I can tell Patrick that adolescence in men does not necessarily end between ages 25 and 30. I am acquainted with some grownup men of 20 and some adolescents of 50 (and some of those adolescents are managers!)

Finally, Bella Abzug is to be commended for her remark: "Let's get all those unqualified women into office with all those unqualified men."

SALLY F. DENNIS
Montrose, New York

Mr. Patrick replies: Seasoning means "prepared for the earn."

Programmer professionalization

I enjoyed reading the October 1975 Forum article by Philip Kraft and Gerald M. Weinberg (p. 169). In general I am in agreement with what they had to say about professionalization of programming.

I disagree however that a "program survey" leads to the conclusion that the condition of programming expertise today is extremely poor. My opinion is that it has been programmers who have managed to keep systems going on the computer in spite of some heavy odds against them. These odds are: (a) the expectation of users and management in general that systems can be programmed in half the time needed for a thorough job; and (b) a lack of appreciation of the complexities of programming, e.g., the multiplicity of options in coding that can lead to numerous logic loopholes if programmers' work units (so many lines of coding per day, for example) are not small enough to concentrate sufficiently on them. If the Business Specs leave loopholes, the effect can only be geometrically worse on programming as far as program loopholes are concerned.

Steps taken to insist on structured programming have helped cut down the complexity of coding and testing. But a more important step will occur when reasonable time factors are applied to reasonable programming work efforts to ensure a thorough and accurate job.

Perhaps if coding mistakes were more frequently disastrous than they are now, the second step towards reasonable work units would occur much faster! Programmers are often on call 24 hours a day to correct situations that occur because of rush jobs done on Business Specifications, Systems Specifications, or Programming and Testing. Their willingness to be flexible

in their hours has saved many a system from breaking down completely. On the other hand these night hours don't contribute to well-thought-out solutions, so a vicious cycle of errors can occur. The programmer working in the above environment often becomes frustrated and overworked, and this again could lead to more errors. . . .

I do not wish to imply that there are no mediocre programmers in the business, but that this problem pales before the often unreasonable work demands. In fact the very work demands themselves makes it difficult to spot mediocre programmers—bad ones are easy to spot—and to concentrate on improving them. We often hand them built-in excuses for not meeting the objective of implementing a stable error-free system.

ERNIE KAMMERER
*Chief, Commercial Systems
Development
Canfarm Data System
Canadian Department of Agriculture
Guelph, Ontario
Canada*

I have been thinking about writing my thoughts about "Professionalization of Programming" but it could not have been expressed more correctly nor more clearly than it was by Philip Kraft and Gerald Weinberg. . . .

DAVID E. FERGUSON
*Publisher
System/3 World
Canoga Park, California*

Possible danger

Edsger Dijkstra's review of *On the Feasibility of Software Certification* is very evenhanded. But I think that he overlooks a serious problem when he suggests that the system user (as a practical matter, the application programmer) "totally disregard the compiler and the bit patterns it generates as irrelevant aspects of the implementation." This leaves a system programmer bent on fraud an open door to program control.

BELDEN MENKUS
*Editor, Computer Security
Computer Security Institute
Northboro, Massachusetts*

Inmate dp

I saw your November issue for the first time, and was impressed with the depth of your articles. . . .

I am presently incarcerated at the Wisconsin State Reformatory where I was first introduced to data processing about three years ago. Since then I have mastered Basic, RPG, FORTRAN, COBOL, and BAL.

After further schooling inside the institution became impossible, I

letters

worked with a number of people from Northeast Wisconsin Technical Inst. and the state government to start a dp shop at the institution. This was a revolutionary idea to the people involved in the penal system—that an inmate could do something that complicated and sophisticated. But they were willing, reluctantly, to give it a try. Since there was no corrections official even remotely qualified to manage the new "Computer Services Department," I was put in charge. I have two other people working with me, also inmates here.

The department, and the fact that it is completely inmate-run, are both firsts for the Wisconsin penal system. After the customary red tape, we were given an office (another first), computer time on an IBM 360/40 and a 370/145, and also a time-sharing terminal (PDP-11/E). Every two or three weeks, representatives from the state government come to the institution with their problems for us to apply our dp expertise to. We now have a number of systems up and running in Madison, the state capital.

JEFF C. LARKIN
Wisconsin State Reformatory
Green Bay, Wisconsin

Women's flag unfurled

Congratulations to the Yaker twins on their success in rising into IBM's management structure (People, Nov. '75, p. 11).

That you chose to use the Yaker twins as a vehicle to air your prejudices about women and the women's movement is abominable. When are people going to stop thinking that a woman's identity and effectiveness are defined by "being blonde, attractive and looking even younger than her . . . years."

Also, of what significance is it that they have achieved their professional status "without waving the flag of women's lib to any great degree"? Your implication is that support of women's liberation is a black mark against anyone who believes in it. For your information, the objective of women's liberation is raising people's awareness of women's talents and capabilities which are largely unused. If you consider this something to be ashamed of, then you should be ashamed of yourself.

ANNE PETROKUBI
Senior Software Engineer
3M Company
Newton, Massachusetts

The People item on the Yaker twins was written by one woman and edited by another.

Don't Tread on Structured Programming

Thomas Gildersleeve's contribution to the Forum in the November '75 issue, "The Dark Side of Structured Programming" (p. 78), loosed an avalanche of response from structured programming proponents. Mr. Gildersleeve argued that structured programming is not equally well suited to all applications, and used a file update program as an example. The example and the argument have been attacked by readers from Peoria to West Germany. There is no possible way to show the many flowcharts and solutions supplied, but the following excerpts give some flavor of the responses.

Maybe "The Dark Side of Structured Programming" isn't dark after all. Mr. Gildersleeve concluded that "the merging of additions into a master file" was "the nemesis of structured programming" because "to express this logic in structured form requires the introduction of a flag . . ." I am also concerned about the overuse of flags, but I don't agree that flags are required. In fact, this logic can be quite lucid and succinct when expressed in "flag-less" structured programming.

WILLIAM H. ELRICK
Central Illinois Light Company
Peoria, Illinois

Selecting a specific case in order to demonstrate the general superiority of one technique (decision tables) over another (structured programming) is not a persuasive method of proof. . . . The flag introduced by Mr. Gildersleeve in the structured logic of his Figure 3 is superficial—one of many alternative solutions is attached. . . .

R. KRİKORIAN
Dillingersville, Pennsylvania

The November '75 Forum gives a good example of the fact that no amount of structuring rules will by themselves result in a well-structured program. Let's analyze the problem and the solution presented

GEORG WINTER
Kurhaus
West Germany

The author misunderstood the intent of the methods of IBM's Independent Study Program on Structured Programming. It should be taken as an informal proof that transforms exist to map unstructured flow charts into structured ones. This was originally presented by Bohm and Jacopini to prove that

any proper flow chart can be represented with only three basic constructs (WHILE DO, IF THEN ELSE, AND BEGIN END). This transformation should not, in general, be used as a method of programming. The PASCAL program below . . .

S. C. SCHWARM
C. E. BRIDGE
Engineering Physics Laboratory
E. I. Du Pont De Nemours & Co.
Wilmington, Delaware

Mr. Gildersleeve contrasted "old" and structured flowcharts for merging additions into a master file. His old flowchart used 9 boxes, while the structured flowchart used 16 and was more complicated. He concluded that structured programming led to a poorer solution to the problem.

The structured flowchart below . . .

ED LATO
Washington, D. C.

Although I am an advocate of structured programming, I do appreciate the position taken by Mr. Gildersleeve in his article. I do not object to using decision tables in certain situations. However, I feel that his example should not be used to compare structured programming with decision tabling. I personally feel that, in most instances, a SAM file structure is not efficient for the file maintenance process. In many cases, an ISAM file structure . . .

DOHN P. ADDLEMAN
Systems Analyst
Commonwealth of Pennsylvania
Department of Education
Harrisburg, Pennsylvania

The letter writers generally viewed structured design and programming methods in a more favorable light, saying:

As for me, structured programming illuminates a path to clear, readable, and eminently satisfying programs which ease my workload and brighten my outlook (Elrick).

I believe decision tables are most useful as a means of communicating decision logic from designer to programmer and as an aid to the programmer in determining the logical requirements of his program. However, I feel the function of logical structure is best illustrated by flowcharts (Krikorian).

Structured programming is indeed a powerful aid to good programming when properly applied (Winter). *

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So why pay twice as much (and more) if 900 LPM is all you need?

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The 2290 was designed (from the proven technology of our 2200 series) to meet the requirements of the new high-performance, minicomputer-based systems.

So you can count on maximum operating economy in medium and large business data processing systems, distributed processing, and remote terminals at 9600 baud and up.

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The 2290, like all 2200 series printers, offers two unique systems:

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An acoustical cabinet for quiet operation in office atmospheres.

Little wonder that, with these outstanding features (and many more), Dataproducts is the world's leading independent manufacturer of line printers.

For all the facts and figures on the 900-LPM 2290, write for our brochure.

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Dataproducts

The Line Printer Company

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(213) 887-8451; Telex: 67-4734

THE NEW 900-LPM 2290

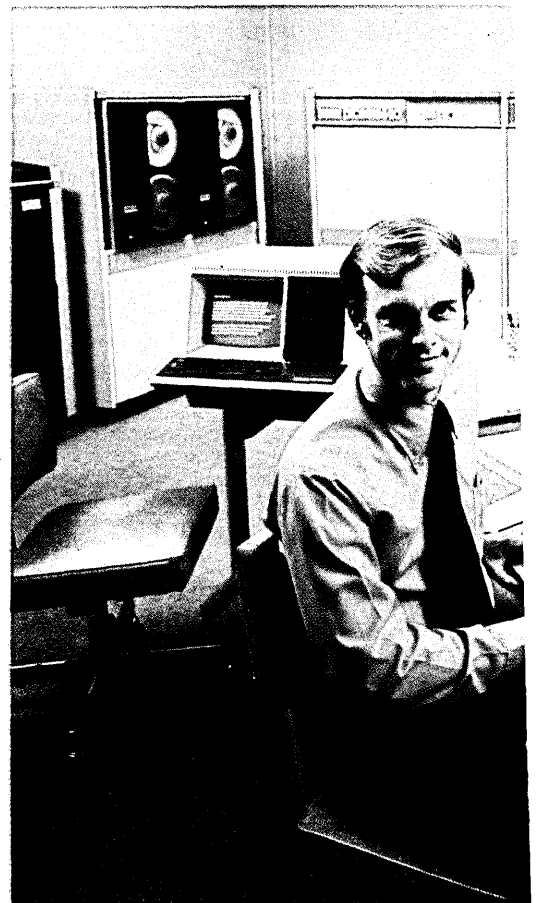
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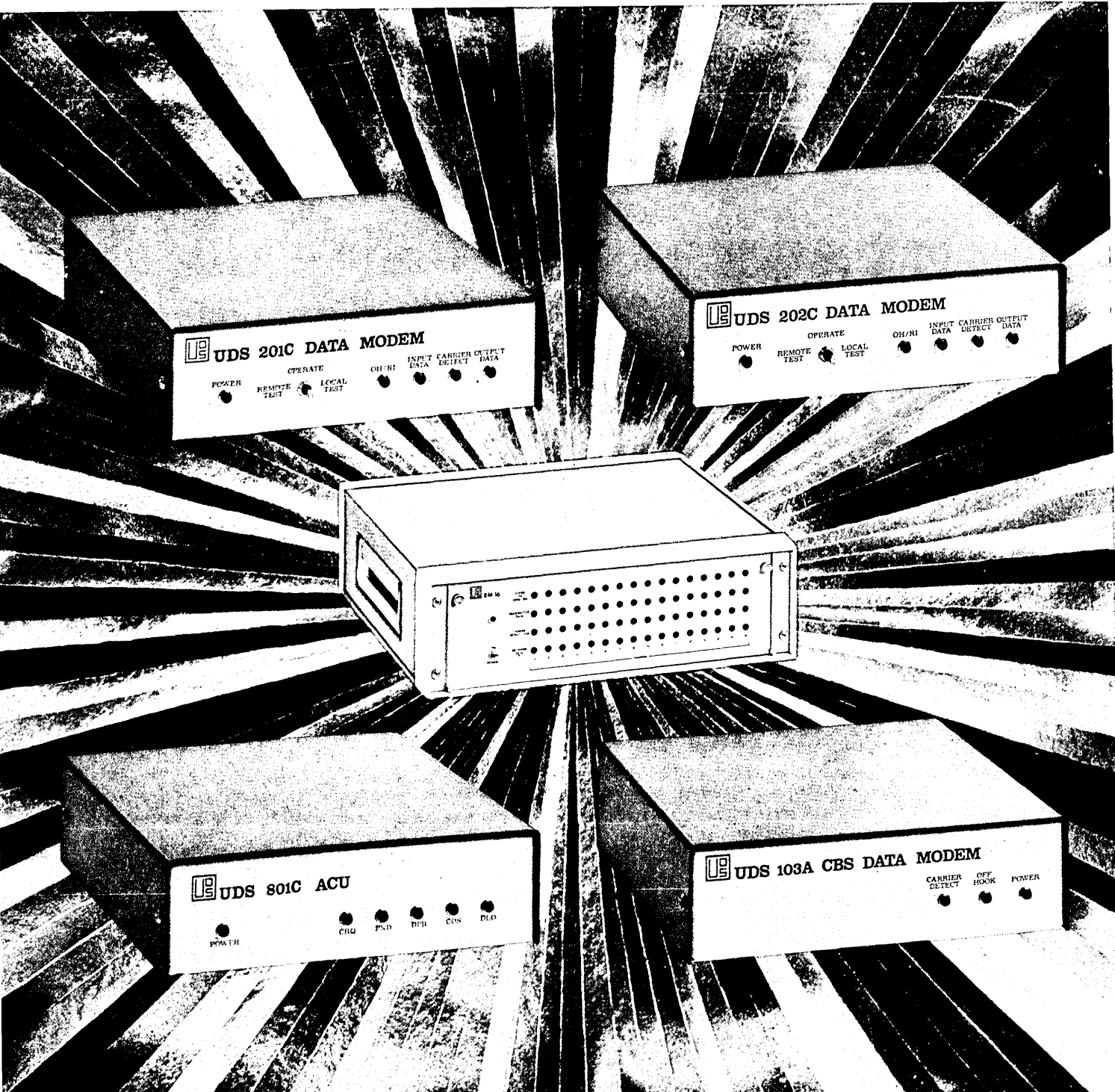
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CIRCLE 54 ON READER CARD

people

From a Mustang to a Mercedes

Four years ago, when John Maguire was operating out of a 1968 Mustang he called his office, the ambitious president of software ag of North America said he would feel he'd "made it" when he'd bought a Mercedes and moved the company into a real building. He's had his Mercedes 450SLC almost two years now and his company is



JOHN MAGUIRE

"failure is not part of my psychology"

operating out of real offices in Reston, Va., a suburb of Washington, D.C.

"Failure is not part of my psychology," said Maguire. "My doctor once asked me how many hours a week I wasn't thinking of succeeding and I answered, none."

Maguire has been president of software ag, which markets a data base management system called ADABAS in this country, since February 1972. ADABAS was developed by software ag of Darmstadt, West Germany.

In 1971, when he had been selling software products for 10 years, Maguire was in Europe with a "suitcase full" of packages produced by Consolidated Analysis Centers, Inc., a company he worked for for six years. In '71 he was a senior vice president and director of technical operations for CACI's nationwide operations.

"No one had been able to solve the data base management system problem then," he recalled. "Then I bumped into ADABAS and it was clear to me that it was head and shoulders over anything I had

seen."

He convinced software ag that he was the one to do their marketing in the U.S. Getting started, he said, proved to be a time-consuming procedure. "I had to get the material translated for openers, so I hired a translator who worked at night, part-time. I also had to develop all the marketing brochures and advertising myself."

Maguire said he quickly drew up slides for his marketing presentation. "I went downtown and bought colored paper stickem letters—A.D.A.B.A.S.—and colored tapes. Then I cut 35 mm slides and went to prospects with my slide projector and put on a show."

"In the early days I would get discouraged," Maguire said. One large chemical company spent some \$80,000 on a study that indicated ADABAS was best for its DBMS needs only to shelve the report and go with IBM's IMS. "We didn't have a user base then so ADABAS was considered risky," he recalled. He added that the chemical firm switched from IMS to ADABAS three years later.

Maguire said business began to pick up after 15 months of intensive marketing. Now there are 130

ADABAS installations and user groups have been formed.

The software ag North America president believes the recession helped his company. "I could point to about 15 sales that I'm pretty confident would have gone IMS except for the recession." Programming managers who might have gone with IMS, he explained, realized it would take more people and hardware. ADABAS, "although its price (\$120,000) is high, doesn't require many people and is easy to use."

Maguire attributes part of his success to his diversified marketing strategy. "You can sell a software package to an insurance company and then to 10 more insurance companies and that's the easy way." He chose instead to go after large and leading organizations in a variety of categories. "I knew that when we got some leaders in a category it would look like dominoes rippling right through the category."

He prefers traveling to staying in the office. "I'm not a very good administrator. I get itchy at the desk. He said he averages some 3,000 miles a week. "Wherever there's an IBM computer, there's a good ADABAS prospect." *

42% Compounded Annually

Charles R. (Chuck) Williams had five majors in 1960 when he was working for a Ph.D. at UCLA. They were insurance and economic theory; management; statistical analysis; finance; and math.

He didn't get his Ph.D. He went to work instead, for RCA Computer Systems. He was acquired with the division by Sperry Univac. He's held a lot of jobs both with RCA and Univac that have used a lot of what he learned in all of his majors. He's learned what he likes best—general management. And that's what he's been doing since April 1, 1973 as vice president of Western Operations for Sperry Univac.

Apparently he's been doing it well. Since he took over the post, Sperry Univac's Western Operations has experienced a 42%, compounded annually, growth rate. What does he like about the job? "The overall perspective." He is responsible for all marketing, systems, customer engineering, financial and personnel activities in 11 western states. This includes 15 marketing and customer engineering branches and six associated local offices and 1,000 people. And, says Williams,

"we're in a major recruitment mode."

Williams obtained a B.S. degree in Business Administration from UCLA in 1957 and an M.B.A. in Finance in 1958. In the course, he had some training in computer science. In 1958 he joined the Air Force. He was placed in charge of data processing for the Military Air Transport Service (MATS) in Europe. "That's where it all began." He served in this capacity for two years. "We went from a 602A to a

(Continued on page 14)



CHARLES R. WILLIAMS
A Los Angeles native who still lives there

42% . . .

(Continued from page 13)

605 . . . handling things like personnel and inventory.”

When he left the Air Force he went back to UCLA to work on his Ph.D. and to teach a course in insurance and economic theory. He

was recruited away by RCA where he progressed from systems analyst, through salesman, sales manager for a branch, district manager, to marketing operations manager for the western region, the post he held when “acquired” by Sperry Univac.

Williams is one of those rarities, a native of Los Angeles who has spent

most of his life (41 years) in Los Angeles. The only exception is the two years he spent in Europe while in the Air Force. He lives in the beach community of Malibu which makes him “water oriented.” Los Angeles’ proximity to top ski resorts facilitates his other extra-curricular love, skiing. *

An Effect After All?

Paul Armer once was head of a team asked by the government to come up with a hypothetical electronic system that would, in effect, be a “big-brother-is-watching-you” system. The team’s recommendation . . . an electronic funds transfer system.

Armer was recommended by the American Federation of Information Processing Societies (AFIPS) as a candidate for membership on the recently appointed National Commission on Electronic Funds Transfer (Nov. ’75, p. 135). He didn’t make it. But maybe he’ll have an effect on the commission. He’s been named chairman of a Special Committee on Electronic Funds Transfer Systems by AFIPS.

AFIPS president, Dr. Anthony Ralston, said the committee “marks a major commitment by the Federation to assure that pertinent technological information is made available to the federal government and to other groups concerned with the increasing use of automated transactions. The committee, in cooperation with the AFIPS Washington office, will provide a reservoir of expert testimony and counsel on the



PAUL ARMER
“a major commitment”

use of computers and related communications techniques in all areas involving EFTS.”

Armer is a fellow and program coordinator on science, technology and society for the Center for Advanced Study in the Behavioral Sciences, Stanford, Calif. He also is a lecturer in computer science at Stanford Univ.

Prior to joining the center in 1972, he was a research associate in the Program on Technology and

Science at Harvard Univ. and a lecturer in the Harvard School of Business. Previously, Armer was Director of the Stanford Computation Center and for 10 years served as head of the Computer Sciences Dept. at the Rand Corp. where he also was a member of the Corporate Management Committee.

A prolific author (he’s a DATA-MATION contributing editor) and a member of a variety of professional groups, Armer has appeared as a witness before a number of governmental bodies. Most recently, last June 23, he testified on “Computer Technology and Surveillance” at hearings held jointly by the subcommittee on Constitutional Rights of the U.S. Senate Judiciary Committee, and the subcommittee on Science and Technology of the Senate Committee on Commerce. He also has served as a consultant to the Presidential Commission on Technology, Automation and Economic Progress, and to the Warren Commission.

Armer is a member of the Board of Directors of the Institute for the Certification of Computer Personnel and a past president of AFIPS. *

In New Posts

Amdahl Corp. named two new vice presidents. KENNETH W. SIMONDS, formerly director of market operations, was named vice president of marketing, western and Canadian operations, and JAMES K. DUTTON, formerly with Storage Technology Corp., was appointed vice president of marketing, eastern operations . . . ALLEN J. KROWE was elected a vice president of IBM. He continues as assistant group executive, plans and controls, Data Processing Group . . . PERRY M. KANTNER was named president and chief executive officer of Omnitext, Inc., manufacturer and distributor of computer-based video display terminal systems . . . MICHAEL PFAFF was appointed director of data processing for Federal Express Corp. . . . CARL F. GRISWOLD, senior vice president of Southeast Banking Corp., Miami, was named chairman of the Payments System Policy Coordinating Group of the American Bankers Assn. . . . Advanced Memory Systems, Inc., Sunnyvale, Calif., promoted DR. JAMES A. CUNNINGHAM to senior vice president . . . MARVIN HOFFMAN was promoted to director of research and

development of Computer Machinery Corp., Marina Del Rey, Calif. . . . JAMES H. CHAMBERS was appointed president of Computeristics, Inc., a wholly owned subsidiary of Uniroyal, Inc., Middlebury, Conn., which provides on-line computer services to Uniroyal and other industrial customers . . . LISTON M. RICE, JR. was promoted to vice president and director of corporate marketing for Texas Instruments, Inc. . . . VIRGINIA C. BURTNETT was named regional systems manager for GTE Data Services’ midwest regional data center in Fort Wayne, Ind. . . . R. C. PHILLIPS was named vice president, systems division, in Sperry Univac’s Worldwide Development and Manufacturing organization in Blue Bell, Pa. . . . The Richard A. Viguier Co., Inc., Falls Church, Va. firm specializing in direct mail fund raising for political candidates and organizations and non-profit organizations in the religious, health and welfare, and educational fields, named RICHARD S. BARI as director of data processing . . . ALAN G. BROWN was named general manager of A. O. Smith Corp.’s data systems division. *

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When you've seen how UCC-FCS meets your financial reporting requirements, call this number again. We'll arrange a presentation at your convenience.

Here are some reasons why UCC-FCS has made the Accounting and Data Processing Departments happy in over 150 installations:

- Quick and efficient implementation.
- Easy-to-use report writer requiring virtually no EDP assistance.
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The inventors of magnetic tape just made a better "Winchester."



Back in 1932, BASF invented magnetic tape, the forerunner of such modern data processing media as the 3348 "Winchester" Data Module. Now BASF research has made significant improvements on the Winchester. While still completely compatible with existing 3340 drives, our new Data Modules feature an exclusive oriented oxide coating and polishing technique which offers 30-35% better resolution properties than competitive Winchester-type packs.

Our new finish allows the read/write heads to fly uniformly and four times smoother than independent competitive module heads . . . resulting in greatly reduced possibilities of error generation. In addition, BASF has developed a special disk-surface lubricant, which eliminates disk coating wear and consequent contamination and er-

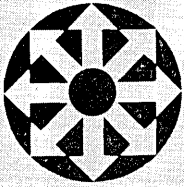
rors. This new finish also eliminates, for the first time, any possibility of a head sticking to the disk surface while the module is stored.

BASF Data Modules are available in three configurations: the 1335 Module, with 35 million-byte capacity; the 1370, with 70 million-byte capacity; and the 1375, with fixed head and quicker access. Because our error testing is twice as critical as drive manufacturer's specifications, we warranty our Data Module to be free from manufacturing defects for as long as you use it.

For complete details on the BASF "Winchester" Data Module, write: BASF Systems, Crosby Drive, Bedford, MA 01730, or call our nearest regional office: in Los Angeles, (213) 451-8781; in Chicago, (312) 343-6618; and in Clifton, NJ, (201) 473-8424.

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LOOK AHEAD

ANOTHER LOST (LOSS?) LEADER

An insider at Singer Business Machines, listing possible mistakes the corporation might cite as causes of the division's need to go, mentioned its having "dragged its feet" in getting into the supermarket point-of-sale arena. "We allowed NCR and IBM to get in and grab off a decent chunk of that market before we got moving."

A move Singer almost made but didn't was to buy, in late 1972, the then acknowledged leader in supermarket point-of-sale, the Electronic Store Information Systems division (ESIS) of Nuclear Data Corp., which then had more than 500 POS terminals installed in stores of six supermarket chains. Maybe, if the acquisition had gone through, Singer could have become the leader in supermarkets as it already was in general retail stores. But it didn't go through and what its consummation might have meant to both Singer and ESIS is an interesting point of conjecture.

A few short weeks after Singer announced it was abandoning its Business Machines Division (p. 108), the company that picked up ESIS when Singer bowed out, Bunker Ramo, said it was going to discontinue development and production of the POS product line for supermarkets. Bunker Ramo said it would "continue" discussions with prospective buyers for all or part of the line but it's highly unlikely the prospects included Singer.

FOR SINGER USERS

Like other users seemingly abandoned by their suppliers, Singer Business Machines users were quick to act following announcement by Singer Corp. it was abandoning SBM. The division's user group, Forum, took two quick steps. It changed the location of its March 15-17 meeting from New Orleans to Chicago "to enable more users to attend" and it named professional association executive Donn W. Sanford, formerly executive director of DPMA, to take command.

Sanford said he has formulated a number of questions for Singer Corp. to which he had received "no firm answers" at this writing. He also said he had received numerous inquiries from Singer users who were not members of Forum and felt confident that many of them would join before the March meeting, and he was in the process in mid-January of compiling a user directory which would include a master list of all installations and an equipment exchange column. He was hopeful that a contingent of Singer executives, "at least middle echelon," would attend the March meeting.

FORGING AHEAD -- SINGULARLY AND PLURALLY

Telefile Computer Products, Inc., Irvine, Calif., said in September it was going after the Xerox user base on its own, after having been thwarted in attempts to talk about purchase of the base from Xerox. It then had signed up one user and, in mid-January, still had one but was "close" with three more and president Sam Edens felt the firm was "doing very well, thank you." He said a personal trip around the world had convinced him that the big concern of Xerox users was CP-V (an operating systems) development and his company was going to get into this "aggressively" and was going to "forge ahead" with new product development for Xerox users. Toward this end it hired Hal Eden, (no relation -- "he's the singular, I'm the plural"), a founder of Iomec and a principal designer when with IBM of the 2314 disc drive.

LOOK AHEAD

WHERE ARE THEY NOW DEPARTMENT

When we last left Royden C. Sanders Jr. he was bitterly fighting his ouster as president of Sanders Associates. On his way out the door at the firm, the feisty Sanders demanded that his name be removed from the name of the company while company officers complained of their former president's "playboy airs."

Well, Royden Sanders now heads a firm called R. C. Sanders Technological Systems, Inc., in southern New Hampshire. He is as elusive as ever, but the word is that he is getting ready to introduce a computer-related product; that he is in the process of hiring 25 operations people; and that he has lined up a 12,000 sq. ft. plant in Newington, N.H. Ever in a hurry, he acquired the SYS Computer Corp. of Hackensack, N.J., which makes intelligent terminals. The betting now is that R.C. Sanders Technological Systems, Inc. will enter the systems and intelligent terminals markets and that one of its competitors will be none other than Sanders Associates.

HONEYWELL: LIBERATING IBM'S MOD 10

If you see a System 3 model 10 being wheeled out of an installation, there is a good chance that it's being replaced by a Honeywell Liberator 3, model 62/40. Although the HIS machine was introduced less than a year ago, it is known that already several hundred of the machines have been installed. Further, the majority are first-time Honeywell users and nearly three quarters of those are replacing IBM equipment, primarily the model 10.

One reason you won't hear much trumpeting from Honeywell on the subject is because the Liberator 3 is manufactured in Italy. The sensitive French Honeywell Bull operation might be offended.

IN TRUE PERSPECTIVE

Vector General, Canoga Park, Calif., producer of interactive graphic terminals, has something new in the offing -- a new line of terminals it will introduce April 1. The company hints at a "departure in architecture" that "finally" offers "true perspective" to users of three dimensional displays. Older three dimensional displays haven't been quite "true" when it comes to perspective, the firm says. The new architecture also is supposed to "dramatically increase the amount of data a user can display on a screen, and will be modularly constructed making it "more easily adaptable to a range of applications." The series will be numbered 3400.

REUNION BEFORE THE SENATE

It was a reunion recently of IBM's attorneys when its legal counsel, former U.S. Atty. Gen. Nicholas deB. Katzenbach testified before Sen. Frank Church's Senate Select Committee on Intelligence. Accompanying Mr. Katzenbach was IBM's lead attorney on the government antitrust case, Thomas D. Barr of the New York law firm of Cravath, Swaine & Moore. The Senate committee's majority legal counsel is none other than Frederick A. O. Schwarz Jr. who worked with Barr at Cravath, Swaine on various IBM antitrust cases.

Katzenbach was questioned about electronic bugs that were employed to monitor the Rev. Dr. Martin Luther King Jr. during his tenure as attorney general. The IBM attorney said he couldn't remember memos that dealt with the subject. Later, Katzenbach suggested to the Senate Government Operations Committee that the U.S. place a moratorium on all covert intelligence operations.

THE HP 2644A MINI DATASTATION. AT \$4400*, IT STANDS ALONE.

A NEW KIND OF TERMINAL.

Say goodbye to cumbersome, costly, complex approaches to increasing throughput at your work stations. The Mini DataStation combines powerful interactive editing capabilities with dual cartridge, integrated local mass storage—all in one compact, economical, easy-to-use unit.

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Delete. Insert. Emphasize. Format. At the touch of a key. Watch computer-connect charges drop. And watch the happy faces of your operators as they discover the fatigue-fighting readability of our unique, crisp characters (HP uses a 9 x 15 dot matrix cell) on our non-glare display.

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Yet small enough to slip into a shirt pocket, with assured interchangeability and extraordinarily high reliability.

ACCURATE DATA ENTRY SIMPLIFIED.

Now operators can "get it right" before it's transmitted. High-resolution characters and a choice of additional plug-in character sets eliminate makeshift symbols. There's even one for "forms drawing." Design new forms when-



ever you need them. Store your company's frequently used forms for instant display.

"FAIL-SAFE" ON LINE OPERATION.

With the Mini DataStation, computer down-time no longer means work down-time.

POP-OUT, POP-IN FEATURES.

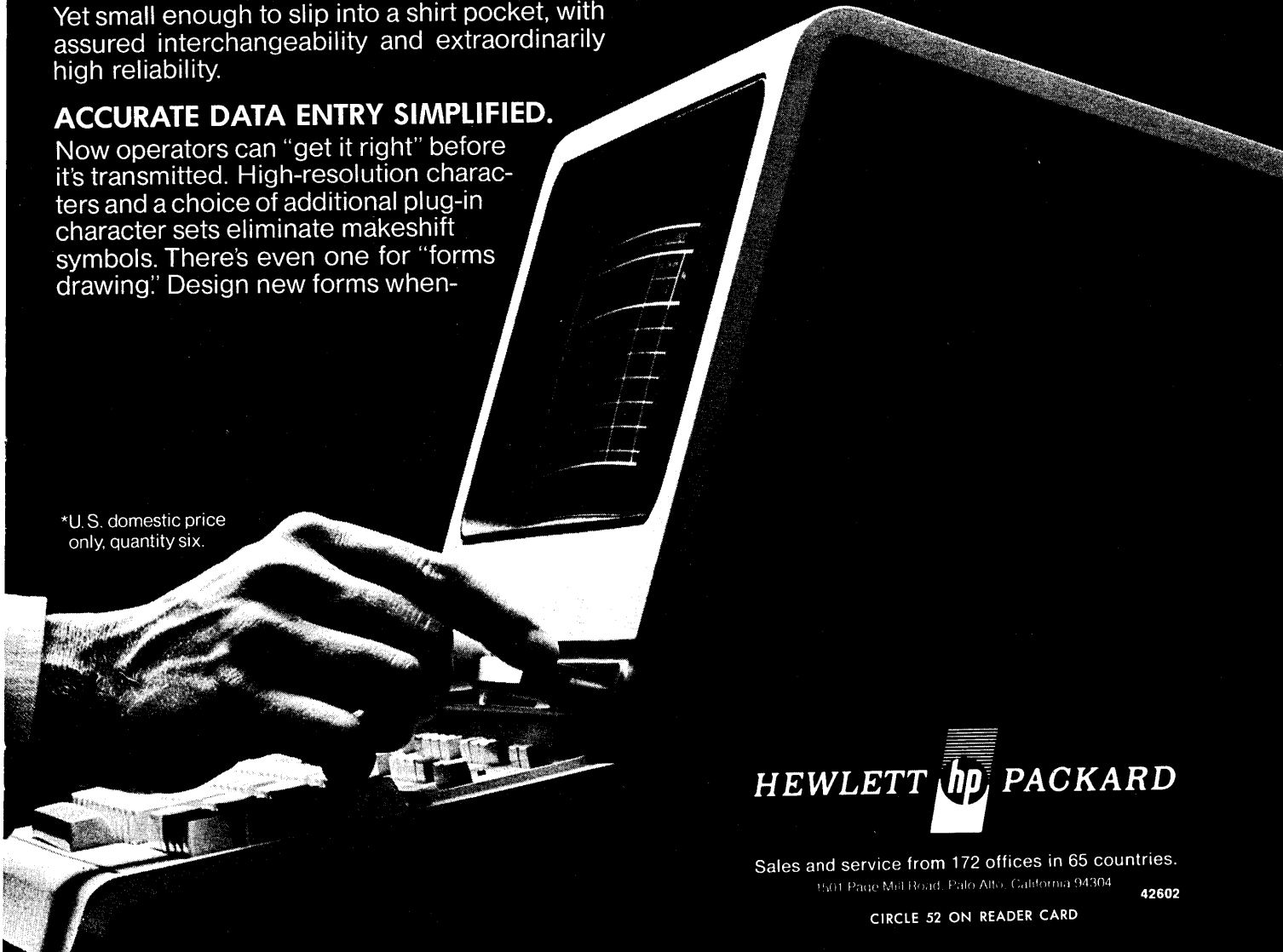
Internal modules are easily accessible. Add options, replace cards

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Or write today. There's an HP field office near you. Make your own comparison. Inside or outside, you won't find another terminal that comes close at anywhere near the price.

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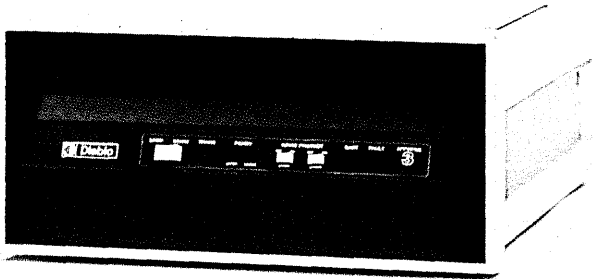
CIRCLE 52 ON READER CARD

Diablo announces the 40 megabyte drive for a 10 megabyte price in a 5 megabyte box.

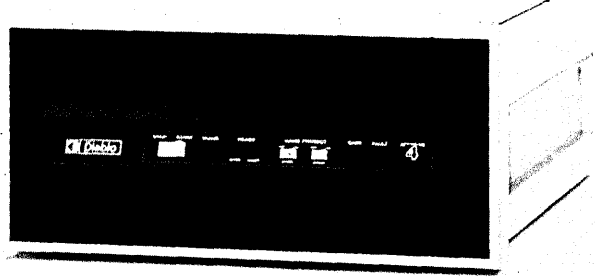
The New SERIES 400 Family of Disk Drives.

- Two Independent Head Positioners
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- Identical Dimensions
- 100% Common Spares
- Internal Diagnostics

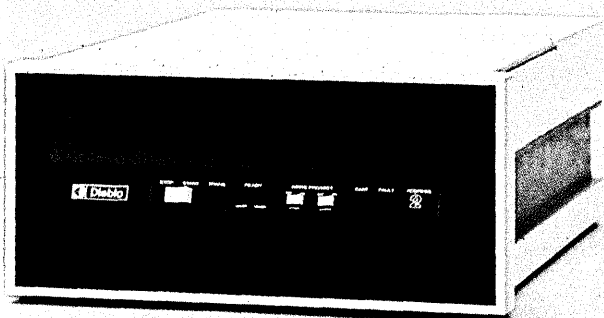
M410F, 13.3 megabytes
1 removable 2315-type
cartridge



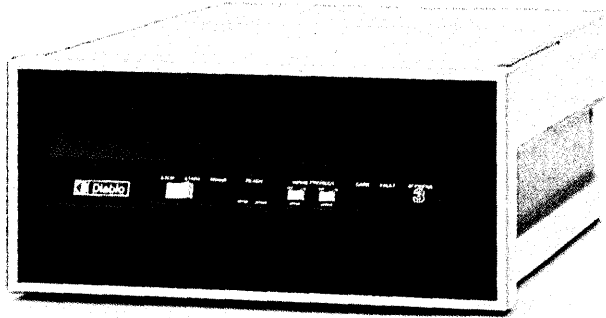
M411F, 26.6 megabytes
1 removable 2315-type
cartridge
1 fixed disk



M410T, 13.3 megabytes
removable 5440-type
cartridge



M411T, 26.6 megabytes
1 removable 5440-type
cartridge
1 fixed disk



The New Series 400. Eight top- and front-loading drives from 13.3 to 53.3 megabytes. Each drive totally compatible in technology, media, interface, transfer rate and dimensions. And each Series 400 drive with 99% common parts.

This complete compatibility increases your ability to respond quickly and profitably to changing customer capacity requirements, and reduces your inventory investments in drives, controllers, cabinets and spares. You can even upgrade installed systems without impacting existing data bases, software investments, field support or system operations.

Several design innovations in the Series 400 helped make it all

possible. Foremost among them: a unique dual head positioning mechanism—based on an inertial actuator—providing the capability for independently moving two head positioners per drive. A highly efficient, low-cost motor-generator internal power supply results in low power consumption, cooler operation and protection from line transients, voltage spikes and power “brown-outs”. A unique servo track following technique—with pre-recorded servo data imbedded in the sector overhead area—means each head operates in a closed loop servo on the track it is seeking. The result—higher positioning accuracy, greater utilization of disk surfaces and

pack interchangeability (completely eliminating the need for CE packs). And a microprocessor performs internal diagnostics, provides interface flexibility and improves reliability by eliminating many electronic components.

For complete documentation, write Diablo Systems, Inc., 24500 Industrial Boulevard, Hayward, California 94545. (415) 783-3910. In Europe, Diablo Systems, S.A., Avenue de Fre, 263, 1180 Brussels, Belgium.

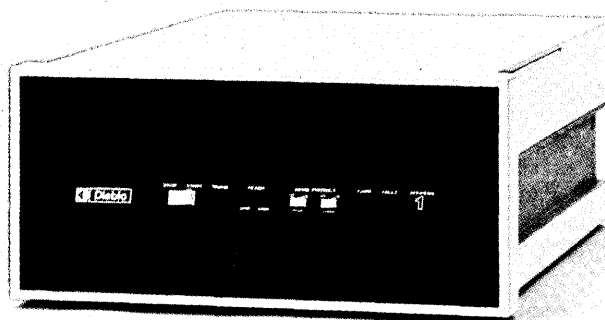


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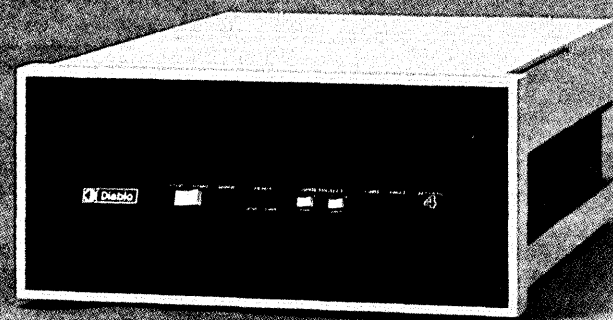
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CIRCLE 25 ON READER CARD

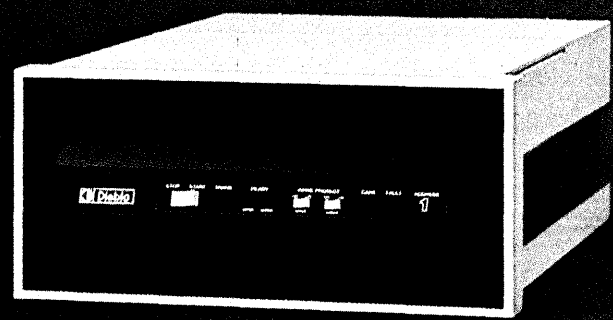
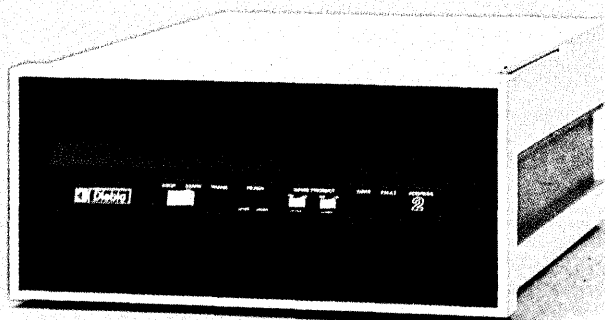
M412F, 40 megabytes
1 removable 2315-type
cartridge
2 fixed disks



M412F, 53.3 megabytes
1 removable 2315-type
cartridge
3 fixed disks



M412T, 40 megabytes
1 removable 5440-type
cartridge
2 fixed disks



calendar

MARCH

Federal Data Processing Exposition, March 2-3, Washington, D.C. An expected exhibitor list of 75 companies will participate in this second annual trade show specifically directed toward the federal government. Hardware, software and service companies will be represented. Show hours are 9 a.m. to 6 p.m.; admission is free. Contact: Robert E. Harar, Federal DP Expo, (301) 937-7177.

Computer Contracts, March 3, Washington, D.C. The Computer Law Assn. will examine all sides of the question of computer contracts, discussing the needs of both supplier and user. Advance registration for the meeting, which includes luncheon, is \$10, members; \$15, nonmembers. Contact: Edward Grenier, Suite 800, 1666 K St. N.W., Washington, D.C. (202) 872-7800.

Programming Systems in the Small Processor Environment, March 4-6, New Orleans. The ACM special interest groups on minicomputers and programming languages sponsor this conference. Original papers will be presented on the advantages, problems, and techniques of programming small processors. Fees: \$45, members; \$50, nonmembers; \$15, students. An "ACM Group Rate" for hotel accommodations is available for those planning to attend the Mardi Gras on March 2. Contact: ACM, 1133 Avenue of the Americas, New York, N.Y. 10036, (212) 265-6300.

4th Conference on Programming Languages, March 8-10, Erlangen-Nurnberg, Germany. Specialists in universities or industry working in the field programming languages and related topics will hear survey lectures by major speakers, and short lectures on such topics as compilers and interpreters, languages for system programming, and programming methods, among others. Fees: \$26, members; \$37.50, nonmembers (approx.). Contact: Dr. M. Nagl, GI, Inst. f. Math. Masch. u. dv, 852 Erlangen, Egerlandstr 13, W. Germany.

Computer '76, March 15-19, Tokyo. A major computer exhibition will be sponsored by the U.S. Dept. of Commerce at the U.S. Trade Center. The Japanese government liberalized imports and foreign capital investment of computers and related equipment in January, and an increase in the U.S. share of that market is expected. Contact: John L. Wolf, U.S. Dept. of Commerce, Rm. 6324, Washington, D.C. 20230, (202) 967-2461.

9th Annual Simulation Symposium, March 17-19, Tampa. The Society for Computer Simulation has scheduled major speakers in the field of digital computer simulation with discussions of the state of the art, applications programs, and language development. Fee: \$100. Contact: Annual Simulation Symposium, P.O. Box 22621, Tampa, Fla. 33622, (813) 839-5201.

Minicomputers: The Application Explosion, March 22-24, San Francisco. Minicomputer applications experience and user "lessons" will be presented in overviews and case study workshops. Presentations will be followed by panel discus-

sions. Fees: \$295; teams, \$195. Contact: MINI 7, AIEE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025, (213) 826-7572.

Computers in Higher Education, March 24-26, Loughborough Leicestershire, England. The Centre for Advancement of Mathematical Education in Technology has arranged this conference in conjunction with the National Development Programme in Computer Assisted Learning. For information contact Gordon Bell, conference secretary, Loughborough Univ. of Technology, Leicestershire LE11 3TU.

INTERFACE '76, March 29-31, Miami Beach. Forty-one technical sessions, seminars, and panel discussions are combined with exhibits from leading suppliers at this fourth annual presentation of the original national data, communications conference, cosponsored by DATAMATION magazine. There will be products and methods workshops, application sessions, highlight sessions, and the DataComm school, an introduction to and overview of the field. Fees: \$95, three days; \$50, one day; team discounts available. Contact: INTERFACE '76, 160 Speen St., Framingham, Mass. 01701, toll-free (800) 225-4620; within Massachusetts, collect, (617) 879-4502.

6th Conference, Computer Audit, Control and Security, March 29-31, San Francisco. Computer auditors and systems managers are the target audience for this year's meeting, featuring presentations of advanced dp audit, control and security techniques. Fee: \$335. Contact: Institute of Internal Auditors, 5500 Diplomat Circle, Orlando, Fla. 32810.

APRIL

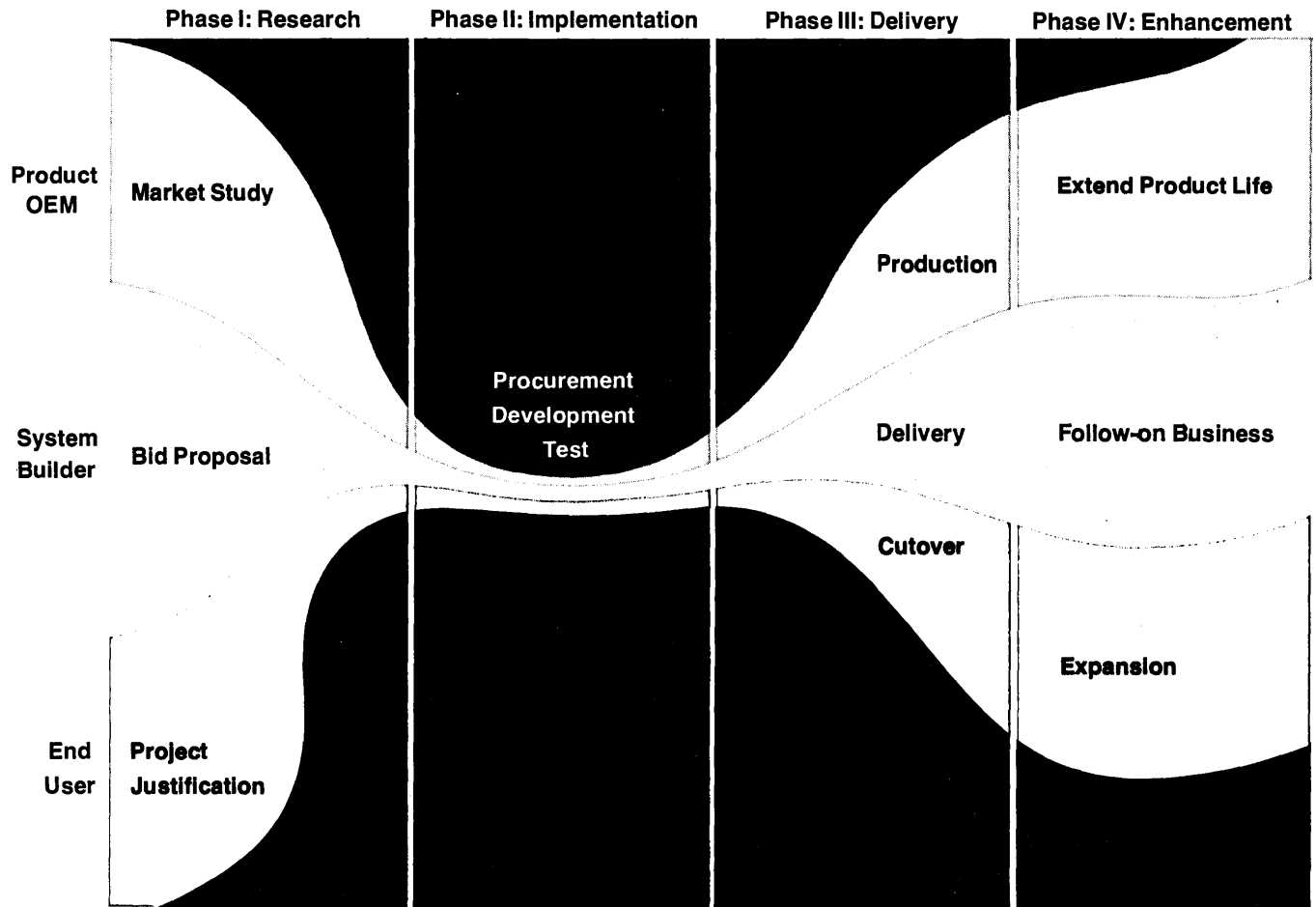
EXPO.SIUM '76, April 7-9, Milwaukee. Major word processing manufacturers and suppliers will exhibit products at this show sponsored by the Word Processing Society of Milwaukee. Twelve seminars will cover topics such as the ailing office, legal aspects of office administration, performance standards, and word processing in education. Fee: \$75, including meals. Contact: WPS, Inc., P.O. Box 92553, Milwaukee, Wisc. 53202.

Int'l. Conference on Acoustics, Speech and Signal Processing, April 12-14, Philadelphia. The IEEE is sponsor of this first in a series of annual conferences on this topic. Papers will be presented on signal processing, speech processing, underwater acoustics, electroacoustics, and noise measurement. Educational and commercial exhibits will be displayed. Fees: \$43, member; \$53, nonmember; add \$12 after March 22; \$10, student. Contact: IEEE ICASSP '76, Morse School of Elec. Engrg., Univ. of Pennsylvania, Philadelphia, Pa. 19174, (215) 243-8106.

DATACON '76, April 29-30, St. Louis. This event is sponsored by the data processing conference of the St. Louis chapters of the Assn. of Systems Management and the Data Processing Management Assn. Scheduled are 32 seminars in basic systems, personnel development, management, and manufacturing systems. In addition, more than 40 companies will display equipment. Fees: (two-day) \$60, members; \$70, nonmembers; (one-day) \$35, members; \$40, nonmembers. Contact: Hardie L. Wilson, Datacon '76, P.O. Box 820, Fenton, Mo. 63026. *

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

INTERDATA INTRODUCES COMPUTER LIFE SUPPORT.



YOUR COMPUTER'S LIFE CYCLE.

Interdata's computer products and services exist for one reason—to satisfy our customers. The key to our business is understanding our customers' business needs.

There are three types of computer buyers:

The Product OEM buys large quantities of identical computers, adds special software and hardware, and sells a resulting product.

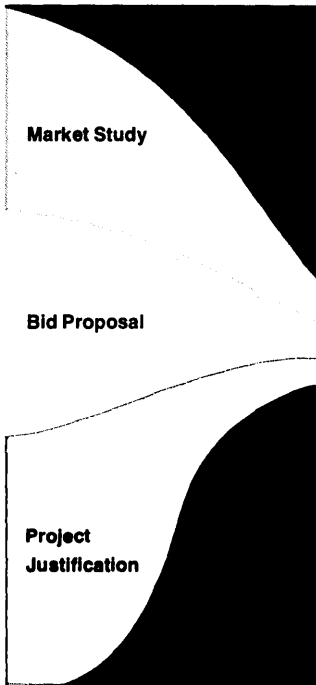
The System Builder buys computers and peripherals, packages them into a system, adds proprietary software and delivers them to fulfill a specific customer need.

The End User buys a computer system to solve his problem.

Each of these buyers goes through a Computer Life Cycle consisting of four specific Phases—Research, Implementation, Delivery and Enhancement. Interdata responds to the specific needs of the computer buyer during all four Phases of his Computer's Life Cycle.

If you are a Product OEM, System Builder or End User, you might be interested in reading the next two pages to find out how Interdata can make your job easier.

The following description is the essence of the Interdata concept called Computer Life Support.



Phase I: Research

Computer Life Support begins here. The Product OEM studies his market to determine just what his product should be, where it fits and how much it should cost. The System Builder produces a bid proposal aimed at solving his customer's specific problem. The End User is interested in defining a computer-based solution to a problem and justifying this project to management.

Interdata recognizes that each kind of customer has specific needs during this Phase. Here's how we respond to them.

Product OEM. In studying his market, this customer must gather competitive data, do a ROI analysis, a feasibility study, and—ultimately—determine what products to make or buy.

Interdata makes available cost information over the projected product's life cycle. We will discuss our development plans to help you with your planning. We have field analysts and systems engineers to help with specifications. And we help identify the trade-offs of any make-or-buy decision.

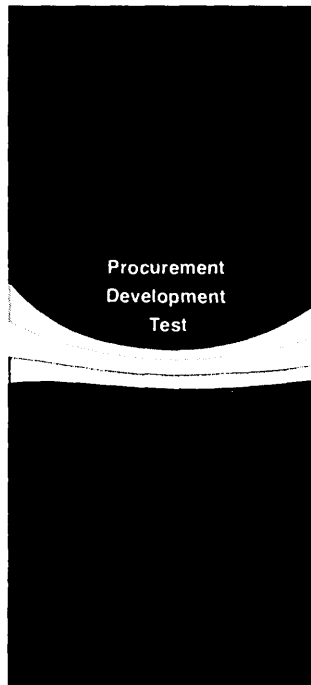
System Builder. This customer needs responsive project and proposal support. He demands a professional relationship with his computer vendors. And he must identify what equipment meets his performance specifications.

At Interdata we format our proposals to your requirements. We offer technical support plus special products and services to fill your needs. And we back this all up with our policy of not competing with our customers.

End User. This customer needs an easy-to-understand computer system. He's interested in near term solutions yielding long term profits. And he must know that his computer can do the job.

Interdata computers have familiar IBM-like architecture supported by thorough documentation. We show you similar applications and provide local benchmark and demonstration facilities.

And, as a subsidiary of Perkin-Elmer, we bring you the resources and financial stability of a multi-million dollar corporation.



Phase II: Implementation

In the Implementation Phase, very similar tasks must be performed by each Interdata customer—be he a Product OEM, System Builder or End User. Each customer must take his computer through procurement, development and testing.

Procurement. The primary need of every customer is an equitable business arrangement with his computer supplier. He must have the proper set of terms and conditions.

Interdata offers the Product OEM a quantity discount agreement; the System Builder a dollar volume agreement; and the End User terms and support tailored specifically for him.

Development. Here all customers want to optimize their design and meet their schedule.

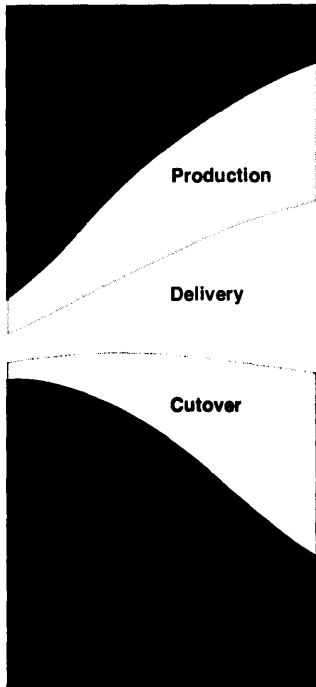
Interdata provides a full family of compatible hardware, software, peripheral and service products so you don't have to start from scratch. We have easy-to-use program development tools like BASIC, FORTRAN, MACRO CAL, COBOL and a multi-terminal development system.

Test. At this point the customer needs to minimize the possibility of system failure.

Interdata provides system debugging and integration aids such as hardware memory protect and privileged instructions.

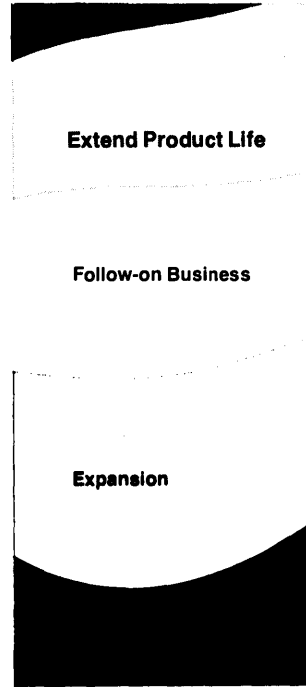
Net Results. You can benefit from Interdata support during Implementation in three critical areas: Lowest overall price. Optimum computer performance. And on-time systems completion.





Phase III: Delivery

At this Phase of a computer's life cycle, our customers again have distinct tasks: The Product OEM must produce as efficiently and economically as possible. For the System Builder, on-time delivery is critical. And, the End User wants to cutover his system as soon as possible.



Phase IV: Enhancement

In the final Phase of the computer life cycle, the Product OEM is working to extend his product's life. The System Builder is looking for follow-on business. And the End User wants to expand his system.

Product OEM. This customer wants to minimize recurring product costs. He wants his computer equipment to be reliable and delivered on time. He also wants to increase the value he adds to his product.

Interdata reduces your recurring costs with unbundled hardware and software modules. Our products are reliable because of our conservative design and stringent quality control procedures.

For vertical integration, Interdata sells computer board sets to allow you to increase your value added.

System Builder. To meet delivery commitments, he must have reliable computer equipment backed up by responsive field service.

Interdata's quality control assures you of no on-site surprises. We 100% test all our incoming parts. We put our computers through a unique "shake and bake" process. We solve product problems in the factory — rather than in the field.

End User. When cutting over to production, the End User needs service. Accordingly, Interdata provides four field service programs: resident service; contract service with fixed price on parts and labor; on-call service for which we charge for parts and hourly labor; and depot parts maintenance service.

Product OEM. This customer's concern is to avoid product obsolescence.

Interdata offers you improved product performance through upward compatibility. Or, you can lower your product's price by taking advantage of the next generation of Interdata computers.

System Builder. To capture follow-on business, the System Builder needs to transfer his experience, training and software from one system to the next.

Interdata makes transferability easy because of our familiar, large-machine architecture and complete family compatibility.

End User. For this customer, system enhancement means system expansion.

Interdata's computer architecture allows you to expand all the way from a single board 16-bit processor to a \$300,000 32-bit MEGAMINI™ computer system.

Find out more. Interdata's responsiveness to your needs during every Phase of your Computer's Life Cycle adds up to Computer Life Support. If you are a Product OEM, System Builder or End User, we have a lot more to tell you. Just send in the coupon. Or call us.

Gentlemen:

I'm a (check one) Product OEM
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to know more about Computer Life Support.
 Send information. Have an Interdata
representative call.

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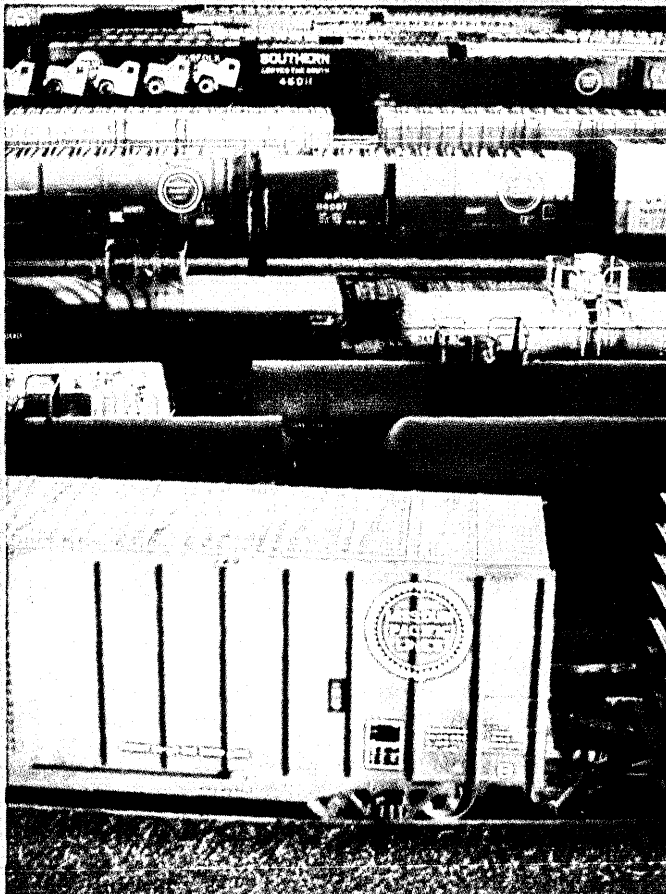
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In Chicago, The Missouri Pacific Railroad Relies On The Terminal That Could:

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The tracks of the Missouri Pacific Railroad stretch nearly 12,000 miles . . . from Chicago to the Gulf Coast, from the Mississippi River to the Colorado Rockies. They carry an average of 475 trains every day, with as many as 100,000 railroad cars in use throughout the MO-PAC system at any given time.

INCOTERM helps MO-PAC keep track of all those cars. In fact, MO-PAC is in the process of upgrading their car reporting system . . . and they've switched to INCOTERM equipment because it provides the improved capacity, speed and response capability required for future phases. INCOTERM provides access to a continuous history of each car—its routes, its arrivals and departures, its constantly growing itinerary—as the car moves from point to point within the system. INCOTERM can generate switch lists, show status of repair tracks, call up waybills, and signal potential problems before they occur.

Take Chicago, for example. Using INCOTERM equipment, MO-PAC service representatives will be able to input waybills while still on the telephone with their customers. Because Chicago is one of MO-PAC's 126 reporting locations, INCOTERM will access and display data on the movement of all

trains throughout the system—and of each car passing through that particular terminal. And INCOTERM eases the transmission of administrative messages between Chicago and other points in the system by minimizing line time.

Because it's programmable, INCOTERM equipment contains the power to grow—and change—with the evolving requirements of the systems it serves: Hospitals. Federal, state and regional governments. Financial institutions. Hotels. Airlines. And, of course, railroads.

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books

Information Systems Handbook
F. Warren McFarlen & Richard Nolan,
eds.
Dow Jones—Irwin, Inc., 1818 Ridge
Rd., Homewood, Ill. 60430 (1975)
888 pp. \$30

Today's dp executive is expected to be current on a formidable array of subject matter. He is asked to make decisions and select courses of action on topics he may not have dealt with for several years—if ever. How is the executive to know that his personal experiences and knowledge are not completely outdated? In addition to reliance on his staff, carefully selected reference material may mean the difference between embarrassing failure and outstanding success. This is the material addressed by the *Information Systems Handbook*.

The editors of this handbook have not intended it to be used as an elementary text. It is rather for management people with a mature, broad, general knowledge of the dp field. The stated goal is to provide an accurate, up-to-date compendium of knowledge for use as a reference by the dp executive as he pursues his day-to-day tasks. The editors realize that this handbook cannot be the total collection of dp knowledge for the future; however, it can be the starting place in the search for relevant concepts and techniques on important topics. The executive need search only material written after this book's date of publication for additional information.

The text is written by 41 practicing dp businessmen and has been reviewed by a six man editorial review board consisting of both businessmen and academicians. The entire subject matter is arranged somewhat like the organization of the dp department. It is organized into six major sections. The first deals with the dp executive as a member of top management and addresses problems related to strategy, planning, and organizing. The second section provides information comprising the functions of administration of the total dp department.

Section three relates to personnel and functional management of each

major area within the dp department. Section four addresses methods, criteria, and techniques for the financial and economic analysis of capital equipment acquisition. The fifth section deals with management of the applications development function. The sixth and last section addresses problems unique to computer room management. There is an adequate index and sufficient bibliographies.

This handbook is very broad in scope and addresses nearly every topic that could possibly be of interest to the dp executive or manager. It covers a range from the dp executive as a member of top management down through the management of each of the dp functions including systems, programming, and computer operations. It delves into the kind of insurance one might require for a computer installation; it goes into staffing, motivation,



and retention of personnel. It covers the legal ramifications of data processing, the process of internal and external audits, and relationships with the IRS. It addresses topics that are highly controversial in nature, such as centralization versus decentralization and minicomputers versus large scale computers. It provides clues for solution of technical problems, administrative problems, and managerial problems. Really a completely imposing array of subject matter!

Many chapters are exceptionally well written. Alternatives and differing points of view are clearly presented and specifically delineated. Much of the subject matter is truly state-of-the-art, complete, and expertly organized. However, as with any publication with as many contributors, there are inconsistencies. It is very obvious that we do not have an accepted universal vocabulary in the field. Many of the contributors have used words, titles, and lan-

guages that are probably very meaningful in their local organizations, but have less meaning to those outside of those organizations. Many terms are simply not well defined.

A few chapters are limited and biased in their point of view. Some authors do not present opposing points of view or alternatives, and the indiscriminating reader may be misled. Although most of the chapters are well balanced, with appropriate space dedicated to the important topics, some have little to say of real value and should be considered filler. A few chapters forget the audience and are almost embarrassing in their "kindergarten" like presentation of their subject.

All of the criticism notwithstanding, the good outweighs the bad, and overall, this book is well above average in organization, content, and presentation. If used as a handbook and not as gospel by the person for whom it is written, the book will be a useful and valuable tool. If the dp executive or manager is mature and able to recognize the biases from the facts, he will have an outstanding base of information.

I think the editors have achieved their goals within reason and I believe this handbook to be a valuable asset that should be added to every dp executive's bookshelf.

—Eugene Greenroyd
Mr. Greenroyd is manager of user services for Rockwell Computing Services.

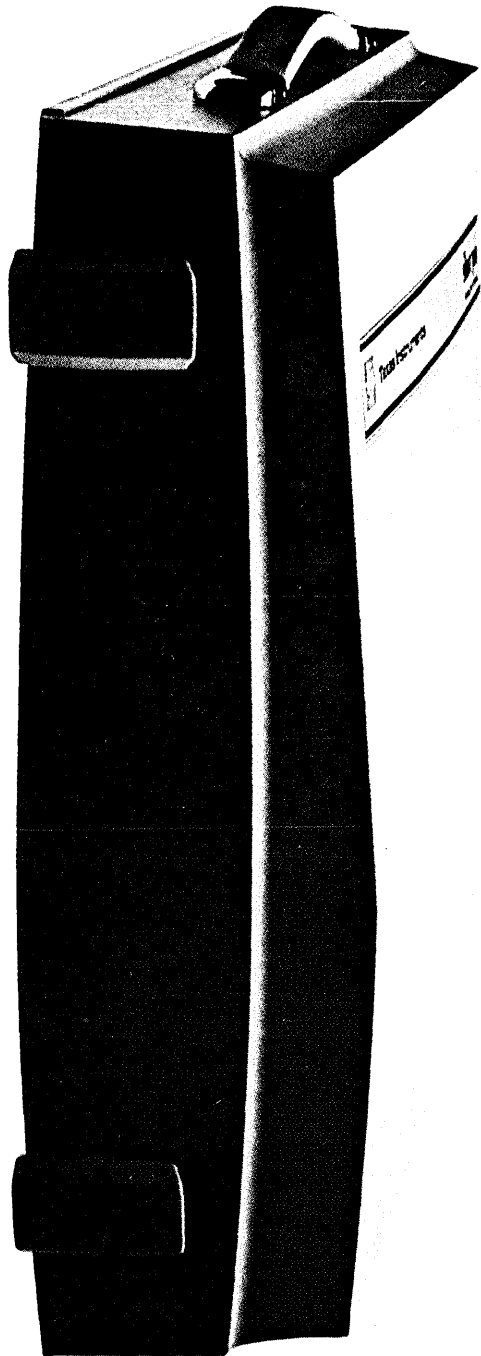
Why Information Systems Fail
by Henry C. Lucas Jr.
Columbia Univ. Press, 1975
116 pp. \$11.00

This unfortunate book needs three additional ingredients for success: relevant definitions, relevant information, and a relevant audience. Even the title is misleading. Dr. Lucas begins by deciding that we're probably better off not knowing what an information system is, although we come to find it's any old thing you run on a computer. He augments this by neglecting to specify a criterion by which the success or failure of an information system might be determined.

Dr. Lucas proceeds to dazzle us with many pages of inconsequential statistics. These statistics support a collection of 16 self-evident propositions. None of these propositions will enlighten you nor will your attitude toward any of them be changed as a result of any material covered in this book.

A more formal statement of the information contained in Dr. Lucas' book can be summarized in the following expression: Information systems

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The new "Silent 700*" Model 745 Portable Data Terminal from Texas Instruments is the new lightweight champion. It weighs only 13 pounds...*half* as much as the currently most popular portable...our own Model 735.

Its price is also light...\$1995 at quantity one...the lowest on the market for a full-capability 30-characters-per-second portable terminal. And, of course, quantity discounts are available.

The 745 is really the first portable terminal ever to achieve that "briefcase mobility" everybody's been wanting, which means it travels easily with you... all day.

And, for stationary computer I/O needs, the 745 has a new lightweight companion... the Model 743 KSR terminal. The 743 is a compact keyboard send-receive terminal ideal for computer input/output. What's more, it sells for only \$1395, in quantity one.

Either way, these two new terminals from TI are the lightest and quietest available, and extend the "Silent 700" tradition of price/performance leadership.

*Trademark of Texas Instruments.

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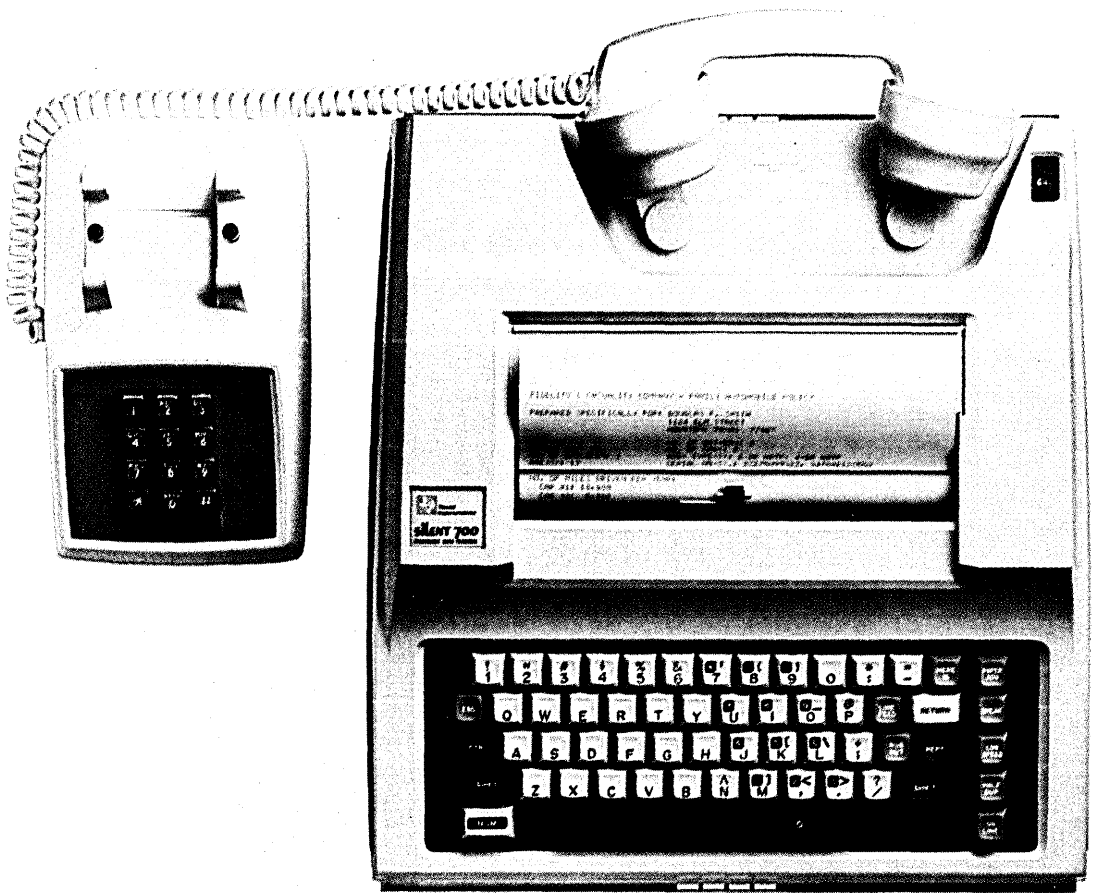
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CAPABLE/RELIABLE

When it comes to communications capabilities...for insurance, real estate, financial, manufacturing, or wholesale and retail needs...the new Model 745 portable terminal is a real heavyweight. True to the "Silent 700" heritage, it's fast, quiet and reliable.

The field-proven thermal printing technique gives you quiet printing at 30 characters per second...for a fast, hard copy of crucial information.

The 745 portable interfaces via a built-in acoustic coupler or auxiliary EIA port, whereas the KSR interfaces via TTY, EIA or integral modem. Both feature either half- or full-duplex operating modes, standard parity options and an ANSI standard

keyboard with an embedded numeric key pad.

At the heart of each model is a TI micro-processor...the key element contributing to its compactness, high reliability and superior performance capabilities.

The new lightweight, low-cost "Silent 700" portable...it gives your field representatives the capability to get the right information to close the sale...with a call...on the spot.

For more information, contact your nearest TI office. Or, write Texas Instruments Incorporated, P.O. Box 1444, M/S 784, Houston, Texas 77001. Or, call Data Terminal Marketing at (713) 494-5115, extension 2126.



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which are flexible, participatory, technically sound, and receive management support are mostly better than those which do not. There, I just saved you \$11, you lucky devils.

—Gerald H. Larsen
Mr. Larsen is president of Unicorn Systems Co., Los Angeles.

Computer Audit Guidelines
Canadian Institute of Chartered Accountants Study Group
Available from American Inst. of Certified Public Accountants
1211 Ave. of the Americas
New York, N.Y. 10017
318 pp. \$23.50 (\$18.50 members)

This is the second of a pair of books a Canadian Study Group has prepared on computer control and audit. The first document, *Computer Audit Guidelines*, was produced in 1970, and this is a continuation (it starts with Chapter VIII).

The individual working styles of the contributors show through. While each chapter is informative and rather easy to read, the variations in style and the difficulty in understanding the structure of the document make it considerably less valuable than it might have been.

This volume contains text guides, and evaluation forms. Although attempts were made to include some management audit topics (called oper-

ational audits in the U.S.), the flavor is still heavily financial.

The introduction clearly states that this text is aimed at the *experienced* auditor. However, even an experienced auditor would probably not use this book directly, but would read it once as a reference book, pull out the nuggets, and put them into his own series of guides/checklists/procedures. As the material is presented, it needs further adaptation to be useful.

The first of the volumes has not been updated for five years. The second was published in May of 1975. While the work of such professional study committees is commendable, such lengthy publication delays in a rapidly moving field render the resulting product of marginal utility. In the last six or seven years, data base technology, extensive use of communications, and on-line data inquiry have become quite commonplace in the U.S. Yet this manual addresses none of these. An outstanding set of Audit Guidelines should contain some guidance about distributed data bases or multiprocessors. In contrast, the Glossary appended to this volume contains the following: batch header document, job control language, scratching of magnetic tapes, and skip key (on a keypunch).

—R. L. Patrick

Mr. Patrick is a versatile dp consultant and a contributing editor of *DATA-MATION*.

BOOK BRIEFS . . .

Safeguarding Psychiatric Privacy
Eugene M. Laska and Rheta Bank,
eds.
Wiley & Sons, 1975
451 pp. \$22

Perhaps nowhere in society is there a more private relationship than that of doctor and patient, and therefore it is not surprising that both the public and professionals are wary of the increasing use of computerized health information systems. This book presents material from experts in many fields who are involved with the Multi-State Information System (MSS), an automated psychiatric information system funded by the U.S. Dept. of Health, Education and Welfare. Authors include doctors and directors from research and health facilities at Columbia, Harvard, and Yale universities, and Rockland Psychiatric Institute, as well as Reps. Barry M. Goldwater, Jr., and Edward I. Koch, who cosponsored the Privacy Act of 1974. The consensus is that it is possible to gather and analyze information without "trampling on human rights" and the articles describe efforts to protect the privacy and confidentiality of the data collected.

MIS in Action
by Robert G. Murdick and Joel E. Ross
West. Publ. Co., 50 Kellogg Blvd.,
St. Paul, Minn 55102 (1975)
724 pp. \$12.95 (paperback)

This well written and attractively presented textbook seems to be a comprehensive description and explanation of a complex topic—management information systems. The book is a compilation of addresses, essays, and lectures by a variety of experts that provide a detailed look at applications of



MIS, plus several case studies to illustrate concepts and theories. The early pages define the objectives and scope of MIS, while subsequent chapters deal with various uses of these systems. The book will be of primary value to management personnel who need timely information on which to base decisions and solve problems, although nearly everyone in the business environment will find it interesting and worthwhile.

Computer Projects in Health Care
by Gerald A. Giebink and Leonard L. Hurst
Health Administration Press, Univ. of Michigan, Ann Arbor, Mich. 48104
(1975)
204 pp. \$7.50

Twenty-nine computer applications in health care settings are presented as examples of the current status of medical computing. An overview of the field is provided, followed by projects profiles, which include: ambulatory care project, multiphasic patient screening admission program, intensive care unit monitoring, nurse practitioner project, laboratory test reporting system, and automated radiology system. Facilities reporting on these systems are located in all parts of the U.S. The authors note that health care computer systems introduced a few years ago are not now in existence, pointing out that major problems still need to be solved before "wide scale, cost effective medical computing systems" become a reality.

The Intelligent Guide to Computer Selection
Computer Lessors Assn., Inc.,
1212 Potomac St., N.W.,
Washington, D.C. 20007 (1975)
61 pp. \$9.95 (paperback)

This useful little book should be of aid to any corporate executive faced with decisions on what to buy for his dp department. Cutting through a lot of the industry jargon, the easy-to-read (about a half hour) volume provides cost/performance information on the IBM 360 and 370. The book uses simple illustrations, a glossary of hardware and software terms, and pertinent questions to assist anyone unfamiliar with the industry to sort out the pros and cons of various systems and equipment.

Laboratory On-Line Computing
by John Brignell and Godfrey Rhodes
Halsted Press, 1975
297 pp. \$24.50

Directed especially toward scientists and engineers working in the laboratory environment, this clear and engagingly written book concerns itself with the use of small to medium on-line computers directly associated with scientific apparatus. The carefully chosen material is not intended to comprise a compendium; however, there are detailed mathematical examples and a reference list of "must" reading. The book is divided into two parts: a survey of the "tools" available, and applications of these "tools."

Electronic Data Processing
by Glyn Emery
American Elsevier Publ. Co., Inc.,
52 Vanderbilt Ave., N.Y. 10017
(1975), 2nd ed.
422 pp. \$10.50 (paperback)

This British publication is clear, well illustrated, and appears to be an excellent introductory text. Basic program-

The new package from the leader:

Precision Graphics at an alphanumeric price.

Not just graphing. Graphics from the graphics specialist. The key is information capacity. Tektronix' new 4006-1 offers far and away the highest output density of any terminal in its price range: 1024 X by 780 Y viewable points; 2590 alphanumeric on screen characters.

It's all you'd expect from the company serving all your graphic needs . . . priced competitively with most alphanumericics.

Immediately compatible with most mainframes. Thanks to proven interfaces. Time-tested software. Great new usable software packages. And expert maintenance anywhere in the world.

And rely on Tektronix to do it right. The 4006-1 is our biggest breakthrough towards making the power of graphics affordable for everyone. Just \$2995

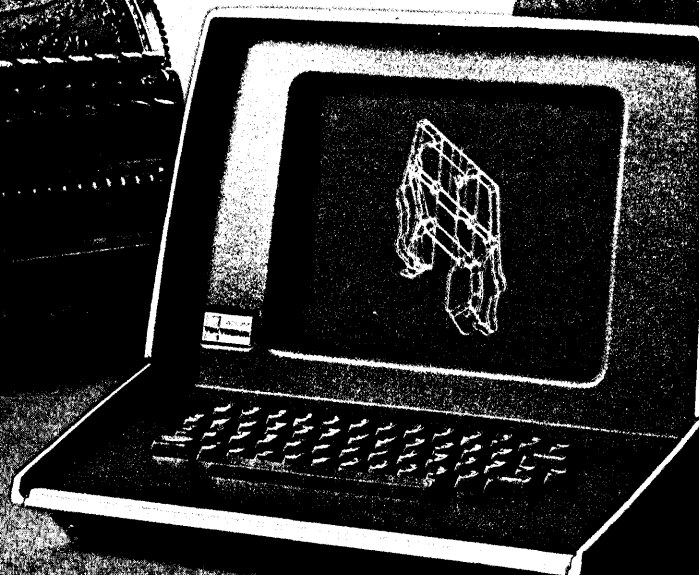
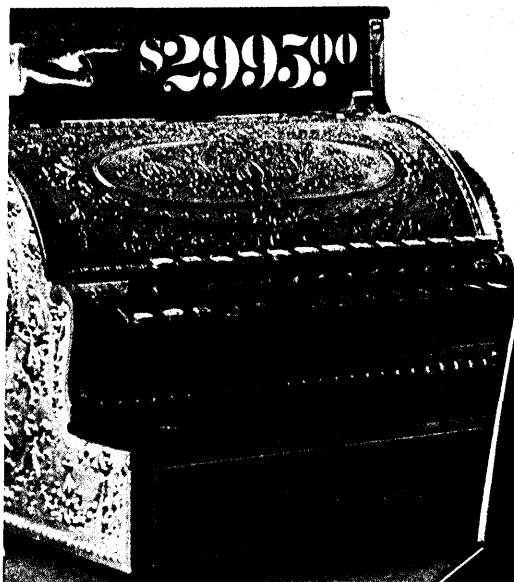
for openers. Lease price \$150 per month on a two year lease, includes maintenance. Plus peripheral options like our 4631 Hard Copy Unit for up to four 4006-1's, with 8½"x11" copies, and 4923 Digital Cartridge Tape Recorder. And as fine a package of technical support as you'll find for any terminal anywhere.

Check it out: we're graphic leaders for some mighty good reasons. Your local Tektronix Sales Engineer can give you the whole story. Or write:

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



TEKTRONIX®



Circle 31 on Reader Card

U.S. Domestic Price Only

Graphics
\$150/mo



GE puts it on the line with a new family of TermiNet[®] line printers

Four value-packed true line printers with real 90-340 lines per minute throughput at practical, low prices

Small size. Compact design. Modern styling. Quiet operation. Low prices.

At the same time this new space-saving family of GE TermiNet line printers is big on performance. They're big on throughput. Gives you a range of speeds from 90 lpm to 340 lpm, depending on the number of printable characters per line and the size (64 or 96) of the ASCII subset. And that's *real* throughput (see graph).

They're big on reliability backed by years of proven electronics and rotating belt technology. (Over 75,000 GE belt printers installed worldwide.) Big on versatility. 67% of the parts are common to TermiNet 300, 1200 and 120 printers. For resellers this means a minimal spare parts investment. For users it means improved service and less downtime due to a lack of spare parts. You can modify or upgrade quickly and at modest cost. They're big on interfaces. Serial and parallel, buffered and unbuffered.

Big on quietness. They're a welcomed addition to any office or computer room. Big on value-packed features. Both front (recommended for multi-part forms) and

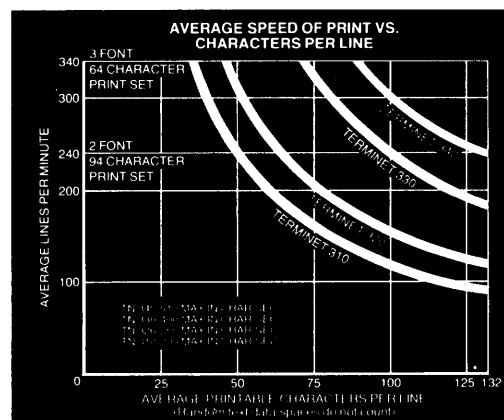
rear loading. 132 columns. Original and 5 copies. A unique ribbon cartridge. With a life span of 50 million print characters. Operators can replace in less than a minute. Easily. Cleanly.

And, they're big on troubleshooting. 14 light emitting diodes (LED's) located on the outside of five printed circuit boards quickly indicate malfunctions. A test button on the control panel provides rapid checkout of printer action. Staggered or "ripple" test patterns print continuously as long as TEST is activated.

This big new family of TermiNet line printers are *true* line printers.

In fact, the only thing you'll find small about this new family of line printers is their size and price. In these days of spiraling costs, GE is putting it on the line with practical, low prices. From \$3900 for the TermiNet 310 printer to \$5130 for the TermiNet 340 printer (user quantity 1). That could well be the best cost/performance in line printers available today.

Let us prove it. Write General Electric Company, TermiNet 794-17, Waynesboro, VA 22980.



The print rate for TermiNet line printers varies with the number of printable characters per line and the size of the ASCII subset used. Analysis of the typical rate curve shows that TermiNet 340 throughput for the 64 character ASCII subset is an average of 340 lines per minute when there are 90 or fewer characters printed on a line. This includes one line feed per line. Minimum throughput is 231.8 lines per minute when printing characters in all 132 columns, faster if there are spaces in the print line.

For your special kind of needs-A special kind of printer

GENERAL  ELECTRIC

source data

ming techniques, including chapters on assembling, loading, and debugging programs, are covered. Hardware is described in some detail, including the cpu and peripherals. Chapters on data structures, i/o, files and file devices, multiprogramming, series architecture, and total systems, show how comprehensive the book is. There are also useful appendices of codes, conversions, powers, suggestions for program documentation, and a bibliography.



Auerbach Brochure

Continually updated references covering product evaluations, specifications, and prices, plus state-of-the-art reports and tutorials, are among the reports described in a brochure from this publisher. Auerbach Computer Technology Reports in several volumes, such as on minicomputers, software, etc., are listed. Hotline Reports, Auerbach Reporter/Subscriber Newsletter, and the 18-volume corporate dp library are also described. AUERBACH PUBLISHERS INC., Pennsauken, N.J.

FOR COPY CIRCLE 200 ON READER CARD

Minicomputer Peripherals

A nine-fold increase in the market for minicomputer peripherals and software in Europe, from \$69 million in 1974 to \$621 million by 1984, is projected in a 470-page study. Germany, followed by the United Kingdom and France, will be the largest markets. Five mini-peripheral categories are studied: hardcopy units, serial storage equipment, random access storage, drums and discs, and internal main memory. Software in the form of systems and control packages from independent software houses are covered. Price: \$695. FROST & SULLIVAN, INC., 106 Fulton St., New York, N.Y. 10038.

Software for Performance

The "Third Annual Survey of Performance-related Software Packages," covering 230 software products from 97 vendors, appeared in the December *EDP Performance Review*. The packages provide either performance measurement capabilities or direct performance improvements. Categories for

the packages include communications, simulation, data management, job accounting, etc. A vendor index, product descriptions, prices, etc., are included. This issue is available to non-subscribers for \$5; annual subscription for the monthly is \$48. APPLIED COMPUTER RESEARCH, 8808 No. Central Ave., Ste. 298, Phoenix, Ariz, 85020.

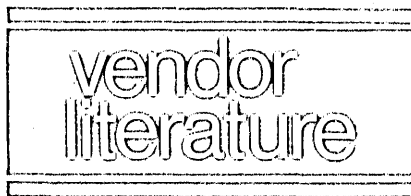
Operating System Enhancements

The 100-page *Auerbach Guide to Operating System Enhancements* describes and evaluates 35 independently vended software packages to replace or enhance various functions of existing systems. Sort/merge programs, disc and tape utility programs, spoolers, and job schedulers are included. Price: \$24.95. AUERBACH PUBLISHERS INC., 6560 No. Park Dr., Pennsauken, N.J. 08109.

Test Instrument Industry

Worldwide sales of instruments to test electronic or electrical equipment or components are expected to increase at a compound annual growth rate of 10.4% from \$1,454 million in 1975 to \$2,389 million in 1980. The industry, the market, the technology, and profiles on companies that manufacture such test equipment as signal analyzers, signal sources, automatic test equipment, etc., are covered in the illustrated 76-page research report, *The Test Equipment Industry*. Available as part of csr's Industry Analysis Service, or separately at \$495. CREATIVE STRATEGIES INC., San Jose, Calif.

FOR DATA CIRCLE 201 ON READER CARD



Security Control System

An 8-page brochure describes the Interrogator 880, a field expandable maximum security access control system and alarm monitoring console. The microprocessor's monitor and control functions can extend to 128 separate access locations, both across town or across country. Environmental and emergency situations, elevator activity, and parking conditions can be monitored on the central console, and more than 500 alarm monitoring terminals are available.

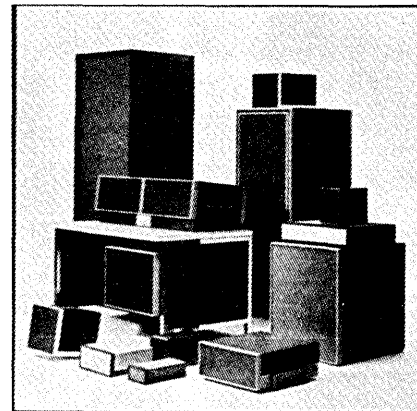
Features include capacity to read and evaluate up to 62,000 cardkeys, and to permit or deny access. There is

also the ability to increase functions and capabilities by inserting plug-in modular printed circuit boards, as well as programmable functions (by means of two front panel keyboards) which include access level coding, time zone control, alarm condition control, etc. A front panel mounted digital clock operates even when power fails. CARD-KEY SYSTEMS, Chatsworth, Calif.

FOR COPY CIRCLE 202 ON READER CARD

Electronic Enclosures

An 8-page full color brochure describes the Optima line of cabinets, cases, racks, consoles, and electronic desks for dp and other technical equipment. A variety of sizes, colors and styles are illustrated. Also described is



an operator's desk with provisions for instrument attachment and hidden cable connections. SCIENTIFIC-ATLANTA, INC., Atlanta, Ga.

FOR COPY CIRCLE 210 ON READER CARD

Tape Cleaner/Rewinder

A flyer introduces the model 1011 tape cleaner/rewinder which guards against common causes of tape failure such as cinching and edge damage. New features in the design are claimed to eliminate extra reel handling. An automatic signal device informs when cleaning elements need replacement, and a preset footage counter eliminates the need for hand tape stripping. COMPUTER-LINK CORP., Burlington, Mass.

FOR COPY CIRCLE 211 ON READER CARD

Microfilm Jacket

A brochure describing a microfilm jacket system that permits storage of "200 times as many records per cabinet as ordinary paper file folders" is available. The system offers complete file control, and process sequences are detailed. Advantages such as rapid retrieval, duplicate printing, ease of indexing, etc., are covered. BELL & HOWELL, Chicago, Illinois.

FOR COPY CIRCLE 206 ON READER CARD

(Continued on page 42)

Announcing Honeywell's Series 60, Level 6.



**Our new minicomputer -
it's small and quick
and very smart.**

Now Honeywell has a whole new family of minicomputers.

Level 6 means high-reliability hardware that's easy to program, easy to configure, easy to service. For only \$2634.*

Powerful central system architecture: Level 6 architecture is designed to support the most demanding minicomputer applications, and provide a full range of compatible systems from which the user will be able to select the one best suited to his requirements. Initial models include many of the following architectural features:

- Microprogrammed instruction set with writeable control store available to the user.
- Direct addressing up to 8 million words of memory.
- Minimum of 18 programmable hardware registers.
- Bit, byte, word and multi-word addressing.
- Hardware stack and queue management.

- Proven N-channel MOS memory in 8K by 16-bit modules, with byte parity and up to 32K words on a single board. Cycle time is 650 nanoseconds.
- Error detection and correction (Corrects single bit, detects two-bit errors).
- Memory management hardware.
- Over 100 basic instructions, with more than 600 variations.
- High-performance scientific and commercial instruction set extensions.
- Common asynchronous Megabus™ operating in an interleaved mode, with a bandwidth of 6 million bytes per second.
- Vectored interrupt capability with up to 64 interrupt priority levels.
- Separate trap structure with more

than 20 unique entry points.

- Microprogrammed input-output controllers.
- Multiprocessor and networking capabilities.

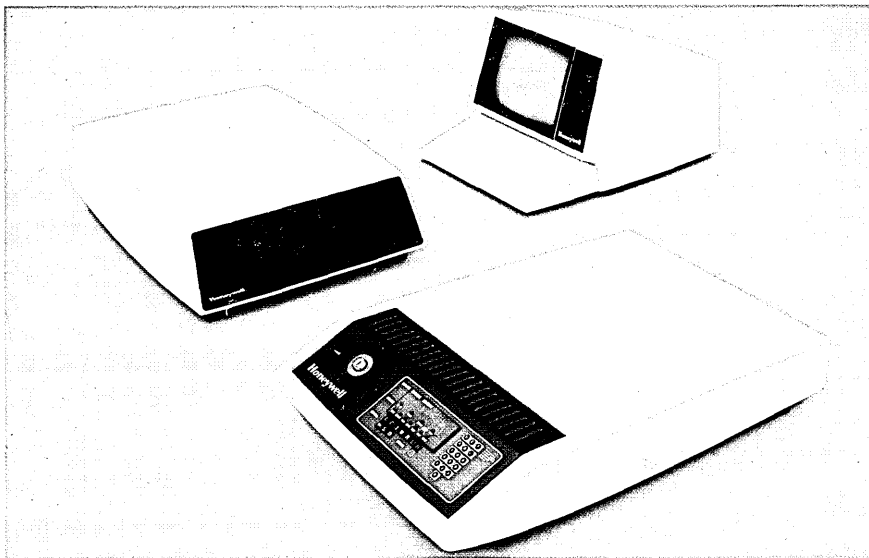
The benefits include the ability to write compact and efficient programs, increased processing speed, reduced memory utilization and memory management overhead, reduced software overhead, increased throughput, and the capacity to handle large and versatile configurations.

Models 6/34 and 6/36 incorporate subsets of the above features and are immediately available. These models are well suited for OEM and system-builder applications. Maximum memory for the 6/34 is 32K words, and for the 6/36, 64K words.

Advanced modularity:

Level 6 combines TTL logic, LSI and MSI circuitry, firmware-driven microprocessors, MOS memory, and etched wire connections in a new way to achieve plug-in modularity with optimum configurability and replaceability. Specifically:

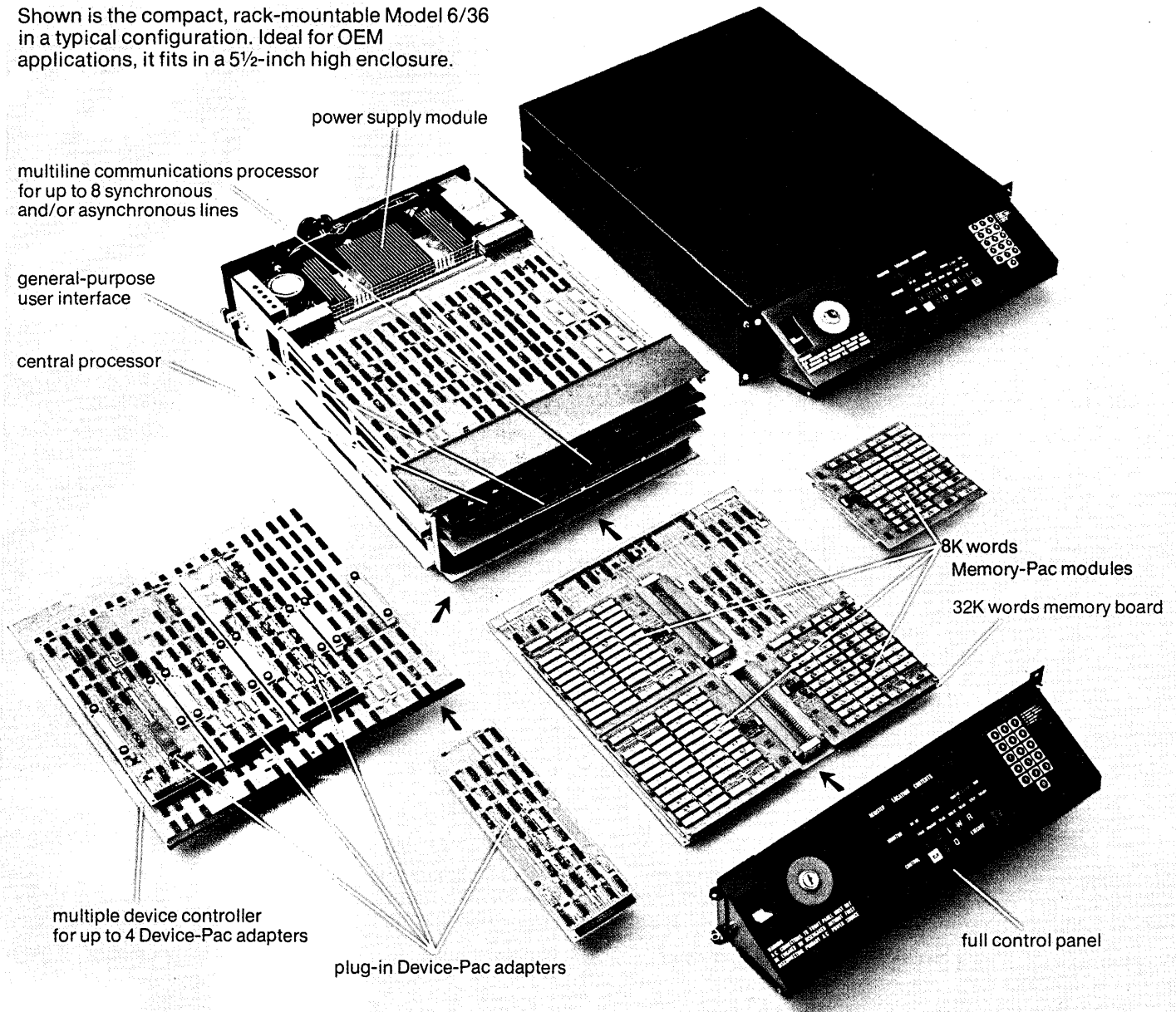
- The entire central processor is contained on a single board 15" x 16".
- Other 15" x 16" boards are devoted to the memory, communications processor, peripheral controller, and user interface.
- Functional modules (i.e. device adapters and memory modules) plug into the 15" x 16" boards.
- Boards fit into the bus without backplane wiring.



Level 6 offers a choice of rack-mountable, cabinet and tabletop models. Level 6 also includes a new full line of low-cost peripherals in both tabletop and rack-mounted versions. Shown are the tabletop minicomputer, diskette and CRT.

*U.S. price in quantities of 50 for rack-mountable Model 6/34. Includes 8K words of MOS memory, with parity, multiply/divide, realtime clock, and bootstrap loader.

Shown is the compact, rack-mountable Model 6/36 in a typical configuration. Ideal for OEM applications, it fits in a 5½-inch high enclosure.



These features offer the following benefits: The sharing of costly logic elements such as controller microprocessors and memory error correction lowers the system cost. A system can be easily configured through the selection of a minimum number of appropriate boards and modules. Fewer components and connections mean increased system reliability. And serviceability is improved by having fewer — as well as more easily replaceable — components.

Microprogrammed communications processor: Honeywell's multiline communications board functions as a true front-end processor. It offers unusually powerful

communications capability at moderate cost.

- Separately programmable memory allows tailoring to individual requirements.
- Usable memory of 4096 bytes enables execution of complex line-handling procedures with no central processor involvement.
- Each board handles up to eight full-duplex lines.
- A variety of modules adapt the communications processor for different line types and speeds (up to four modules per board, line types and speeds may be mixed on the same board).

As a result, the central processor is relieved of most of the data com-

munications overhead, and the user has maximum application flexibility.

Built-in test and verification:

The Level 6 system provides an automatic configuration integrity check and self-diagnosis:

- Light-emitting diodes on the central processor and each controller board verify logic quality.
- A console indicator verifies that boards, terminators, and bus cabling are properly connected at time of system initialization.

By means of these features, together with the simple replaceability of boards and plug-in modules, the Honeywell Level 6 system is designed to be the most serviceable minicomputer ever built.

Efficient system-building software: Honeywell has gained considerable system building experience through the application of minicomputers within the general purpose computer and control system segments of its business. This experience, together with the expertise gathered in ten years of



building minicomputers, has been applied to Level 6 hardware and software design to produce integrated system products particularly well-suited to a wide variety of jobs. The initial software includes:

- Stand-alone program development system.
- Stand-alone multitasking real-time executive.

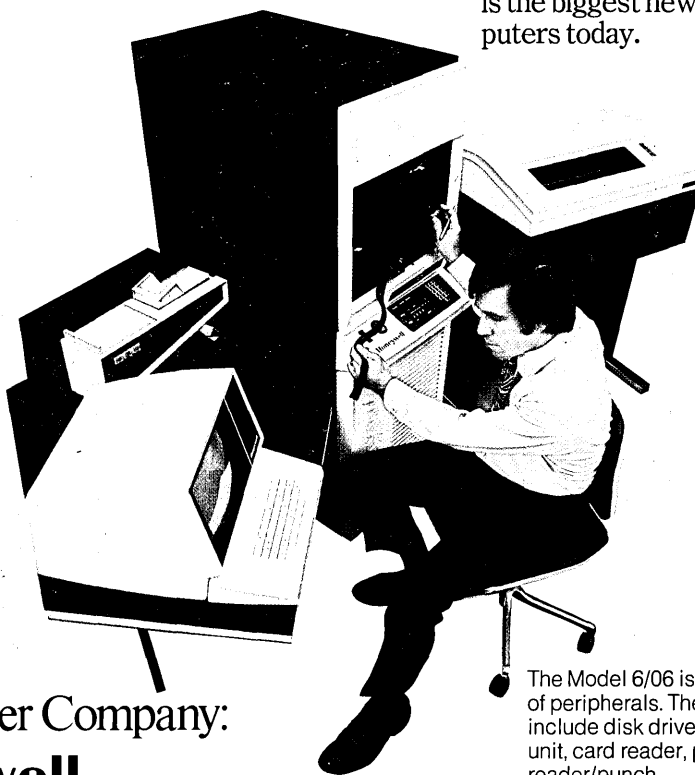
- Disk-based multitasking real-time operating system.
- Assembler, FORTRAN and utilities.

These are the first results of a comprehensive software development program. Scheduled for future release are additional higher level languages, communications software enhancements, and operating system extensions.

System 700 compatibility: Level 6 offers System 700 com-

patibility via the Model 6/06. The 6/06 incorporates the packaging and technology advances of Level 6 and supports the full range of System 700 software and peripherals. Memory is available in 8K word increments up to 64K. Systems are available for immediate shipment.

For more information, please mail us the coupon or circle number 125 on reader card. We'd like to show you why Honeywell's Level 6 is the biggest news in minicomputers today.



The Model 6/06 is offered with a variety of peripherals. The configurations shown include disk drive, CRT, tape cassette unit, card reader, printer, and paper tape reader/punch.

The Other Computer Company: **Honeywell**

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

- Please send me more information about Level 6 minicomputers.
 Please have a salesman call.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____

To help you answer my request more effectively, here's some basic information:

I'm an OEM End-user I have a need for _____ minicomputers during 1976.

My intended application(s) is _____

I am interested in Model(s) 6/34 and 6/36 6/06

ABCDEF G





Your computer. We're good for what ails it.

One of the main causes of computer downtime has nothing at all to do with the way your computer is built.

It's the environment your computer has to work in. If it's too humid, too dry, too warm, too cool, or too dirty, no computer will put up with it for long.

The result can be anything from gibberish to total shutdown — and this can cost a fortune!

More often than not, the trouble begins with an environmental system that has been designed to keep people comfortable but that can't keep either the people or the computer comfortable.

The problem can easily be prevented by creating and maintaining a precise, controlled environment for optimum computer operation.

The technology to achieve that precise environment does not exist with comfort air conditioning.

It does with *process cooling*.

Specifically, EDPAC Process Cooling Systems.

To learn more about remedying your own computer room climate control problems, fill out the prescription below. We'll rush you a copy of "Process Cooling for the Data Center Environment." And the name of your EDPAC specialist.

Rx

Please rush me your prescription for computer room climate ills. And the name of my nearest EDPAC specialist.

Name _____

Title _____

Company _____

Address _____

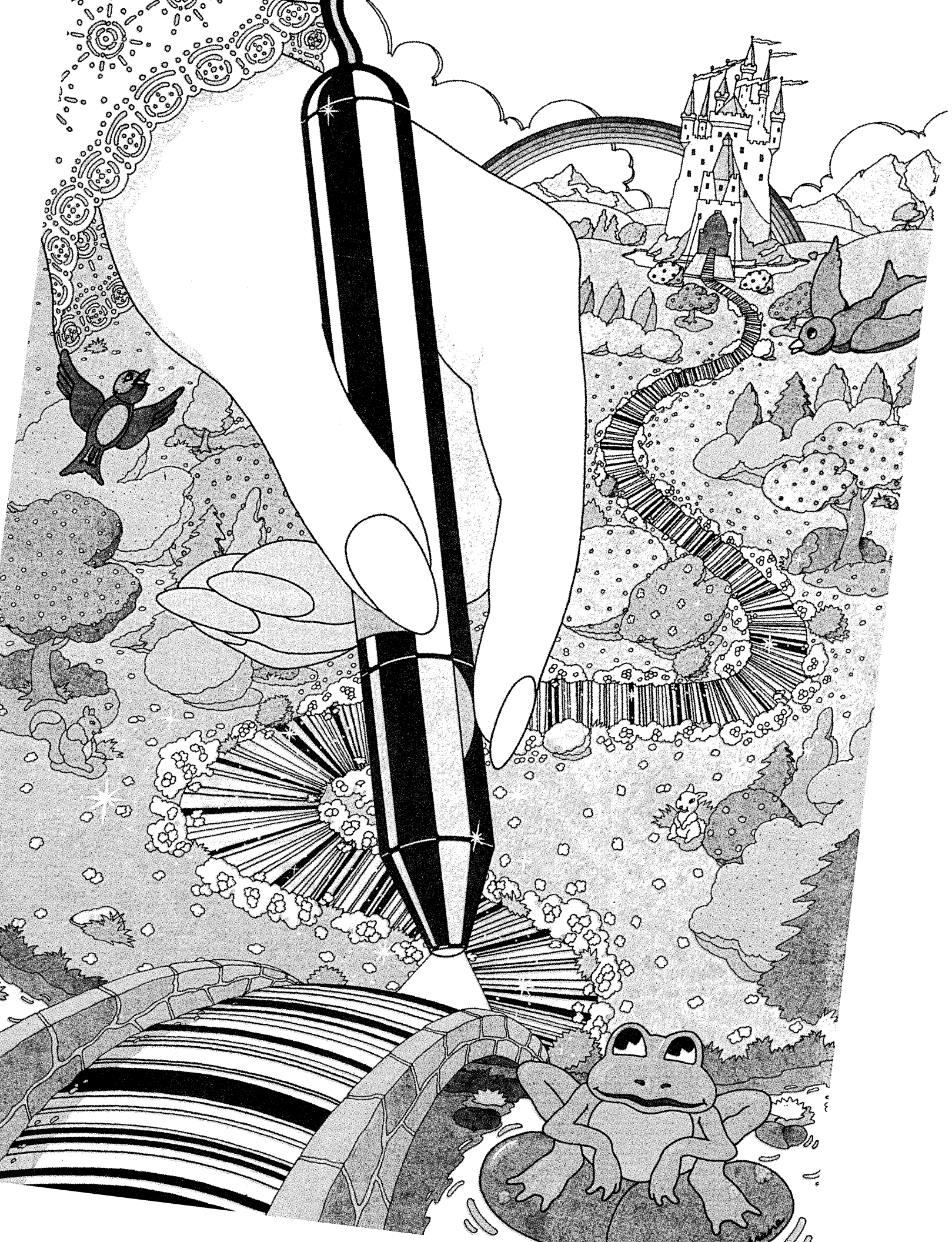
Phone _____

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EDPAC

Old Cuthbert Rd. at Deer Rd.
Cherry Hill, New Jersey 08034

EDPAC is a product of AC Manufacturing Company

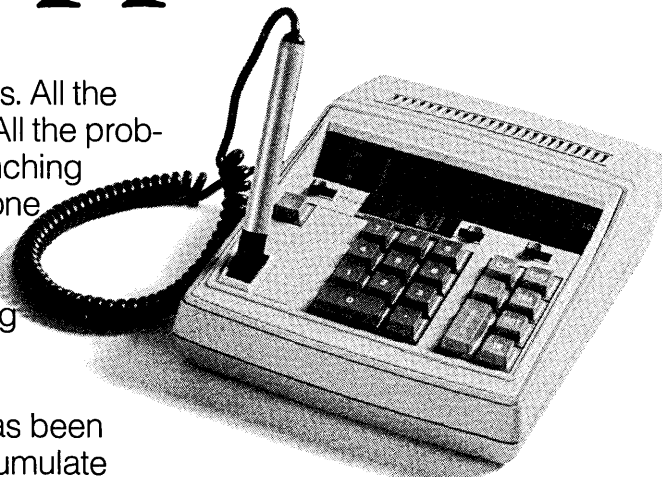




And then, with a wave of her magic wand, the wicked evils of keypunching disappeared forever.

All the mistakes. All the lost information. All the problems that keypunching can cause. All gone forever because she was using the Ames Guiding Light Data Entry System.

The System has been designed to accumulate data primarily by reading a bar code via a pen-like input. The inherent accuracy in reading bar coded data makes it foolproof. The entry of data requires minimum operator skill, and can be taught in a matter of minutes. The data entry of up to 16 digits of information may be transmitted to a central computer simply by tracing an invisible line over a series of black and white bars. And after the information is

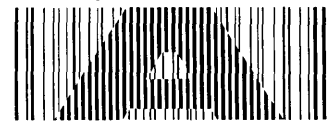


received and decoded correctly, an acknowledgment signal is given. If transmission is not completed to the computer, an alarm is indicated.

Installation of the system requires minimum training and may be accomplished by semiskilled personnel. The modules of The Guiding Light Data Entry System may be used in countless combinations to provide necessary flexibility. The afore-

mentioned modules: a Pen Terminal, Pen Keyboard Terminal, Terminal Multiplexor, Line Multiplexor and Bar Code Label Printer.

For further information fill out the coupon and end keypunching mistakes forever.



Ames Medical Record Systems Division
Ames Color File Corporation
12 Park Street, Somerville, Mass. 02143
(617) 776-1142

Please send me information on Ames Guiding Light System.

Name _____

Firm _____

Street _____

City _____

State _____ Zip _____

Phone _____

source data

(Continued from page 34)

Desktop Printer

The CP110 desktop printer capable of producing 80 columns of 5 x 7 dot matrix characters among other features, is described in a 6-page illustrated folder. Interface capability with a wide range of modems, crt's, and minicomputers is covered. OKIDATA CORP., Moorestown, N.J.

FOR COPY CIRCLE 208 ON READER CARD

Disc Conversion Guide

A 24-page booklet based on customer

experience with this vendor's software package, "Dossier," describes how to manage disc conversions and other major system changes. The method suggested applies to both manual conversions and the automated approach possible with "Dossier." The booklet is also useful to those who have upgraded their disc drives but have not yet completed reblocking and reformatting files. COMPUTER CONCEPTS, INC., Portland, Oregon.

FOR COPY CIRCLE 205 ON READER CARD

2400 Bps Modem

A 16-page illustrated booklet compares this vendor's Modem 24 LSI with the

Dataphone 2400 data set. Besides pricing policies, line turnaround time and reverse and secondary channels and diagnostics are discussed. Charts, photos, and diagrams are featured in the comparison. INTERNATIONAL COMMUNICATIONS CORP., Miami, Florida.

FOR COPY CIRCLE 209 ON READER CARD

Microcomputer Series

This vendor's Series 70 computer on one board with system expansion options is described in a new brochure. This computer is based on the technology of microprocessors and support circuits, and provides a cpu in one enclosure with an IBM compatible floppy disc system. APPLIED DATA COMMUNICATIONS, Santa Ana, Calif.

FOR COPY CIRCLE 207 ON READER CARD

Optical Mark Readers

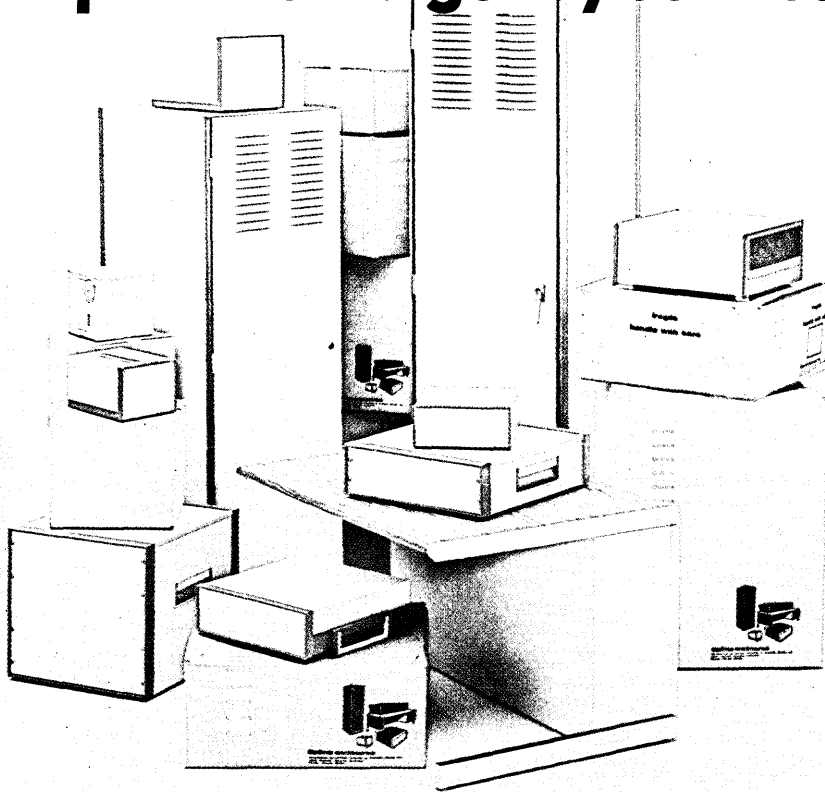
Several brochures and data sheets on this vendor's series of optical mark readers (OMR's) and optical mark read/sort systems are available. The series range from a hand fed buffered reader for low volume applications to the microcomputer based Series 8000 Read/Sort System. Custom designed batch and real-time data collection systems using OMR's as primary input devices are available. BOURNS MANAGEMENT SYSTEMS DIV., Riverside, Calif.

FOR COPY CIRCLE 204 ON READER CARD

Graphics System

An illustrated 12-page brochure on "the importance of graphical reporting for improving management visibility to achieve improved project management" also includes information on this vendor's "Ezpert," a project graphics system. Time scaled project networks, Gantt barcharts, and cost/resource graphs are produced automatically by the "Ezpert." Special

Introducing the Optima emergency service



Here's how it works. We keep an inventory of cabinets, small cases, desks and racks on hand...all wrapped and ready to ship anytime. You call us whenever you've got an emergency and we ship within five days (at the very most). A good idea, no?

It's called Instant Optima. Altogether we've got 80 different products, each completely painted in beige with bronze trim, ready for shipment in our emergency room. Just circle the number below and we'll send you an Instant Optima catalog or if you have an emergency now...call Keith Moore at 404-939-6340.

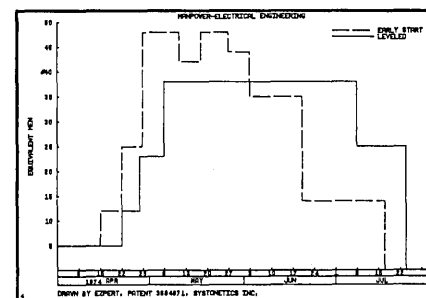
INSTANT OPTIMA

Optima® Enclosures, a division of Scientific-Atlanta, Inc.
2166 Mountain Industrial Blvd., Tucker, Georgia 30084

CIRCLE 96 ON READER CARD

SA-8751

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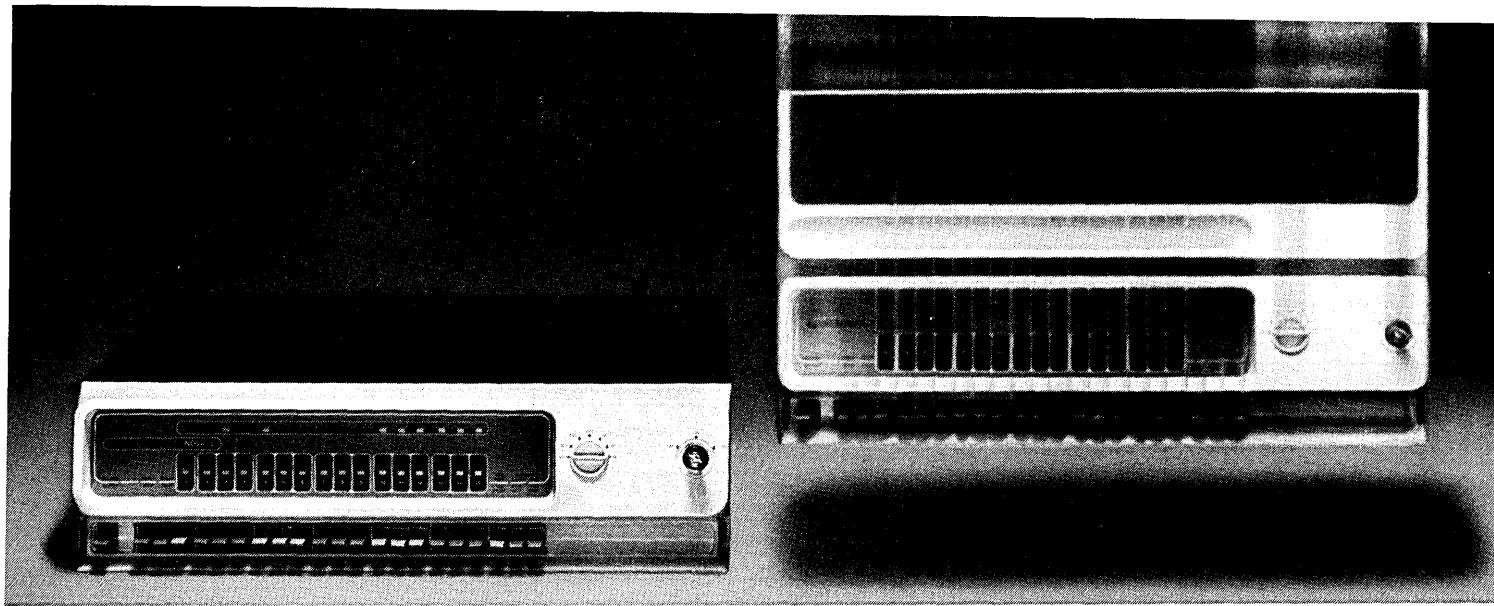


"cuts" of a network diagram to zero in on problem areas can be done; "subnets can be created or program summaries displayed. A cost comparison between the "Ezpert" and manual network production is given. SYSTONETICS, INC., Anaheim, Calif.

FOR COPY CIRCLE 203 ON READER CARD

(Continued on page 158)

DATAMATION



The biggest thing to ever hit the OEM market, gets even bigger.

The four slot version of the Nova 3 gets pretty big. Up to 32K words of memory. But Nova 3 doesn't stop there. If you want to go further, consider the 12 slot Nova 3.

It can take on up to 128K words of memory. And our optional Memory Management Unit makes efficient use of all that memory, without a lot of systems overhead.

If you're going to need more I/O than the 12 slot Nova 3 can give you, there's an optional 12 slot expansion chassis.

And if one fully expanded Nova 3 still isn't big enough to handle the problem, you can add more Nova 3's and make multiprocessor systems. And they come with standard off-the-shelf software.

Why do we go to the trouble of offering such a wide range of configurations?

So you can meet any number of different systems requirements with the same processor. Without buying a lot of

different spares. Without training your people in a lot of different test and maintenance procedures.

And so you can take your smallest product and make it a lot bigger. Without systems redesign. Without rebuilding your interfaces. Without rewriting your software.

And, no matter how small a Nova 3 you start out with, you get big performance. Nova 3 executes instructions in only 700 nanoseconds. Or more than twice as fast as the computers you're apt to compare it with.

Yet for all its bigness, there is one small feature in the Nova 3. Price. You can get a 64K word MOS memory Nova 3 with Memory Management Unit, Automatic Program Load and Power Fail Protection for just \$16,800* (Or a smaller Nova 3 for an even smaller price. A 4K MOS system for \$2,600*.)

Write for the brochure.

You may discover that bigger is better.

*Single unit price before OEM and quantity discounts get figured in.

DataGeneral

Nova 3: The biggest thing to ever hit the OEM market.

•Data General, Dept. N8, 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.

Introducing the New Age of Achievement in In-house Data Processing Training

CONCEPT 80

Is Concept 80 an idea or an ideal?

Concept 80 is both. Certainly many new ideas, many innovations have been incorporated by Advanced Systems into Concept 80. But Concept 80 is more than the greatness of any single idea.

It is, instead, an ideal to which Advanced Systems has committed its energies and its innovations. That ideal is **Achievement**.

Concept 80 will continually demonstrate that Advanced Systems is the leader in video-assisted instruction. That Advanced Systems is a dynamic, ever-improving organization dedicated to a philosophy of achievement. Yours and ours.

Here are some of the Concept 80 innovations that are achieving for companies like yours right now . . .

New Technological Advances in Video Production.

Now made possible through the finest broadcast-quality videotape hardware: a two-inch videotape recording and editing system; and the most advanced reproduction system to produce cassettes under the best quality controls in the industry.

New In-house Computer Assisted Instruction.

Computer assisted instruction provides the student with a constant, immediate feedback on

quizzes. It creates an overt, personal involvement with the course material. And, it's all accomplished in-house through your present equipment in most instances. In addition, we offer a computerized curriculum service for every student in your training program.

New Course Development in All Major Fields.

This coming year will see the release of 140 new videotapes for new courses in data processing, management development, marketing training, and manufacturing. Our aim is to continue our leadership in course content; communication of that content; customization of curriculum to customer organizations; and finally, to provide programs for on-the-job training throughout the career of each deserving person.

New Language Programs and Course Translations.

Currently some 200 courses have been translated into Spanish, 120 into German, and 12 into French. New Linguaphone Language Programs are already proving their value with marketing and administrative people in many multi-national companies.

New Concept 80 Revolving Library.

More flexible, more economical than any other library tape pro-

gram. The new Concept 80 library will contain *everything* available from Advanced Systems —including *all future* courses.

New Computer Technology Video Update Series.

Concept 80's commitment to achievement dictates that state-of-the-art technology must be a major consideration in developing a total program such as this. In our new Computer Technology Video Update Series, we will offer a succession of reports presenting the latest developments in computer technology. Upcoming subjects include Systems Network Architecture/SDLC, and fine-tuning VS for efficiency.

New Toll-Free Customer Number.

A single source for service and information. Feel free to call toll-free: (800) 323-0377.

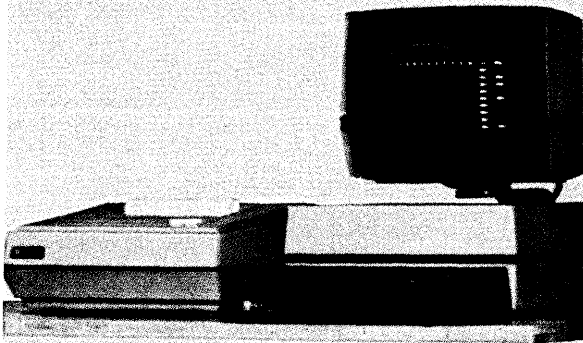
Over every great idea is the ideal to which it aspires.

The logo for Advanced Systems, Incorporated (ASi) features the letters 'ASi' in a bold, italicized, sans-serif font. The 'A' and 'S' are connected, and the 'i' has a dot. To the left of the 'A' are three horizontal lines of varying lengths, suggesting motion or a stylized 'A'.

Advanced Systems, Incorporated
and its VAI subsidiaries
1601 Tonne Road
Elk Grove Village, Illinois 60007

In data communication systems, ICC helps you put it all together.

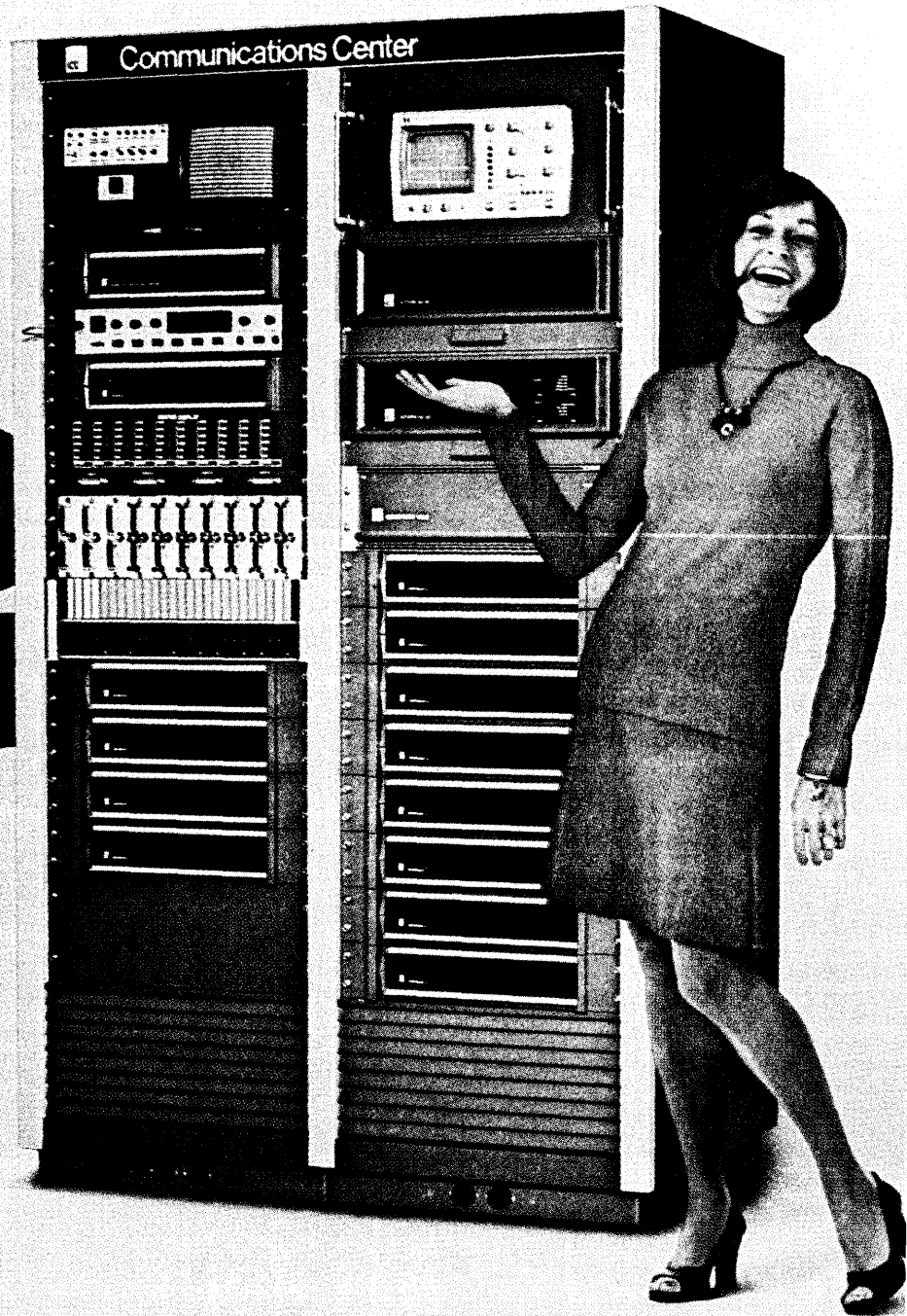
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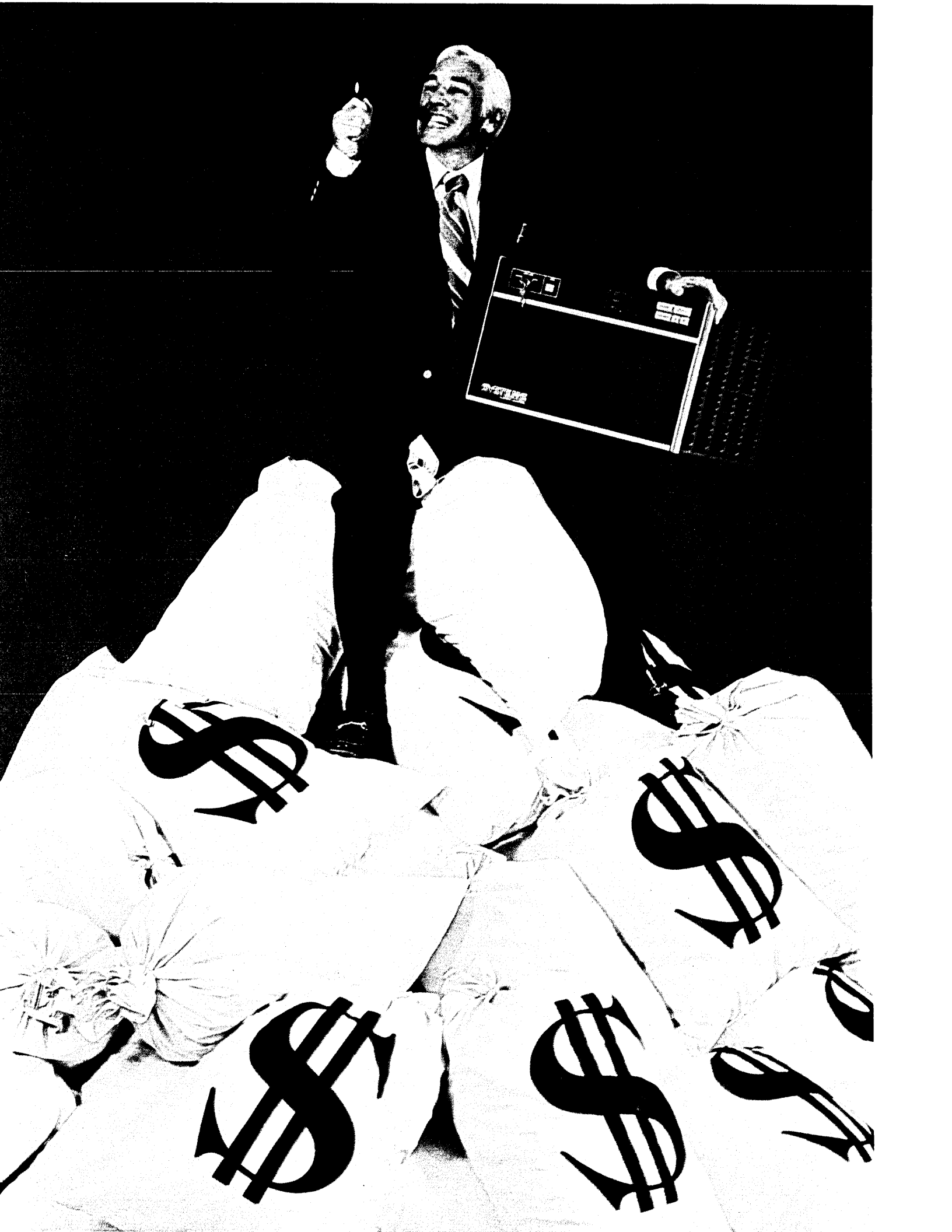
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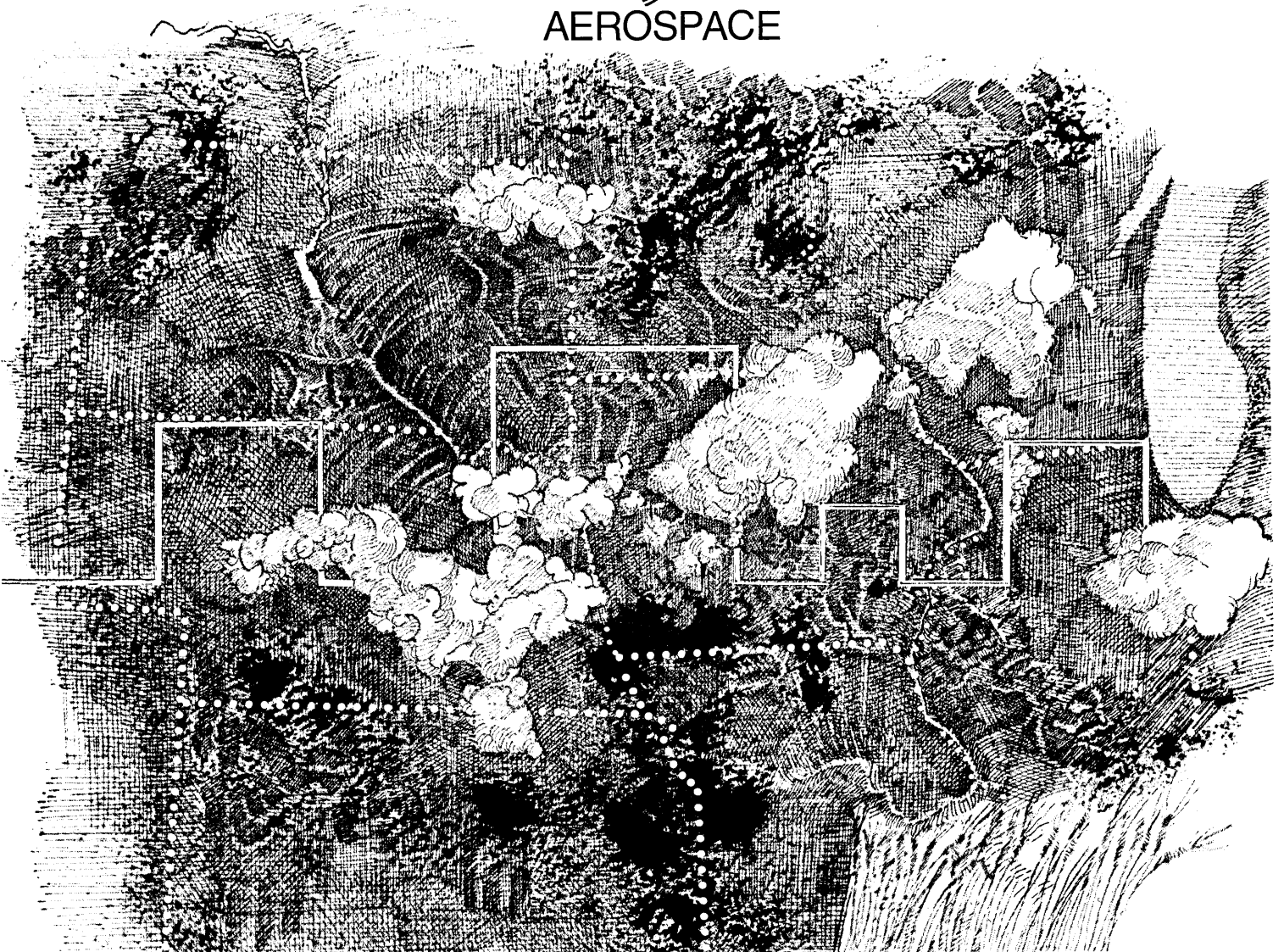
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Editor's Readout

John L. Kirkley, Editor

The Golden Rule

I remember a flight I made from Los Angeles to New York many years ago. I sat next to a tough looking elderly businessman with pale eyes as cold and hard as arctic ice. We got to talking about politics and politicians. "Boy," he said to me, "never mind what any of those *****s say. Find out where the money comes from. Then you'll really know who's running things."

Cynical? Perhaps. But in our society we often follow the Golden Rule — he who's got the gold makes the rules.

In this issue you'll find our annual data processing budget survey. It describes in detail how the corporate dp pie is going to be sliced up in 1976.

Back in the sixties making a budget was a relatively easy but irksome task for many a dp manager. He wasn't trained in management. At best he had a nodding acquaintance with business plans — enough to convince him they were cumbersome and messy. At heart he was where he had come from — he was an operations man; and he knew by instinct and experience that next year he was going to need more paper, more hardware, and more staff.

So, when budget time came around, he simply took pencil in hand and added 15% to his current operating budget. And that was that for another year.

Although you can still find shops where this quaint but archaic process is followed, it is unacceptable in most organizations where dp is a significant part of the corporate activity.

Today's users are demanding a great deal more control over the dp budget. After all, from a line manager's point of view, money spent on dp is money that could have been put into a new plant or manufacturing equipment that actually produces something other than paper.

To escape from the onus of being regarded as a "burden center" instead of a profit center, many installations have developed elaborate charge back systems and created new managerial entities — data processing steering committees that attempt to serve as communications channels between the user and the dp department. (Problem is that charge back systems are an expensive overhead item in their own right; and, from what we've heard, dp steering committees just don't work.)

Another approach to budgeting and project control that is gaining widespread acceptance was described to us by the dp manager of a large installation in New York.

His department acts like a captive service bureau. As budget preparation time draws near, users come to him with specs for new development projects. The dp manager has the power and the cash to run feasibility studies for the user and to project what it will cost to forge ahead with the project.

The user then goes to his management — in this case all the way to the top, the corporate chairman — and justifies and negotiates final approval for the project. If he's successful, he gets a wad of money in next year's budget for the project. And in turn he hires the dp department to do the job.

As the various user departments go through this process, the dp manager begins to get a clear picture of what revenues will be available for his operation in the coming year. He budgets accordingly. His is one of the last departments to submit a budget for managerial approval.

As a crafty, conservative manager, he knows that some of those projects may be trimmed or killed altogether. But, like any good small businessman, he has a bottom drawer stuffed with fall-back plans in case the money dries up.

Some of his manpower will be temporary help from body shops; some jobs will be farmed out to commercial service bureaus; other developmental work will be contracted on a turnkey basis. If the crunch comes he's ready to chop without damaging the core of his own department.

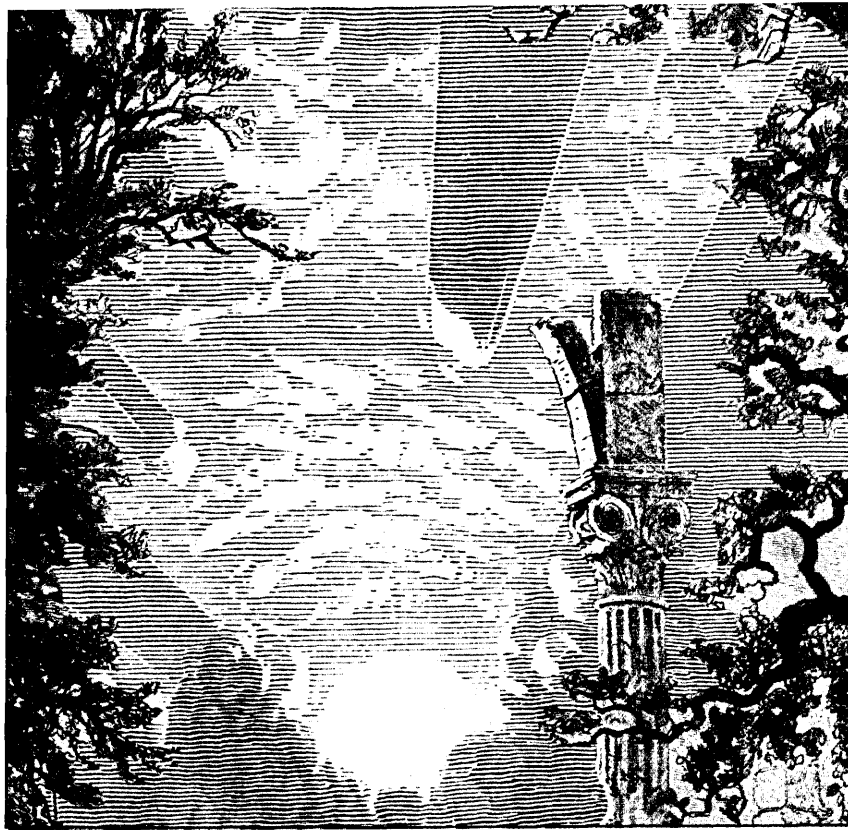
Under this set-up, although the user's got the gold, his control is limited to project budgeting and scheduling. He does not decide whether the job is run in assembly language or COBOL, in-house or outside, on an Altair 8800 or 370/168. That's dp's job.

This system, like any other, has its shortcomings and pitfalls. But it works. And it does give the user an agreeable feeling of control without ham stringing the dp manager.

Obviously there are many, many ways to prepare the annual dp budget and to structure the sometimes tumultuous interaction between user and data processing. Some work, some don't.

We'd like to know what's worked for you. And, if you're willing, we'd also like to hear about approaches you've tried that have been unmitigated disasters. As we have with responses to our November '75 editorial, "Civil War in the Corporation," we'll publish your comments in the Letters section.

*



1976 DP BUDGETS

by Richard A. McLaughlin, Sr. Associate Editor

There's a light at the end of the tunnel, at least for teleprocessing applications, and maybe for salaries too.

Things are looking up, at least a little bit.

A year ago, poor John Upcoder, dp manager for Makeshift Enterprises, Inc., was faced with long waits in line for high-priced gasoline, delays in getting equally outrageously priced printer forms, bacon at \$1.30 a pound, demands for salary increases which he couldn't hope to meet, and an energy crisis. Among other things.

This year, gasoline is easier to get, if no cheaper. So are printer forms. The ranchers tell us that pork is coming down. On top of that, John's gotten used to living with the crunch, with running used forms through the on-line console, and with getting by with slightly fewer people. And maybe, just maybe, there's a light at the end of the tunnel.

Inflation peaked out at 7-8% in 1975, and a little bit more money is coming back into Makeshift Enterprises' data processing budget too. There isn't a lot of money, maybe 10% overall, but at least there are going to be some funds to push into teleprocessing applications. And teleprocessing is what is going to get the extra dough, according to a recent DATAMATION survey of data processing budgets. There's typically 30% more put aside for central site communications gear,

35% more salted away for terminals, 40% more for remote site communications hardware and maybe 20% more for line charges. That's where the action will be in 1976.

There is some indication that the change in business that the hardware vendors will see will be better than the changes most individual installations will experience. The explanation for that comes from the big shops, specifically the big non-IBM shops for some reason. When increases in budget items are tallied, the average *percentage* increase earmarked for hardware is only a little over 10%, counting the smallest and the biggest computer centers. But when the hardware *dollars* for the roughly 400 shops surveyed for this article were compared, there was a +16.9% difference between 1975 spending and 1976 budgets—which for these particular shops was worth nearly \$21 million.

However it's measured, many budget items aren't going to see much of the increase. Extra money for mainframes, peripherals, and data entry equipment is being held between 5 and 7% overall, barely enough to cover rental and maintenance increases.

Not all sizes of shops, using all brands of equipment, in all industries are going to see the changes the same

way either. They spend their money somewhat differently. One of the uses made of the budget survey data was to determine how a dp budget in one industry differs from that in another, and to answer some even more basic questions.

How much does dp cost?

One of the questions was "How much does data processing cost?" The answer was that it's a noise-level expense, probably less than the phone bill for an average company. Measured as a percent of gross income, the dp budget for various industries stacks up like this:

DP Spending as a % of Gross Income	
Food stores	0.2%
Oil production	0.2
Chemicals	0.4
Construction	0.4
Primary metals	0.5
Furniture manufacture	0.7
Stone & glass products	0.7
Machinery manufacture	0.8
Transportation	0.8
Transportation products	0.9
Scientific instruments	0.9
Metal products	1.1
Electrical equipment & computers	1.2

Apparel manufacture	1.3
Wholesale trade	1.3
City & county government	1.4
Insurance	1.6
Medical	1.8
Utilities	2.0
Educational institutions	3.0

How those percentages are parceled out is answered for many of the industries by the budgets presented in Tables 1 and 2.

Does it cost more to go IBM?

A second question was "Does it cost more to be an IBM shop?" Finding the answer to that one is much tougher. If two shops spend the same amount on hardware, and only one of them uses IBM equipment, then the budget for the IBM shop might show the hardware as

a bigger percentage of total budget. The reasoning is that you would not be comparing two equal size shops with equal amounts of computing; the shop with the IBM cpu would actually be a "smaller" shop which just happened to be spending money on hardware at the same rate as the larger shop.

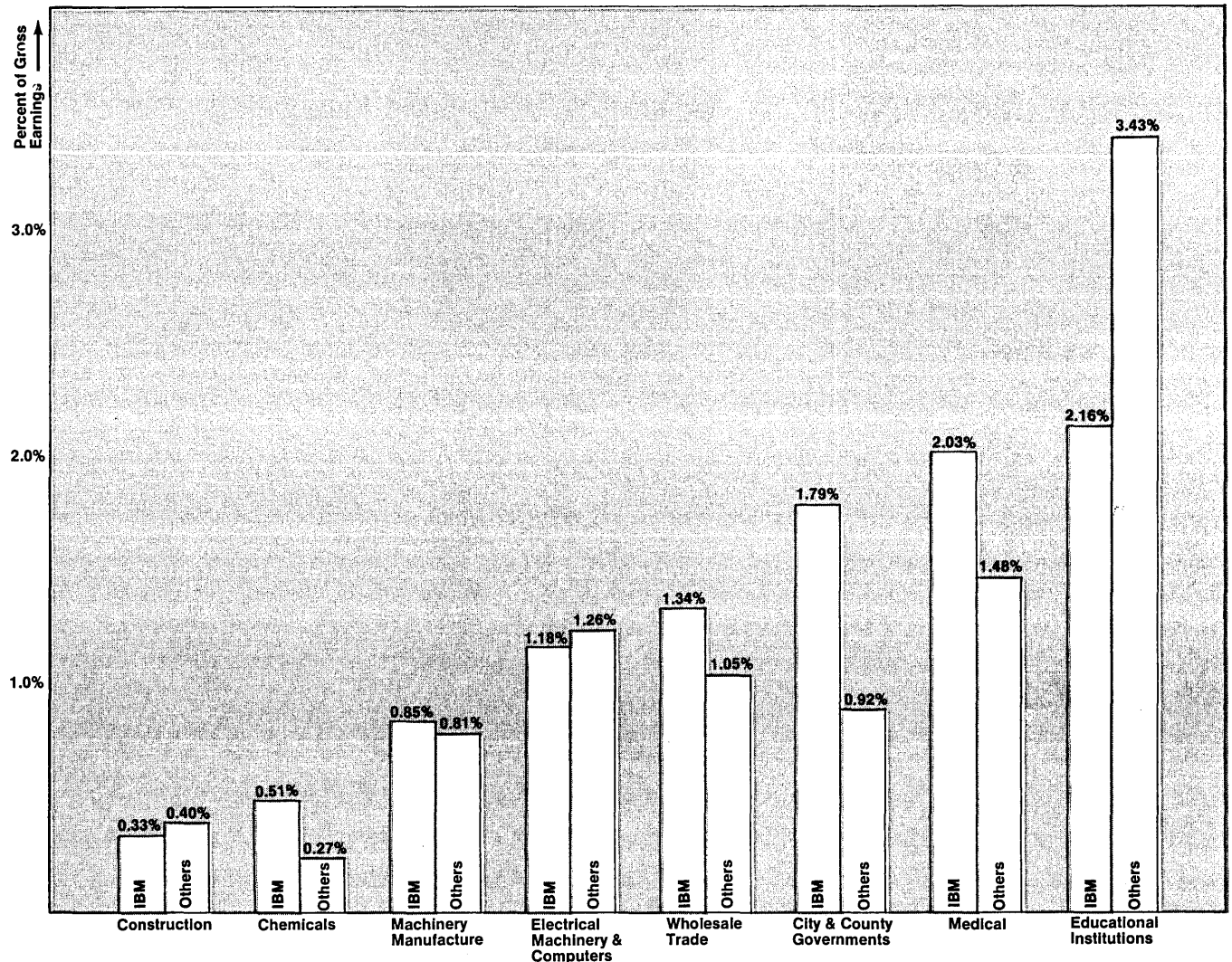
A counter argument might be that the IBM shop has a larger hardware budget percentage because it cuts down on the number of people needed and otherwise saves on costs. Well, perhaps, but that would not be true of cutting down on the workload and on the things you might use to measure workload, like media, terminals, and communication lines.

Both sides of the argument are illustrated in Tables 3 and 4, since IBM shops have been isolated from other shops in figuring the budget alloca-

tions. The numbers seem to favor the non-IBM shops except for shops spending between \$250,000 and \$999,999 per year on hardware, where the situation reverses. Does the reversal occur then because IBM's line is particularly cost-effective in that range—the 370/135, /145, and /158 section? Or do the abnormally high percentages for cpu expenditures for the non-IBM shops in that dollar category mean that the competition is poor there? There's no good side to that argument.

There may be another way to approach the problem, however. If we look at dp budgets as a percent of gross income for a company, will IBM shops show up as a higher absolute cost? The answer, shown in the bar chart for those few industries where our sample size was big enough to try it, is "yes, they often do." But are those users in

DOES AN IBM INSTALLATION SPEND MORE?



The answer is a qualified "yes." When IBM shops are compared with other installations on an industry by industry basis, the results suggest that companies using IBM equipment usually spend more on their data processing than do other companies. The one very notable exception on the chart is for Educational

Institutions, and its disparity may be at least partly explained by IBM's past practice of heavily discounting machines sold to schools. The chart cannot show, nor can any table of budget items, whether the installations spending more are getting more utility from their operations.

DP BUDGETS

those industries getting more function for more dollars? And what about the other industries? We simply don't know.

Where do I fit?

The budgets shown in Tables 3 and 4 are broken out by size of shop because it makes sense to do it that way. First, it's neat. More important, there really were clusters in our sample of budgets, and there really seem to be plateaus a shop reaches in growing. Our breakdown is done based on amount spent annually on hardware only. The result is eight categories.

To \$25,000/year IBM shops in this category are running System/3 Model 10s usually, while non-IBM installations may have minicomputers of various manufacture or, say, a Honeywell 2020 or Univac 9200. Budgets are simple, but they differ markedly between the two camps. IBM sites spend far more on hardware and software. Both shops spend on consultants, which is reasonable for their start-up nature, but the non-IBM shops spend far more. (Either the S/3 is as simple

Cutting Costs

"A four-day workweek." . . . an automotive parts division with multiple cpu's.

"I don't know, but we must do something."

. . . a university using a Xerox 560.

"Prayer." . . . an air freight forwarder with a Univac 1100.

The financial health of a data processing shop reflects the financial status of the company in which it operates, so not all shops are going to see the turnaround—if there is one—at the same time. The comments above come from managers who are still hard-pressed, who now must look beyond the conventional means to reduce budgets. Prayer may work for that man in the automotive industry, but there are three or four other things he should try first just to make certain he's checked all his secular options.

A data processing budget is a lopsided thing. It contains only three big expenditure items: people, hardware, and supplies. These items account for such a great portion of the budget that the other items can be largely ignored, short of wasteful extravagance.

When a crunch comes, managers react by reducing the use of sup-

plies, deferring new hardware acquisitions, and by cutting staff. Mostly cutting staff. When push comes to shove, the hardware stays and the people go.

It was that kind of year in 1975. Nearly one-third of all sites reduced staff to meet budgets last year. Heartless though it may seem, it works. And it was used to great effect in 1975.

Supplies usage has always been an obvious target for cost-cutting, and rising paper costs have made it an even more important one in recent years. Nearly every shop has done something to reduce paper use, by reducing the number of copies of reports, eliminating little used reports, or at least by cutting down on the use of expensive special forms. Lighter weight stock was tried, as was recycled paper (generally using the back side of the form), and even recycled cards

AVERAGE DP BUDGETS FOR SELECTED INDUSTRIES

	Banking (9 sites)	Construction (6 sites)	Education: universities (37 sites)	Education: school districts (6 sites)	Food processing (4 sites)	Food store chains (5 sites)	Gov't: city (10 sites)	Gov't: county (6 sites)	Gov't: state (4 sites)
PERSONNEL EXPENSES									
Salaries & fringe benefits	35.45%	49.51%	45.78%	48.41%	52.13%	49.77%	53.24%	52.84%	40.40%
Conferences, travel, training	0.94%	0.20%	0.79%	0.27%	1.07%	1.52%	1.00%	0.85%	0.82%
Other	—	—	0.05%	0.62%	0.01%	—	—	0.03%	0.13%
HARDWARE & MAINTENANCE	46.54%	40.13%	43.52%	38.03%	34.70%	33.33%	33.77%	35.16%	41.25%
MEDIA, SUPPLIES & ACCESSORIES	8.51%	7.42%	6.55%	7.53%	5.84%	11.65%	7.66%	5.11%	12.81%
PACKAGED SOFTWARE									
From mainframe vendor	0.83%	0.95%	0.83%	1.09%	2.17%	0.84%	0.78%	0.52%	0.84%
From independent	2.11%	—	0.28%	0.06%	0.48%	0.25%	0.55%	0.41%	2.65%
OUTSIDE SERVICES									
Time-sharing	0.52%	—	0.14%	—	0.69%	—	—	—	—
Batch processing	0.53%	0.12%	—	0.05%	—	—	0.02%	—	—
Remote batch	—	—	0.47%	—	—	—	0.35%	—	—
Microfilm processing	0.05%	0.26%	0.07%	—	—	0.21%	—	0.09%	0.26%
Keypunching	0.03%	—	0.05%	0.21%	0.12%	0.23%	—	0.38%	—
Facilities management	—	—	—	—	—	—	—	—	—
Consultants	0.01%	—	0.03%	—	0.54%	0.35%	1.45%	1.22%	—
Contract programming	0.08%	—	0.16%	—	—	0.58%	—	0.67%	—
Temporary help	0.08%	0.33%	0.14%	0.61%	0.12%	0.07%	0.49%	2.03%	—
VOICE & DATA LINES	3.66%	0.77%	0.99%	3.12%	2.13%	1.11%	0.41%	0.21%	0.54%
MISCELLANEOUS	0.66%	0.31%	0.15%	—	—	0.09%	0.28%	0.48%	0.30%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 1.

AVERAGE HARDWARE SPENDING FOR SELECTED INDUSTRIES

	Banking (9 sites)	Construction (6 sites)	Education: universities (37 sites)	Education: school districts (6 sites)	Food processing (4 sites)	Food store chains (5 sites)	Gov't: city (10 sites)	Gov't: county (6 sites)	Gov't: state (4 sites)
CENTRAL SITE									
Computers & memory	42.02%	39.90%	51.25%	59.41%	29.91%	32.35%	46.75%	35.06%	60.82%
Peripherals	32.08%	37.75%	30.29%	16.42%	45.82%	41.31%	25.74%	44.45%	24.85%
Data entry	4.30%	16.58%	8.60%	8.77%	7.87%	8.57%	13.11%	9.73%	9.08%
Communications gear	5.86%	1.08%	2.28%	7.22%	1.28%	5.74%	0.32%	6.10%	0.50%
COM equipment	1.59%	—	0.11%	—	—	—	0.12%	—	—
Microfilm readers, etc.	—	—	0.03%	0.23%	—	—	—	0.24%	—
Auxiliary equipment	0.08%	1.98%	2.12%	3.81%	0.80%	0.14%	1.47%	0.70%	0.55%
Other	4.60%	0.94%	—	3.07%	—	—	0.55%	0.92%	—
REMOTE SITES									
Computers	1.62%	0.83%	0.50%	1.07%	—	—	1.88%	2.32%	—
Terminals	7.63%	0.94%	3.80%	—	13.99%	11.89%	8.62%	—	1.66%
Communications gear	0.22%	—	0.69%	—	0.33%	—	0.38%	—	2.54%
Other	—	—	0.33%	—	—	—	1.06%	0.48%	—
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2.

(presumably no one used the backs of those).

More surprising, considering it didn't happen in other bad times to any great degree, has been the switch to 8 lines/inch printing. About 100 computer centers in our sample were using 8 lpi printing before 1975 was out. Apparently those who can afford the animosity it generates have already converted to it, however, as almost no more users will change over to 8 lpi in 1976, not according to what they tell us.

Another batch of installations is making the switch to microfilm; 40 or 50 sites indicated they had increased their microfilm use in 1975 or would increase it in 1976, or both. Film is still used by only a minority of computer centers, but its use—if not always its popularity—is still growing.

A third common place to look for cost reductions is in data entry. Key punches eat millions of expensive cards, and any kind of data entry is people intensive; that puts two strikes against the old kind of in-house data entry. Small groups of users are seeking solutions in key-to-

disc devices; a couple of sites are looking at key-to-tape or mark sense reading. But mostly the big swing is to on-line processing, a trend guaranteed to gladden the cockles of IBM's corporate heart. Putting terminals in user areas, especially display terminals, benefits the central dp budget in several ways: reducing central site staff, reducing forms use, and transferring some costs to the users.

Finally, there is a savings to be realized in acquiring the things you cannot do without in the least expensive way. Numbers of users are in the process of converting rentals to leases, or to lease purchases, or changing leases to purchases. Financing of hardware is in a state of flux, with about a quarter of all sites actually having switched their method of acquisition in 1975, or contemplating the switch for 1976.

Those few kinds of budget-slicing—reducing staff, cutting forms use, streamlining data entry, converting to teleprocessing, and refinancing—represent the conventional wisdom found in 1975 and 1976 budgets. After those have been tried, additional cuts are hard to find; maybe that man in Detroit is right. *

to operate as IBM says, or IBM salesmen are extremely knowledgeable and can provide the consulting service themselves.) The biggest increase in either kind of shop is in media costs, about 10%.

To \$50,000/year The most popular IBM computer in this class by far is still the System/3 Model 10, though 360/20s and /30s are found in our batch too. The opposition is made up of a team of NCR 101s, Honeywell 2020s, and a gaggle of others, including a Burroughs 1714, Singer 10, and a Xerox 530.

Budgets show far less for consulting, a more nearly normal balance between hardware and software costs, and more use of outside services. The non-IBM shops in this range are big enough to be software buyers, though they usually don't buy from their mainframe vendor. Since the bulk of the machines in the IBM group are the same S/3s as in the "under \$25,000" group, their software expenditures remain almost the same.

People expenses are going up for both groups, at about 13% for the IBM side and 19% for the others. Media percentages are also up. Outside key-punching charges are expected to be reduced by over 70% in the IBM shops,

Insurance (8 sites)	Mfg.: chemicals (10 sites)	Mfg.: electrical & dp equip. (11 sites)	Mfg.: machinery (12 sites)	Mfg.: primary metals (7 sites)	Mfg.: scientific instrument (7 sites)	Mfg.: stone & glass prod. (4 sites)	Mfg.: transport. products (5 sites)	Medical & health (16 sites)	Printing & publishing (7 sites)	Utilities (9 sites)	Wholesale trade (12 sites)
50.61%	48.53%	48.73%	46.96%	51.24%	53.98%	44.84%	45.35%	50.62%	51.00%	49.26%	39.48%
1.18%	1.26%	1.19%	1.00%	1.10%	1.00%	2.43%	0.81%	0.63%	0.56%	0.42%	1.08%
—	0.07%	0.58%	—	—	1.52%	0.34%	—	0.04%	0.03%	—	0.41%
38.49%	38.62%	32.68%	38.76%	35.62%	31.86%	33.50%	43.80%	34.91%	38.02%	36.26%	45.46%
3.93%	6.60%	7.91%	6.46%	7.73%	5.43%	10.84%	5.96%	6.66%	8.73%	9.97%	8.99%
0.39%	1.00%	0.10%	0.56%	0.54%	0.70%	1.01%	0.37%	0.72%	0.42%	0.66%	0.82%
0.80%	0.20%	1.18%	0.91%	0.40%	0.77%	0.93%	1.08%	1.47%	—	0.25%	0.88%
0.22%	0.32%	0.67%	0.46%	0.04%	0.77%	2.44%	—	0.06%	0.23%	—	0.10%
0.23%	—	0.20%	—	—	0.04%	—	—	2.47%	—	0.65%	0.34%
—	0.15%	2.84%	—	—	1.78%	—	—	—	—	—	—
0.35%	0.03%	0.33%	0.13%	0.04%	0.02%	0.27%	—	0.15%	0.34%	0.14%	0.72%
0.25%	0.46%	0.10%	0.20%	—	0.42%	0.02%	—	1.24%	0.07%	—	0.38%
—	—	2.12%	—	—	—	—	—	0.06%	—	—	—
0.03%	0.29%	0.40%	0.61%	—	—	—	0.38%	0.27%	—	1.36%	—
0.13%	0.07%	0.50%	0.35%	0.14%	0.24%	2.02%	0.59%	0.14%	0.18%	—	—
0.08%	0.14%	0.31%	0.02%	0.27%	0.08%	0.22%	0.12%	0.16%	0.04%	0.40%	0.30%
3.23%	2.02%	1.52%	1.24%	2.68%	1.39%	0.81%	0.83%	0.07%	0.36%	0.63%	0.96%
0.08%	0.24%	0.96%	0.02%	0.20%	—	0.33%	0.71%	0.33%	0.02%	—	0.08%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Insurance (8 sites)	Mfg.: chemicals (10 sites)	Mfg.: electrical & dp equip. (11 sites)	Mfg.: machinery (12 sites)	Mfg.: primary metals (7 sites)	Mfg.: scientific instrument (7 sites)	Mfg.: stone & glass prod. (4 sites)	Mfg.: transport. products (5 sites)	Medical & health (16 sites)	Printing & publishing (7 sites)	Utilities (9 sites)	Wholesale trade (12 sites)
35.46%	46.37%	40.39%	44.17%	38.61%	45.98%	34.65%	34.81%	48.70%	33.32%	44.54%	40.05%
37.02%	31.55%	35.65%	35.42%	31.58%	35.44%	37.29%	40.98%	31.03%	38.84%	42.91%	38.25%
10.61%	6.68%	9.62%	4.67%	14.07%	12.20%	10.51%	14.41%	11.82%	9.77%	6.27%	10.32%
2.91%	3.98%	2.98%	4.56%	1.04%	2.46%	3.76%	—	3.75%	1.05%	0.32%	1.42%
0.76%	—	1.00%	0.23%	—	0.32%	—	—	—	0.49%	0.18%	—
0.39%	—	0.19%	—	—	0.03%	0.78%	—	0.01%	0.49%	—	—
0.15%	1.07%	0.78%	3.40%	2.24%	3.38%	2.81%	0.86%	0.55%	3.70%	0.18%	0.11%
1.18%	0.35%	0.36%	1.08%	0.31%	—	0.50%	—	0.63%	2.05%	—	0.66%
0.16%	0.13%	2.80%	—	2.06%	—	2.81%	—	—	5.79%	2.27%	4.25%
10.19%	9.04%	6.23%	5.08%	10.09%	0.19%	5.36%	8.94%	3.22%	4.20%	3.33%	4.27%
0.99%	0.58%	—	1.39%	—	—	0.55%	—	0.29%	0.30%	—	0.57%
0.18%	0.25%	—	—	—	—	0.98%	—	—	—	—	0.10%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

DP BUDGETS

perhaps as these try to convert to "cardless" processing; and contract programming is up for them by as much as 50%, though few of the IBM shops (roughly one-fifth) really use outside programmers.

To \$100,000/year There are more 360/30s than System 3/10 computers in IBM shops of this range, and between them they seem to make up the vast majority of machines. The competition fields a vast array to fill the slot, including NCR 101s and 200s, Univac 9300s and 9400s, Burroughs 1700s, and the DEC PDP-10.

Budgets for this group show far more use of services, and the real solid beginnings of teleprocessing. In fact, computer installations five times as large spend very little more on teleprocessing as a percentage of budget (though they may have more complex systems). At least half of the shops this size budget for software packages, and a strange disparity occurs, at least in our sample. The non-IBM sites are putting away more and more funds for purchases of software from their

mainframe vendors; the IBM sites buy more from independents.

Big increases come in terminals for non-IBMers (up 78%) and communications lines (up 40%). In contrast, IBM centers are budgeting only 12% more for terminals, but about the same increase for phone lines.

To \$150,000/year IBM has a broad range of equipment to service this market with, including the 360/40, 370/125, and the System 3/15 (which often may have a System/7 alongside). The most prevalent machines in the other camp are Burroughs 2700s, NCR 200s, and small Honeywells. The differences between the IBM and non-IBM budgets are extremely slight, with one exception; the non-IBM computer departments are much more likely to be more heavily involved in the use of communications hardware and terminals.

Big budget changes come in software. IBM users expect to spend 21% more on IBM software in 1976, 41% less on independent packages. Managers at non-IBM sites are putting aside 33% and 66% more respectively. Although the budgets look very similar,

far more IBM customers buy software packages; the other shops must buy bigger ones.

IBM-based computer departments have generally cut down on outside services since 1975 while other computer departments have increased that use slightly. These moves have tended to bring their spending patterns closer together.

To \$250,000/year For \$250,000/year a manager can have a 370/125 or /135, a B4700 or 5700, Honeywell 2040 or 2050, or a Univac 9400 series cpu. He's sitting somewhere in mid-stream of all data processing, and probably has all or almost all the same headaches of managers with three times the money to spend. He's fairly likely to be using microfilm (especially in a non-IBM shop) and to have pretty intelligent devices at the user ends of his communication lines. Most often he's running a single cpu, but not always.

Big budget increases have been set for microfilm processing done offsite, in non-IBM budgets, while cuts are being made for temporary help. IBM budgets have swelled by 35% for terminals.

DP BUDGETS BY INSTALLATION SIZE (Determined by yearly hardware expenditures)

(Number of sites)	to \$25,000		to \$50,000		to \$100,000	
	IBM (9)	Others (8)	IBM (25)	Others (18)	IBM (31)	Others (21)
PERSONNEL EXPENSES						
Salaries & fringe benefits	53.14%	62.92%	50.97%	53.78%	47.13%	50.28%
Conferences, travel, training	0.87%	0.49%	0.87%	0.87%	0.85%	0.90%
Other	—	—	0.19%	0.58%	—	0.03%
HARDWARE & MAINTENANCE	32.43%	24.02%	38.73%	33.81%	38.74%	37.16%
MEDIA, SUPPLIES & ACCESSORIES	10.86%	8.32%	7.35%	6.73%	7.99%	7.60%
PACKAGED SOFTWARE						
From mainframe vendor	0.92%	0.13%	0.78%	0.13%	0.68%	1.01%
From independent	0.20%	—	0.29%	0.73%	1.09%	0.30%
OUTSIDE SERVICES						
Time-sharing	—	—	0.15%	—	0.26%	0.49%
Batch processing	—	1.02%	—	0.04%	0.15%	0.29%
Remote batch	0.55%	—	—	0.82%	—	0.62%
Microfilm processing	—	—	0.08%	—	0.10%	0.09%
Keypunching	—	—	0.04%	0.09%	0.12%	0.07%
Facilities management	—	—	—	—	0.82%	—
Consultants	0.19%	2.19%	—	0.03%	0.82%	—
Contract programming	—	—	0.08%	1.07%	0.27%	—
Temporary help	0.20%	0.59%	0.31%	0.13%	0.48%	0.24%
VOICE & DATA LINES	0.55%	0.32%	0.09%	0.54%	0.46%	0.80%
MISCELLANEOUS	0.09%	—	0.07%	0.63%	0.04%	0.12%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 3.

DP HARDWARE SPENDING BY INSTALLATION SIZE (Determined by yearly hardware expenditures)

(Number of sites)	to \$25,000		to \$50,000		to \$100,000	
	IBM (9)	Others (8)	IBM (25)	Others (18)	IBM (31)	Others (21)
CENTRAL SITE						
Computers & memory	51.67%	62.41%	36.40%	44.34%	39.81%	43.52%
Peripherals	26.84%	12.74%	46.84%	40.00%	38.34%	33.02%
Data entry	19.34%	16.29%	14.73%	13.32%	10.49%	13.84%
Communications gear	—	4.28%	—	0.85%	1.62%	1.85%
COM equipment	—	—	—	—	—	—
Microfilm readers, etc.	—	—	0.06%	—	—	0.07%
Auxiliary equipment	0.48%	4.28%	0.02%	1.34%	1.06%	2.02%
Other	0.49%	—	0.62%	0.15%	1.38%	0.81%
REMOTE SITES						
Computers	—	—	—	—	1.49%	0.33%
Terminals	—	—	1.33%	—	4.41%	4.35%
Communications gear	—	—	—	—	0.71%	0.19%
Other	1.18%	—	—	—	0.69%	—
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 4.

Central site communications hardware budgets have increased in both kinds of shops (29% in IBM shops, 26% in others).

To \$500,000/year IBM 370/135s and /145s make up the bulk of their brand of machines in this price class, while other users can step up to a Burroughs 6700 or CDC 6400. This category is one of the two classes in which the IBM hardware charge shows up as a smaller percent of the budget, and the workload, as measured by media, is higher too. There's a great deal of difference in nearly every aspect of the budgets for these groups, with the exception of their emphasis on terminals and communications. Another significant difference is the amount of funds allocated for remote batch processing by non-IBM users, though it doesn't take too much to throw off a small sample.

Good size increases are budgeted for software from the mainframers and from independents, for communications lines, and anything else dealing with terminals.

To \$1 million/year By the time a user is spending this amount each year, he is very likely to be responsible for mul-

multiple cpu's. In the case of IBM equipment he might be running a pair of 360/50s, or a 145 with an S/3. Other shops reporting listed a CDC 6400/Cyber 73 pair, a Univac 1106 with a 9300, and a Burroughs 3700 with a 1401. Single machines of 370/158 or Univac 1106 size can also run up totals like this.

This is the second class of equipment in which the IBM hardware percentages fall below those of the other users, and that happens in spite of the fact that expenditures for remote computers are much larger for the IBM managers. It might be argued that the overall expenditure is lower because of the emphasis on distributed processing (one of the effects of which is to disperse some of the costs of the operation among user departments), but the very biggest shops see a reverse phenomenon, distributed processing or not.

The IBM shops and the others are much different, at least the changes in their budgets are, suggesting that they are moving in different directions. Both kinds of shops are budgeting increases for off-site film processing (33% and 54%), and for communications lines

(roughly 15% each). But the IBM sites are upping budgets 33% and 44% for IBM and independent software, respectively, by roughly 40% for terminals and remote site communications gear, by 23% for central site communications gear, and by over 17% for people.

In contrast, the non-IBM shops are budgeting half the increase for people, about one-tenth the increase for terminals, and almost no increases for software.

Over \$1 million/year Welcome to the big time. The people who play in this league usually run multiple 370s or several machines of some other manufacture. When a single machine owner breaks into the game, it's because he's renting a fully-configured large scale machine, one at least the size of a 165.

These users spend proportionately less on personnel than any other size classification does, again very likely because they have distributed their machines and terminals to put the programmers and data entry personnel on the users budgets. In most other respects, their budget allocations look little different from other size shops.

to \$150,000		to \$250,000		to \$500,000		to \$1 million		over \$1 million	
IBM (22)	Others (17)	IBM (23)	Others (17)	IBM (25)	Others (9)	IBM (15)	Others (9)	IBM (15)	Others (6)
49.48%	50.62%	47.42%	45.53%	44.28%	46.46%	42.90%	42.37%	39.09%	41.73%
0.98%	1.57%	0.92%	0.59%	1.30%	0.62%	1.23%	0.46%	0.86%	0.94%
—	0.22%	—	0.19%	0.67%	—	0.16%	—	—	—
38.67%	35.87%	41.17%	38.66%	37.30%	41.99%	40.97%	45.24%	45.31%	36.90%
6.56%	6.79%	7.47%	6.72%	8.74%	5.14%	6.72%	6.30%	5.28%	7.23%
0.89%	0.33%	1.01%	0.39%	0.95%	0.20%	0.74%	0.40%	0.72%	0.54%
0.66%	0.65%	0.53%	0.42%	0.65%	0.07%	2.32%	0.22%	0.49%	1.07%
0.34%	0.06%	0.16%	—	0.86%	0.01%	0.33%	2.52%	0.42%	0.02%
—	0.05%	0.01%	2.06%	0.51%	—	—	—	0.45%	0.04%
0.86%	—	0.04%	—	0.43%	2.10%	—	—	—	—
0.11%	0.35%	0.06%	0.29%	0.18%	0.09%	0.18%	0.21%	0.20%	0.84%
0.17%	0.23%	0.15%	0.14%	0.31%	0.13%	0.10%	0.17%	1.81%	1.18%
—	0.95%	—	—	—	—	0.06%	—	0.06%	—
0.34%	0.16%	—	1.28%	0.64%	0.23%	0.83%	—	0.08%	—
0.35%	0.23%	0.09%	0.64%	0.70%	0.09%	0.79%	0.25%	0.42%	7.45%
0.05%	0.26%	0.04%	0.14%	0.16%	—	0.28%	0.16%	0.02%	0.30%
0.30%	1.54%	0.79%	2.88%	2.12%	2.84%	1.89%	1.35%	4.44%	0.92%
0.24%	0.12%	0.14%	0.07%	0.20%	0.03%	0.50%	0.35%	0.41%	0.84%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

to \$150,000		to \$250,000		to \$500,000		to \$1 million		over \$1 million	
IBM (22)	Others (17)	IBM (23)	Others (17)	IBM (25)	Others (9)	IBM (15)	Others (9)	IBM (15)	Others (6)
45.22%	37.87%	44.69%	48.22%	41.98%	43.39%	38.22%	41.10%	49.09%	51.68%
35.22%	36.63%	33.94%	26.57%	31.74%	35.31%	29.93%	37.19%	31.08%	21.05%
9.81%	7.50%	7.97%	8.78%	6.26%	5.74%	8.21%	3.50%	4.11%	2.30%
2.55%	5.53%	3.49%	2.92%	5.78%	2.87%	3.58%	1.87%	2.30%	1.13%
0.12%	0.63%	0.80%	1.29%	0.57%	—	3.28%	1.55%	0.67%	1.47%
—	0.08%	0.03%	0.35%	0.15%	0.07%	0.01%	0.02%	0.17%	—
1.27%	1.65%	1.20%	2.09%	0.83%	0.46%	2.20%	0.21%	1.50%	1.47%
—	1.35%	0.19%	0.46%	0.37%	1.41%	0.28%	0.88%	0.58%	1.61%
0.15%	0.72%	2.15%	1.00%	1.22%	—	2.67%	0.32%	3.35%	2.77%
5.15%	7.40%	4.56%	8.24%	9.82%	9.78%	10.34%	12.31%	6.11%	15.68%
0.51%	0.64%	0.98%	0.08%	0.90%	0.97%	0.92%	0.96%	0.79%	0.58%
—	—	—	—	0.38%	—	0.36%	0.09%	0.25%	0.26%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

DP BUDGETS

Again both shops are budgeting big increases for software (in the 30% range) for program products from computer vendors and others. Both camps will be going strong in terminals too, as the IBM group has put aside 27% more funds and the non-IBMers 42% more than last year.

One major disparity exists. While the IBM group has budgeted for an increase of over 8% for personnel, the non-IBM group is staying put (just over a 1% increase). Apparently the non-IBM group is holding off for hardware expansion first, for which it has increased the budget by over 17% compared to the IBM side's more conservative 10%.

After several pages of tables and numbers, another batch cannot be that appealing, but a few more column-inches worth can help cover a part that's pretty important to John Upcoder and all the members of his crew, the people side. Here, compared with

the changes for hardware, are what's happening to money set aside for salary increases and new hires. Since these two pieces, hardware and personnel, make up the bulk of any dp budget, the total changes are given too. Consider the numbers "typical" of the average installation, IBM or non-IBM.

<u>To \$25,000</u>	
Personnel	+ 6.3%
Hardware	+ 2.2%
Total budget	+ 4.9%
<u>To \$50,000</u>	
Personnel	+16.2%
Hardware	+ 5.1%
Total budget	+10.8%
<u>To \$100,000</u>	
Personnel	+ 9.3%
Hardware	+ 7.9%
Total budget	+13.1%
<u>To \$150,000</u>	
Personnel	+12.1%
Hardware	+13.6%
Total budget	+14.3%

<u>To \$250,000</u>	
Personnel	+11.0%
Hardware	+10.0%
Total budget	+ 9.9%
<u>To \$500,000</u>	
Personnel	+ 8.8%
Hardware	+12.4%
Total budget	+10.7%
<u>To \$1 million</u>	
Personnel	+13.2%
Hardware	+10.0%
Total budget	+11.9%
<u>Over \$1 million</u>	
Personnel	+ 4.8%
Hardware	+14.7%
Total budget	+12.2%

So as we claimed at the start, there may be a light at the end of the tunnel in terms of bigger budgets for John Upcoder and bigger salaries for his staff. But as all of these numbers in all of their variety will attest, it's still a matter of being in the right place at the right time. *

Generating Non-Random Numbers

Over 400 data processing installations across the U.S. and Canada contributed information for this survey. All sizes of installation were represented, from the one-man minicomputer operation performing scientific calculations for a lab, to some of the world's biggest centers with data processing budgets well over \$10 million per year. The installations were widely spread in terms of industry, geography, and brand name of computer used.

The shops cooperating in the study have two things in common. They are almost all represented by data processing managers who are members of DATAMATION's Computer User Panel, and they all use data processing in the conventional sense—processing words and numbers, not in process control applications.

Not all managers submitted their complete budgets to us, and not all complete budgets were used in compiling the tables included here. There are some strange cases where a computer department is upgrading from second generation equipment right up to a top-of-the-line 370/158 or its equivalent in one swell foop. Even these were used to some extent in cross checking other averages, but their transition from 1975 spending to 1976 budgeting was too unbalanced to allow for using the 1976 data in the budget compilations. In all, 270 sets of budgets were used, enough to give a good feeling for trends as well as

some confidence in the averages.

Of these 270, 165 are for sites where the primary computer was from IBM. Included are a smattering of 1800, 1130, and 1401 vintage mainframes, plus nearly equal parts of System/3, 360, and 370. Represented in the other 105 are samples from all major manufacturers in approximately the proportions they exist in the outside world.

The hard way, on purpose

A good deal of subjectivity has to come into reading other people's budgets, amortizing some one-time purchases, and interpreting marginal comments. After several years of such budget reading, we *think* we've learned how to do those things. Each budget was carefully checked for reasonableness, and in a few cases we found managers providing monthly expenses for one or two items amidst yearly numbers for other items. These things were fixed where the person's intent was clear; where there was any doubt, the case was kept out of the final stack.

In coming up with the numbers in the tables, it would have been easiest to add up all of the dollar expenditures for 1976 and divide by the number of budgets to come up with an average percentage. Though this is an easy method, it allows the big guys to push the little guys around; the averages get bent. We didn't do it that way. Instead, the percentage of total expenditure was calculated for each budget item

and these were averaged. As a result, the numbers shown are as useful for the bottom end of a range as they are for the top end. The same kind of arithmetic was used in figuring percentage differences from one year to another, and in computing average budgets by industry.

Reading the tables takes the same kind of care as compiling them. Just as there is no place to find the "average" family with 1½ children—or whatever the number is—there is no installation whose computer spending will directly correspond to one of these sets of numbers. If an item is shown to be 0.1% of a total budget (which happens to be about right for microfilm processing done by outside vendors, for instance), it is quite likely that 10% of the computer departments in the sample actually spend 1% of their monies on film processing while the other 90% spend nothing at all. Every site is presumed to spend money on data entry, computer mainframe, peripherals, media, and people. Beyond those, the selections from the menu, especially in small sites, are spotty.

The purpose of the exercise was to make it easy for a user to directly compare his data processing expenditures with those of other installations his size, and with those of other installations in his industry. The method used works well. The numbers produced have not been massaged to "prove" any pet theories. We invite you to make the comparisons. *

Rent, Lease, or Buy?

by Ted Szatrowski

All things being equal, present value financial analysis can help in making the most economical decision.

Making the decision to acquire a computer system may be relatively simple compared to deciding *how* to acquire it, i.e. whether to rent, lease, or buy. Too often the financial options are not understood fully and the most economical decision may be overlooked. By using the technique of present value financial analysis, the underlying details that lead to the rent, lease, or buy decision may be uncovered, thereby helping the manager make the best decision for his company's situation.

However, before getting to these details, a summary of the typical rent, lease, and purchase contracts would clarify the options.

Rental contract

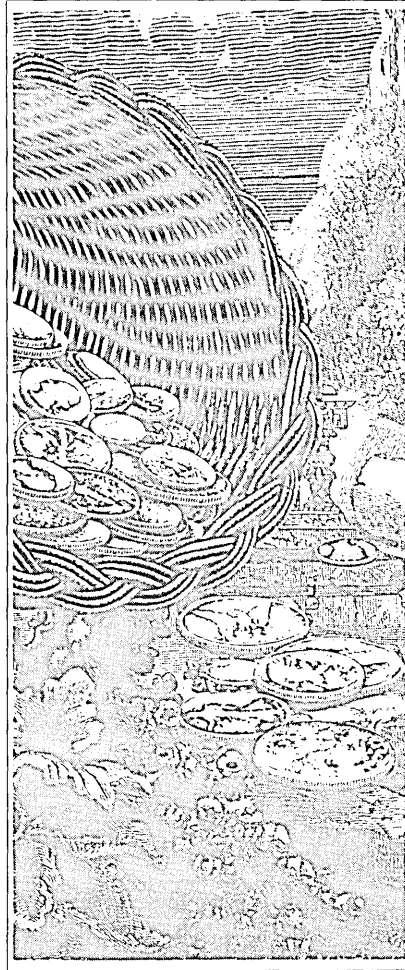
Under the rental agreement, the user is liable for a prepaid fixed minimum payment. The agreement can be terminated by a minimum of 90 days prior written notice. Under this agreement, the risk of ownership remains with the vendor. The user has no obligation for such expenses as insurance and maintenance; however, he is responsible for paying taxes that may be levied on the rental contract by the state or local government. These include state and local privilege taxes, excise taxes, and sales tax (if any), but not personal property taxes.

Extra shift use, over and above the standard monthly base hours, represents an additional cost to the user.

Investment tax credit is also a consideration under a rental contract and can be passed to the user. However, since investment tax credit is based on the writeoff period for equipment by the manufacturer—usually four years—only 3⅓% is allowed under current IRS regulations.

Rental contracts find a high level of usage in the computer industry due to a number of factors: (1) low risk; (2) financial leverage; (3) equipment obsolescence; (4) flexibility.

Flexibility is probably the best argument for a rental contract. When the user has a continually varying mix of jobs that require different configura-



tions of equipment, it is to his advantage to be able to move equipment rapidly in or out of the installation without penalty charges.

Lease contract

The lease contract contains characteristics of both the purchase and rental contracts. In the computer industry, lease contracts are available through "third parties," or directly from the vendors. The third party company will purchase the equipment from the manufacturer and lease it to the user. The terms can be flexible and negotiable, depending on the risk to the lessor; thus the longer the duration of the lease, the more favorable the

terms and conditions possible for the user. The lessor (not the user) must rely on the cash inflow (depreciation tax deduction plus cash payments) and the residual value of the equipment to cover his costs. If the term of the agreement is of relatively short duration, the lessor must look forward to the problem of finding a second user.

Lease contracts fall into two general categories: (1) full payout or financial leases; (2) non-full payout or operating leases.

In the full payout or financial lease, the user (or lessee) essentially has the rights of purchase and assumes the risks normally assumed by the purchaser. The legal title, however, is retained by the lessor. The lessee's payments are designed to recover for the lessor:

1. The total cost of the equipment
2. The cost of money required to purchase the equipment by the lessor
3. A contract fee, normally about 0.5% or more.

At termination, the lessor still owns the equipment, although the lessee will normally have the option to purchase. The full payout lease is normally used to obtain financial benefit for the lessee, for example, lower payments over the useful life of the computer as compared to a rental.

The non-full payout or operating lease has many characteristics of a rental contract. The essential difference is the length of commitment. The term of this contract generally starts with a minimum commitment of two years, and can go as high as ten. Monthly payments average 10% to 30% less than the manufacturer's rental price.

Generally speaking, a lease contract (either financial or operating) is the most flexible of all contracts available to a user of computer equipment. The user can negotiate with the lessor for terms most beneficial to both parties. These negotiations are somewhat unusual since both parties, by and large, are aware of each other's financial needs and requirements. Some items

RENT, LEASE . . .

that affect the negotiations are: (1) maintenance; (2) depreciation; (3) investment tax credit; and (4) property taxes and insurance.

One of the two parties must pay for maintenance, and the cost is the same for either party. There may be local advantages for one party or the other to assume the maintenance obligation; for example, the user may already have a maintenance contract with the manufacturer for other computer equipment and could perhaps extend it to include the leased equipment. Alternatively the lessor may have a national contract with the maintenance organization.

In addition, the investment tax credit is a direct tax benefit for one of the parties. In certain cases, it could benefit one corporation more than another. For example, if one of the companies may be operating in a loss period, it may not need the investment tax credit since its tax would not be as large as in other periods. Another case might occur when a company makes massive investments, say an airline in the years it purchases new planes; such investments may exhaust the potential investment tax credits. In such cases, by relinquishing the investment tax credit, the user may be able to negotiate a lower lease price.

There are some additional tax considerations to be taken into account in a leasing arrangement. For a transaction to be acceptable as a true lease, i.e. not as an installment purchase contract, the IRS requires the lessor to assume a significant risk both during the lease term and in the period after its expiration. According to IRS regulations, the ideal lease arrangement would have characteristics among which are these:

1. Lease payments would be approximately the same throughout the basic lease term.
2. Purchase options are not at fixed amounts but are based on fair values at the end of the lease term.
3. The estimated fair market value of an asset at the end of the lease term is at least 10% of the asset's original cost.
4. The lease term is less than 80% of the asset's useful life.

Also important in the financial analysis of the lease contract is the unlimited availability of the equipment for the lessee. There are also no overtime use payments associated with a lease contract.

IBM plans

IBM offers three variations to the standard rental and lease plans: (1) a

fixed term plan (FTP); (2) an extended term plan (ETP); and (3) a term lease plan (TLP).

Under the fixed term plan, only peripheral devices are available. The contract is written for a minimum of 12 months and a maximum of 24 months with available extensions. The longer the term, the lower the monthly charge. There are no extra shift costs in this contract, and the contract period may be extended any number of times.

The extended term plan is a lease arrangement for 24 months. The cost is 16% less than a rental contract and there are no charges for extra shift usage. Again, only peripheral devices are available under this extended term plan.

A purchase option may be exercised under both the ETP and FTP.

The term lease plan applies only to CPU's and is written for a four year period. The monthly payments are the same as under the rental contract. The contract does, however, provide for a once per year change in monthly charges, with specific limitations on the net change. There are no extra shift charges. Purchase options and contract extension periods are available.

Purchase contract

Under a purchase contract, the purchaser bears all the risks of ownership including insurance, taxes, and equipment obsolescence.

By and large, the purchaser will obtain the same services and support from the vendor that are available under a lease or rental agreement. There are, however, three important factors affecting this financial decision:

1. Full payment must be made to the vendor upon delivery of the equipment.
2. A separate maintenance service contract must be negotiated since service of the equipment is not considered part of the purchase price.
3. Insurance premiums and appropriate taxes must be paid on the asset.

Assigned values of depreciation can substantially affect the cash flow analysis for a purchased system. The buyer of any expensive capital equipment should be acquainted with the optimum depreciation schedules allowed by law. In addition, the future projected tax position in the corporation should be considered in order to be able to calculate its after-tax cash flow.

The assignment of a residual (or market) value to the equipment at some future date is probably the most difficult estimate to make in the financial analysis. If the residual value is too

optimistic, losses are experienced at resale or trade-in time. On the other hand, assigning a zero dollar value as residual may be entirely unrealistic. Under such circumstances, it may be advisable to assign both the most pessimistic and the most optimistic value for residual, with analysis under both conditions. Statistically it may be possible to determine the most probable outcome under these circumstances.

Present value method

By using a technique called the present value method, a comparison can be made of choices to purchase, lease, or rent a particular computer system configuration. By this method, a cash flow (favorable or unfavorable) in several future time periods is made equivalent to a single receipt or expenditure of cash in the present time period. The calculations involved depend on the interest rates. (Tables 3 to 7 present the results of calculations based on this method for purchase, lease, or rental of the same computer configuration at four interest rates.)

As an illustration of the present value technique, rental, for example, involves the obligation to expend money over several future time periods. The periodic future expenditures of, say, \$1,000 per month for 96 future months has a present value of something less than \$96,000. This "something less," as calculated by the present value method, depends on the interest rate.

Another way of thinking about it is that one could deposit \$96,000 in a savings and loan association, pay out \$1,000 a month for 96 months, and still have a fair amount of money left over because of the interest earnings over the eight-year period. (Similar considerations, of course, apply to leasing arrangements.)

On the other side of the coin, when equipment is purchased, there is an immediate cash payout in the present period—but there is a deferred positive cash flow built into the purchase of capital equipment because of corporate income tax. In addition to the investment tax credit in the first year, depreciation produces tax savings. Purchased capital equipment of any kind may be depreciated, for example, over eight future years. If the depreciation is \$100,000 a year, the company's profits would be reduced by that amount per year (since depreciation is an expense). Assuming that the corporation pays 48% corporate income tax on its profits, the \$100,000 depreciation reduces the company's cash payout to the U. S. government in future years by \$48,000 per year. (There would also be, of course, additional savings on state and local taxes.)

Note that for the equipment itself, all the cash is expended at the time of the purchase, and there is no negative cash flow in future years associated with the depreciation expense (which is an accounting entry).

The \$48,000 tax savings in each of eight future years reduces the purchase cost, by present value theory, to something less than \$48,000 times eight. Again the "something less" depends on the rate of interest.

Table 1 presents present value factors, or conversion factors to convert future cash flows into present values. They are factors that when multiplied by an amount to be paid in the future, give the present discounted value of those funds. For example, at 6% interest, \$1,000 to be paid in one year is equivalent today to \$943.40; \$1,000 to be paid in two years is equivalent today to \$890, etc. If instead of money to be paid out, it is money to be received (or figured in tax deductions), then again a \$48,000 tax savings a year from now (at 6%) is worth \$48,000 x .9434, or \$45,283.20 today.

(The factors shown in Table 1 are for interest rates of 6%, 8%, 10%, and 12%, and from one to eight years. These factors are applied to the cash flows shown in Tables 3 to 7 in order

to arrive at the present value equivalent at each of the interest rates used.)

The financial analysis

Table 2 describes the computer system configuration under consideration, a typical IBM 370/145 system with components. The purchase column shows the manufacturer's new purchase price for each unit. (Prices may vary depending on options and price changes, but these prices can serve for illustration.) The "true rental" is arrived at by subtracting the maintenance cost from the monthly rental. (Maintenance costs on a particular piece of equipment are directly related to the complexity of the unit and the frequency of preventive maintenance.)

The ratio analysis (purchase price divided by "true rental") is the number of rental payments equal to the full purchase price. This ratio may provide a clue regarding the manufacturer's depreciation schedules. In addition, it may indicate a pricing policy encouraging purchase on the one hand (low ratio) or rental on the other (high ratio).

The present value method of analysis carried out here is presented for five possibilities: (1) manufacturer's rental plan; (2) third party lease: full payout; (3) third party lease: non-full payout;

(4) purchase with zero residual; (5) purchase with residual.

While the data in Tables 3 to 7 show analyses through eight years, they can be extended for any time period using similar techniques.

1. Manufacturer's rental plan

Table 3 presents the analysis for the manufacturer's rental plan and projects the cash flow for eight years. The total monthly rental from Table 2 (\$25,141) is multiplied by 12 to give a total yearly figure of \$301,692. Tax savings for year zero is the investment tax credit of 3 1/3%; for the other years, it is 48% of the yearly rental, deductible as part of the corporate tax. This leaves an after-tax cash flow of \$152,880 for each year (except for year zero).

Ordinarily the present discounted value for year one at say 6% is calculated by multiplying the after-tax cost by the present value factor of .9434 (see Table 1); the figure for year two is obtained by multiplying the after-tax cost for that year by the present value factor of .89 for year two; etc. In other words, each year's present discounted value is obtained by multiplying that year's after-tax figure by that year's present value factor. Each calculation results in the present value cost for that year discounted at the particular inter-

PRESENT VALUE FACTORS									
Years:	0	1	2	3	4	5	6	7	8
Present Value Factor @ 6%	1.0000	.94340	.89000	.83962	.79209	.74726	.70496	.66506	.62741
Present Value Factor @ 8%	1.0000	.92593	.85734	.79383	.73503	.68058	.63017	.58349	.54027
Present Value Factor @ 10%	1.0000	.90909	.82645	.75131	.68301	.62092	.56447	.51316	.46651
Present Value Factor @ 12%	1.0000	.89286	.79719	.71178	.63552	.56743	.50663	.45235	.40388

Table 1. These factors are used to convert future cash flows at particular interest rates to present values. For example, at 6% interest, \$1,000 to be paid in one year is equivalent to \$943.30 today.

IBM 370/145 COMPUTER SYSTEM					
EQUIPMENT DESCRIPTION	COST			RATIO ANALYSIS	
	Purchase	Rental/Monthly	Monthly Maintenance	True Rental (Less Maintenance)	Purchase + True Rental
370/145 Central Processing Unit (256 K)	\$715,125.00	\$14,932.00	\$1,161.00	\$13,771.00	51.9
1403-N1 Printer	34,350.00	885.00	199.00	686.00	50.0
2821-1 Control Unit	40,190.00	1,060.00	49.00	1,011.00	39.7
1419 Reader Sorter	124,470.00	2,714.00	252.00	2,462.00	50.5
2540-1 Card Reader/Punch	32,930.00	710.00	124.00	586.00	56.2
2314-B1 Disc Storage Control	61,570.00	1,620.00	62.00	1,558.00	39.5
2319-B1 Disc Storage	38,250.00	1,000.00	210.00	790.00	48.4
3803-1 Tape Control Unit	34,430.00	900.00	106.00	794.00	43.4
3420-3 Tape Unit (3)	50,520.00	1,320.00	195.00	1,125.00	44.9
TOTAL	\$1,131,835.00	\$25,141.00	\$2,358.00	\$22,783.00	49.6

Table 2. The IBM 370/145 configuration presented here is the one used for the calculations. The prices shown are typical and will vary depending on optional equipment and manufacturer's price changes.

Present Value Cash Flow Analysis for MANUFACTURER'S RENTAL CONTRACT (Assuming a 370/145 configuration at \$1,131,835)									
Year:	0	1	2	3	4	5	6	7	8
Rental Payments	—	301,692	301,692	301,692	301,692	301,692	301,692	301,692	301,692
Tax Savings	(37,728)*	(144,812)	(144,812)	(144,812)	(144,812)	(144,812)	(144,812)	(144,812)	(144,812)
After-tax Cash Flow	(37,728)*	156,880	156,880	156,880	156,880	156,880	156,880	156,880	156,880
Present Value Cost @ 6%	965,680	152,439	143,810	135,670	127,990	120,745	113,911	107,463	101,380
Present Value Cost @ 8%	899,854	151,068	139,878	129,516	119,922	111,039	102,814	95,198	88,147
Present Value Cost @ 10%	841,050	149,748	136,134	123,758	112,506	102,279	92,981	84,528	76,844
Present Value Cost @ 12%	788,344	148,474	132,566	118,362	105,681	94,358	84,248	75,221	67,162

*Investment tax credit of 3 1/3%

Table 3. By the present value cash flow analysis, the total costs for eight years of renting the 370/145 configuration are discounted at four different interest rates to their equivalent value

as of "today." Rental for eight years, not surprisingly, costs more than leasing or purchase.

RENT, LEASE . . .

est rate as of "today."

In order to calculate accurately the present value cost for rental agreements at each chosen discount rate, it would be necessary to calculate the cash flows on a month-to-month basis throughout the year, since rental payments are processed monthly. However, for the sake of simplicity while still maintaining a reasonable degree of accuracy, the present value cost is calculated for this table using an averaging technique. The yearly after-tax rental for any specific year is multiplied by the present value factor for that year (see Table 1). (This calculation yields a present value cost as if the entire payment were made at the end of the year.) The after-tax rental is also multiplied by the present value factor for the previous year. These two results are then averaged. This averaging technique approximates on a yearly basis the monthly present value figures; it yields a maximum error rate of 1.5% when compared to monthly cash flows within any year. (This same method is used for the full payout and non-full payout lease contracts below.)

These present value costs for each of eight years are summed to arrive at a total present value cost. From this number, the 3 1/3 % investment tax credit—\$37,728 in this case—is subtracted in order to arrive at the final present discounted value for eight years at each of the four discount rates, shown in the year zero column. These numbers can be compared with those from Tables 4, 5, and 7. It should

come as no surprise that rental ultimately costs more than purchase of the computer configuration.

2. Full payout lease

In the full payout lease agreement data (Table 4), the pre-tax lease payments are constant throughout the life of the lease. These figures were obtained by utilizing typical amortization schedules for the duration of the lease. The payment is applied first to the interest on the principal balance outstanding, and the remainder to the principal.

Insurance and property taxes were estimated to be 1.2% of the depreciated value of the equipment. Maintenance cost per year is \$28,296 (or 12 times the monthly rate—see Table 2). The total of the lease payment, insurance and property tax, and maintenance is the pre-tax cash flow. Of this figure, 48% is deductible as part of the corporate tax, and is entered in Table 4 as "tax savings." The after-tax cash flow is then the difference between the pre-tax cash flow and the tax savings; and it is on the basis of the after-tax cash flow that the present value costs are calculated.

The present value costs are obtained by the same averaging technique used for the rental figures. From the totals at each discount rate for eight years, the 10% investment tax credit, or \$113,184, is subtracted to arrive at the present discounted value as of "today" for each of the four rates.

3. Non-full payout lease

The non-full payout lease utilizes a decreasing lease payment schedule over time. Each year's payments are reduced by 1 1/2 % compared to the

previous year. The base rate for the first year is estimated to be 90% of the typical rental fee under a manufacturer's rental agreement. The actual values depend on the number of years in the non-full payout lease agreement (see Table 5).

With the non-full payout lease, in contrast to the full payout lease arrangement, the lessor absorbs the maintenance and the insurance and property tax. Otherwise, the lease payments, the tax savings (again 48%), and after-tax cash flow are all similar entries in Table 5 to those in Table 4. Again it is from the after-tax cash flow that the present value costs are calculated; and these calculations are done in exactly the same way as for the full payout lease.

Table 6 shows a typical lease discount available from a third party lease company as a percent of the total IBM rental contract. The figures in this table are used to calculate the lease payments for a non-full payout lease contract.

4. Purchase with zero residual

Table 7 presents the analysis of a purchase contract. The calculations are somewhat different from those above. An initial cash outlay of the total purchase price of the equipment is made at time of delivery. The investment tax credit is directly applicable to the current tax liability. It can be immediately subtracted from the tax obligation and has the effect of directly decreasing the total cash outlay by the total amount of the tax investment credit. Under present U.S. tax laws, a business purchasing a new asset may write off 10% of that asset against

Present Value Cash Flow Analysis for
THIRD PARTY LEASE: FULL PAYOUT
(Assuming a 370/145 configuration at \$1,131,835)

Year:	0	1	2	3	4	5	6	7	8
Lease Payments	—	206,802	206,802	206,802	206,802	206,802	206,802	206,802	206,802
Insurance & Property Tax (1.2% of Value)	—	13,582	12,414	11,124	9,699	8,125	6,387	4,467	2,344
Maintenance	—	28,296	28,296	28,296	28,296	28,296	28,296	28,296	28,296
Pre-tax Cash Flow	—	248,680	247,512	246,222	244,797	243,223	241,485	239,565	237,442
Tax Savings	(113,184)*	(119,366)	(118,806)	(118,187)	(117,503)	(116,747)	(115,913)	(114,991)	(113,972)
After-tax Cash Flow	(113,184)*	129,314	128,706	128,035	127,294	126,476	125,572	124,573	123,469
Present Value Cost @ 6%	698,675	125,653	117,984	110,725	103,853	97,344	91,178	85,333	79,789
Present Value Cost @ 8%	645,889	124,523	114,758	105,703	97,306	89,519	82,296	75,594	69,374
Present Value Cost @ 10%	598,814	123,435	111,687	101,003	91,392	82,456	74,425	67,121	60,479
Present Value Cost @ 12%	556,406	122,385	108,759	96,600	85,751	76,071	67,435	59,731	52,858

*Investment tax credit of 10%

Table 4. A full payout leasing arrangement is more economical than the non-full payout lease or rental.

Present Value Cash Flow Analysis for
THIRD PARTY LEASE: NON-FULL PAYOUT
(Assuming a 370/145 configuration at \$1,131,835)

Year:	0	1	2	3	4	5	6	7	8
Lease Payments	—	271,522	266,997	262,472	257,946	253,421	248,896	244,370	239,845
Tax Savings	(113,184)*	(130,331)	(128,159)	(125,987)	(123,814)	(121,642)	(119,470)	(117,298)	(115,126)
After-tax Cash Flow	(113,184)*	141,191	138,838	136,485	134,132	131,779	129,426	127,072	124,719
Present Value Cost @ 6%	741,789	137,195	127,274	118,033	109,431	101,426	93,976	87,045	80,593
Present Value Cost @ 8%	687,062	135,961	123,792	112,679	102,534	93,273	84,821	77,110	70,076
Present Value Cost @ 10%	638,114	134,773	120,479	107,670	96,193	85,915	76,709	68,468	61,091
Present Value Cost @ 12%	594,183	133,627	117,321	102,975	90,357	79,261	69,504	60,929	53,393

*Investment tax credit of 10%

Table 5. In the non-full payout leasing arrangement, the lessor absorbs the maintenance costs and the insurance and property

taxes. The total cash flow is higher than for the full payout lease.

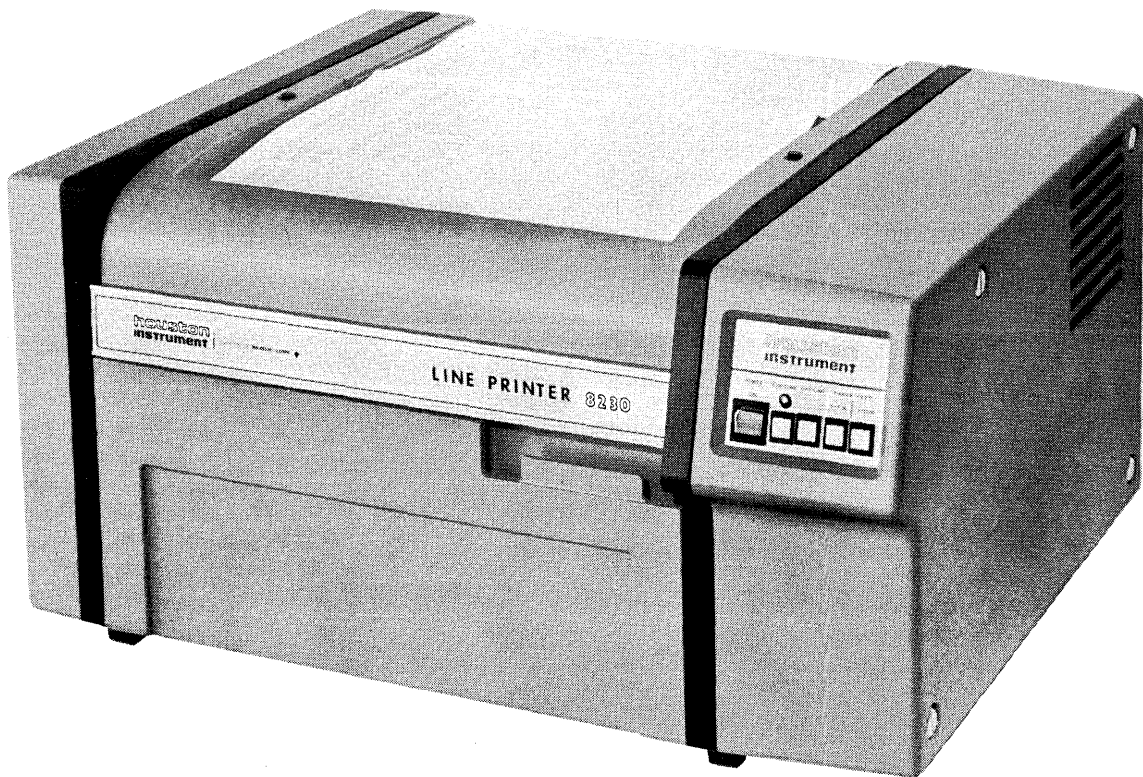
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RENT, LEASE . . .

taxes in the year the purchase is consummated.

Depreciation is calculated by using the "sum-of-the-years digits method," one of the common ways of calculating depreciation. The amount of depreciation is derived by summing together each year of the estimated life of the equipment and dividing this sum into each year in reverse order; this number is then multiplied by the asset value. For example, assume a \$1,000 asset with a three year depreciation cycle. The sum of the years is six: 1 + 2 + 3 = 6. The first year's depreciation would then be equal to $\frac{1}{6} \times \$1,000$; the second year's, $\frac{2}{6} \times \$1,000$; etc.

Alternate methods of calculating depreciation are the straight-line method (an equal amount of depreciation for each year of useful life), or some form of declining-balance (the remaining book value of the asset is multiplied by a given depreciation rate each year). Each company making a financial analysis should apply a depreciation schedule consistent with its accounting practices.

Depreciation is assumed to take place at the end of each year. The depreciation figures in Table 7 illustrate an equivalent of a cash outflow for tax purposes. It should be noticed that the depreciation is heavily weighted during the early years due to the depreciation technique used.

The insurance and property tax are calculated by taking 1.2% of the value of the equipment at the beginning of each year. This is an estimated value. In year one, the value is assumed to be the total purchase cost, while in year two, it is assumed to be the purchase cost less the first year's depreciation.

Maintenance is a constant yearly expense determined by the manufacturer's quoted rates. These costs are subject to change, and in periods of inflation, they of course will increase. The results of the present value analysis will be more realistic if this possibil-

ity is considered. For the sake of simplicity, constant yearly maintenance costs are assumed in this analysis.

(Maintenance invoices are normally paid monthly. Therefore, the cash out-

lays do not take place at year end as assumed but rather in 12 equal increments during the year. However, since the total cost of maintenance is relatively small in comparison to deprecia-

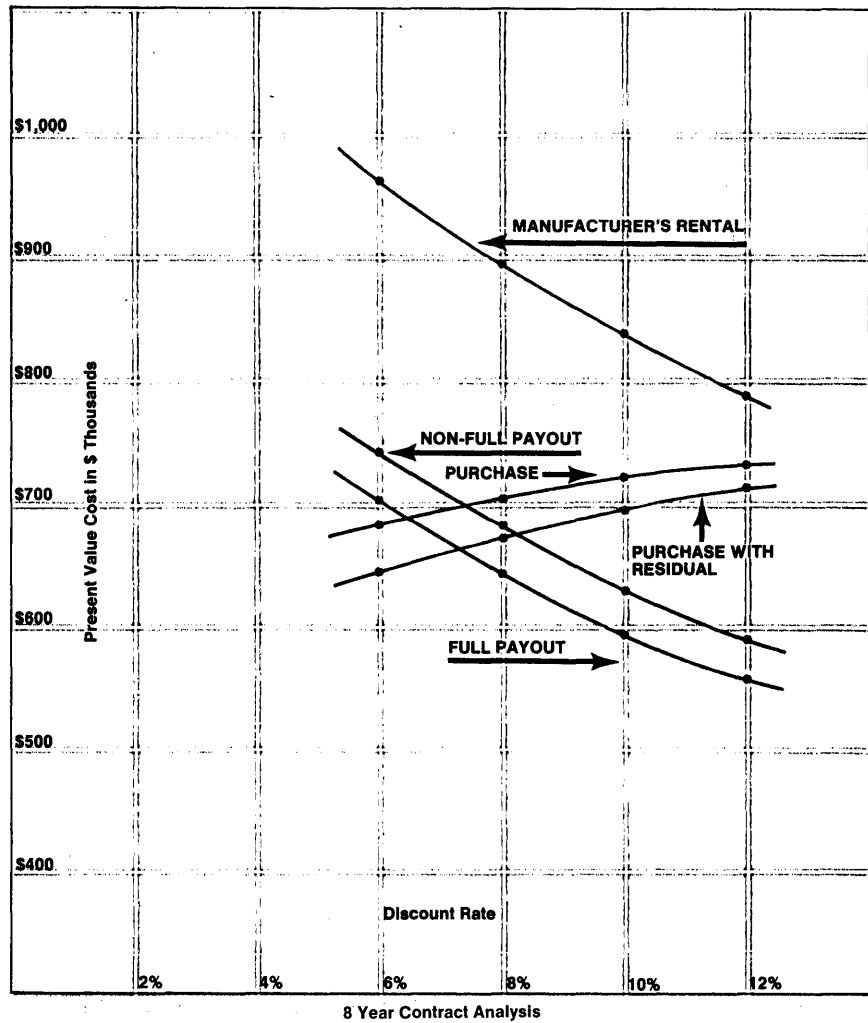


Fig. 1. Depending on the interest rates, one method of obtaining a computer configuration may be ultimately more economical than another. At higher rates of interest, lease arrangements seem to be most economical; at lower rates, purchasing the equipment can save in the long run.

LEASE PAYMENT SCHEDULE AS PERCENT OF IBM ANNUAL RENTAL DOLLARS

YEAR	PERCENT	YEAR	PERCENT	YEAR	PERCENT
1	90%	4	85.5%	7	81%
2	88.5%	5	84%	8	79.5%
3	87%	6	82.5%		

Table 6. The typical lease discounts available from a third party lease company such as in this schedule are used to calculate a non-full payout lease arrangement.

Present Value Cash Flow Analysis for PURCHASE (WITH ZERO RESIDUAL VALUE) (Assuming a 370/145 configuration at \$1,131,835)

Year:	0	1	2	3	4	5	6	7	8
Purchase Payment	1,131,835	—	—	—	—	—	—	—	—
Depreciation	—	251,518	220,078	188,639	157,200	125,760	94,320	62,880	31,440
Insurance & Property Tax (1.2% of Value)	—	13,582	10,563	7,922	5,659	3,772	2,263	1,131	377
Maintenance	—	28,296	28,296	28,296	28,296	28,296	28,296	28,296	28,296
Pre-tax Cash Flow	1,131,835	41,878	38,859	36,218	33,955	32,068	30,559	29,427	28,673
Tax Savings	(113,184)*	(140,830)	(124,290)	(107,931)	(91,754)	(75,757)	(59,942)	(44,307)	(28,854)
After-tax Cash Flow	1,018,651	(98,952)	(85,431)	(71,713)	(57,799)	(43,689)	(29,383)	(14,880)	(181)
Present Value Cost @ 6%	679,902	(93,351)	(76,033)	(60,212)	(45,782)	(32,647)	(20,714)	(9,896)	(114)
Present Value Cost @ 8%	697,343	(91,623)	(73,243)	(56,928)	(42,484)	(29,734)	(18,516)	(8,682)	(98)
Present Value Cost @ 10%	713,302	(89,956)	(70,604)	(53,879)	(39,477)	(27,127)	(16,586)	(7,636)	(84)
Present Value Cost @ 12%	727,940	(88,350)	(68,105)	(51,044)	(36,732)	(24,790)	(14,886)	(6,731)	(73)

*Investment tax credit of 10%

Table 7. The cash flow analysis for a purchase contract differs essentially from such analyses for rental or lease in that pros-

pective tax savings rather than cash outflow are discounted to present values.

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RENT, LEASE . . .

tion, the present value calculation was made as if the maintenance is paid at yearend. There will be a slight downward cost bias in the purchase alternative and purchase with residual alternative as a result of this methodology.)

The actual pre-tax cash flow is the sum of the insurance and property tax and the maintenance; the depreciation, although considered an expense, is not an actual outflow of cash. However the tax savings is calculated as 48% of the sum of all three figures (depreciation, insurance and property tax, and maintenance). The tax savings for year zero in Table 3 is the investment tax credit of 10%.

The after-tax cash flow (except in year zero) is calculated as the tax savings minus the pre-tax cash flow; this could be called the net tax savings.

The present value costs are generated from the after-tax figures since the latter show the positive cash flows (or net tax savings in this case) for the future years. Present value cost figures are calculated at discount rates of 6%, 8%, 10%, and 12%, for each of eight years.

These present values are summed for eight years for each discount rate.

These figures are then subtracted from the initial net cash outlay (\$1,018,651 in this case), giving finally the total present discounted value for 6%, 8%, 10%, and 12% respectively, over an eight year period. It is these final four figures (appearing in the year zero column) that are to be compared with similar figures for rental and lease of the same computer configuration.

5. Purchase with residual

Purchase with residual data is derived in the same manner as the straight purchase with zero residual data, except that at the end of year eight, a residual value is assigned to the equipment on a "best estimate" basis. This residual would represent a cash inflow since presumably the user could sell the equipment for this estimated figure after the eight-year period.

A table with such values has not been included here since it would be very similar to Table 7. However the graph in Fig. 1 includes purchase with a residual value after eight years of \$113,184, or 10% of the original purchase price. Based on this residual value, the figures for comparison in Tables 3, 4, 5, and 7 are:

Present Value Cost @ 6%:	\$645,820
Present Value Cost @ 8%:	\$667,998
Present Value Cost @ 10%:	\$687,962
Present Value Cost @ 12%:	\$706,003

Graphical model

The graph in Fig. 1 is the end result of the calculations for the total present value cost for varying discount rates under different contractual conditions. For example, it is possible to choose any discount rate for a given contractual commitment and obtain the present value cost for rent, lease, or purchase. If an eight year commitment at an 8.5% discount rate is assumed, Fig. 1 shows that by tracing the 8.5% discount rate vertically until it crosses each of the option curves, a non-full payout lease has an approximate present value cost of \$665,000; purchase with residual \$675,000; full payout \$630,000; purchase \$700,000, and rental \$870,000.

By using the graphical model, it is possible to observe trends due to the change in the variables used. This can lead to modification of the initial assumptions and a recalculation of costs.

Final words

It may be necessary for the user to choose a mixed strategy for obtaining the equipment configuration. The useful life of the components within a computer system will vary. The user, as a hedge against the risks of equipment obsolescence, might look into a non-full payout lease or rental for one portion of the system while purchasing or leasing other portions of the system under a full payout contract.

The method of present discount value cash flow analysis presented here is but one of the considerations for a company about to acquire a computer system configuration. Other particular situations of the company—for example, its cash position, its availability of credit, its current tax situation—may heavily influence such a decision. However, this present value method should certainly be used as an aid in deciding how to acquire a computer, i.e. whether to buy, rent, or lease. *

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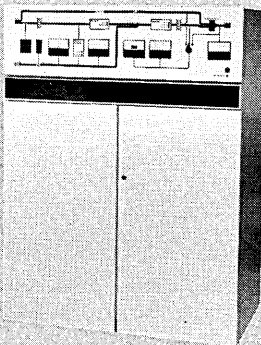
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Mr. Szatrowski is vice president in charge of bank operations at Peoples National Bank in Seattle. In data processing since 1953, he was formerly with General Electric Corp. He has published several articles in banking and dp journals.

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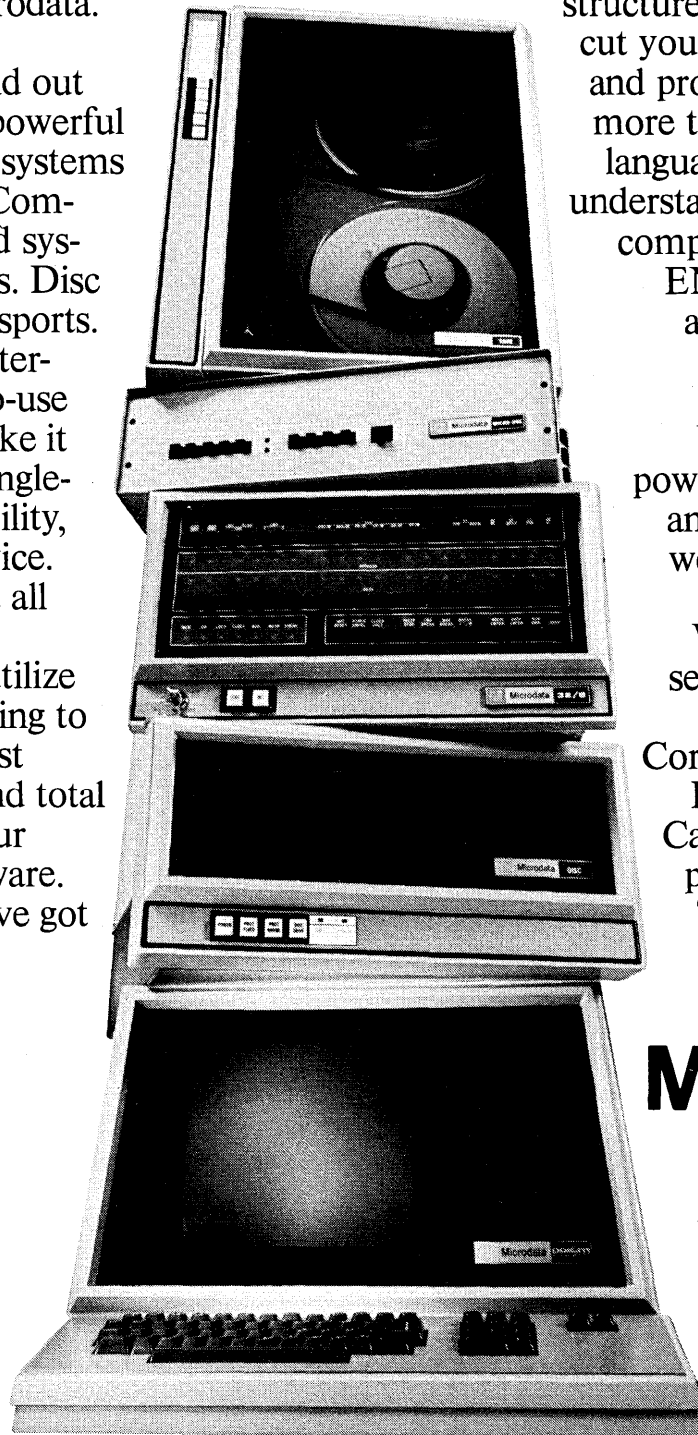
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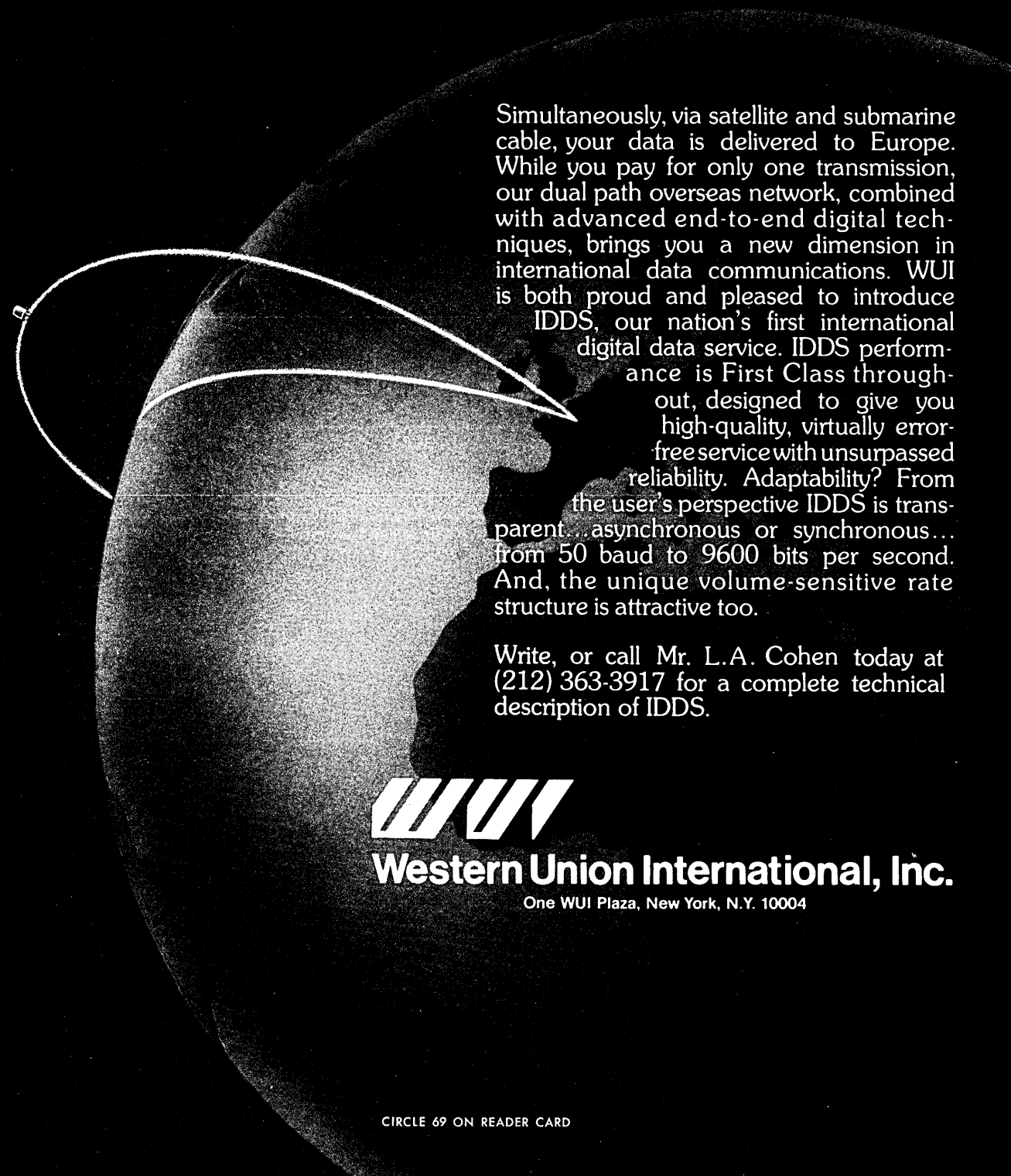
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Microprocessors In System Design

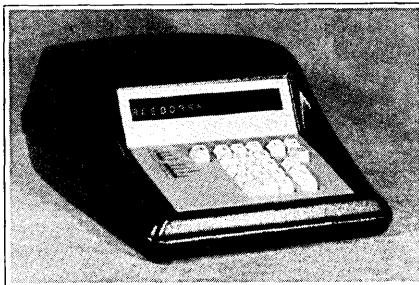
by Edward K. Yasaki, Sr. Associate Editor

Microprocessor technology is beginning to have a significant effect on the way systems are designed, implemented, and used. Expect the unexpected.

Two new multiprocessing systems that use microcomputers as the heart of each processor were announced late last year. They are bellwethers of new designs, new architectures that can be anticipated in data processing equipment. They are innovations made possible in large part because of the microprocessor technology, a technology that also is putting designers to the test.

The first of the two new systems was the Hypercube, an array processor introduced by IMS Associates Inc. of San Leandro, Calif. The Hypercube can be configured with from 16 to 256 "processor nodes." Each node has one microcomputer dedicated to system overhead and communications tasks and a second to execute user code. And each node communicates through shared memories with eight adjacent nodes. In contrast to the super-scale Illiac IV array processor, which has 16 processors, the Hypercube does not split and distribute a part of a job to each processor; instead, a program remains intact within one processor node.

The second system was announced by a new company, Tandem Computers Inc., Cupertino, Calif. Tandem's so-called NonStop system is a high-volume, transaction-oriented system that can be configured with any-



Replacing hardwired functions with microprocessor based logic, as was done in Interface Technology's newest data entry terminal, makes it possible to justify tailoring a smaller number of devices than was previously possible.

where from 2 to 16 processors. Each of these processors is built around a pipelined microprocessor, plus a second micro dedicated to I/O functions. The processors themselves, rather than the micros within them, are interconnected by a duplicated link that can transfer data at a speed of 20 MB. In a communications-based system, of course, the significant thing is that the failure of one processor does not shut down the terminals. And in both systems one finds that processor tasks can be dynamically allocated, and the failure of any one processor does not contaminate any other processor.

These are but two of what is believed will be a rash of new approaches

to old problems in the dp world. They begin to tackle the difficulty of getting large scale computers to service a large number of users with differing requirements. And they aim to serve those same users with low-cost multiple processors, allowing for that service to continue although one processor may fail.

Rethinking old architectures

"I think microprocessors should cause the whole data processing industry to rethink the architecture of computers because that architecture is based on the economics of 15 or 20 years ago," says Edwin Lee, president of Pro-Log Corp., Monterey, Calif. He says the use of a single memory for storing programs and data was dictated by the economics of core memory, where 65K of core didn't cost more than twice as much as 16K. But with solid state memory, he continues, "You actually find yourself saving money having an array of small memories" because they can be slower, and therefore cheaper.

"This whole idea of time-sharing and centralizing on one cpu or one memory is really based on old economics," he adds, "but I think it's really become cultural. I'm glad to see people looking at arrays of microprocessors. They should also look at de-

MICROPROCESSORS

centralized memories and a few other things."

The idea of rethinking the problem and coming up with innovative uses of the new microprocessor technology is echoed by Lee Thomas at Bell Labs in Holmdel, N.J. Thomas, who is supervisor of the microprocessor development group at the lab, says he thinks in terms of two kinds of applications. In a conventional, ho-hum use, the micro merely replaces hardwired logic or a minicomputer. "In applications like that," he explains, "you haven't really innovated; you've done what you would've done anyway, but with a new device. The innovation comes when you've come up with an architecture for a system that you simply wouldn't have done otherwise. . . . You wouldn't have built that system in that way in the first place. We have a number of examples of products of that type in design now."

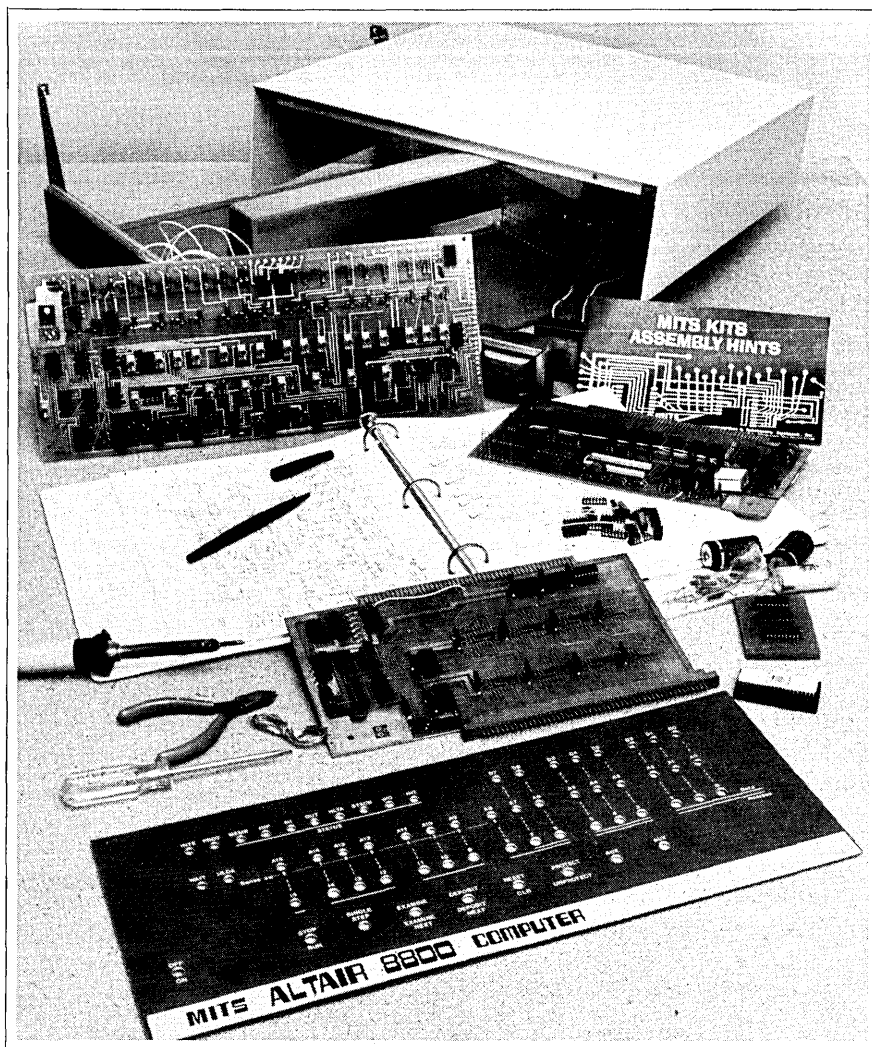
Thomas looks at knobs and switches on the front of a set as being "hardware memory"—devices that make the set heavy, expensive, difficult for someone to learn to use, and error-prone. The new approach is to replace the hardware memory with electronic memory.

"The microprocessor is a memory revolution," he says. "Properly viewed, the cpu is a servant of memory and nothing else. If there is one generalization I can make from the many applications we've had over the last two years, it is that every time we've done something clever, it has not been from some clever choice of the cpu. It has been from a clever use of memory."

All this is not to say that the benefits of microprocessor technology to the world of data processing lie in the future. In the usual evolutionary way, new products of innovative design, based on the micro, can certainly be anticipated. But benefits to the dp user can be seen in products being delivered and used today. Those benefits take

the form, for example, of terminals tailored to an application, devices that relieve the host computer of some of its load, devices that provide much greater reliability and therefore less downtime, and, in some cases, lower prices. In some instances, the user is paying perhaps the same price but gets more features than previously were available at any price.

At Hewlett-Packard's Data Terminal Div., for example, they were able to design the 2640 crt terminal around a micro with the idea that additional storage capability would be added later. The designers were able to wait until the 2640 hit the marketplace to decide how they would implement the incorporation of tape drives in the upgraded 2644. "If we had not had the microprocessor and just tried to add the cartridge tapes later, it would have been essentially a redesign of all the logic inside," says HP's Tom Waitman. Instead, they were able to accomplish it with a redesign of the microcode and the addition of two printed circuit boards.



One big advantage of microprocessors is that they reduce the number of components and connections, compared to hardwired logic. The Altair computer kit

from MITS, in Albuquerque, is evidence of this. Note that the most complicated looking board is not for the processor, but for the display.



ANTHONY H. KOESTER
Vp, Marketing, Interface Technology

"That's one of the reasons people are going to the microprocessor," says Ed Hayes, the division's marketing manager. "It gives you that kind of flexibility. What that means for the customer is that when he buys a product, he's going to begin to see more and more choices of peripherals and other accessories that he can add on at the beginning or later, to do his job. He won't have to throw the product out, but rather get another accessory, which hopefully will allow him to continue using that product for his new jobs and for whatever new requirements management happens to give him."

In St. Louis a new microprocessor-based terminal is about to be announced by Interface Technology Inc. It's a tailorable numeric data entry device which uses the Pace microprocessor from National Semiconductor.

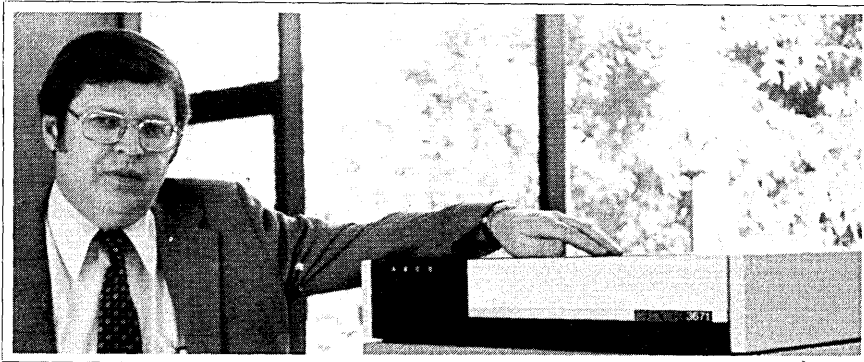
Tony Koester, marketing vp for Interface Technology, says that in the

past they've been approached by customers with specific data entry requirements, and even though the customer might be in need of hundreds of terminals for his particular application, the cost to develop the product he needed could not be justified. With the micro, however, that same customer's needs might be satisfied by an existing terminal that has selectable options conveniently incorporated into the basic design or perhaps requiring only a firmware change in the tiny processor's memory.

"The main thing a microprocessor gives us is flexibility," says Koester, "flexibility in terms of changing a terminal to accommodate various communications disciplines and also providing functions that customers need. The functions include such things as validation of inventory item numbers to reduce data entry errors and accommodation of various data formats and entry line lengths." That's the specialty of the firm—simplifying the data entry procedure for the terminal user.



EDWARD J. HAYES
Marketing manager, Hewlett-Packard
Data Terminal Division



JOHN KEVILL Director, Equipment Engineering, Memorex Corp.

Terminals increasingly are becoming applications-oriented, easier to use, and more reliable. But in addition, test diagnostics can be placed in firmware, making the units self-testing. At the start of each day or shift, the operator can get the terminal to perform a test. Terminal Communications Inc., of Raleigh, N.C., has its diagnostics program on a floppy disc and has it brought in as part of the bootstrap. Herb Deutsch, TCI's manager of development engineering, says it performs a hardware checkout and a display indicates to the operator where any failing point is, enabling the user to tell the customer engineer exactly what replacement part to bring.

The HP 2640 and 2644 also have this self-test feature. They incorporate the Intel 8008 micro, which exercises various functions of the terminal, a process that can be initiated by the operator or by a remote host computer.

With the user's attitude toward downtime, however, and the high cost of a service call, manufacturers continually strive for the utmost in reliability. Toward this end, the microprocessor technology is a boon. In electronic equipment, reliability is a direct function of the number of interconnections and solder joints. Reduce the number of electronic components, then, and you increase reliability, all other factors being equal. And that's another benefit of the microcomputer system, which enables a handful of components to replace anywhere from 100 to 200 packages. One designer estimates it would take from 250 to 300 integrated circuits to do what his micro does.

The key to communications

Switching to the world of data communications, Frederick G. Withington of Arthur D. Little Inc. says, "The effect of the microprocessor may be that we don't have to worry about a protocol standard anymore." He mentions the current hassle over the European protocol, Burroughs' BDLC, IBM's SDLC, and whatever. "Maybe it's a non-

issue. Because if everyone's going to have a microprocessor at the end of every communications link, which seems like it's coming for other reasons anyway, the difference between protocols is only in what bit does what . . . So the hypothesis would be that, fortunately, we don't have to get together on this."

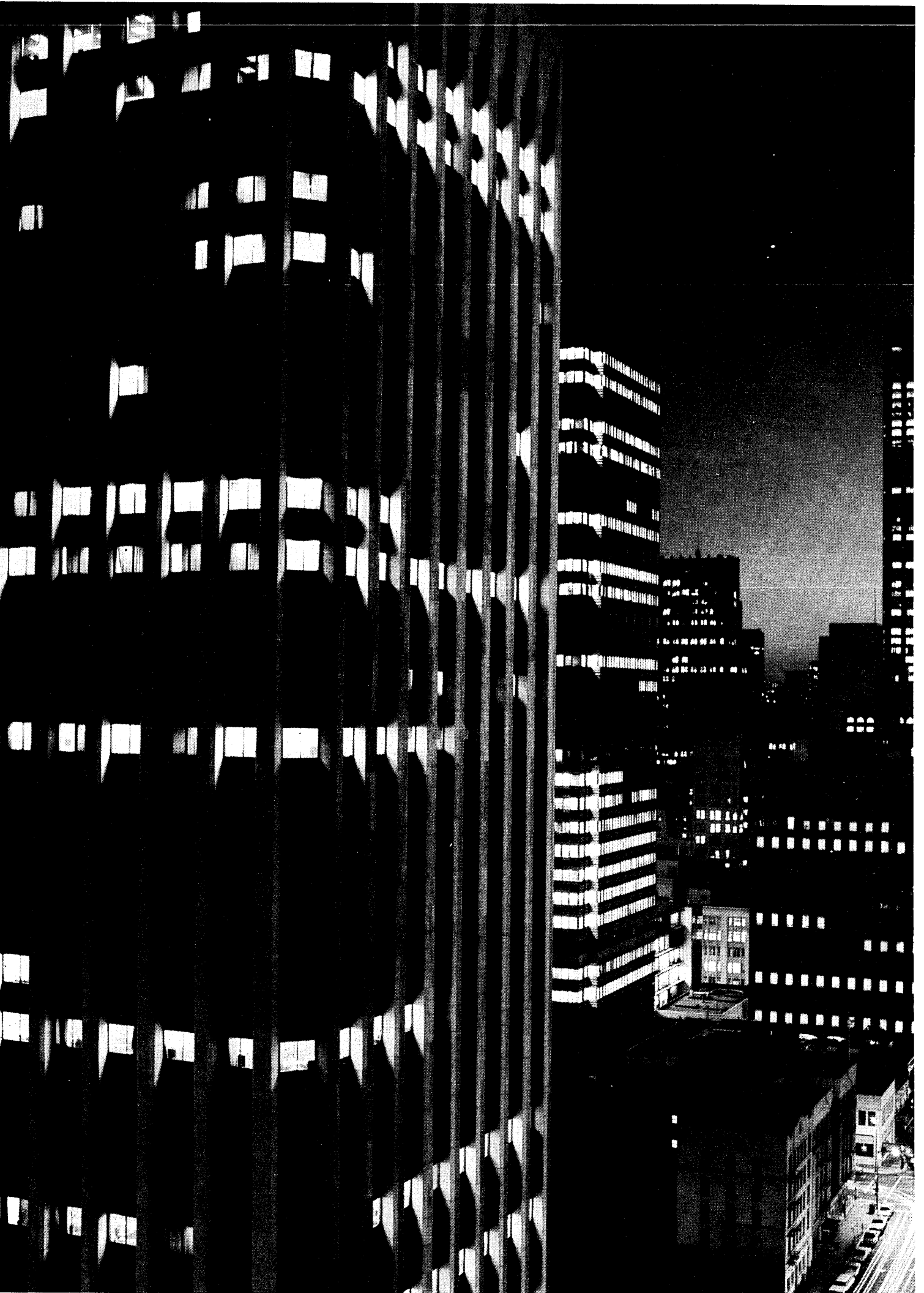
Bob Wickham of Vantage Research in Los Altos, Calif., adds, "You could conceive of systems that are protocol-independent." He describes a network consisting of a number of host processors and a variety of terminal types, plus node processors that perform the protocol conversion. "You send a message with an origination code, which is who you are, and a destination code, who you want to talk to," he says. "Stored in the node processor is a lookup table that determines the data is coming from an ASCII terminal and is destined for a computer that's SDLC. So it makes those conversions."

Thus in an intelligent network, he continues, one uses the low-cost processors "to overcome the fact that since we're human beings we're never going to get together and agree on what everything's going to be." There are too many vested interests pushing for the adoption of their favorite communications protocols, Wickham says, not to mention the politics involved in the standardization effort.

A number of semiconductor companies have begun work on chip sets to handle SDLC, which is a bit-level protocol. Scientific Micro Systems, Mountain View, Calif., is implementing it on a proprietary bipolar microcomputer, which they say is "typically 10 to 30 times faster" than, say, the Intel 8080. The increased speed, they explain, is necessary to operate at the bit level in firmware. According to Terry Trigg of SMS, their micro does the serial to parallel conversion, the zero-bit insertion and deletion, flag detection and generation, the various control fields, as well as the cyclic redundancy check code. "What all this means is we can handle the complete SDLC protocol at the bit level in firmware," he says. "Right now we have working all the bit-level functions and all the frame-level functions." He says they also intend to handle the high-level functions. An advantage of implementing functions in firmware, of course, is the relative ease of changing that firmware, which is stored in a ROM; one merely changes the ROM.

"What we're offering is an approach that completely off-loads the whole protocol function from the main computer," Trigg says. "It relieves it of all the overhead it previously had with, say, bisynch."

Indeed, the idea of relieving the host



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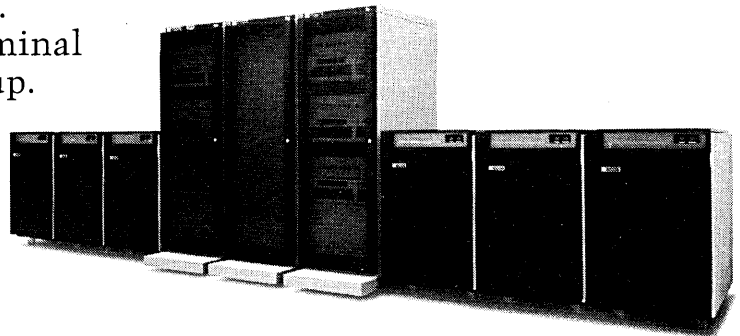
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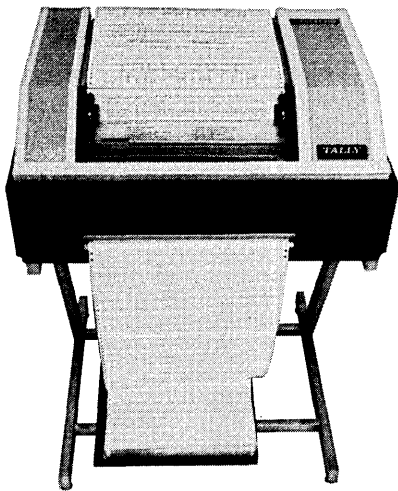


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computer of many of its current tasks appears to be another offshoot of the micro and its incorporation into a growing variety of products. At Versatec, for example, they've been making nonimpact printers and plotters. But an electrostatic plotter requires much more preprocessing by the host computer than a pen-and-ink plotter. Now they think they can relieve the mainframe of a lot of that processing by getting a micro to do it.

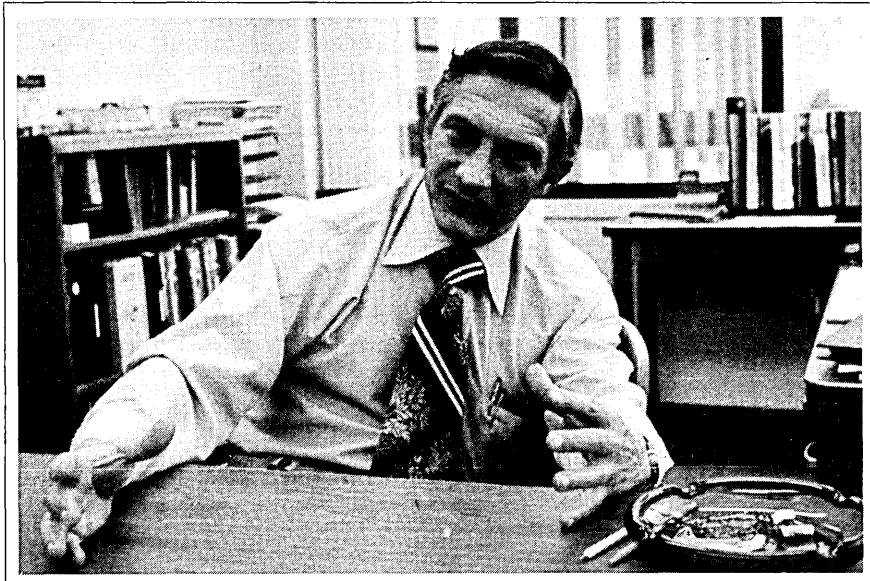
"We think we'll be making efforts to try to simplify what the user has to do in order to use our device," says Jim Willott of the Santa Clara, Calif., firm. "We may take some of the processing responsibility away from the central processor and place it in the peripheral." Adding that he is not predicting

involved only if there's any massaging of the data to be done.

"The whole object of the game in the future is to shield the host processor from this huge number of interrupts that will occur," Wickham continues. Further, to relieve the front-end processor of its increased load, steps are being taken to reduce the number of times data must be transmitted over the communications lines.

"It's getting to be a locally on-line world with a batch or highly structured transmission to the host computer. And microprocessors in all their forms are what's making that possible."

The company that brought you the microprocessor is Intel Corp., whose chairman Robert N. Noyce says, "I think we've only begun to scratch the surface of what's going to happen with all this. It'll just sneak into every mode of life that we have." Noyce notes that



ROBERT N. NOYCE Board chairman, Intel Corp.

this capability, Willott says ideally the user would be able to take a tape prepared for a pen plotter and run it through a matrix plotting device. The conversion of the plotting commands would be handled by a micro in the matrix plotter rather than host cpu software.

The idea of performing in hardware what currently is done with software is also mentioned by Wickham. He foresees the next generation of computers featuring data bases that have their own controllers built from bit-slicing micros. "You can have a request for data come in to the front-end processor; it will recognize the request by its coding and will route that directly to a file processor, which is hardware," he says. "It will come up with the data from the disc file, put it back over the communications line, and never cause an interrupt on the host processor." The mainframe, he adds, will be in-

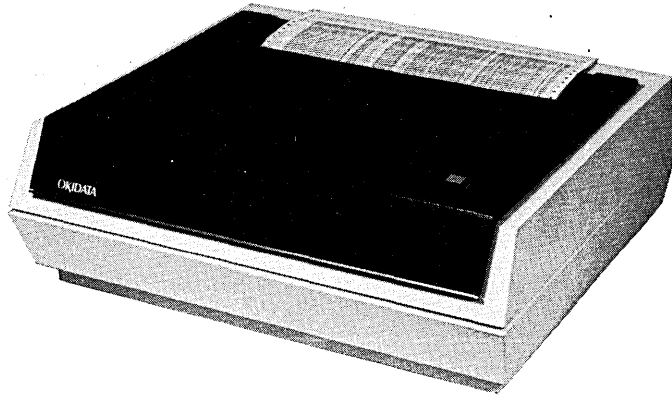
the Intel 8080 micro, which was introduced about two years ago at a price of more than \$300, is now being offered by Texas Instruments—one of five sources of the 8080—for only \$21 in quantities of 100.

A 370/158 micro?

"In predicting the future," he adds, "we're a little too optimistic for the short term and too pessimistic for the long term. We won't be as far in two years as we think we will be, but we'll be a lot further in five years than we think." He says that in 1970, when they were beginning to see that they could put a calculator on a chip, "something as sophisticated as the 8080 was just beyond comprehension." Looking now at the processor, he says something as sophisticated as a 370/158 is beyond comprehension. Smiling broadly, he adds: "But I think it'll be done anyhow." *

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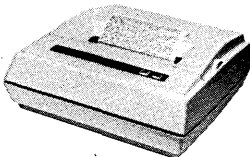
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It provides star performance for minicomputers, small business systems, and terminals. And it's available now. From Okidata. Working for the OEM.

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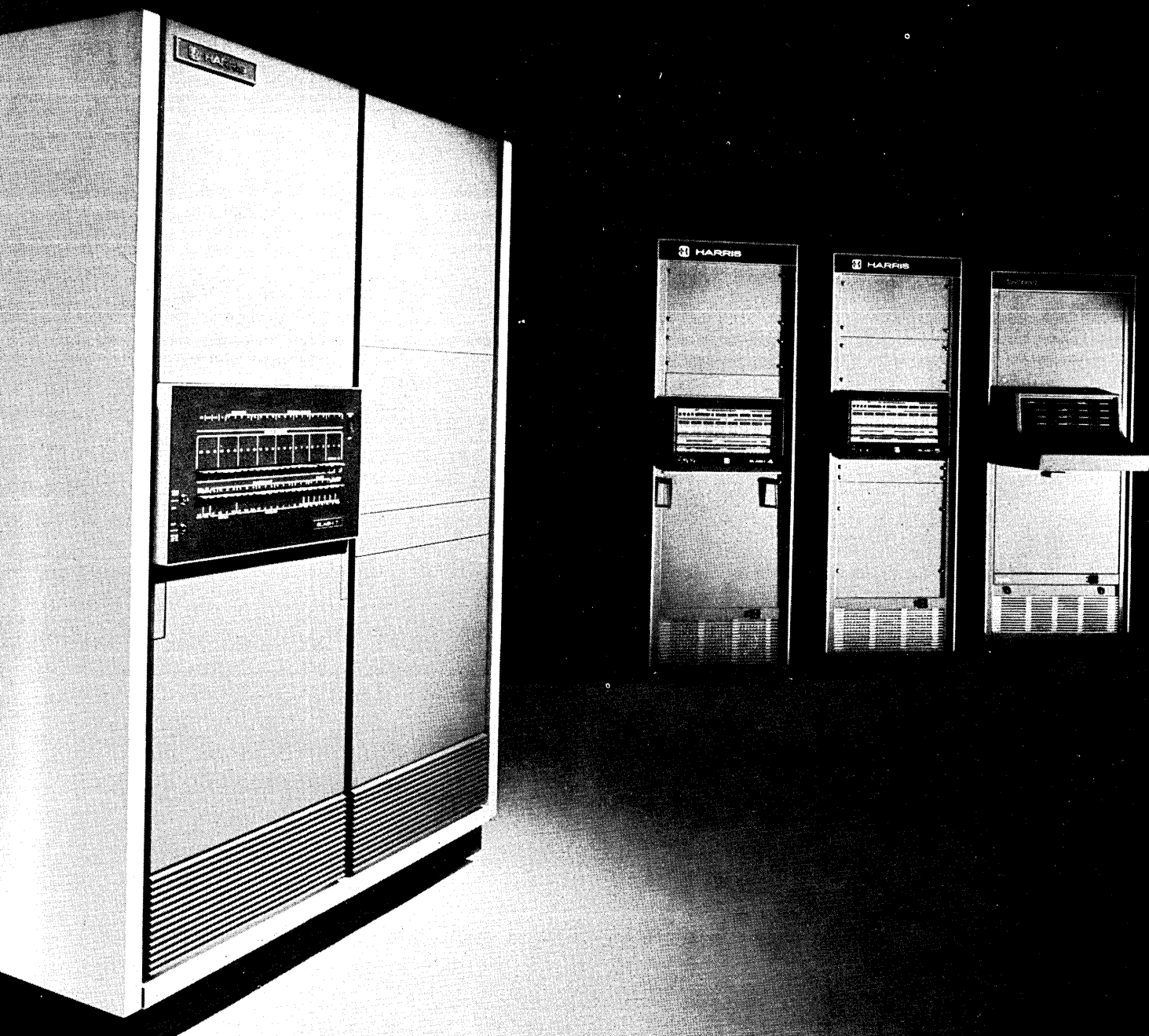
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CPU cycle time: 425 ns (minimum)

Maximum DMA rate per second: 15MB

Integer add (register to memory): 0.95 microseconds,

multiply: 2.22 microseconds,

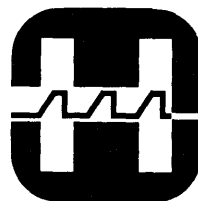
divide: 6.37 microseconds

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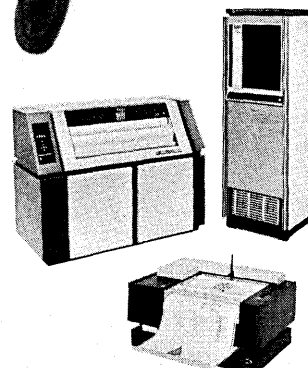
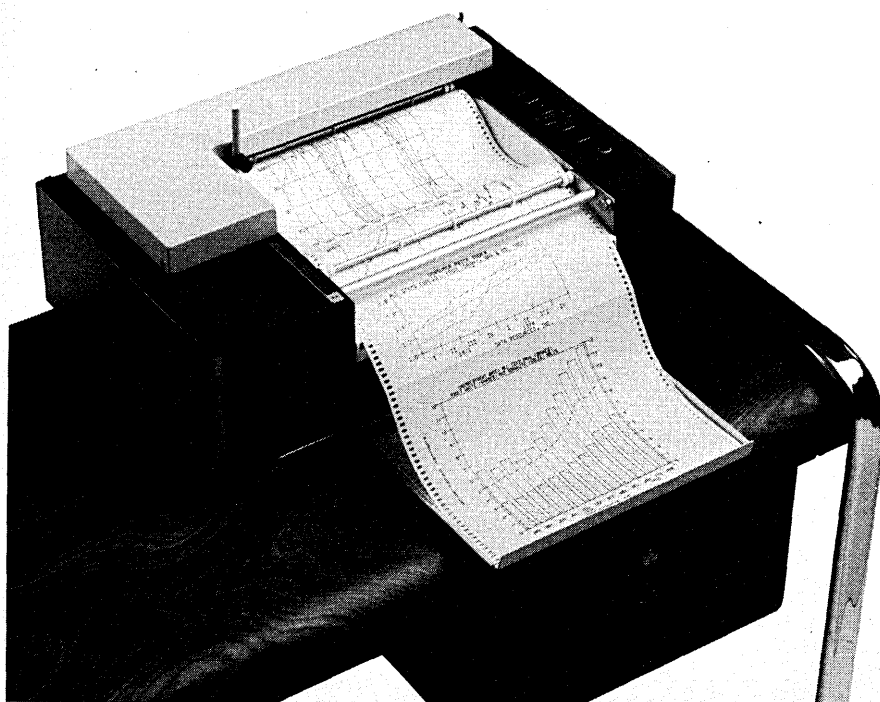
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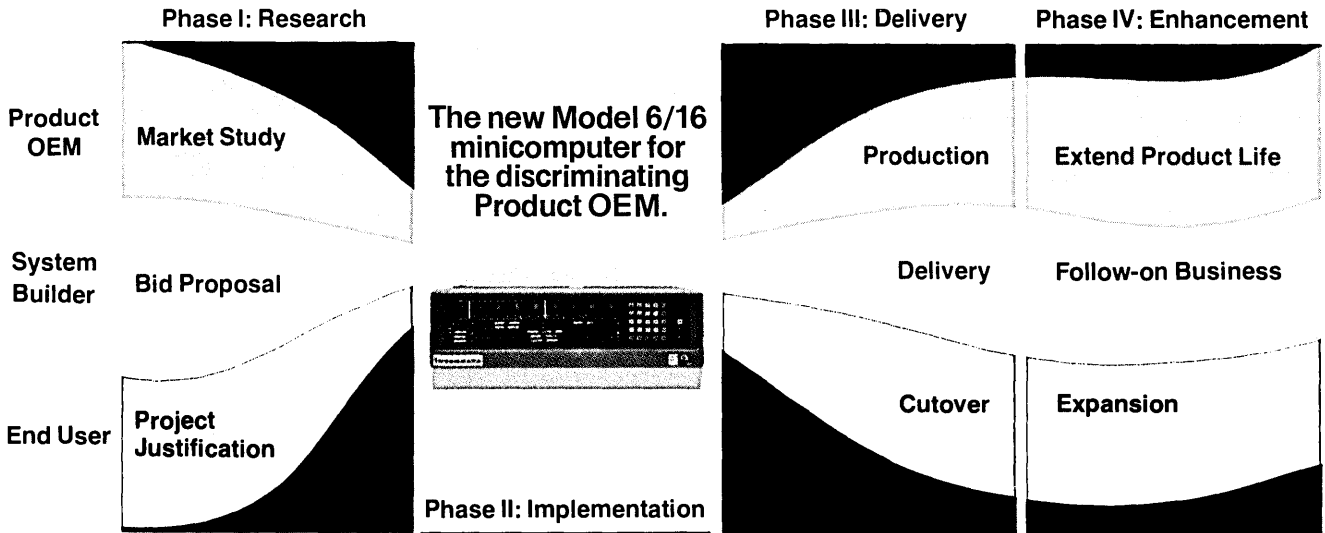
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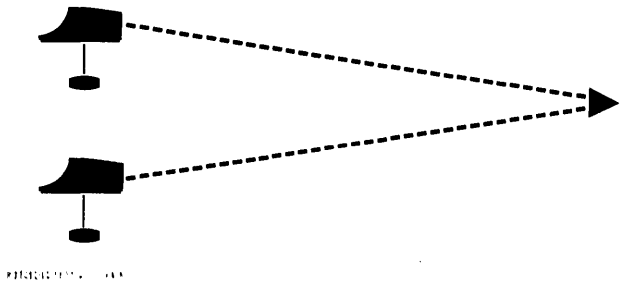
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Datapoint Dispersed

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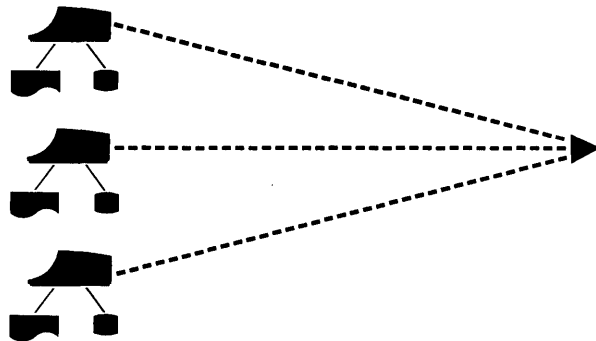
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Dotted line indicates dial-up connection to home office computer



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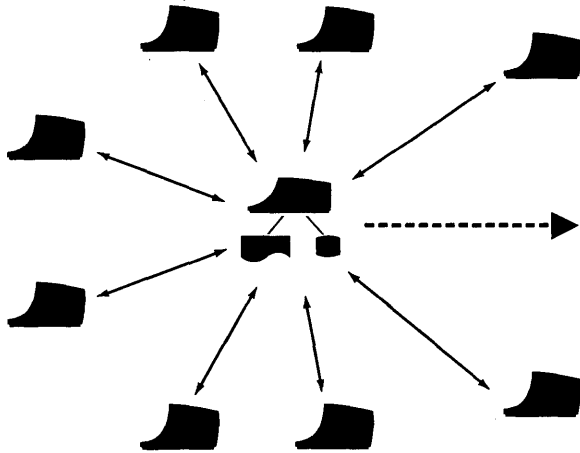


FIG. 1. 8-USER DATASHARE SYSTEM

will also run here, saving development cost and time. Most importantly, field office personnel have instant access to local business data — there's no need to wait for the needed information from a home office file.

At the end of the day or between shifts, the local DATASHARE system can communicate with the home office computer and exchange field data, allowing home office and field personnel to work always with current, edited information, while data entry errors and transportation bottlenecks become a thing of the past.

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With its powerful computing capability the 5500 DATASHARE can handle all of the data processing

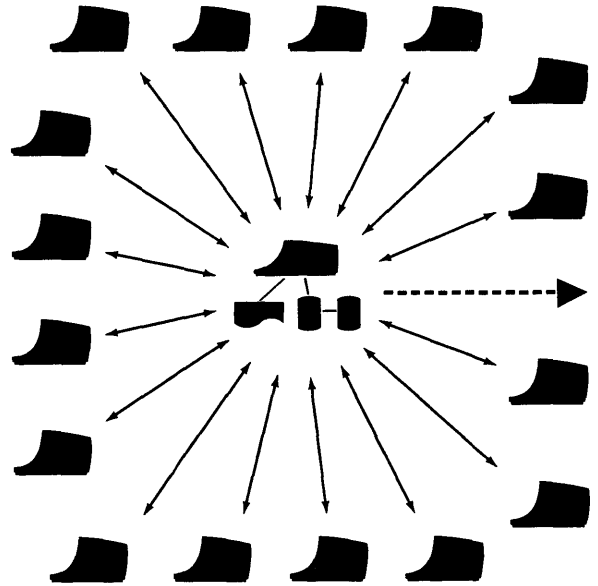


FIG. 2. 16-USER DATASHARE SYSTEM

requirements of a regional or manufacturing facility independently or work in conjunction with the home office computer, depending on what's most economical for the user.

Datapoint dispersed processing systems are designed for growth. We offer a variety of configurations, from small to large scale, which can be installed in scattered facilities of a company, depending on current work requirements. Not only can users pick and choose the precise configurations called for by current work loads in their various offices but they enjoy both modularity and upward program capability — that is, systems can be readily expanded to handle increased work loads while employing the programs created for initial configurations.

Daniel & John McCracken & Wiley Enough said?

A Guide to FORTRAN IV Programming,

2nd Ed.

Daniel D. McCracken
1972 290 pp. \$7.95 paper

The essentials of FORTRAN IV can be mastered with just a few hours of careful reading of this text and computer use. Ideal for the individual who wants to use FORTRAN IV to solve problems in science, engineering, statistics, education, and business. Includes challenging exercises and term problem suggestions for readers who want more detailed comprehension. Can be used as a text for computer programming or as a supplementary text for other courses. Features: Prepares students to program the computer almost immediately; calculus is not required; shows how FORTRAN IV can be applied to real problems; suitable for individual study in school or industry; all answers are given in text or in Teacher's Manual. Partial contents: Fundamentals of FORTRAN Computation; Transfer of Control; Double-Precision; Complex and Logical Variables; Subscripted Variables; Functions and Specification Statements; Diary of a Time-Sharing Session; How to Write a Readable FORTRAN Program; Efficient Use of FORTRAN; Operator Formation Rules; Suggestions for Term Problems; WATFOR and WATFIV; FORTRAN Statement Punctuation Samples.

A Simplified Guide to FORTRAN Programming

Daniel D. McCracken
1974 278 pp. \$7.95 paper

Specifically designed for the student beginning FORTRAN computer programming. Simply and intelligently illustrates how computers can solve many non-mathematical problems. Features: Minimal math; students need little math background; student oriented; review material and summary after each chapter; case studies show students typical programming operation with realistic applications; all programs have been run and are presented in an easy-to-read format; early student involvement; early "hands-on" use of the computer. Instructor's Manual; answers to even-numbered exercises.

Partial contents: Getting Started Programming with FORTRAN; The Assignment Statement; Input and Output; Program Execution; Program Development and Checkout; FORTRAN Functions and Subroutines; Additional FORTRAN Features; Case Studies-Printing Three Columns with Headings; An Ecological Model of Two-Species Interaction; Elementary Descriptive Statistics; A Program to Simulate Ten Games of Craps; Printing A Properly Spaced Index from a Memo File; Finding a Root of an Equation by Interval Halving.

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Daniel D. McCracken
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This newest McCracken text is written for the first or second year student taking a first course in COBOL programming. Using his successful non-mathematical and simplified format, it introduces the student to "structured" programming, a discipline or logic imposed on the programming process that produces programs that display their structure or interrelationships of the parts. Serves as a text for computer programming or as a supplementary text. Features: Unlike other COBOL texts, McCracken's emphasizes "structured" programming which leads to program clarity, writing ease, quick debugging, simpler maintenance, increased productivity, and decreased costs. Students program early in the text; early "hands-on" use of the computer: student oriented; provides review, summaries, and problems at the conclusion of each chapter.

Partial contents: Getting Started Programming in COBOL; The Basic Program Structure; Data Division Elements and the Arithmetic Verbs; Identification Division, and Nested IF Statements, with Programming Debugging; Data Representation and Related Topics; Sequential File Processing and Subroutines.

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D-2

Next Steps in Urban Transit

by Harry Carroll

Mass rapid transit won't be accepted until systems provide on-demand service, convenience, speed, safety, and privacy. Good computer controls are part of the answer, but there's a selling job to do.

The problems of urban transit, those ugly, depressing ills, pose an exciting challenge to the data processing professional. More than any mayor, any senator, or any other urban traveler, the dp professional is in a position to recognize that advanced technology can be used to reduce pollution and congestion in our urban areas and enable us to reduce our wasteful consumption of oil.

Transit's fundamental problem is getting urban drivers out of private vehicles and onto public systems. In the U.S. in particular, we have concentrated on short term problems instead, and therefore on short term solutions, while ignoring promising new developments. Present line-haul vehicles (subways, buses, street cars) which provide service on a schedule (the vehicles come when the transit company gets them there) will surely fail to supplant private automobiles as the primary transit means. New systems which provide service on demand (the vehicles, like elevators, come when the passenger wants them) might well succeed. It is essential not only that the promise of these new systems be recognized if we are to have options like closing 100 U.S. city centers to private vehicle traffic, but also that their practicality be understood.

The need for understanding is nowhere greater than in Personal Rapid Transit (PRT) which its proponents claim will someday supersede the private automobile in urban areas by providing equally good service on a public system. Electrically powered driverless PRT vehicles, with the size and capacity of compact cars, could run under computer control apart from street traffic on a network of small guideways. The

network would consist of intersecting one-way lines with a station mid-way on every city block. Thus access to the system would average a ¼ block walk although stations may optionally be installed in individual buildings. A person or group might hire a vehicle as today one might hire a taxi; or a passenger might pay for a seat, as today one might pay for passage on a bus. And at journey's end the passenger alights leaving the system to take care of the vehicle.

Despite its attractive service objectives, PRT is largely ignored in the major transit plans of the day. Faced with a serious proposal to run driverless vehicles spaced at one second intervals on 500 miles of urban guideway, mayors envisage liability suits arising from collisions between vehicles traveling in such close array. And transit commissioners are likely to denounce 'Buck Rogers technology.' A dp professional will have doubts about the command and control of the network, but those doubts will be on a different level than those of the others.

The size of the problem

To understand something about PRT as a major transit alternative we begin with the environmental and financial problems, describable by some startling statistics caused by our dependence on the automobile. For instance, we dump 150,000 tons of auto pollutants on U.S. cities annually. Traffic averages under 15 mph in our downtowns in peak periods. And we consume the equivalent of 833 million barrels of crude oil in driving our automobiles in urban areas each year.

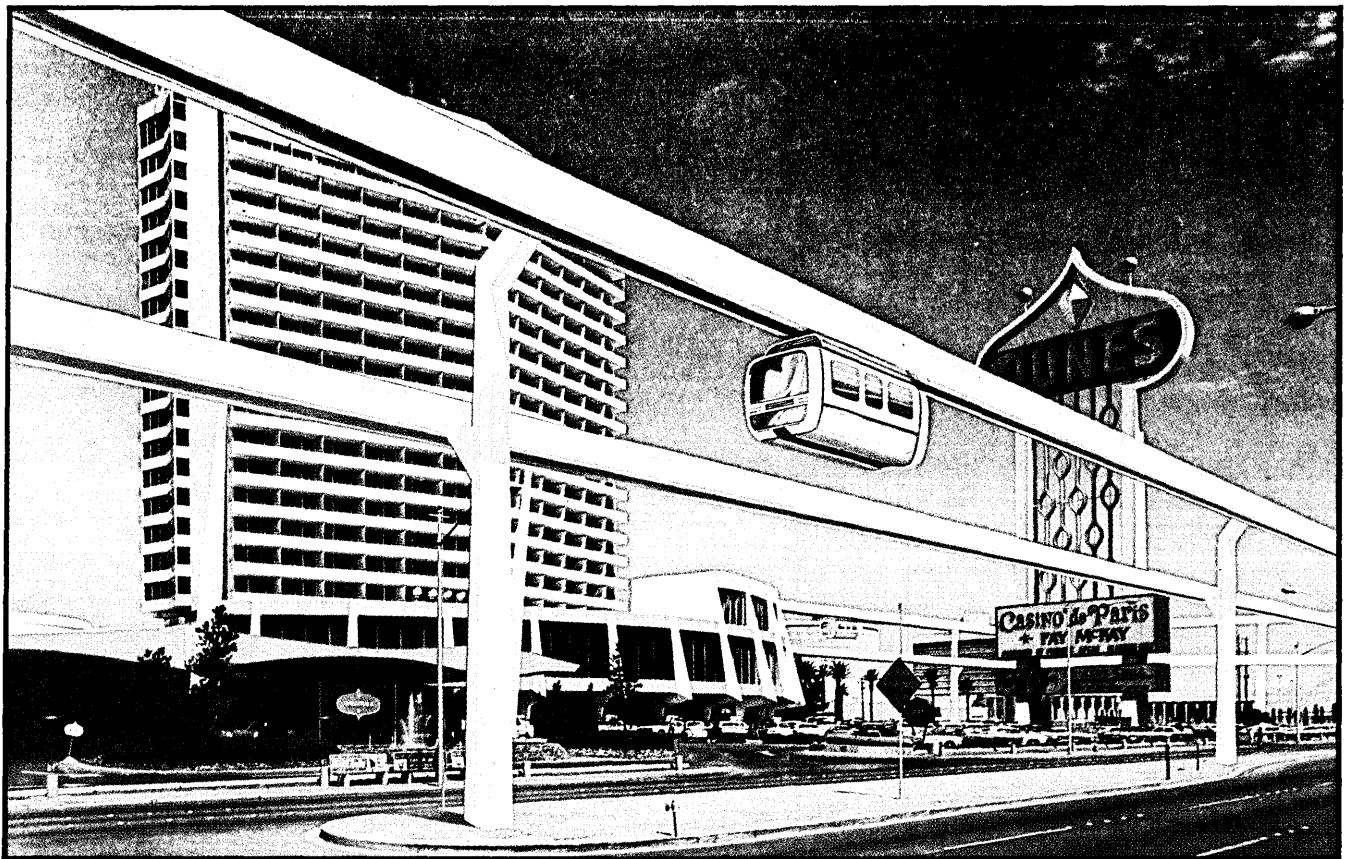
Nor having grown so dependent on our cars will we be easily rid of their

offensive byproducts. By 1970, 139 million Americans lived in urban areas and of these 76 million lived outside of city centers. In urban America in 1970, 94% of all passenger-miles were traveled in private automobiles. We ride billions of miles between home and shopping center or from home to work along the beltway without ever entering the city.

Moreover, when we turn to our downtowns where public transit traditionally is at its best, we find that here too the private home reachable only by private car has had its effects. Battered by declining ridership, declining revenues, and rising operating costs (mostly wages), private transit companies have virtually disappeared from the larger urban areas; today we may only rehabilitate transit with funds from the public treasury.

It is not old but new construction that presents us with our choices. However, new construction of conventional systems has become extremely expensive. For example, the Washington, D.C., subway, under construction, is now estimated to cost \$3.5 billion for 98 miles (over \$35 million per mile). The original estimate for New York's Second Avenue line, \$1.9 billion, has been so far exceeded that the project has been shelved. Some half dozen U.S. cities have applied to the federal government for capital grants (80% federal money) for heavy rail (subway or short trip commuter train) construction. When the Dept. of Transportation summed up these requests with those for other transit modes, it found it didn't have the money.

The federal government does plan outlays of \$11.8 billion for mass transit



Personal Rapid Transit systems running driverless, electrically powered vehicles about the size of compact cars are seen as a possible solution to some of the problems of urban transit.

This artist's conception represents a Rohr Corp. proposal which would change the appearance of Las Vegas strip if accepted.

—mostly for construction and operation—over the next six years, an amount certain to increase thereafter as operating costs continue to rise. The urban driver, feeling that he pays for transit twice—through his tax dollars and through the dollars he spends to operate his automobile—objects.

The driver's direct dollar outlays are enormous, indeed. Figured at 50 cents a gallon, the fuel bill alone for the estimated 476 billion urban miles private cars traveled in the U.S. in 1971 would be \$17.5 billion. By the end of the century, if we go on as we are going, the total bill for urban auto transit will exceed \$1 trillion. At these prices private drivers might well be willing to abandon the cars they use for urban driving in favor of acceptable public systems.

Clearly the demand is great but what of the supply? Improvements in our transit can only come through upgrading old or devising new systems. Judging by our current public spending we favor improving the conventional vehicles that in 1970 logged but 6% of all urban passenger-miles in the U.S.

A renewed emphasis on surface transit vehicles, buses and street cars, is ample evidence of this preference. To transit authorities, buses have favorable operating and capital costs, under 10 cents/mile and \$50,000 a vehicle. Street cars, with lower costs of opera-

tion—vehicle capacities are greater so the motorman takes more passengers—have higher capital costs, \$325,000 a vehicle. Although the service advantage one surface mode enjoys over the other varies from situation to situation, the two share common goals, lowering costs and increasing ridership.

For these ends transit authorities already use data processing to improve both management control and fleet operations; vehicle and personnel data bases are appearing. Larger transit authorities are also planning vehicle maintenance systems using communications links between garages and central site computers to improve maintenance performance and reduce the frequency of road calls. Moreover, through two-way communications between central site dispatchers and the buses en route, vehicle location information will be input to a comprehensive data base system which authorities envision as useful not only for vehicle and personnel scheduling but for informing the passengers, through displays at stops, about bus arrival times.

Yet although data processing can improve the efficiency of operations it cannot eliminate the physical limitations of the vehicles on the routes. Given an 80 passenger vehicle capacity, moving 12,000 persons per lane per hour demands that a bus pass a

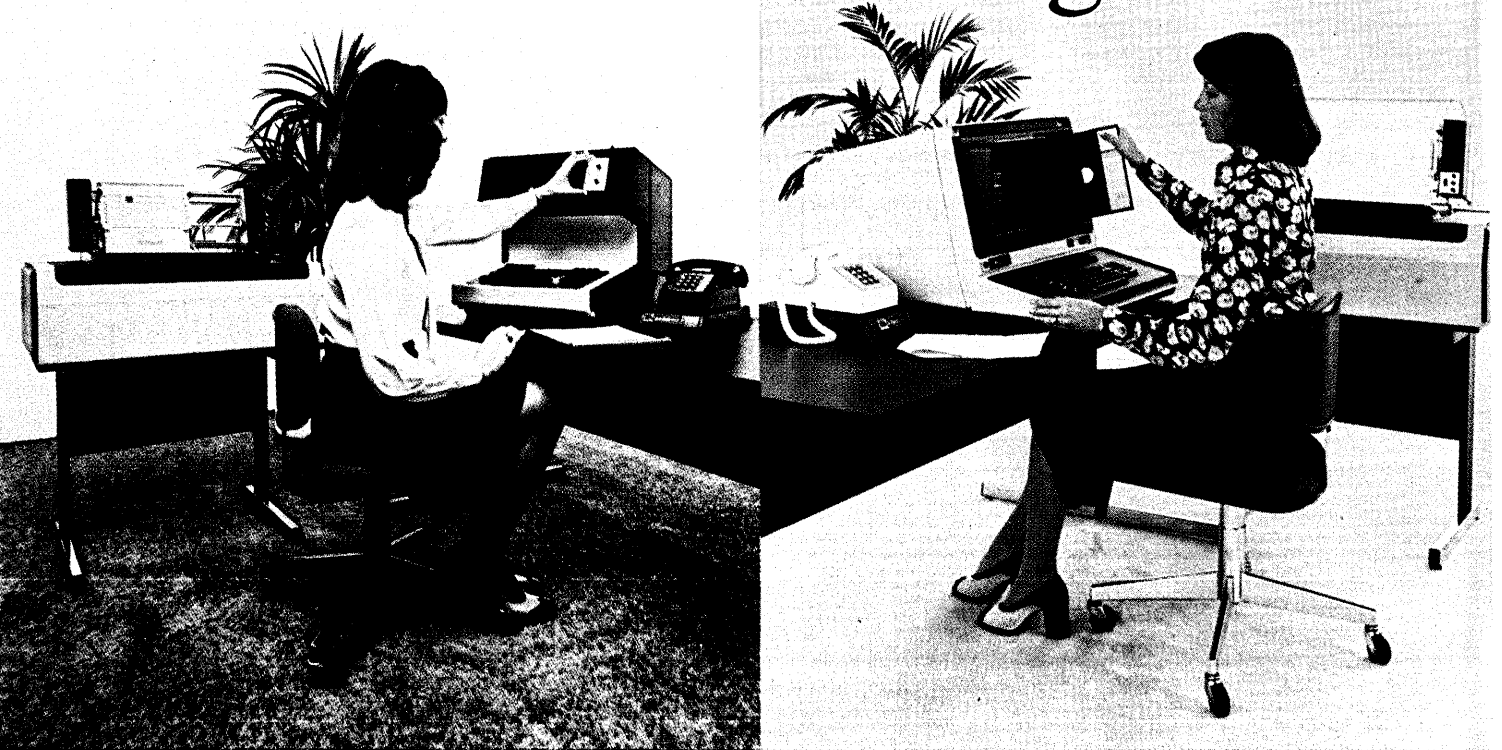
stop en route every 24 seconds. (For comparison, a busy four-lane highway accommodates approximately 10,000 persons per hour total.) This would overwhelm narrow streets in the city centers where that volume is required.

For high capacities (40 to 80,000 passengers per lane per hour) the subway with its 10 car trains and 220 passenger cars passing a point every two minutes (two-minute headways) is used. In the short run, we have no choice but to support existing lines.

So far, not far along

Automating some functions on existing lines may help. For example, in operation the more advanced lines already limit the motorman's activity to pushing a button to start the train. One such line, the Victoria line of the London subway, uses automatic train operation and "program machines" at intersections to virtually automate train movement from depot to depot. (The "program machines" are punched tape controllers handling switching, safety, and signalling.) Physically separate command and safety subsystems provide automatic train operation. The command subsystem, using wayside oscillators to place alternating current signals on segments of track, controls stopping at danger signals and at stations. The commanded speed of a train is in direct proportion to the frequency

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URBAN TRANSIT

picked up by sensing coils aboard, so by applying decreasing frequencies to track segments, a train approaching a station is slowed then stopped.

Like the command subsystem, the safety subsystem responds to signal frequencies applied at trackside; depending on frequency, the safety subsystem allows speeds of 0, under 25 mph, or "maximum" along a track section. Unlike the command subsystem, the safety equipment aboard must receive a signal continuously; if not, emergency brakes take hold.

The timetables for an entire week are stored in the plastic tape in the "program machines" along the route. A train passing a junction electrically emits its identification which is matched with an anticipated ID read from the plastic tape. Upon an identity match, coded orders are transmitted to wayside sensors to control switching and safety at intersections.

Progress of the trains is communicated to human controllers at a central site in voice communication with the motormen on the routes. The controllers may cancel a trip by initiating a sequenced advance, without reading, of the remote plastic tape readers. Also, they may insert a train into the schedule by inhibiting the advance of the readers, substituting manually provided input instead.

Yet despite improvements in management and operation, conventional vehicles still transport people on a schedule in a line where, judging by the popularity of the automobile, people demand responsiveness and door to door service; conventional line-haul modes will never provide these.

Transit planners contemplate demand-responsive systems for urban trips of under 15 miles. Such systems now under development differ in sophistication. "Dial-A-Bus" or "Dial-a-Ride," relatively unsophisticated, uses minibuses (10 to 25 passengers). To arrange a trip, the patron phones a dispatcher who, using a computer that keeps track of the locations of the buses, picks the best bus for *this* trip and tells the patron where and when he may board. Dial-A-Bus is limited to low volume situations and although its capital costs are relatively low, its operating costs are high so it must be heavily subsidized.

GRT—half way to PRT

At the next level of sophistication is Group Rapid Transit (GRT) in which driverless vehicles run apart from regular street traffic on guideways. Since only GRT vehicles are in the system, computers using signalling and safety devices installed along the guideway

exert more effective control than ever could be realized in a street network. GRT vehicles, accommodating from 8 to over 20 passengers, resemble buses in that strangers ride together.

Computers control a passenger's entire trip beginning with ticket purchase and continuing through boarding, transportation, disembarkation, and disposition of the vehicle. Systems which are advanced enough to collect revenue from passengers now range from the relatively simple Airtrans at the Dallas-Fort Worth airport, where the vehicles follow a fixed route on a

guideway, to the relatively sophisticated Morgantown system at the Univ. of West Virginia where some flexible routing is allowed. The Morgantown system's flexibility derives from its off-line stations which, in contrast to the on-line stations of conventional rail lines, permit leading vehicles to pull off a guideway link to approach a stop, with no effect on the speed of trailing vehicles. Because of off-line stations, GRT systems may operate private, taxi-like service during off-peak hours.

The labels "bus-like" and "taxi-like" roughly define the difference between



Aerospace Corp. proposed a PRT system for the city of Los Angeles which was to use small, four to six person, cars as illustrated in this photomontage.



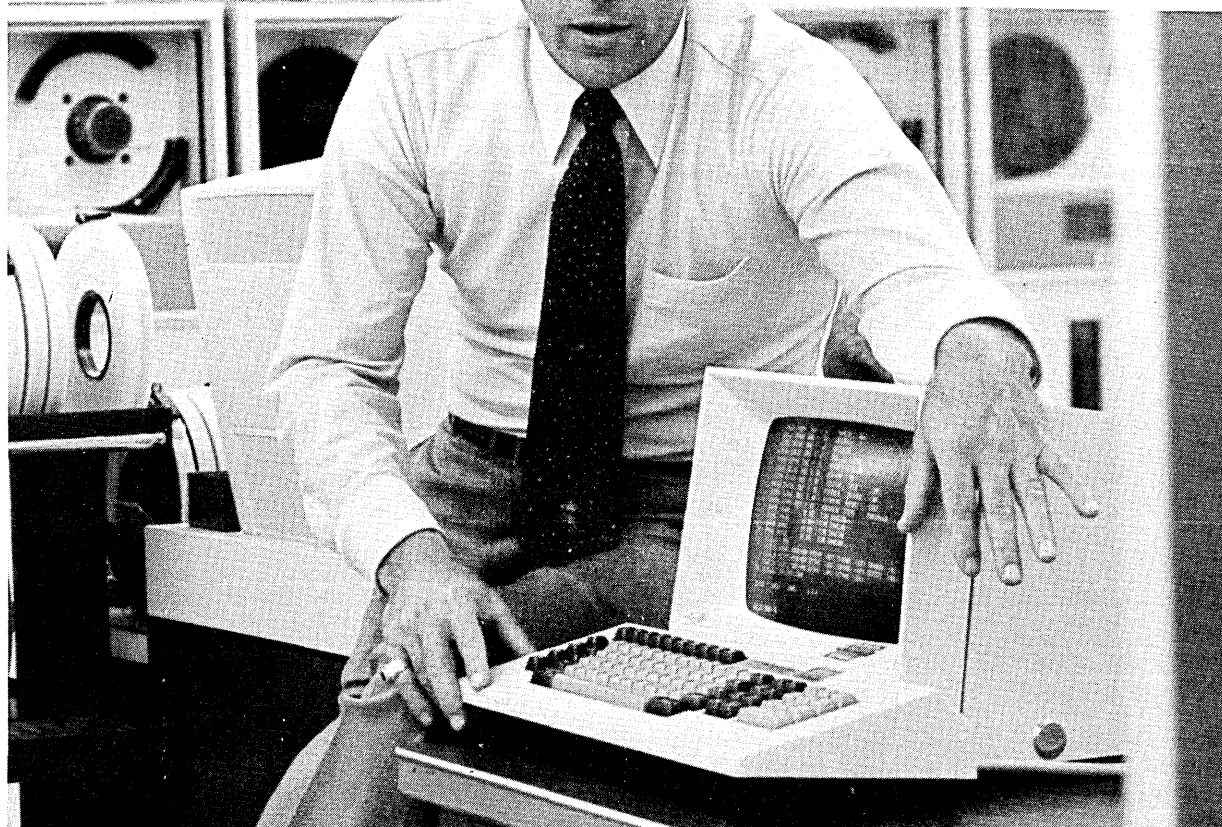
This Rohr vehicle was first shown at Transpo 72, a Washington, D.C., exhibit held by the Urban Transit Administration. Vehicles like this could operate under computer control on a demand responsive schedule.

Group Rapid Transit service and Personal Rapid Transit. At this stage, although there are urban situations in which each might best fit, there are competitive situations as well. GRT proponents claim that by grouping passengers, capacities of the system will be greater without having to resort to the close headways the smaller vehicles of PRT imply. The two-fold PRT response is that grouping strangers in driverless vehicles in many circumstances will be unacceptable to the riding public; also that the larger vehicles of GRT mean larger guideway support structures. These, in turn, will be expensive (guideway costs are the largest item in the total cost of the system) and unacceptable in neighborhoods where smaller guideways supporting smaller vehicles well might go. In other ways, the principles, if not the practice (headways, capacities, etc.) of GRT and PRT are the same. The two control systems can be described together.

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URBAN TRANSIT

ways, usually overhead as a protection against vandalism, form a network for PRT vehicles much as roads form a network for private automobiles. And PRT networks, like road networks, are general purpose—they support the transport of light freight.

Depending upon the individual design, PRT vehicles now in development are specified to consume $\frac{1}{4}$ to $\frac{1}{10}$ the fuel used by automobiles, and to be noise and pollution free. PRT systems are designed to use less land than roads use up, relieve congestion in the streets, and provide transit for urban dwellers who, lacking cars, lack means to get about—and to do these things within standards of safety that far exceed those of the private automobile.

Among leading PRT systems under development are: Cabintaxi, West Germany; Computer Vehicle System (cvs), Japan; and Rohr Monocab, U.S.

A patron at a PRT station requests a trip by inserting a credit card (or cash) in an automatic ticketing device. In response, a computer dispatches a vehicle, then displays not only the passenger's boarding point and vehicle number, but his time of departure and subsequent arrival.

At the boarding point, the passenger enters the designated vehicle after again identifying himself to the system. He has a seat and normally is transported nonstop, and at constant cruise speed, to his destination. There may be foam rubber seats, there may be stereo, there may be air conditioning. Although until some cvs or Cabintaxi goes into revenue service, what to charge for which service option will be unknown; what is known is that if such amenities help convert many from trips in private automobiles they will be cheap.

PRT (and GRT) systems use either asynchronous (vehicle follower) or synchronous (spot follower) command and control. In asynchronous systems, vehicles maintain constant spacing between one another using on-board controls, whereas in synchronous systems, vehicles space themselves according to signals broadcast over the network. Either mode may use a three-level hierarchy of control: Vehicle (lowest level), Intersection, and Central Control.

In the synchronous system, trips are scheduled on demand prior to their being taken. Vehicle Control first describes the reactions that guideway devices and synchronizing signals induce in vehicles moving within a link of the network. If at time 1 vehicle 1 passes device 1, then at time 2, say one second later, when vehicle 2 passes device 1, vehicle 1 passes device 2 upstream.

Vehicle 1 passing device 1 normally senses two pulses, one from the device it passes, which might be a simple permanent magnet, the other a synchronizing pulse, broadcast to the entire network by a central clock. The two pulses, inputs to a time difference amplifier and feedback circuits aboard, speed or slow the vehicle so as to maintain a constant velocity. Should a vehicle fail to sense a signal from a wayside device within a given time, it will instantly revert to an emergency mode in which equipment aboard gains exclusive control.

Central computers and Intersection Control Equipments (ICE's—which include storage, simple logic, and switching functions) exercise Central Control, which ordinarily is insensitive to local variations which Vehicle Control corrects, oversees the vehicle's path.

By requesting a trip, a patron at a station stimulates the creation of a vehicle path which the central system accounts for as though it were an invisible spot switched by means of the Intersection Control Equipment (ICE) from origin to destination. A vehicle is assigned to move over the network

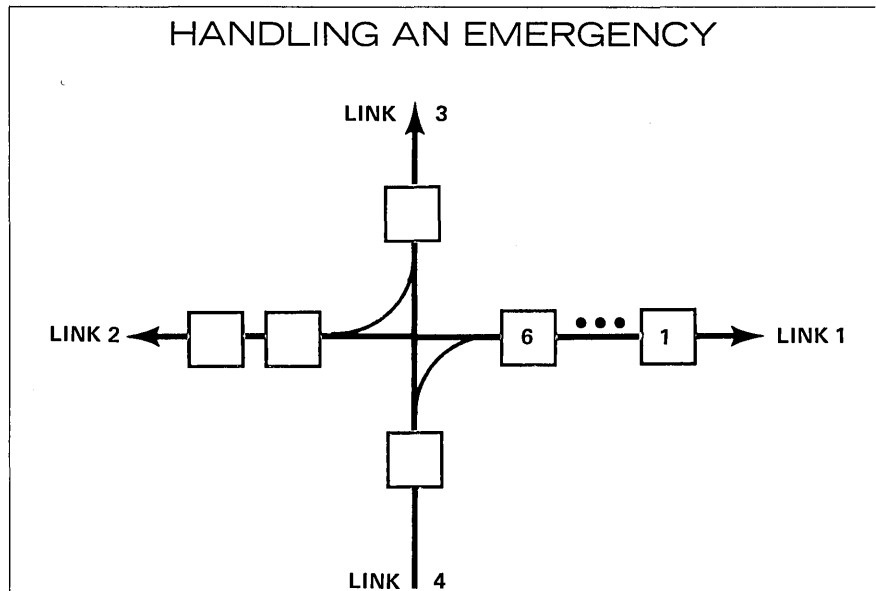


Fig. 1. PRT systems could have three levels of control: on-board systems, intersection controllers, and central site controllers. If vehicle 1 were to fail while going along link 1, sensors aboard vehicles 2 through 6 on that link would cause them to close ranks behind vehicle 1, preventing any col-

lision. The central controller would send new routing information to the intersection controller to handle vehicles coming to link 1 from other links. Vehicles on link 2 or 4 which are not headed for link 1, would proceed unhindered.

Say that in Fig. 1 vehicle 1 fails in the middle of link 1. Sensors aboard vehicles 2 through 6 on link 1 take over in the immediate emergency, causing these vehicles to close ranks behind vehicle 1. (If vehicle 1's condition, as sensed by transducers aboard, warrants it, it may be pushed to a nearby off-line station by vehicle 2.) Within an instant Central Control, notified of vehicle 1's failure, begins transmitting commands to the ICE for controlling vehicles on links 2 and 4 scheduled with link 1 in their paths. Vehicles on links 2 and 4 which are scheduled to traverse link 3 proceed unhindered.

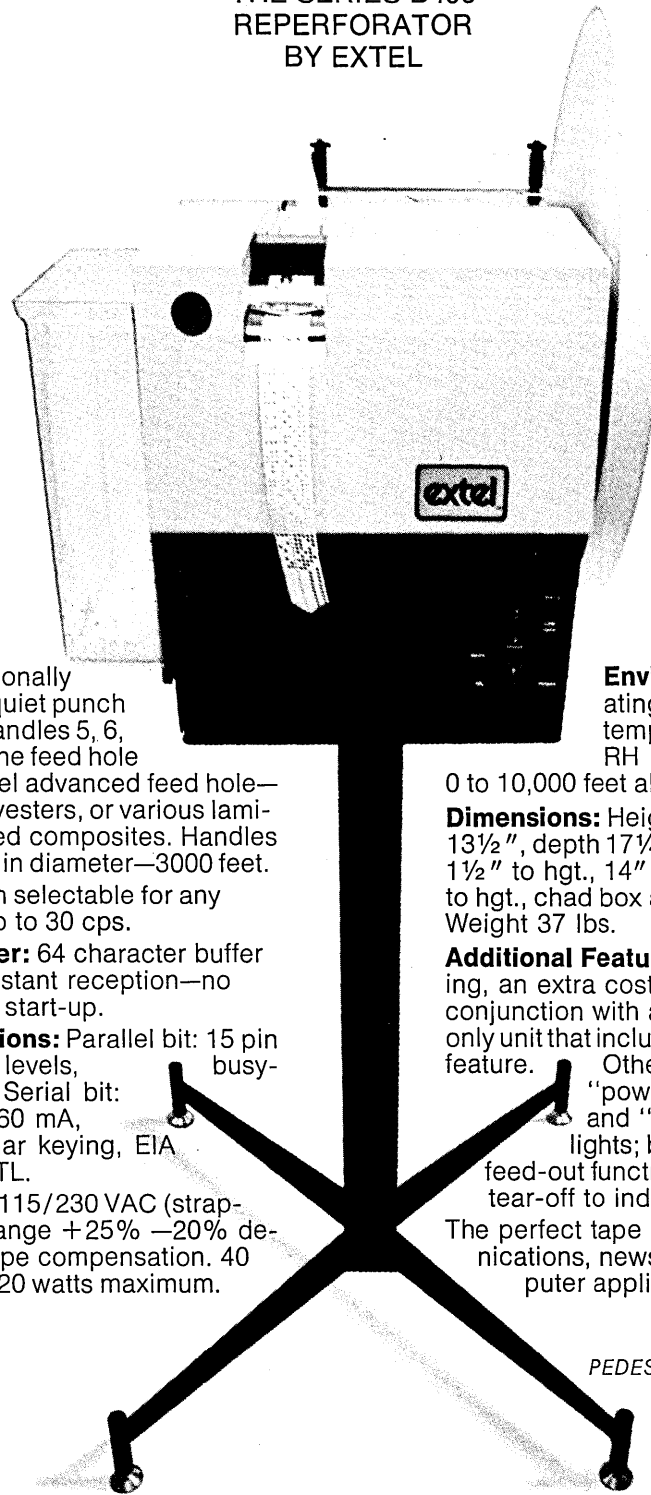
With the immediate emergency under control, the central computer reschedules vehicles whose paths include the inoperative link or links by accessing the old switch lists and appending new commands to them; thus the now invalid commands are superseded within ICE stacks. Ap-

propriate time slots in the link reservations strings in main storage have their status changed from "available" to "busy." In a system accommodating 500,000 trips an hour, at least 139 trips may be rescheduled in one second.

After enough trips have been rescheduled to keep traffic moving, (vehicles scheduled for a station on the blocked link are re-routed to a nearby station) the operable vehicles on link 1 are backed out of the blocked link onto link 2, which has been temporarily cleared, and re-dispatched. Emergency crews travelling on small access roads separate from the guideway system arrive to repair the failed vehicle, lifting it from the guideway if necessary. Lest all of this raise visions of monstrous traffic jams, it should be stated that simulations have shown that on the average a PRT patron would be delayed for six minutes—twice a year. *

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within this spot or time slot.* The system consults an inventory of all previous trips to create a unique, non-stop path for this trip prior to dispatching a vehicle.

First a scheduler routine does a table look up of origin-destination pairs corresponding to this passenger's request. Next, the routine attempts to find enough free time slots in the appropriate switches (ICE's) to accommodate the path. If the attempt fails, the scheduler constructs an alternate path and again searches for free time slots in the reservations string. Finding the free resources, the scheduler marks the chosen time slots "busy" then creates a switch list, a group of commands to the ICE's of the path, and places the list in the scheduler output queue.

A distribution routine retrieves the switch lists which have been stored on direct access devices pending their communication to the ICE's of the network. Because of communications data rate restrictions and storage limitations of the ICE's, the commands are sorted into sequence by time and sent just prior to the ICE's planned activity. Commands which are to execute simultaneously are transmitted simultaneously. At 10:00:00 the central system, addressing particular switches, sends the commands to be executed at 10:00:08. At 10:00:01 the central system transmits 10:00:09's commands.

The ICE's in which commands are stored in a First In-First Out stack have the intelligence to deal with more than one command for one time slot. A command in the stack transmitted at 10:00:05 may cancel the command in the stack sent at 10:00:02. The ability to override previous commands and the independent Vehicle Control System provide control in emergencies.

As to the data processing power needed at the central site to sustain the scheduling and command distribution functions, processing 50,000 trips per hour (assume 25 switch commands per trip, 16 bytes per command, a command life of 10 minutes) requires data set capacities of 33 megabytes. To support half second headways seems to imply that this entire data set must be searched every half second so that the ICE command stacks may be updated in that time. This, in turn, implies a data set transmission rate of 66MB.

Although main memory bandwidths of 66MB and main memory capacities

*—Synchronous Systems are further classified by the timing of merging decisions and the manner of merging. In pure synchronous systems, computers pre-schedule vehicle merges at appropriate intersections so that the vehicle remains in its time slot throughout the trip. Trans-synchronous systems likewise pre-schedule trips but with slot slipping (the ability to reassign a vehicle for a later slot) at intersections. In quasi-synchronous systems merging decisions may be taken during the trip; slot slipping is allowed.

of over 33MB are conceivable, such power is unnecessary for the job at hand. Some form of direct access data set in which the frequency of accessing a command depends upon its proximity to executions in an ICE is implied.

Yet until a PRT network with tens of thousands of vehicles is actually meeting its objectives, doubts about its feasibility will remain. These boil down to doubts about the command and control of a large urban system; there is no doubt that PRT's can perform at amusement parks and airports, they do it now.

Certainly the components of the system, the on-board receivers, time difference amplifiers and feedback circuits for speed control, and the sensors aboard to trigger independent braking have been known to engineers for years. Intersection Control Equipments with less logic and storage than a miniprocessor and with high-speed switches exist now. And on a systems basis, the check-out, maintenance and automated testing of these equipments to the highest standards is feasible. As to the central system, two, three, or four-way multiprocessing with each cpu as backup in an emergency requires not new invention, just good systems engineering. Moreover, a heavy dollar investment in safety will be supportable; even \$50 million of control equipment allocated to 500 miles of guideway comes to just \$100,000 a mile.

Integrating the individual technologies into a workable system will be the real challenge; that will fall to systems engineers seeking to accomplish the larger goals of urban planners. Hitherto it would have been meaningless to apply systems engineering in mass transit operations. For a city planner to define some requirement the engineer could satisfy only with demand responsive transit would have been fruitless when the engineer could only choose between 20,000 pound buses or 70,000 pound street cars to make it work.

In contrast, modern transit engineers and city planners have great latitude. Engineers may choose either propulsion engines distributed between vehicles and guideway, or on-board propulsion engines, as in conventional vehicles. And they are free to trade costs for benefits in suspension and control as well. No longer saddled by solutions like the street car or the bus from the outset, the planners may plan and engineers may design to new dimensions that describe not how many people the system will move down a lane in an hour but how many the system will move about in a network.

Though the technical prospects of advanced transit technology are high,

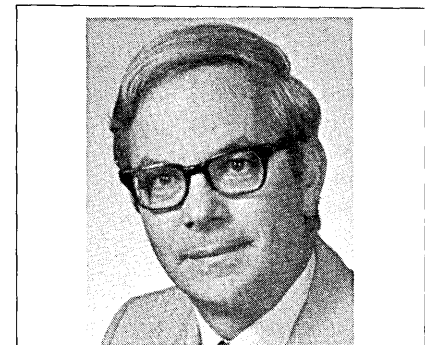
its immediate political prospects are low. The 1975 budget of the Urban Mass Transit Administration of the U.S. Dept. of Transportation included over \$1 billion for transit, of which less than \$10 million was for research and development of advanced technology. Meanwhile over \$9 billion was proposed for military research and development in 1976. And our national leaders, exhorting us to drive less, state in effect that the splendid mobility most of us have known is over.

Yet the dp professional, who appreciates the practicality as well as the service advantages of PRT, understands that we may maintain not only the same mobility as in the past but the same growth in mobility.

Before real progress will be made, public understanding will come. Several facts will have to become known: facts about private service and surveillance safety systems for non-private service (shared vehicles), facts about the low average speeds within the networks, and facts about the replacement of private vehicles in urban areas where they are a nuisance and not on interstate highways where they are beneficial.

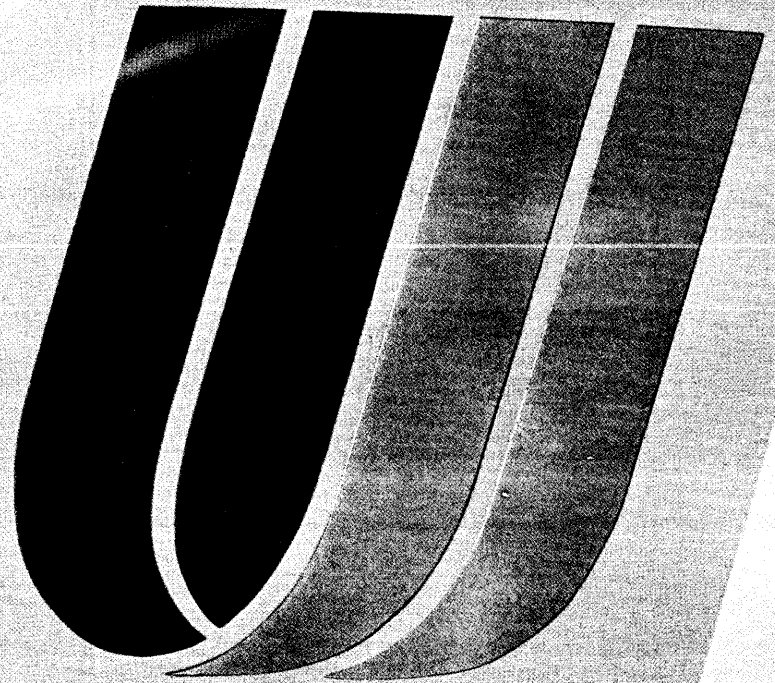
Public education will not be easy. Yet the service advantages, together with the cost advantages of mass produced vehicles and guideways, and with the architectural advantages of a network of 2½ foot guideways (into which utility wires can be stuffed and around which linear parks may be built) can be made apparent to most thoughtful people.

Appreciating that large scale systems will work gives a unique challenge to the dp professional—a challenge to educate at a critical time. Considering that out of that education might come systems that better the lives of millions, the challenge ranks among the best opportunities of helping mankind through data processing. *

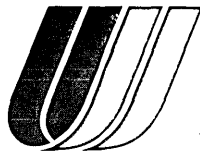


Mr. Carroll is an Advisory Planner in Industry Systems—Education at the IBM Laboratory, Poughkeepsie, N.Y., and has been with IBM since 1956. He is also the author of "OS Data Processing With Review of OS/VS," John Wiley and Sons, Inc., 1974.

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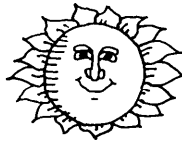
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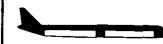
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







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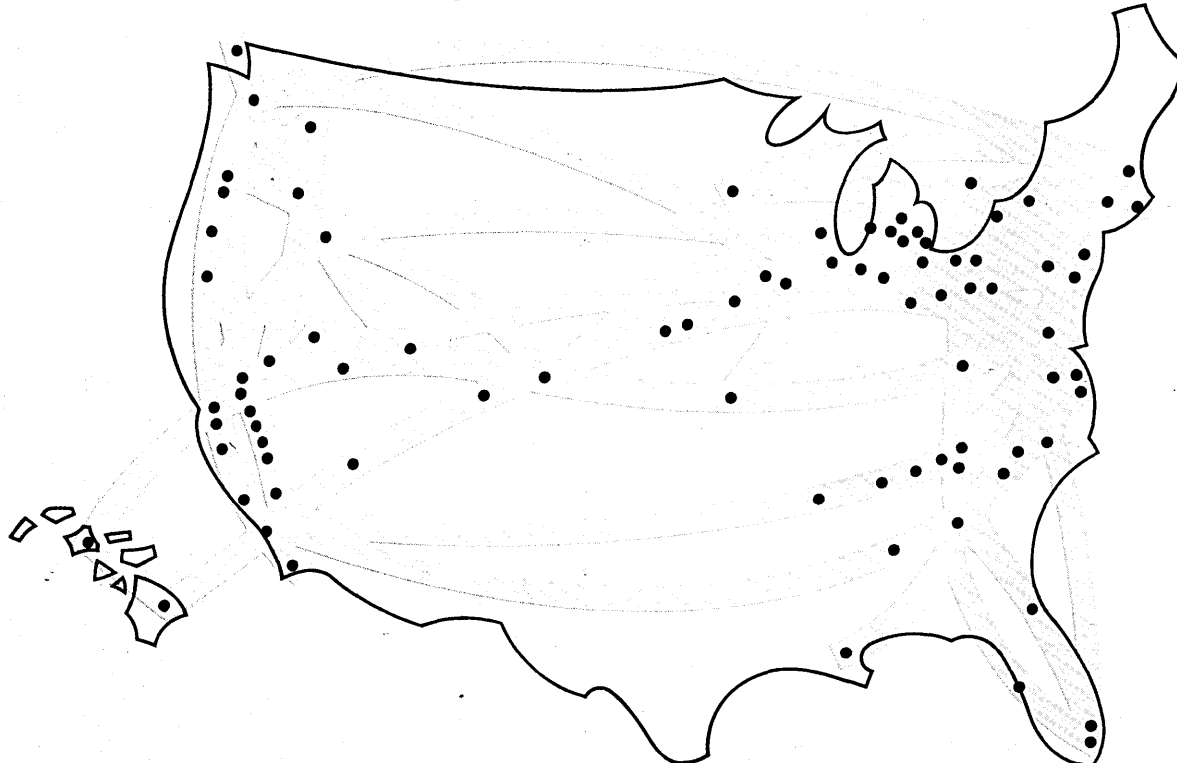
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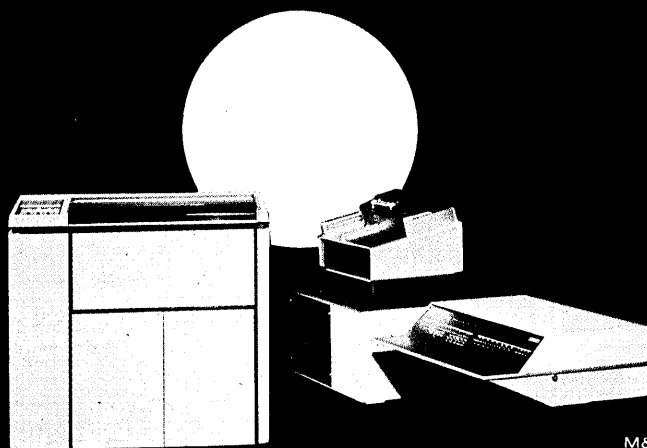
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Staffing the Albatross Project

by Donald Kenney

To: G. Pyrrhus
Vice President
Superdigitronics Corp.

From: A. Mariner
Program Manager
ALBATROSS Project

Subject: Manpower requisitions

As you made clear in your comments at our Program Status Review of Tuesday last, I have been somewhat remiss in staffing ALBATROSS. I'd like to apologize for my somewhat incoherent response. I hadn't anticipated that particular question. I'd been up most of the night working on the briefing, and I've been under some strain, and, besides which, sometimes I do things that just aren't too cool. Anyway, I'm sorry.

I'd like to explain, hopefully with greater lucidity, exactly why I've been late with the manpower reqs. I gathered from your remarks at the PSR that you don't feel an explanation is important, and that all you want is the reqs on your desk by 8:00 this morning. That's fine, and they'll be there, but I think you're going to want an explanation of some of the more, let us say, exotic aspects of the requisitions.

The principal problem I have encountered in formulating staffing requirements has been that it has taken me six weeks to figure out exactly what the ALBATROSS proposal actually promised. As you may, or may not, be aware, that proposal is written into our statement of work. One Lt. Col. R. G. (Bulldog) Gunshy has been assigned as our contract monitor. Gunshy has a Masters in Math and a Phd in Computer Science. He has just finished a two year assignment working with Senator Proxmire on improved contract monitoring procedures. He's sharp as a tack, and is convinced that we're out to rob the government somehow. (Who, us?) We're not likely to get much past him.

Anyway, I think I'm beginning to get a picture of what we promised. There's certainly a lot, and, as a taxpayer, I can't help but be impressed with the bargain the people of this country have gotten. Suffice it to say that anything we neglected to promise was probably due to lack of imagination rather than reticence or forbearance on our part.

After carefully assessing the magnitude of the task facing us and our meager resources, I have concluded that, given superb management, very good technical people, lots of enthusiasm, and some moderate amount of good luck, we might be able to deliver about 16 weeks late if we can staff up immediately to 20 people and hold that level for 18 months. Of course, if any of our key technical people quit (and, on this one, they're all going to be key technical people) it might take us a little longer.

As you are no doubt aware, our proposal team estimated the task at 13 people for 16 months. During proposal review, Marketing got it cut back to what their intelligence told them the customer could afford -- 9 people for 14 months.

To round out the picture, I must mention the point which you emphasized at the PSR. This is a fixed price contract and there's no follow-on. We can't afford to overrun it. In view of all these factors, I think you'll agree that a somewhat unusual approach to staffing is appropriate to this project.

My reqs are attached.

Regards
Al Mariner

Software Engineer -- one each

Must be capable of designing, coding, documenting and checking out the entire ALBATROSS system in 14 months while the other 8 of us cover for him. Don't care if he can get along with people -- he won't have to. I would expect him to be fairly junior in that I doubt that anybody with any substantial amount of experience would be foolish enough to take this job on.

Software Designer -- one each

Should be a senior type with lots of experience with Mil Spec documentation. Should be expert in writing incomprehensible gibberish subject to a wide variety of interpretations. Should also be adept at interpreting said gibberish. An aggressive briefing style and the ability to completely dominate a meeting are highly desirable. Ideally, everybody will come away from his writing or presentation with no clear idea what was said, but convinced that he was probably right. He doesn't have to be, incidentally -- we aren't going to use his design.

Coders -- 3 each

Programmers -- any background will do. At least one should be well-kempt and well-spoken in case we need to dredge up a programmer to show off to the customer. Should be somewhat restrained in using computer time for own purposes as our budget for that isn't any too generous either. Doesn't matter if they really can program and might be preferable that they can't. I don't expect these slots (except maybe the well-kempt part) to be difficult to fill.

Configuration Manager -- one each

Our customer has a whole covey of configuration managers who are apparently supposed to keep us controlled and visible. We need somebody to interface with them and make sure that doesn't happen. Whoever fills this slot is

going to have to be able to operate without direction because I don't know word one about managing configures. Allowing for the fact that "without direction" has several meanings ("lost" is one) I have never met a CM type who wouldn't fit these requirements.

Test Type -- one each

A mediocre programmer with precognition might actually help us, but I doubt that anybody who could foretell the future would get mixed up with this project. Barring that, any cocky, self-assured, ill-informed, thick-headed dunce will do just fine. Should be able to write large volumes of boring, confusing and essentially meaningless test specs and reports rapidly and efficiently. Our customer has a Capt. Dreadnaught who is a whiz at statistics and could be dangerous. It would be nice if our test type was either so good or bad at statistics that he tangled Dreadnaught up in knots.

Secretary -- one each

I would prefer that whoever fills this slot is either pretty or can secretary. I can only tell about one of these during an interview and intend to hire accordingly. Lest anyone accuse me of male chauvinism, allow me to point out that I would be the first to defend the right of female supervisors to hire male secretaries on the same basis.

Boss -- one each

The position is currently filled, however, I'm going to go home and call my old fraternity brother Sam Marsipan out in Cleveland to see if that job he offered me at the last reunion really exists when he's not bombed, and if it's still open. If it does, and it is, I'd suggest that you start looking around for either a fallguy or genius type for this slot. Clearly, it's tailor-made for one or the other.

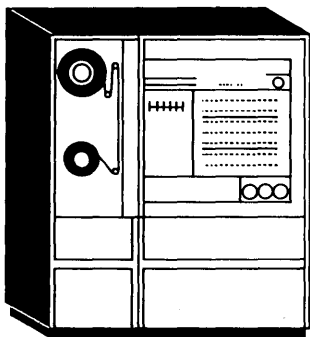
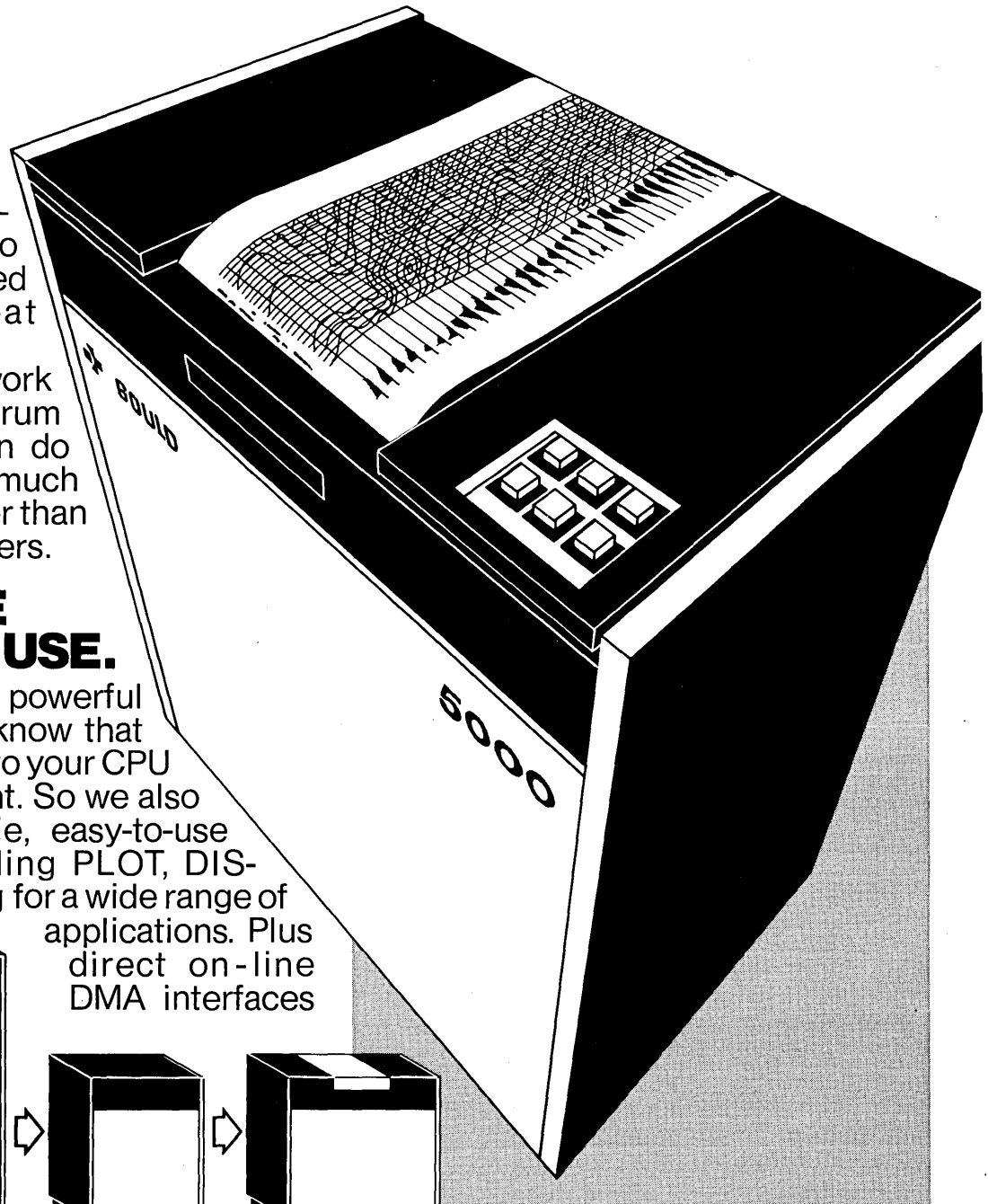
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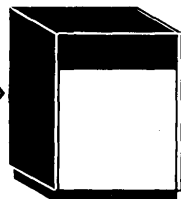
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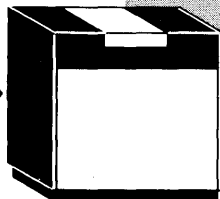
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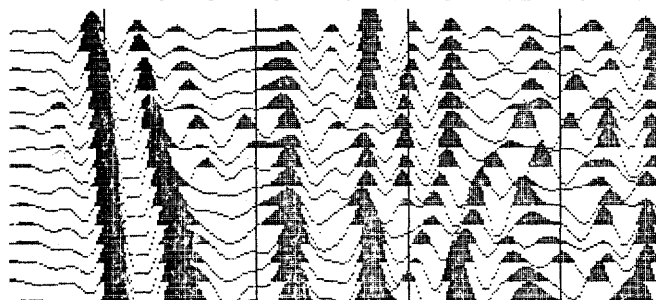
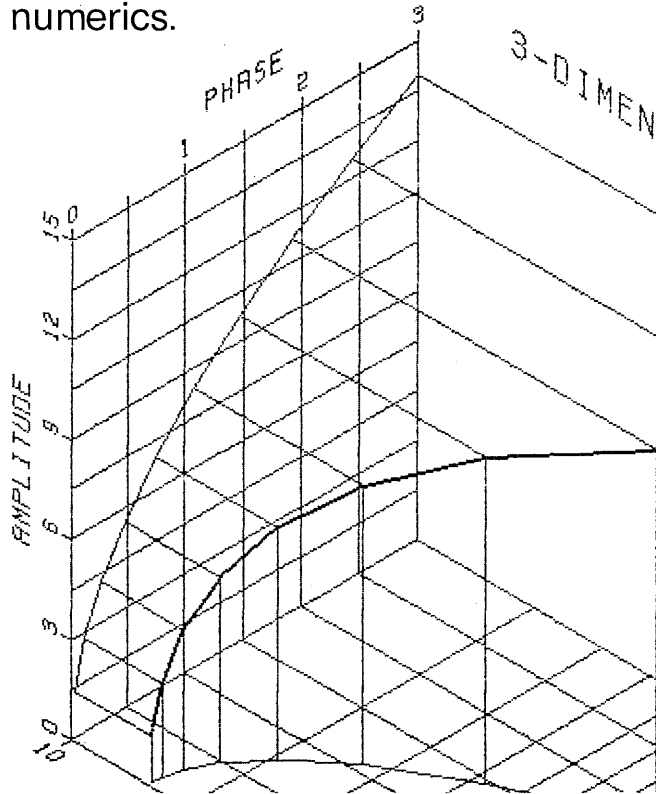
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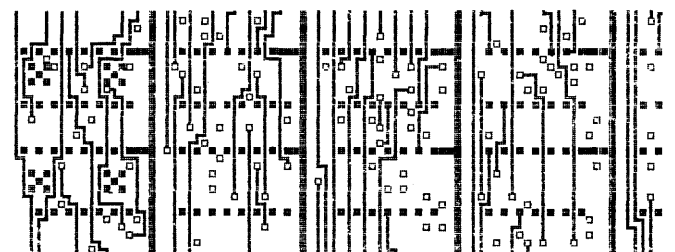
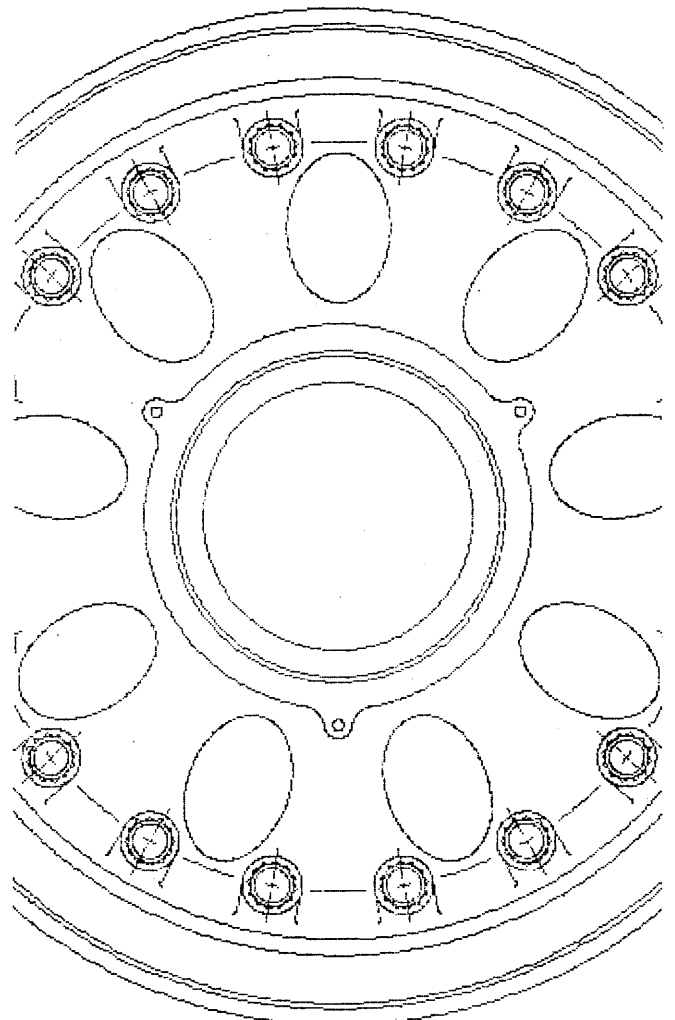
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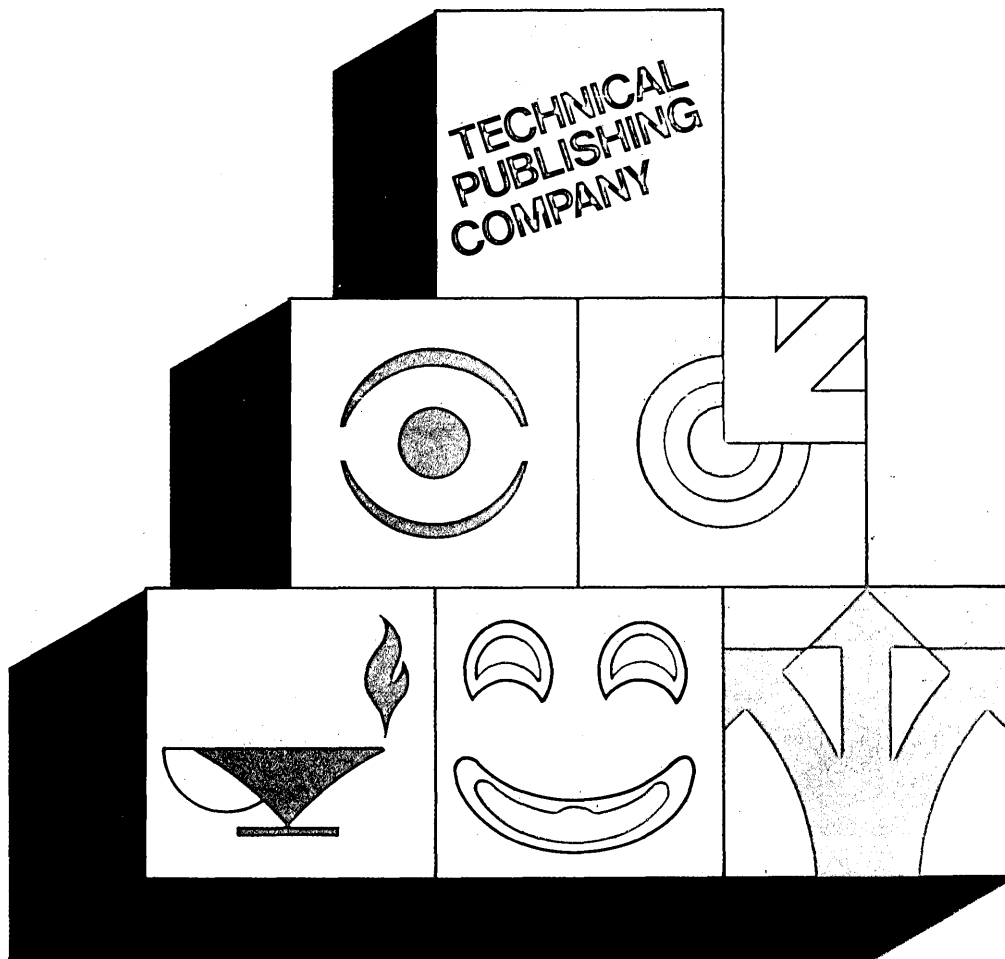
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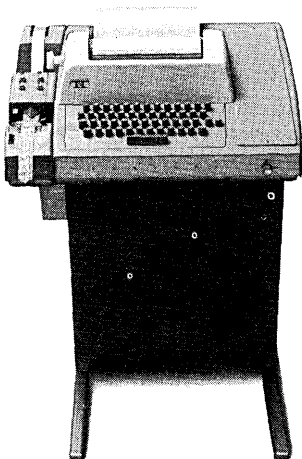
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Companies

Singer Pull Out A Bit of Déjà Vu

A letter that offered "practical answers to real retail questions"

"Please accept this invitation to see what's new from the company that first brought you electronic retailing."

This was the last paragraph of a letter dated Dec. 29, 1975, sent out by John D. Kerin, vice president, marketing, Singer Business Machines Div., to attract people to the Singer booth at the National Retail Merchants Assn. convention Jan. 11-14 at the New York Hilton.

"The company (Singer) has decided to withdraw over the next 12 months from the manufacture and sale of its Business Machines Div. product lines, including retail terminals and data systems."

That is an excerpt from a statement made Dec. 29, by Singer's new board chairman, Joseph B. Flavin.

Last October, (Nov. '75, p. 123) George Cogar, newly installed as president of Singer Business Machines told another NRMA gathering: "We are an ongoing business. We have suffered substantial losses because of our failure to respond adequately to changes in the marketplace. We are taking steps to correct these mistakes, to concentrate on market areas where we have demonstrated strength, to fulfill our responsibility to our customers and Singer Corporation."

There's a bit of déjà vu here or maybe a lot. RCA president Anthony Conrad said on July 12, 1971 (Nov. 1, '71, p. 42): "Neither rumors nor setbacks will undermine our commitment to computers." On Sept. 17, 1971, RCA withdrew from the general purpose computer business.

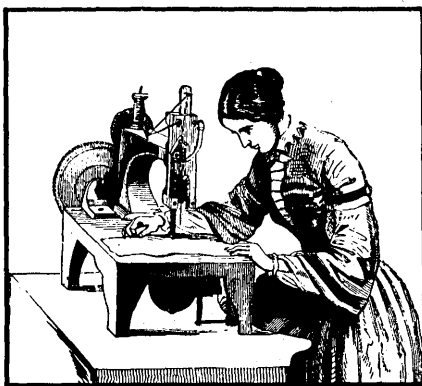
In October 1973, Pitney Bowes-Alpex was actively marketing its point-of-sale (POS) equipment at an NRMA conference. In November 1973 (Dec. '73, p. 101) Pitney Bowes pulled out of the pos market.

And for Flavin, who joined Singer from Xerox Corp. a month before the Dec. 29 announcement, there's the closer-to-home recollection of Xerox' withdrawal from the computer business

(Sept. '75, p. 102) last July 21, at a point where many were feeling that, at last, it looked as if Xerox could be on the road to becoming a factor in the general purpose computer field.

Other questions

Kerin's Dec. 29 letter offered "some practical answers to real retail questions." Singer was at the NRMA confer-



FOR SINGER CORP.

... it's back to sewing machines

ence and questions were asked, but not the ones suggested in the letter.

The company had its booth, complete with a new department store terminal, Model 950 incorporating 16K of ROM and a RAM scratchpad, which presumably was part of the package the corporation was offering to prospective buyers of the division.

It also met with users at a by-invitation-only cocktail party at which security was described as "so tight Flavin himself couldn't have gotten in without a badge and corroborating identification." Flavin didn't get in. He was in Europe at the time.

Cogar and other SBM officials told users pretty much what they'd already been told either individually or via broad announcements: that Singer installations would be supported for five years and orders for new equipment placed by June 30 would be honored by

the end of this year; that Singer is actively looking for buyers for the division; that the corporation would call a users meeting "soon."

Singer's POS competitors focused a lot of attention on Singer users too. Most notable was TRW which is said to have set up a prototype of an unannounced terminal at a hospitality suite to which it invited the largest Singer users, among others.

Singer was the acknowledged retail POS leader. A factor which got the company its early leadership also was a factor which may have helped the firm get out of the business. This was a massive order from Sears Roebuck which many say got "bargain basement" prices from Singer and was a very demanding customer.

Huge write-off

The company's decision to dump the ailing business machines division involved a write-off second only to that of RCA when it got out of the computer business. It was considerably larger than the write-off Xerox took last summer.

Singer's write-off of \$400 million included \$325 million directly related to the business machines division, and \$26 million from last fall for the discontinuance of other product lines, said by many to have been a last ditch attempt to salvage SBM.

RCA originally set up a pretax reserve of \$490 million, equal to \$250 million after taxes, to cover its pullout in 1971. Subsequently the reserve was reduced and the net loss was restated as \$210 million.

Xerox made an \$84.4 million charge against its second quarter earnings last year to cover its estimated net loss from getting out of the computer business.

It wasn't clear at writing what Singer was getting out of, what it might sell, and how.

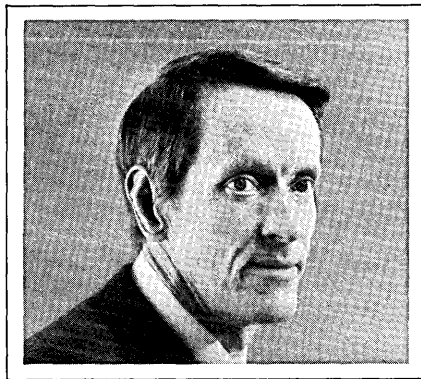
Doing well in Europe

SBM president Cogar also is president

of the Cogar Corp. in which Singer acquired a controlling interest in 1973. With that acquisition Singer began marketing Cogar's most successful product, the System 4 intelligent terminal, as the Singer 1500. In mid-January the Utica, N.Y. manufacturing plant, which produces the 1500, was still running. The terminal has not had a rousing success in the U.S. but, reportedly, is doing very well in Europe.

In fact, SBM generally is conceded to have done better internationally than domestically with an estimated 70% of the division's output last year having gone to the International Division. It was considered possible in January that this division by itself might make a more attractive package than the whole of SBM.

Then there's Singer M&M in Orange, Calif., which makes remote intelligent terminals. This company was acquired by Singer in January of 1973 and became part of SBM in July of 1974. President Fred McKee last month said he was negotiating with Singer officials concerning the future of the firm. He declined to list alternatives being considered but noted "We've been continuously profitable and that's in our favor."



GEORGE COGAR
"We are an ongoing business"

Started with Friden

Profitability has been a rare thing with SBM of late. The division got its start in 1963 when Singer acquired Friden Corp. of San Leandro, Calif. The division reportedly has lost \$60 million in the last five years and this in spite of a profit of \$8 million in 1973. It lost \$12 million in 1971; \$3 million in 1972; and \$19.6 million in 1974.

In announcing the decision to abandon the division, Flavin said it was made "in view of the substantial losses suffered by the division and the limited availability and high cost of capital." Flavin had said when he joined Singer he would spend time familiarizing himself with the company before he made a major move. It didn't take long for this one.

He did say the business had good long term prospects but noted "the company

isn't able to fund the future development and growth of the business machines division and still provide adequate capital for the company's fundamental businesses which possess basic and long term strength, in addition to near-term profit potential."

Buyers, anyone?

Who might want to buy SBM, in toto or piecemeal, was a large question mark in mid-January. Singer said it was talking but wouldn't say to whom. Of the possibilities only IBM and Burroughs had disclaimed interest. Others, including Honeywell, NCR, Litton/Sweda, and General Instrument/Unitote, said they hadn't been contacted.

A lot of reasons were being bandied about as to why SBM didn't make it.

They ranged from the very general—bad management, lack of technological capacity—to the more specific—bargain basement prices to Sears, lack of marketing know-how, and conflicting internal policies.

Singer, THE big name in sewing machines, went on an acquisition binge in the '60s, the decade in which it bought Friden. Of late it's been on the opposite track. It closed down graphic and telecommunication operations, an Italian white goods plant, a number of furniture factories, and an industrial sewing plant. It sold its water resources and German mail order businesses. It retains an aerospace operation and a housing subsidiary but basically . . . it's back to sewing machines.

—Edith Myers

CUC: Alive, Well and Still in Software

Anyone who remembers Computer Usage Corp. as a power in the software business should be pleased to learn that the firm is alive and well and still strong in software. CUC, now based in San Francisco, has begun taking an active role in the systems software maintenance activity at Amdahl Corp., working closely with the mainframe manufacturer's own maintenance group.

In the early 1960s, CUC was one of a triumvirate of software firms, sharing that prominence with Computer Sciences Corp. in Los Angeles and Computer Applications, Inc., in New York. It built up a staff that produced systems software and applications programs for computer makers and for users, only to see the market for those services diminish drastically.

Since 1970, however, a new management group has been at the helm, led by president Victor E. Bartoletti. The firm has diversified its activities, performing a form of facilities management in which the client company retains its system and its personnel while

CUC does the system management. That service, as well as the marketing of turnkey systems, have produced profits exceeding \$3 million over the last five years, according to executive vp Al Flitcraft. In its last fiscal year, the firm had total revenue of \$5.5 million and net income after taxes of \$480,000.

One category of the company's turnkey systems is based on Qantel Corp.'s hardware and CUC's software, and it's being used by some 30 large banks for their domestic and international money transfer operations, for letter of credit systems and for message switching. There are also turnkey systems based on Digital Equipment Corp.'s minis and being marketed to the agricultural industry. These can serve as excellent RJE terminals that could be connected to CUC's new data center, the latest diversification move, says Flitcraft.

CUC is running an Amdahl 470 computer at the service center at Sunnyvale which was acquired last September from the Singer Co. It had been equipped with an IBM 370/158 and was



SINGER SALE: Computer room at Computer Usage Corp. data center which firm acquired last fall from Singer Corp. CUC replaced an IBM 158 with Amdahl Corp. 470 system.

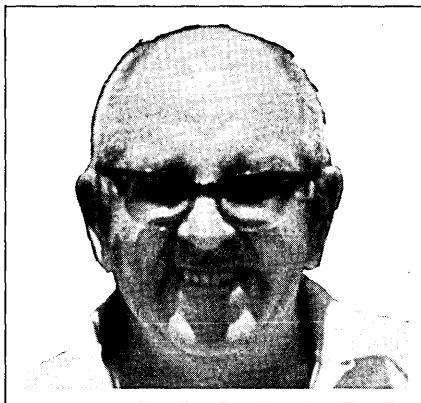
news in perspective

part of the Singer Information Systems network along with centers in London and in Wayne, N. J. As this was being written Singer was expected to announce the sale, also, of its London center, leaving the firm only with its center in New Jersey. The data center operation, Flitcraft says, "is the part of the business we expect will grow the largest and the fastest." *

Fun and Games In Phoenix

What would bring a 59-year-old gentleman farmer off the farm to run a 160-man company in Phoenix? Excitement.

That Vincent A. Van Praag is excited about Mirco Systems Inc., a company he has headed as president for the past year, is evident when he utters just one sentence about the firm. But it's more than that. Mirco makes and markets a line of microprocessor-based automatic



VINCENT A. VAN PRAAG
a second beginning

test equipment. It's the microprocessor and its potential that has Van Praag really excited.

He considers Mirco Systems' newest product, the Model 615 Programming Station, the first microprocessor based complete system. It includes a printer, a crt and keyboard and a tester and it enables a customer to create his own test program and to modify existing programs. In mid-January Mirco had completed three of the systems, one of which had been delivered to Western Electric. Van Praag says they plan to produce model 615s for every member of their own programming staff who now are vying for time on a time-sharing terminal and a couple of mini-computers.

In working with microprocessors, Van Praag feels he's in on the beginning of something bigger than the beginnings of the computer industry and he was there too. He began his computer industry career with Bendix Computer Division in

1952; was a co-founder of Packard Bell Computer; and was in on the founding of Scientific Data Systems (later Xerox Data Systems) which he served as a consultant before succumbing to the lure of agriculture.

Far, but not too far

His first farming venture was in alfalfa in California's Antelope Valley. His next was a joint one with a group of former SDS people who acquired a number of citrus ranches in the Coachella Valley near the Salton Sea. But he didn't get far from the computer (Dec. '72, p. 130). Van Praag used time-sharing to handle accounting, production, soil and market analysis, and for making acquisition decisions.

Although he's phased out of farming in a big way, Van Praag still has five citrus farms near Indian Wells, Calif., which is his home now and to which he commutes from Phoenix on weekends.

He's not quite sure how his involvement with Mirco came about. The company was formed four years ago by John Walsh, now chairman of the board, and Bob Kessler, now head of engineering. Both had been with General Electric. "Walsh got my name from somewhere and asked me to be on the board of directors." He studied their plans, liked them, and became a director.

Went to hardware

The company started out doing software for testing. It was profitable in its first year, earning \$357,000. "We were doing software for all our present competitors." After the first year, he said, "we sat back and saw we were working our butts off and they (the hardware producers) were making the big profits so we decided to go into hardware." Mirco Systems' primary product is a line of automatic test equipment called the Mirco 500-Series Logic-Circuit Testers.

"We're way out in front in using microprocessors in testers," says Van Praag who always likes to look ahead. "Take the automobile industry. They're going to start using microprocessors. I can see one tester for every 1,000 cars."

But testers aren't Mirco's only use of microprocessors. In 1973, Mirco, to finance expansion of its hardware business, acquired Arizona Automation Inc. and merged it into a new subsidiary, Mirco Games Inc. Arizona Automation's principal product was a manually operated soccer game called Champion Soccer.

As Mirco Games, the company has gotten into microprocessor based pinball machines. "Our engineering department develops the games," says Van Praag, "but they (the games subsidiary) take it from there. The games business

is something else!"

Van Praag is obviously having fun with Mirco systems but doesn't feel there's much fun in games. —E.M.

Software

File Processing Jobs Zip Through the 470

Mark IV file processing jobs have run on Amdahl Corp.'s new computer at a fourth to a third of the time required by a 370/158, according to statistics gathered at Computer Usage Co.

The firm last summer acquired Singer Co.'s service bureau in Sunnyvale, Calif., and at year-end replaced a 158 with an Amdahl 470.

At a semiannual meeting last month of the Mark IV user group in San Francisco, a spokesman for CUC described three types of jobs that have been run on both machines using the Mark IV file management system. All called for the passing of some 200,000 records through the master file.

The first job required the sequential passing of files, a minimum of processing, simple table lookup, and a minimum of report generation. Based on time in the cpu, that job ran on the 470 in 35% of the time it formerly required on the 158.

The second job required a lot of files to be brought in, a lot of processing to be done, compares between fields, and updating. That one was performed in 38% of the time on the 158.

The third required a file to be moved in, some table lookups, a minimum of processing and a lot of reporting to be generated. This one was done in 29% of the original time.

Thus the speed improvement was the least on jobs that required much processing and was the greatest on jobs that required report generation. A spokesman for the Informatics Mark IV Systems Co. said a number of 470 installations are now running Mark IV. He said there were 958 installations worldwide of Mark IV at the end of 1975. *

Antitrust

Downed by IBM in the Market and in Court

A number of antitrust suits against IBM remain on the books, almost all of them relating to the marketing of hardware. One that had to do with software, of which there haven't been many, has been dismissed by a U.S. district court judge in San Francisco. He said he failed to see where IBM had injured Symbolic Control Inc. sci's lawyers

were planning to ask for a new trial.

In the suit, filed in November 1971, Symbolic Control charged that IBM had unfairly blocked SCI's efforts to market a new and proprietary numerical control (NC) software package for the 360 called APT/70. The company was formed in March of 1969 in Palo Alto, Calif. At the time, it contended, IBM's processor, called NC/360, was the most widely used, accounting for some 70% of NC tapes produced. And previous to the formation of SCI, the company contended, IBM had announced that by July 1969 it would unbundle its software. It did so in June, at which time IBM purportedly said that all its new programming announcements would be priced.

That allegedly was not to be. Instead, SCI charged, IBM continued to supply new releases between February 1969 and November of '71. In doing so it increased the reliability, processing speed, and capabilities of NC/360.

Symbolic introduced testimony to the effect that an IBM spokesman told the 360 APT Implementors Group (a users group) that NC/360 would become a program product Jan. 1, 1970. It did not. SCI's attorneys attempted to show that IBM kept its NC users on the hook by dangling before them a Version V with enhanced capabilities. IBM's attorneys countered by drawing numerous admissions that Version V was what users naturally anticipated as the follow-on to the existing Version IV, although it was never an appellation used by anyone at IBM.

\$2.3 million at stake

One might ask how important the numerical control market was to IBM or to anyone else, and why IBM would go to any lengths to dominate it at the expense of an upstart software firm. According to figures from Symbolic, the cost of computer time to produce NC tapes to drive all the NC machine tools in the U.S. rose from an estimated \$25 million in 1967 to \$74 million in '71. IBM equipment produced 70% of those tapes. Further, evidence introduced at the trial included a 1972 estimate by IBM that NC processors had already produced "hardware drag" of 2.3 million points worldwide, of which 1.85 million are in the U.S. That is to say, NC software was producing hardware revenues of \$2.3 million per month worldwide, \$1.85 million per month of that in the U.S.

The founders of Symbolic Control said they foresaw a market for their software because they knew that IBM was about to unbundle its NC software and were convinced that APT/70 would be a superior performer over NC/360. In its attempt to prove it was damaged by IBM's acts, which was the function of this phase of the trial, Symbolic made the point that IBM provided free maintenance for its NC/360 in contradiction

to its unbundling announcement. The plaintiffs said, in short, that IBM established a policy with regard to software maintenance, then violated it to damage the plaintiff.

Unannounced maintenance

From the unbundling announcement date until Jan. 1, 1970, according to Symbolic, IBM said that Type II programs (such as NC/360) were to get Class B maintenance. Thus it sounded like there would continue to be free maintenance of NC programs until January of 1970. (At no time, however, did IBM announce what its policy would be with regard to the maintenance of NC/360.) And beyond the 1970 date, IBM did indeed provide this free maintenance, allegedly for at least four and a half years more. During that time, Symbolic said, hundreds of APARS for scores of users were performed.

"Free" maintenance permitted IBM to preserve the customer base it created with "free" software, designed to maximize hardware drag along." Symbolic said in its brief filed after the close of the first half of the trial. "Upon its decision to monopolize the applications program market, IBM needed a vehicle to convert its captive software users into paying captive software users. 'Free' maintenance kept them locked in exactly the right way, to the direct exclusion of Symbolic Control from the numerical control processor market."

Symbolic's lawyers, using depositions and taking testimony, also attempted to show that IBM, when confronted with a benchmark test against APT/70, provid-

ed the user with improved versions of NC/360 to use in the head-to-head comparison runs. The fledgling software firm alleged that IBM pre-released Version IV, Modification 3 to Westinghouse for one of these comparison tests, doing so even before that release had entered Beta test. The use of pre-release versions in similar benchmark tests was also alleged at other sites.

Question of timing

But Judge Alfonso J. Zirpoli, in a non-jury trial, noted that SCI didn't start work on APT/70 until July '69 and that the major developmental effort was held up until the following December when capital was acquired, by which time SCI had announced that APT/70 would be available for the 360 in mid-1970. But in fact the first field test didn't take place until September 1970 and the production version was not offered for sale until January 1971. "Unfortunately," he stated, "SCI was not able to persuade any potential customers that use of APT/70 would actually produce overall advantage to the users."

The judge ruled that SCI's failure to install APT/70 at any user sites did not stem from anything IBM did. "Due to the nature of plaintiff's claim the controlling testimony had to be that of prospective users who examined APT/70 and declined to buy or use it," the judge said. "Yet all the user testimony basic to the fact of injury (impact) establishes that the customers' reasons for not leasing APT/70 had nothing to do with overt acts of IBM."

—Edward K. Yasaki

Communications

IBM and AT&T: Giants Launch their Battle for Edge in Data Communications Services Market

A titanic battle between two giants began at year end when IBM opposed a tariff application made to the Federal Communications Commission by AT&T (Jan., p. 132).

The immediate bone of contention is the phone company's Dataspeed 40 tariff, which it proposed last November. But the real issue is whether AT&T will be able to get out from under its 1956 consent decree, invade the computer and communications market, and do battle against the king of Armonk—as well as against other non-regulated suppliers of telecommunications systems—and survive.

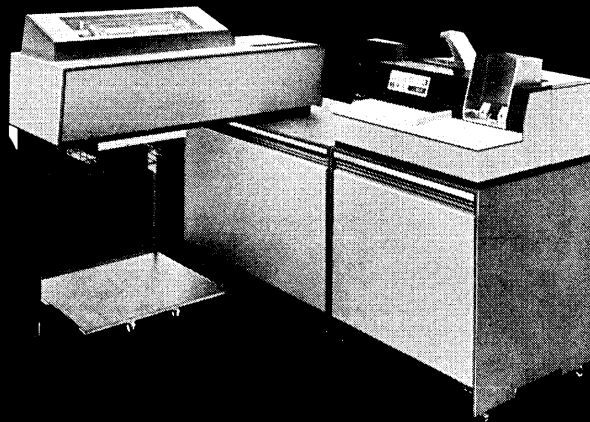
AT&T already has announced plans to offer a value-added "communications processing" service designed to give the user "an alternative to IBM," as marketing director Roger Moody put it in a recent interview (Jan., p. 100). This plan, which threatens specialized carriers as well as intelligent terminal

makers, won't get very far if Bell loses the Dataspeed 40 fight. And if that happens, AT&T also will be more vulnerable on its own turf, where Satellite Business Systems—IBM's new joint venture with Comsat General and Aetna Insurance Co.—is attempting to gain a foothold.

DP or Datacom

Under the consent decree, AT&T can furnish only "common carrier communication services." This explains why IBM argues that the clustered version of the Dataspeed 40—the equipment covered by the pending tariff—is a data processing system, while AT&T insists it's an "evolutionary technological improvement of services traditionally offered by communication common carriers."

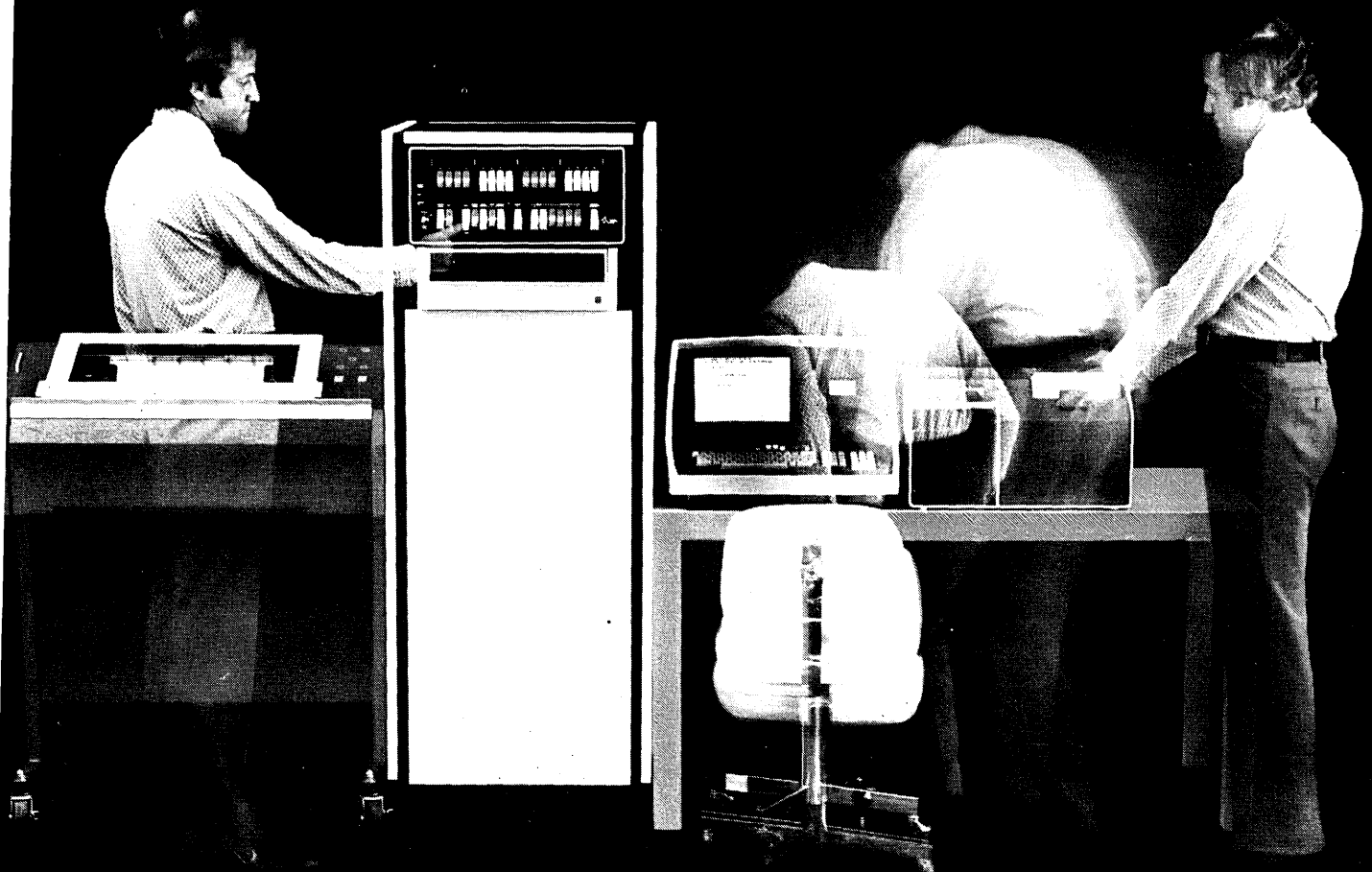
The FCC hasn't yet accepted either view. Instead, it has twice delayed commencement of the Dataspeed tariff to allow time for more study. In late January, the effective date was Feb. 2, but



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an FCC source believed it would be delayed a third time.

In a statement filed with the FCC in January, AT&T attempted to rebut comments made earlier by IBM, CBEMA (Computer and Business Equipment Manufacturers Assn.), and CIA (Computer Industry Assn.) contending that the Dataspeed 40 is a data processing not a communications device. These were the phone company's major points:

The Dataspeed 40 has its origins "in AT&T-provided private line Morse (telegraph) services which required manual coding of information." First, the telegraph key was replaced by a typewriter-like keyboard, then off-line message preparation capability was added to simplify editing and error correction and to improve transmission efficiency. The new features added by the Dataspeed 40—solid state circuitry and crt display—enhance these same transmission, editing, and error-correction capabilities and thus "improve the *communications* function . . ." (AT&T's italics).

Rebuttal

CBEMA's objections were based largely on the contention that the Dataspeed 40 "apparently encompasses far more extensive data functions than terminal equipment heretofore offered by AT&T . . . The lack of more detailed information . . . is one major reason why the filing as submitted is inadequate" and therefore should be rejected by the commission. As evidence of these allegedly more extensive data processing functions, the association cited the equipment's display buffer addressing feature, plus a number of others. Display buffer addressing was defined by CBEMA as "the capability . . . to interact with a customer's computer to compact and eliminate unnecessary data . . . in order to minimize . . . the transmission and computer storage required for data processing applications."

AT&T, in its response, said display buffer addressing "permits the positioning of the text in a pre-determined location on the display screen. Text positioning features such as carriage return, line feeds, vertical and horizontal tabulation and spacing used to position data on a page have for many years been incorporated in AT&T-provided teletypewriter terminal equipment."

The phone company then went on to attack, one by one, CBEMA's other allegations regarding "new data functions" in the same basic manner, concluding that "these allegedly 'unique data processing' features are in fact features which have long been a part of com-

munications common carrier services."

Regarding the alleged lack of sufficient descriptive material on the operation of the Dataspeed 40, AT&T cited a number of court decisions to support its contention that the commission cannot legally reject the proposed tariff on this ground alone. It also insisted that "the material filed . . . in support of the (Dataspeed 40) tariff is substantially similar to materials filed in support of previous tariff submissions which have been held (to be) in full compliance" with FCC regulations.

Crucial point?

One point that may turn out to be crucial in making up the FCC's mind was raised by IBM's statement: "it is the existence of (unregulated) competition which makes it inappropriate for a device to be marketed on a tariffed basis," the company said, adding a little later on, "The Dataspeed 40 equipment performs the same functions as computer terminals (offered by) IBM and other non-carrier manufacturers."

In the FCC's Tentative Computer/Communications Decision, issued nearly six years ago, the commission said government "intervention and regulation" should be "limited to those areas where there is a natural monopoly, where economies of scale are of such magnitude as to dictate the need for a regulated monopoly, or where other factors are present to require governmental intervention to protect the public interest because a potential for unfair practices exists. Subsequently, the commission decided not to regulate the commercial data processing industry.

It is just possible the commission will determine there is a similar absence of necessity to regulate the Dataspeed 40, regardless of whether it is called a data communications or a data processing device. If that happens, AT&T probably won't be able to offer the equipment because of the bar imposed by the 1956 consent decree.

But a solution to this latter problem was suggested by IBM in its recent statement to the FCC: "The commission should seek modification (of the consent decree) from the Department of Justice so as to make perfectly clear that AT&T may continue to offer its terminal equipment for use as a part of data processing systems on an unregulated basis."

Although AT&T showed little interest in this idea, it is at least conceivable the Justice Dept. would go along. If, for example, AT&T were to establish a separate marketing subsidiary for the Dataspeed 40, plus other intelligent terminals that may now be on the drawing board, this

would begin the divestiture process the government is seeking in its current antitrust suit against Bell. AT&T categorically opposes divestiture—for now. But if it represented the only feasible way of getting into the burgeoning computer/communications market, this opposition might evaporate.

—Phil Hirsch

Novel Satellite Net Could be up by '79

Novel ideas are incorporated into the domestic satellite network unveiled at year end by Satellite Business Systems, the newly-named joint venture of IBM, Comsat General and Aetna Insurance Company.

Among the major innovations:

—A customer will access the network through a 16 to 23 ft. dish antenna—typically mounted on his roof or adjacent to his terminal site—eliminating or reducing the extra cost and signal degradation of terrestrial local loops and trunks. This arrangement "virtually" eliminates the distinction between central and remote computing, said SBS, and permits data bases to be placed closer to remote terminals—thereby reducing communications expense and providing faster service to remote users.

—The SBS system will provide an integrated all-digital voice, data, and image transmission service. The high bit rate planned for voice messages "allows for completely normal telephone quality which will be unaffected whether or not privacy or secrecy coding is applied."

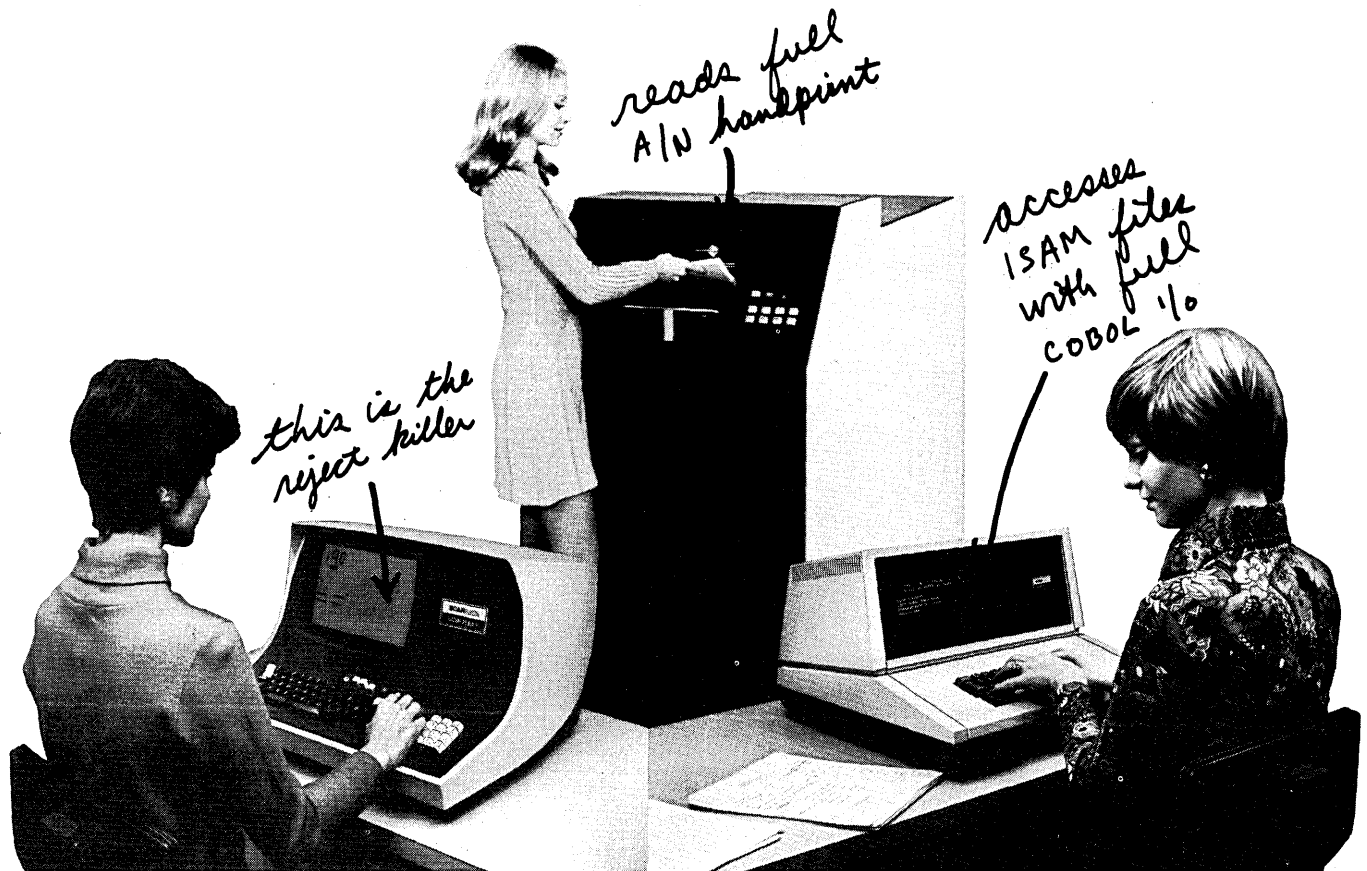
Integration will permit a particular user's satellite capacity to be re-allocated on a dynamic basis among the three kinds of traffic to suit his changing needs. He will also be able to obtain full-period and on-demand service concurrently, and change this mix dynamically.

—"Innovative modulation and access equipment" will be located at each earth station to handle switching and multiplexing and to control assignment of satellite channels among earth stations.

Circuit allocation

A TDMA/DA (time division multiple access/demand assignment) system will control the latter function. This technique, first used in a big way by Comsat in its SPADE system, essentially interconnects all the earth stations on the network through a dedicated signaling channel; they request circuits as needed from a central computer which keeps a constantly updated inventory of those available and can automatically connect any channel to any pair (or group) of sending and receiving terminals. TDMA/DA provides several benefits, according to SBS:

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"Instead of requiring separate transmission capacity for each major route, the satellite capacity can be allocated among all of the routes, as the traffic load on each route varies . . . TDMA permits . . . use of the full power and bandwidth capacity of each satellite transponder." By comparison, "non-TDMA multiple access techniques (may have to) sacrifice up to 60% of the power of the transponder . . . to limit interactive effects and distortion among multiple signals passing through the transponder simultaneously. An additional benefit . . . is the relative insensitivity (of TDMA signals) to interference from adjacent satellites."

-SBS service will include a "window" into the customer's communication network, enabling him to monitor network status and performance, change traffic handling priorities, order changes in service, and collect usage statistics for internal accounting purposes."

Free bandwidth

-The system will operate at 12-14 gigahertz (GHz), "where there is no terrestrial frequency congestion" and no regulatory limit on satellite radiated power.

One possible problem, however, is that these frequencies "have been allocated . . . not only to the fixed satellite service but also to broadcast-satellite service. The SBS system is based on the premise that both of these bands (12 and 14 GHz) are allocated completely to both services on the basis of sharing of the orbital arc." The alternate approach—of allocating only half the available bandwidth to each service—would "substantially increase the cost per circuit of the SBS system."

This network description is part of a five-volume application for construction authority which SBS submitted to the FCC. Assuming the commission grants the application by next autumn, the company said its network could be operational by 1979. Opposition comments from competing satellite carriers are inevitable, but they won't be filed until later this month.

Another hurdle that must be overcome by SBS is a suit now pending in the U. S. Circuit Court of Appeals. Brought by Western Union and RCA Globcom, it contends basically that the FCC was wrong, early last year, when it decided that IBM could go into the domestic satellite business without violating the antitrust laws.

Implementation

Total startup costs of the SBS network were estimated at \$250.6 million, of which the three partners "are prepared to invest" \$165 million. The balance will

come either from them or from "external sources."

At the moment, IBM and Comsat General each have an equal interest in SBS while Aetna has a "nominal interest." Once the pending application is approved by the FCC, Aetna will gain a 15% equity interest plus an option to become an equal partner when the system goes operational.

The initial system will be supported by two orbiting satellites plus a spare on the ground. Each satellite will carry eight transponders, and each transponder will output 20 watts of power, distributed across 54 MHz of usable bandwidth.

Before this system goes up, SBS wants FCC permission to build and operate seven earth stations connected to satellite channels leased from another domestic carrier. This network would support IBM's internal private line communication requirements and "be directed toward establishment and demonstration of the feasibility and effectiveness of the operational system." The first two earth stations would be located at Poughkeepsie, N. Y., and Los Gatos, Cal.

Everybody equal, including IBM

The application devotes a good deal of attention to charges that IBM will gain an unfair advantage over its competitors through the SBS venture. Several critics have suggested that this could happen if the satellite carrier adopted a communications protocol that worked better with IBM systems than with other makes, and/or if the two companies' offerings were bundled or jointly marketed. SBS, in its application, said:

The proposed network "will accept bit streams irrespective of their character code, message content, or line protocol," all of which will be "external to the SBS system and under the control of users." Also, "apart from constraints imposed by (satellite) transmission path delay, . . . existing line protocols will be usable with the SBS system." And "SBS, in its own self-interest, will design its system to be compatible with as broad a spectrum of terminal equipment as possible."

Initially, signaling for switched data service will be accomplished through "a parallel voice-grade access for 'data dial-up' using conventional telephone signaling formats. SBS is monitoring the consideration of 'in-band' digital data signaling techniques by industry and standards organizations, and intends to adopt such interfaces when their use in the industry is established."

SBS "will not have a 'bundled' or 'packaged' offering of communications

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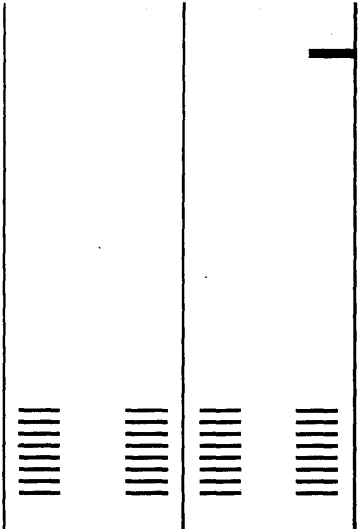
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370/158 memory

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and . . . IBM will neither sell nor promote . . . SBS's communication services to IBM customers nor offer a discount or other professional advantage" to IBM users who contract with SBS. Moreover, SBS will "not sell or promote IBM data processing equipment and services."

However, since "data processing equipment customers must have the opportunity to receive complete . . . proposals for systems designs" from their dp suppliers, "IBM . . . must be free to discuss with its customers whatever common carrier services, including SBS's, IBM believes are applicable to the customer's requirements."

Constraints

To ensure "fair and impartial treatment," this advice will be guided by a number of constraints which IBM laid down in 1964—originally to prevent fa-

voritism from being shown to any communication common carrier. Under these constraints, the IBM salesman is allowed to explain the operation of the company's system in conjunction with the various carriers' facilities, but he can't "make recommendations concerning the selection" of a carrier when more than one "reasonable alternative" is available. Only if a customer fails to request IBM to work with a specific carrier or carriers, may the company's salesman develop a system solution, proposal, and installation program without a carrier's participation.

SBS added that it will "cooperate and consult with all computer hardware and software manufacturers (to gain) consideration of SBS communication services in the total system designs they present to customers. This will include, but not be limited to, IBM." —P.H.

Bell's Rate Increase: A Repeat of Last Year?

AT&T was awarded a \$225 million per year across-the-board rate increase by the Federal Communications Commission. The new charges for specific interstate services won't be known until the company files its tariff, which may occur this month.

One indication of what's in store is provided by the \$365 million increase which Bell won early last year. That rate hike was designed to produce a 4.3%

gain in dial-up revenue, and 4.4% more from WATS and private line services. In the case of dial-up, daytime dial charges for three minute station-to-station calls went up 11 cents for distances of one to 10 miles, 32 cents for distances of 71 to 85 miles, and lesser amounts for distances up to 925 miles. They decreased slightly beyond that point.

Measured time WATS rates rose \$4 to \$32 per month for initial period service

AT&T Charges Called Too High

AT&T is charging too much for its monopoly services and not enough for its competitive services, said FCC Common Carrier Bureau Chief Walter Hinchman. The "monopoly" services are dial-up and WATS; the "competitive" offerings are Telpak, broadband, telegraph, and private line voicegrade circuits.

If adopted by the commission, Hinchman's conclusions will enable the specialized carriers to compete more aggressively against Ma Bell, since they'll be able to raise their rates and stave off the bankruptcy that now threatens many of them. Also, the informal alliance between AT&T and the state regulatory commissions may be weakened; the commissions favor lower rates for residential dial-up telephone service, Bell's major monopoly offering.

But Hinchman's decision faces a lengthy legal gauntlet to run since Ma Bell is strongly opposed to it.

The decision is "unreasonable and illogical," said an AT&T press release, "and endorses criteria that are alto-

gether inappropriate for rate-making purposes and insupportable in economic theory. If adopted by the commission, this decision would mean immediate, unwarranted, and substantial increases in the cost of service for most private line customers."

The Common Carrier bureau chief's decision, which requires more than 100 pages of text and includes several more pages of attachments, involves Docket 18128—a proceeding that began early in the '60s and is directed at determining which of several cost-allocation methods should be used by AT&T to determine its private line and dial-up rates, as well as whether those rates are just and reasonable.

Hinchman found, among other things, that Bell's allocation method—formally known as "long run incremental costing (LRIC)—is "defective" and that rates for new services should be based on another scheme—fully distributed costing—favored by the specialized carriers. *

on calls of up to 700 weighted miles, with the higher increases occurring at the shorter distances. Beyond 700 weighted miles, charges decreased as much as \$40. Full period WATS rates increased \$190 to \$330 on calls of up to 1400 miles, and decreased as much as \$25 for longer distances.

Private line charges were increased a flat 5.1% except for Dataphone Digital Service (DDS) which wasn't affected.

The new increase is an outgrowth of last year's. In 1975, AT&T asked for a net \$717 million hike; the commission, after deciding the company was entitled to a higher rate of return, (8.74% instead of 8.5%) to compensate for its higher borrowing costs, allowed a \$365 million increase. But it also deferred for further study Bell's claims that it needed an even higher rate of return—10.5% to 11% to make its earnings and dividends sufficiently attractive to investors.

Later, Bell contended that changes in the economic environment warranted an increase greater than the one originally sought—i.e., \$660 million on top of the \$365 million already granted. In January, the FCC decided that only \$225 million of this latter request could be justified.

The new increase is calculated to raise AT&T's rate of return from 8.74% to 9.5%. The FCC added that the company may raise it to as much as 10% by improving the efficiency of its internal operations. *

Datacom Technology To Be Tested

A joint U.S.-Canadian satellite experiment, which includes tests of new datacom technology and applications, began this month with launch of the communications technology satellite (CTS) from Cape Canaveral, Fla. The satellite will operate within the 12 GHz (gigaHertz) frequency band, which has been set aside for satellite communication to reduce congestion at 4 to 6 GHz, where all commercial satellite systems now operate.

It may be significant that 12 GHz is one of two bands which Satellite Business Systems (SBS)—the IBM-Comsat General-Aetna Insurance Company joint venture—plans to use for its domestic satellite system.

CTS will have 10 to 20 times more transmission power than present commercial satellites, enabling it to communicate with ground antennas basically like those SBS plans to place at its users' sites.

One result of the experiment will be "to create markets for commercial services and space technology both in the United States and abroad," said NASA, which, along with Canada's Dept. of Communications, is sponsoring the project. The U.S. share of the cost is



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CIRCLE 68 ON READER CARD

news in perspective

about \$22 million. The experiment will last about two years.

A variety of health-, education-, and social welfare-related applications will be tested by the U.S., including teleconferencing and televised instruction using a compressed, digitized video signal. The Canadian test plan involves, among other things, a new TDMA (time division multiple access) synchronization scheme; a high-speed modem; a new channel-sharing system based on FDMA/DA (frequency division multiple access/demand assignment); interfacing of computers to satellite ground stations, and coding/processing of 9600 bps signals transmitted through Codex modem equipment. *

Contracts

Drive for Change Coming From Users

While the computer business often moves with high velocity—a common statement is that a two-week vacation can obsolete anyone associated with computers—some old practices of the business die particularly hard.

Take the contract between the cus-

tomers and the equipment manufacturer, for instance. The contract is essentially a hand-me-down from the tabulating machine equipment days and there have been few significant changes in standard contracts in several years.

But there are indications that the approach to contracts by both users and vendors may be changing and, further, that the drive for change is coming from users.

"Users are becoming more demanding," says Roy N. Freed, an attorney who is an expert in computer user-vendor contracts. "For example, they're becoming better at the very important discipline of identifying the system they want and writing up clear specifications."

The member of the Waltham, Mass., law firm of Pollock, O'Connor and Jacobs, represents computer users—primarily those considering Honeywell and Burroughs machines—as well as some vendors who purchase equipment from larger manufacturers.

Freed is an advocate of doing things correctly from the beginning. Thus, he places great emphasis on the period of negotiation that occurs before a user has formally committed to acquire equipment.

"It's fundamental that users keep those suppliers on the hook until the very, very end," says Freed. "Users have to develop a strategy to maximize their bargaining. Sometimes a vendor will say no and you must play brinkmanship with him. Maybe you will win and maybe you won't. Maybe you will have to go to another vendor."

Fair transaction

Ideally, Freed says a good contract will spell out the specifications in such a manner as to limit the expectations of the user and to limit the obligations of the supplier (you've got to have a fair transaction). In addition, Freed thinks he detects something of a trend in which customers are increasingly recognizing the need for skilled legal experience and know-how in helping them write their contracts.

"You often can have problems when an incomplete contract is drawn," says Freed. "And if a user has problems with the vendor here, he still has some recourse in the courts. All is not always lost when there is an incomplete contract."

Catamore case

The best-known instance of a user seeking and obtaining recourse in the courts was the Catamore case in which a Providence, R. I., jewelry firm, Catamore Enterprises, Inc. won an \$11.4 million jury case against IBM (August '75, p. 57). The crucial turning point in the landmark case—which has been appealed by IBM—was the ability of Catamore's attorney Thomas K. Christo to convince the jury that oral agreements between the user and IBM concerning software performance constituted a separate and distinct agreement from the hardware contract.

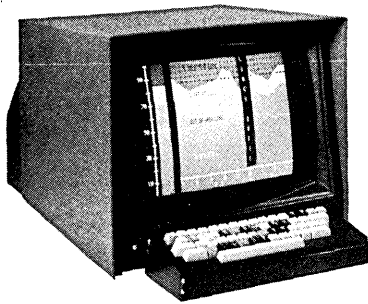
"It's always been the case that an oral agreement is binding," says Christo. "But no one really applied it to the data processing industry until the Catamore case. If there is a message to the user here it's that he should be careful about what he signs on the basis of what a salesman tells him."

Traditionally, vendors include in their written contracts statements that attempt to nullify all oral agreements that may have been made previously between the vendor and the user.

As is nearly always the case in the electronic data processing industry, IBM is the focal manufacturer because of the firm's dominating market share and because the other mainframe vendors tend to follow IBM's lead.

Worthless piece of paper

One specialist in user contracts, Dick H. Brandon of New York, has been critical of the standard IBM contract. "The problem with the IBM contract," says Brandon, "is that it's a worthless piece of paper, not only for the user but for



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IBM."

Brandon, who has just published a book on the subject of contracts entitled "Data Processing Contracts: Structure, Contents and Negotiations," believes that customers are increasingly going to be tougher with vendors as data processing permeates the users' businesses and operations. "When a data processing system is capable of bringing a \$1 billion institution to its knees, that institution is going to be careful about the contract it signs with a vendor," says Brandon. "And, in the end, I think vendors are going to react, too."

Brandon is an advocate of "arbitration clauses" in contracts. The clauses stipulate that a disagreement between a user and a vendor be submitted to arbitration. Brandon notes that in a normal situation without an arbitration clause the user is often forced to sue the vendor and that course is expensive and time-consuming for the vendor.

"Arbitration clauses are incentives to settle disagreements," says Brandon. "In a sense they favor users, and I see more and more arbitration clauses being written into contracts. IBM hates them, though. The other vendors are less concerned about arbitration clauses."

Brandon also urges that "checklists" between the user and the vendor be drawn up in the contract. As examples here, Brandon suggests that contracts include guarantees of system performance, as well as acceptance testing for both hardware and software performance.

Software snag

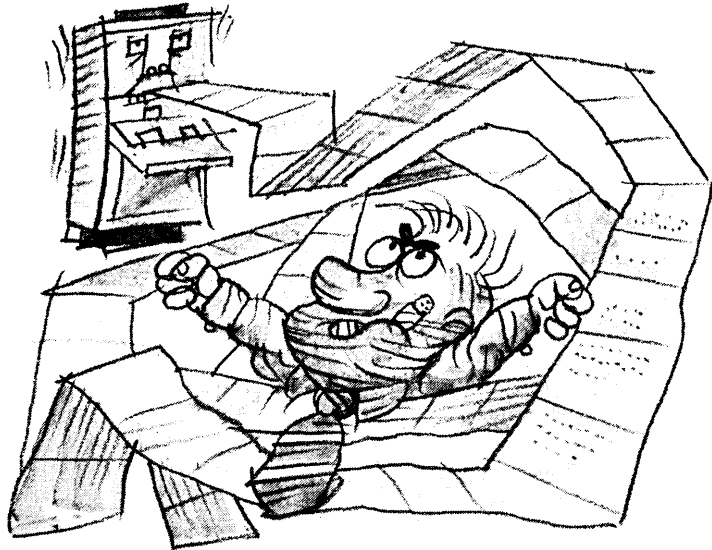
The biggest snag between users and vendors continues to be software: typically the hardware performance is specified in a machine services contract, but the software guarantees tend to be vague and are usually specified in oral agreements.

One firm that has gone a long way towards specifying software for customers is Digital Equipment Corp., which issues customers a "Software Product Description" of the software a user is to receive with the hardware he orders.

"What we're saying," notes Charles Spector, manager of DEC's industrial products group, "is that these software products are as much products as hardware products are. Our Software Product Description has minimized a lot of differences of opinion between us and the user. I think it was vague before we went to this system."

The Software Product Description spells out in detail precisely what software will go to the user and specifies what type of maintenance the user can expect to receive.

Most users, of course, end up satisfied with their equipment and most vendors make serious attempts to rectify situations when users have problems. Ideally, a contract is never referred to after it



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has been signed. "A contract," says Dick Brandon, "is a document that hopefully you sign and put away and never have to use again."

—W. David Gardner

Litigation

Honeywell in Court: Maybe IBM Too?

A dispute over a contract between Honeywell Information Systems Inc. and a Colorado Blue Cross agency has blossomed into a major court battle and the issues joined in the case could have major ramifications for other parties both in and out of the data processing business.

Specifically, Honeywell has filed a \$35.3 million claim against a customer, Colorado Hospital Service, in U.S. federal district court in Denver, Colo. The Blue Cross organization has countersued with a \$39 million suit against Honeywell in the case before Judge Sherman G. Finesilver.

On one level, the case deals with the important issue of oral agreements—of whether oral agreements for software

and other services constitute valid contracts and whether they can supersede written contracts.

On another level, the case could raise questions and examine the manner in which major computer vendors around the country do business with Blue Cross agencies. Many public health and quasi-public health agencies have been the subject of examinations in the past in connection with their data processing requirements. Other vendors could be drawn into the case and, indeed, IBM—which already handles the bulk of Blue Cross processing in the U.S.—has been peripherally involved in the case. Colorado Hospital Service uses IBM equipment in addition to Honeywell equipment, and an IBM attorney has appeared in court in the case.

And, on a purely local level in Colorado, the case could be of major significance since a Blue Cross attorney maintains that a \$35 million judgment would "force the dissolution" of the agency, "completely dissipating the assets held in trust by defendant for application to the hospital care needs of some 900,000 members for whom defendant holds hospital care prepayment funds."

Essentially, the background of the

case is as follows: although Colorado Hospital Service had utilized Honeywell for some of its data processing requirements in the late 1960s, the health insurance agency decided upon IBM as its prime supplier in 1971. The agency used a 145 at first and then moved to a 158. Colorado Hospital Service then entered into negotiations with Honeywell to convert to a 6000. At this point, the dispute arose with Honeywell claiming that the contract to convert was firm and Colorado Hospital Service maintaining that the contract was not firm. The 6000 was never installed.

Specifically, Honeywell claims \$5.3 million on charges that the Blue Cross organization refused to accept equipment it had contracted for and, further, Honeywell maintains it lost another \$30 million on lost profits it would have received for marketing the system to Blue Cross agencies elsewhere in the country. Honeywell argued that the Colorado system was to be a prototype developmental system, which could have been marketed to other health agencies.

Colorado Hospital Service maintains that Honeywell would not commit enough manpower to the project to make it operative. In its countersuit against Honeywell, the Blue Cross agency is charging fraud, negligence, breach of contract, and breach of warranty. Colorado Hospital Service is represented by its house counsel and by Thomas K. Christo of Boston. Christo won the \$11.4 million Catamore case against IBM.

Honeywell is represented by its house counsel and by Edwin S. Kahn, a Denver attorney. *

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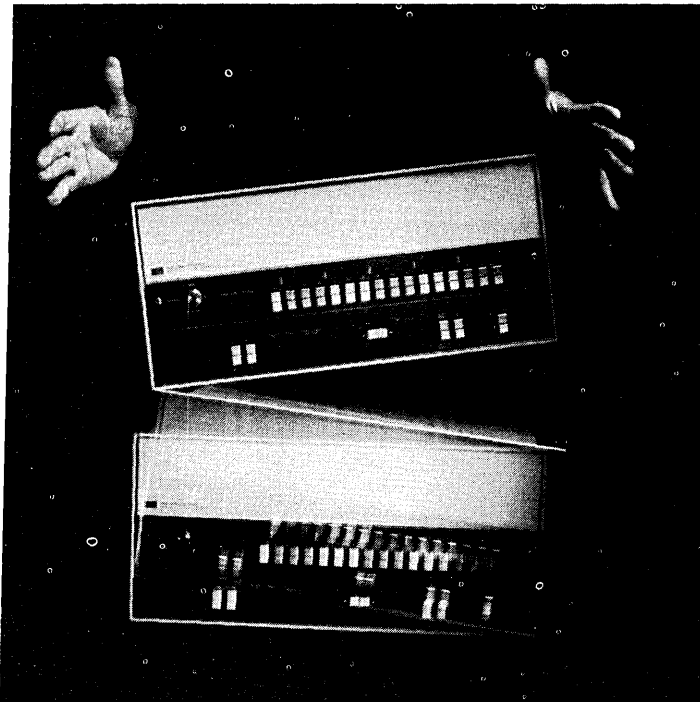
OCR: Visible But Is This the Year?

Optical Character Recognition (OCR) has been around as long as the computer and, for just as long, predictions as to when it would "fulfill its promise" have been pushed ahead.

The visibility of OCR use has been pushed too, particularly by the advent of scanning devices used in the retail point-of-sale (POS) environment. This same use is pushing work toward marking standards, something OCR users have been talking about for a long time. The supermarket industry has its UPC (Universal Product Code) bar code and department stores are working toward a voluntary standard using the OCR-A font.

At last month's winter conference of the OCR Users Assn. in Phoenix, Robert Burns, president of Scan Data Corp., pointed to these examples and urged other industries to follow the lead. At least one industry, the banking industry, under the auspices of the Bank Admin-

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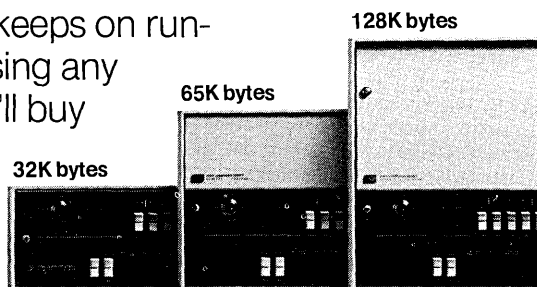


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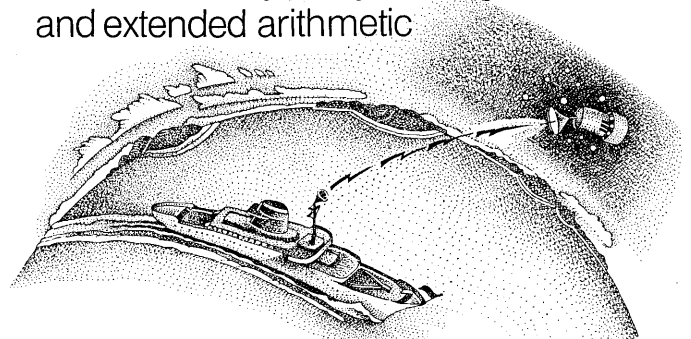
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stration Institute (BAI) started working toward standards during the conference.

Another thrust by conference speakers, toward what Vincent Della Penna of Computer-Link Corp. called "moving scanning to the far corners" also could have been inspired by retailers. Della Penna believes "in a year or two hand scanning will be widespread."

Success story

A non-retail user of hand scanning since last October had a success story for the conference. Stephen Gott, assistant vice president of First National City Bank of New York described the use of a new OCR wand called Datawand in a bond and stock transfer application. Concept for the wand was developed by the bank. It was designed and manufactured by CompuScan, Inc.

The bank's criteria for the wand, as outlined by Gott, were stringent: "Handling documents of different size and weight; ability to handle some staples; varying positions of data; multifont reading capability with the scanner switching fonts; error rate on Xeroxed bonds of no more than one in 5,000 characters; some means of error identification and correction; ability to read degraded text; code conversion capability; no reprogramming of current systems; and a price that would ensure a return on investment for the bank."

And, since the bank had just purchased an Interdata minicomputer, any new system configuration would have to include this mini.

Other requirements for a desired wand were that it had to have the ability to read alphanumeric 1403 and OCR-A simultaneously. It had to be able to directly plug in to the bank's existing crt's so software would not be affected and a keyboard could be used interchangeably with the wand to key non-scannable data. It had to have its own intelligence to handle field editing, code conversions, and various data formatting capabilities the bank required. A keypad had to be on the wand to perform such functions as transmit, erase, tab, field format, and code conversions. Programming had to be simple so it could be done by the user without depending on the manufacturer or any other programming resources. The program had to be able to change the functions of the keys on the key pad as well as change formats and code conversions. The wand had to read far faster than the bank's operators could key, with source text of six lines to an inch and a minimum acceptable error rate of one in 5,000 characters.

The bank approached CompuScan on developing and manufacturing the

wand last May. "By October," said Gott, "the Datawand was working and, I'm pleased to say, surpassed the specifications we had defined."

"Datawand is now an alphanumeric, multifont wand that brings the power of OCR to the individual operator where it previously was available only by means of separate, high speed and expensive machines. When the Datawand is a part of a complete, intelligent terminal, it greatly increases the productivity of the operator which increases accuracy and lowers cost. Data that is printed in scannable form can be 'wanded' at speeds of up to 150 characters per second. Data that must be keyed still can be keyed on the terminal keyboard."

Gott said the wand weighs less than nine ounces and is held in contact with the document and moved along the line of text, producing a video image of the text and transmitting to an intelligent terminal or downstream processors.

Not all wands

Computer-Link's Della Penna feels "low cost scanners now can be designed into a variety of equipment and they don't necessarily have to be wands. While he feels hand scanning use will grow he feels "high speed page and document readers will continue to be the dominant part" of scanning.

And moving data entry "out to the far corners" via use of OCR and scanning, doesn't have to mean moving equipment out. Dennis A. McMullen, data center manager for O. M. Scott and Sons, Marysville, O., told the Phoenix conference how his company had decentralized its data entry operation using a single Scan-Optics Model 20/20 scanning unit that reads OCR-A typed or computer printed documents and numeric handprint. The data entry is decentralized in that the scannable documents are remotely produced. The centralized data entry department has three full time and three part time people. In other areas of the company, he said, approximately 12 people perform data entry on a part time basis. "And, the amount and types of data entry errors have been drastically reduced."

O. M. Scott and Sons is a manufacturer and marketer of lawn care products for the home owner and professional user. All operations, except for sales and some research, are centered in Marysville. All operations for input to dp processing facilities is sent to Marysville. Within Marysville the company is in four separate physical locations. Prior to the move to OCR data entry, the data entry department had a staff of 23 people.

As the representative of a manufac-

turing organization, McMullen was something of a maverick at a conference where representatives of insurance companies, banks, credit card companies, and state and local governments predominated.

Many of these probably envied McMullen for the ability to have input documents prepared on a decentralized basis. "We'd love to have somebody out there do it," said Sal Tillis of Pan American Life Insurance Co. which uses OCR to process one million Medicare claims per year. His company's initial input documents come from physicians, suppliers, and beneficiaries. "We get all sorts of documents such as coffee wrappers and the backs of newspapers." The information has to be transferred to readable documents by coding clerks. But, in spite of this, Tillis said his company is saving \$16,000 a month over keypunch entry and "this is strictly salary saving and doesn't count fringe benefits." Pan American uses a Scan Data 2250.

Volume of transactions led most of the insurance companies to OCR. A similar increase in volume has led credit card companies to OCR, coupled with regulative pressures such as the Fair Credit Billing Act which require more information to be entered on a statement, and increased postage rates which tend to encourage descriptive billing as opposed to country club billing where the hardcopy of a credit card receipt is returned to customers with the bills. Western States Bank Card which administers Master Charge billing is going to descriptive billing and OCR simultaneously. It's installing three Recognition Equipment Inc. Trace systems. It's going slow. "We've been playing around with descriptive (billing) for two years now," said A. J. Munayer of Western States. "We're very large. If we ever crashed I don't know whether we'd ever recover."

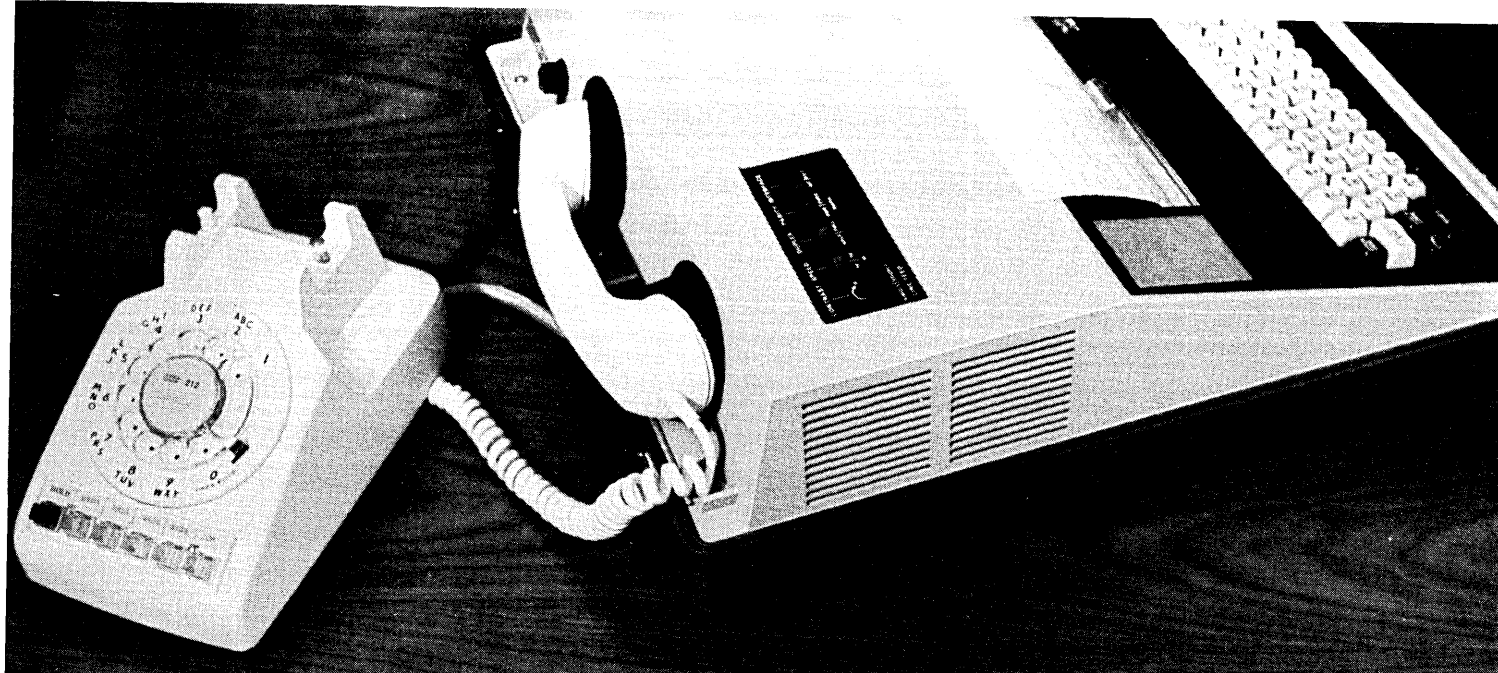
There are still constraints. While there was a lot of talk about cost savings and throughput improvement, there still was much about error rates. It's still anybody's guess as to when OCR will "fulfill" the promise people were talking about as far back as 1965.

—E.M.

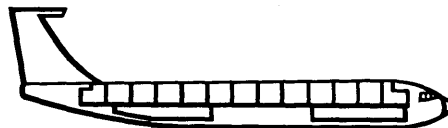
Hospitals

System Given Clean Bill of Health Care

Hospital-wide information systems have been the subject of controversy of late, the target of criticism from both medical and computer professionals. One such system, which has been operational for more than three years at El Camino hospital in Mountain View, Calif., recently was cited as having made "significant improvements in health care delivery."



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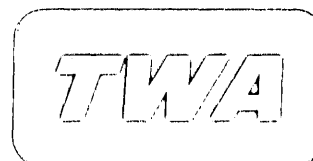
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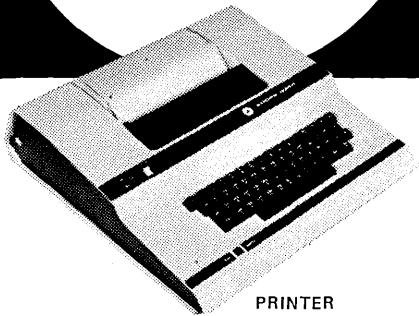
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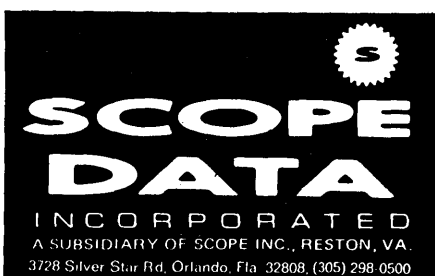
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news in perspective

The system "has improved the ability of the (hospital) staff to deliver patient care as measured by more readily available, more complete, and more accurate information used for administering care and for monitoring patient progress," says Battelle Columbus Laboratories, which performed the evaluation study for the Dept. of Health, Education, and Welfare (HEW).

At this pilot installation, the system developed by Technicon Medical Information Systems Corp. of Mountain View, went through more than its share of growing pains. Opposition to it by physicians and nurses was nevertheless overcome, bugs were removed and significant improvements were made (Sept. 1974, p. 138). The Battelle study found that it is "now supported by a substantial majority of the medical staff and used directly by 78% of the physicians at the hospital." It further found that with time all groups are using the system more.

The study, which covered the period from July 1971 until June 1975, did not get into the economic impact of the system on the hospital's operations. A report on that aspect is due from Battelle/HEW later this year. But the evaluators found instances of the system producing changes in staffing patterns.

"Most departments concerned with direct patient care have reduced their staffs or have been able to contain staff

levels at a time of increased administrative burden resulting from hospital growth," the study states among its conclusions.

It further states that the system "permitted the nursing staff to reduce the amount of time spent on clerical tasks, helped to improve communications among nurses and with ancillary departments and facilitated better planning of patient care by nurses."

Confidentiality of patient information was within accepted legal standards, it said, and the system can become an aid to meeting the government's requirements for utilization review and the audit of patient care.

Edwin C. Whitehead, chairman of TMIS's parent Technicon Corp., said, "At a time when health care is consuming eight percent of our gross national product and we are seeking the means to make health care available to all, it is imperative that this important new resource be fully exploited." The Battelle people agree, recommending that comprehensive hospital information systems be evaluated in other types of hospitals and that barriers to their widespread adoption be identified. "Dependent upon the results of the cost-benefits study, administrative and/or legislative programs should be developed to expand the use of computerized comprehensive hospital information systems," they said. *

Conferences

Communications Data For the Uninitiated

There are computer persons who come up to telecommunications consultant Richard Kuehn after he's delivered one of his frequent lectures on the subject and ask him: "What's a dataset?"

Or, "What's the difference between bisynchronous and asynchronous?"

Kuehn, who's headed RAK Associates, his Cleveland telecommunications consultant firm, for 11 years and has helped some 70 companies set up telecommunications facilities, takes these seemingly dumb questions in stride. "Let's face it," says Kuehn (pronounced *Keen*), the person asking the question "may be the guy who's just got there"—the data processing person, the communications manager or their boss who suddenly have to cope with telecomputing. Telecomputing is that newest buzzword that covers the convergence of computing and communications and its implications of cost, hardware, standards, cost tradeoffs.

And, also, the question of who's in charge.

Kuehn thinks that communications in business and other computer-using organizations is rapidly becoming the charge of the computer people who are fast becoming the biggest users of communications in these organizations.

For that "guy who's just got there," Kuehn is organizing a two-day entry-level course about the data communications field for persons who will attend the 4th annual Data Communications Interface '76 conference and exposition March 29-31 in Miami Beach (page 22). Four courses are scheduled during the first two days of the conference and exposition which is expected to draw close to 4,000 persons and about 75 companies exhibiting services and hardware for users of data communications.

The course, called Datacomm School, will cover four topics: Fundamentals for Managers; Communications Services and Interfaces; Communications Processors and Software; and Terminals and Terminal Systems. Kuehn and two other communications specialists will

conduct each of the four two-and-a-half hour sessions. The other lecturers are Murray Robinson, a Canadian data communications consultant who heads the firm, Murray H. Robinson & Associates, Ltd., Ottawa, and Grant Hagerty, a senior sales representative with the On-Line Systems Div. of Olivetti Corp. in Cleveland. Hagerty and Kuehn have delivered lectures on data communications as part of courses sponsored by the American Management Associations.

Robert Lively, program manager for the Interface conference, said the school attracted crowds of close to 300 last year and that arrangements are being made at the Miami conference for larger facilities to accommodate an expected larger turnout. Hopefully, says Lively, the Datacomm courses will enable persons attending the conference to get a better grasp of the more specialized topics on a program Lively says will feature 115 to 135 speakers at 41 sessions. Registration fee for the conference is \$95 for the three days and \$50 for one day. "The biggest cost, though, is the cost of traveling to the affair," Lively says.

Kuehn thinks it's more than worth the fare, so rapidly is the data communications business developing. He recalls that a year ago when he was investigating ways to maximize the transmission of data between Cleveland and New York City there were three possibilities—and all were offered by AT&T. "Today, only a year later," says Kuehn, "thanks to new specialized carriers, we have 11 rate configurations from which to select."

And of the people at the school with "dumb" questions: "I only hope they aren't afraid to ask them," he says. *

Standards

NBS Proposes New ASCII Rules

Proposed new rules governing compliance with the federal government's ASCII information interchange standard were published by the National Bureau of Standards in the Federal Register on Dec. 29, 1975. If adopted, the proposed rules will make it more difficult for agencies operating on-line systems to use non-ASCII character codes and collating sequences.

The bureau invited interested parties to comment on its new scheme by Feb. 29. After these comments are considered, the rules—possibly amended—will be incorporated into Federal Information Processing Standard (FIPS) 1.1, an updated version of the present standard (FIPS 1 and FIPS 7). This updated standard could become effective as early as next May, said a bureau spokesman.

Here are the key changes proposed by NBS:

An agency using a non-ASCII charac-

ter code would no longer be able to replace or upgrade its existing system with similar equipment on the grounds that conversion to the federal standard is too costly. But the agency *could* continue to qualify for a waiver by showing that use of the government's standard ASCII character code and collating sequence would "seriously" handicap its "mission responsibilities."

The procedure for obtaining a waiver would be simplified. Now, each exemption is issued by the head of the department or agency in which a non-standard system is installed. But this official must first obtain an okay from NBS, and in certain cases from GSA and/or OMB. Under the proposed rules, the bureau's prior approval wouldn't be necessary. Thus, in at least some cases, the agency/department head would decide on his own whether to grant a waiver. He could ask NBS for technical assistance but this wouldn't be mandatory.

After granting the waiver, the agency/department head would have to publish a notice in the Federal Register. The notice would include a detailed justification for his action. If the system was being upgraded or replaced, the waiver announcement would have to be submitted to the publication within seven days after release of the bid solicitation.

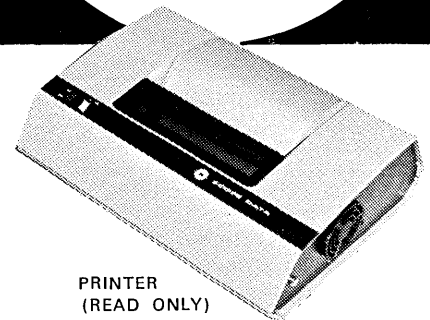
Acceptance testing

"All computer and telecommunications systems and applicable components" acquired after adoption of the proposed rules would be tested before acceptance to assure they were capable of "accepting, processing, and generating data and programs" represented in accordance with the federal ASCII standard. Similar tests would be performed, before acceptance, on the systems and "appropriate components" vendors offered in response to bid solicitations. Both of these compliance tests would apply only to "character-coded data," the Bureau said. "Binary, packed-decimal, and floating point numeric data need not be converted to character codes for such tests."

NBS is now arranging for development of tests to determine the extent that products are in compliance with the federal ASCII standard. Reportedly, the tests will be performed by the same Navy facility that validates COBOL compilers before they're acquired by federal users.

Within 18 months after the new procedures are adopted, "all departments and agencies... authorized to provide or collect character-coded data from other federal agencies or the public" must offer and/or accept the ASCII-encoded representation of this information. The agency's charge, if any, associated with this interchange of information can be no greater than for information recorded in a non-standard form. *

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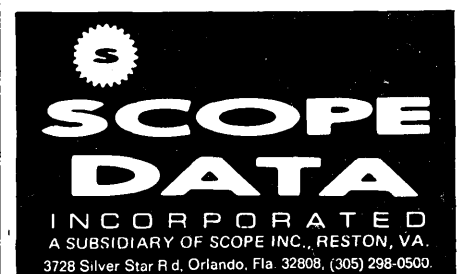


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CIRCLE 115 ON READER CARD

news in perspective

International

France's Latest Move for a Strong Domestic Computer Industry: A \$1.5 Billion Merger

Out of the ashes of France's ambitious Plan Calcul, the merged company CII-Honeywell Bull is finally in the process of being born in Paris.

Plan Calcul was France's scheme in 1967 to nourish a viable French computer industry through the creation of Compagnie Internationale pour L'Informatique (CII)—a computer company owned by some private interests and by the French government. Talks to merge the French company with Honeywell, Inc.'s French subsidiary Honeywell Bull began in the autumn of 1974. A year later, on Nov. 25, 1975, merger agreements were "initialed" and "signing" ceremonies took place last Dec. 23. The actual creation of the new company, first due March 15, has been delayed until April, but will be retroactive to last November.

One aspect of the delay is intriguing. Part of the agreement is that the French government would pay for CII's 1975 losses, which came to \$143 million. An-

other \$31 million was set aside to cover the losses until the merged company is created. That sum could have risen to \$37.2 million when the merger is completed in April.

But the government's midwifery in the CII-HB venture goes well beyond covering CII's losses. An additional \$58.7 million is going to Honeywell, Inc. of Minneapolis for purchase of enough Honeywell Bull shares to reduce its interest in the new company to 47%—which is still more than the 34% that constitutes a "blocking minority" under French law.

The total: \$1.5 billion

Under the agreement, direct government subsidies over the next four years will be about \$273 million, plus guaranteed orders of \$909 million over the same period. (Most observers doubt that the government will be able to find among its own users \$200 million a year worth of Honeywell enthusiasm, so this

too, amounts to a polite form of subsidy.) Then there is a special grant to complete research for the X-4 computer—a mere \$57 million. Thus the direct costs to the French government before 1980 (when it is hoped that CII-HB's need for financial support will diminish) come to something like \$1.5 billion, before they even consider the cost to public sector users of converting existing applications from IBM-compatible CII machines to Honeywell machines, not to mention the cost to restructure the peripherals/minis end of the industry, or several tens of millions more than are earmarked for a future increase in the capitalization of CII-HB.

The CII-designed X-4 and its big brother X-5 have been at the heart of the negotiating controversy, and will remain a critical indicator in many European eyes of how 'French' the new French computer company actually is. Designed in the short life-span of the Unidata venture between CII, Siemens and Philips, X-4 and X-5 are IBM-compatible. The X-4 is in the IBM 370/158 class and the X-5 in the 168 range. CII already has about 10 working prototypes of X-4, which competes eyeball-to-eyeball with Honeywell's 66 series.

As the all-European machine, X-4 had political importance beyond the technical aspects, so the final agreement is still fuzzy. Siemens still wants X-4 and

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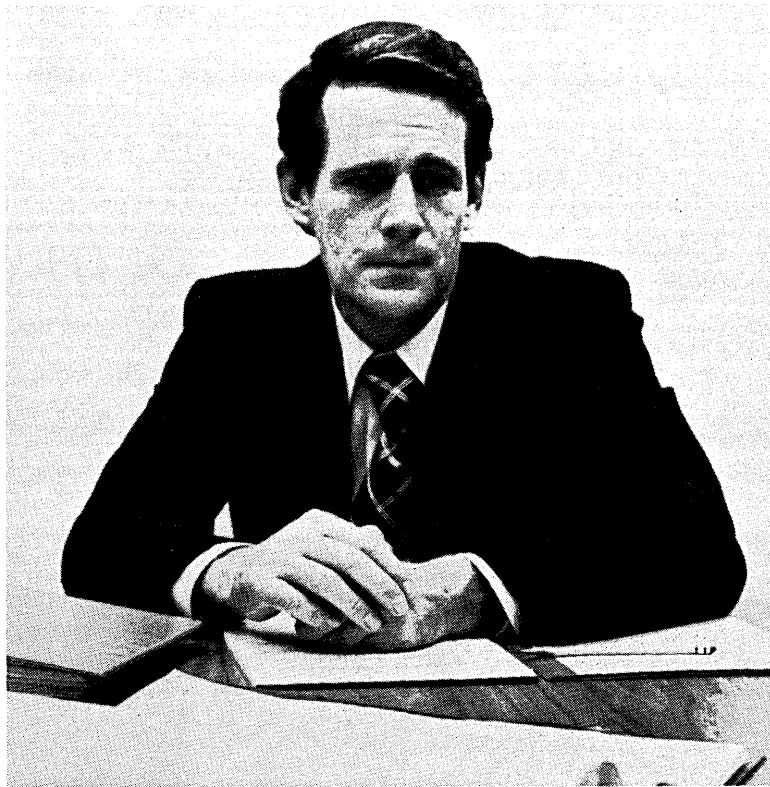
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news in perspective

X-5 to fill out the top of its own product line, and will insist on penalties if deliveries don't begin this spring as promised. Siemens has about 30 on order, at prices said to be about 40% of list price. The government also has ordered about 30 for users in various departments.

Political aspects

Although Honeywell Information Systems, the U.S. parent, holds three of the five seats on the vital product policy committee, French users are hoping they can use the political aspects of the situation to force CII-HB's chief Jean-Pierre Brulé into stronger support for X-4. Brulé told a DATAMATION reporter at a November users group meeting that the decision on how many X-4 and X-5 systems would be made was unlikely to be taken for three months because "the new company needs to do a lot of homework before making the decision." He refused even to make a commitment that any decision would be made. However, sources within the company say that a final compromise will be reached in which the already-promised X-4 systems will be delivered and serviced, and compatible equipment will also be

available.

The merged company will be allowed to import 144 series 66 computers from Honeywell in the next two years, until it sets up production of the 66 in France, which already manufactures the smaller

series 64. If Brulé can give the French a chance to manufacture "their own" large computers in this way, he may be able to overcome union opposition to the agreements, based on worry that the 1,700 employees at CII's Toulouse plant were in danger of losing their jobs if the product line shifted from X-4 to Series 66.

In the November users meeting Brulé



JEAN-PIERRE BRULÉ: As the head of the merged Compagnie Internationale pour L'Informatique / Compagnie Honeywell Bull (CII-HB) Brulé's first major job is to settle the complex question of how CII's future IBM-compatible offerings—the X-4 and X-5 computers—will figure in the new company. The X-4, for instance, competes with Honeywell's Series 66. Brulé said in November a decision on how many would be made would not be taken until some time this month. Brulé has been the president of Honeywell Bull since it was formed in May 1972, after being associated with Bull General Electric since 1967. His 20-year career in computer sciences began after his graduation from Ecole Polytechnique, the French institute for advanced research, and included service with IBM. His first assignment at Bull General Electric was as Deputy General Manager, a post in which he was the company's senior marketing officer. *

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emphasized the other side of the equation—the 700 French-built systems (smaller H-58, 61 and 64 models) that have been shipped to the U.S. He stressed that the French firm would have access to HIS's R&D budget of \$180 million, and that the lines of Honeywell Bull and CII would converge in the future—a process he says took four years when GE and Bull merged in 1964.

More inventive

In the face of skeptical questions from the floor, Hugues de l'Estoile, the government's Director General for Industry, told the users that the partnership was on its way to becoming more and more French: "The French are more inventive than the Americans," he said. "Therefore the technology will tend to be more French." (The French news magazine, *L'Usine Nouvelle* called the merger "the last chance" for a French computer industry in the face of IBM.)

Honeywell's dependence on emulators to bridge the gap between ranges, all focused on the Series 60 as target range, came under fire from the users. Though Honeywell Bull contends it takes only one man-day per program to translate, using new conversion aids, a French user with 50 machines insisted that no matter what conversion aid he used, it always took about two man-days per program—a difference that could affect schedules of many users. He said: "Emulators clearly do not work. We must have a translator for COBOL and data base software."

New HB products

Ten days after the initialing ceremony, Honeywell Bull underscored the vague and tentative nature of the merger by giving birth to its own French-developed new products. Honeywell Bull director "Jacques" Petersen (who had been listed as "Jack" Petersen at the previous ceremony) said the new 61/40 system (in the System/3 class) and floppy-based KDS 7255 data entry system were the result of missions "devolving upon Honeywell Bull" well before the merger.

"In the new CII-Honeywell Bull group, these missions will be not only maintained but *distinctly* reinforced," he stressed. "This side (small business systems, terminals and peripherals) is very important in contributing to our profits." Both new products are likely to be released in the U.S., though schedules in the rest of Europe may be somewhat delayed. The 61/40, priced from \$1,360 to \$2,888 a month, comes with a free operating system and COBOL, plus 30 hours of testing time. Otherwise all software is unbundled, and there is an extra charge for education, documentation and other kinds of support. The data entry system represents the first use of the floppy disc in Honeywell products.

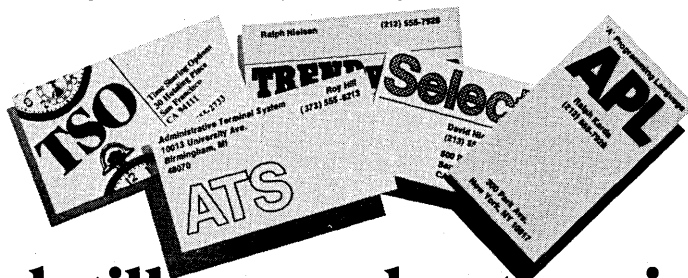
The U.S. company continued to benefit from the French connection. In mid-December came the announcement that CII-HB will take a financial stake in Magnetic Peripherals Inc., currently owned 70% by Control Data Corp. and 30% by HIS. Part of the deal will give MPI a manufacturing foothold in Europe, when it takes over a German HB factory that will supply discs to CII-HB.

Time-sharing company

Another announcement that followed the initialing ceremony was creation of a new French-registered company

called HB Network Information Services to handle the somewhat neglected time-sharing side of the HB business which operates under a license from General Electric in the U.S. The new firm, still clearly dominated by the Americans, will have reduced HIS ownership, down from 66 to 51%, and increased shares for Compagnie des Machines Bull, from 34 to 49%. In all the reshuffles since Honeywell took over the GE computer-manufacturing interests, the network side of the house has lost market share in some European countries and failed to improve it in others. Honeywell currently markets the

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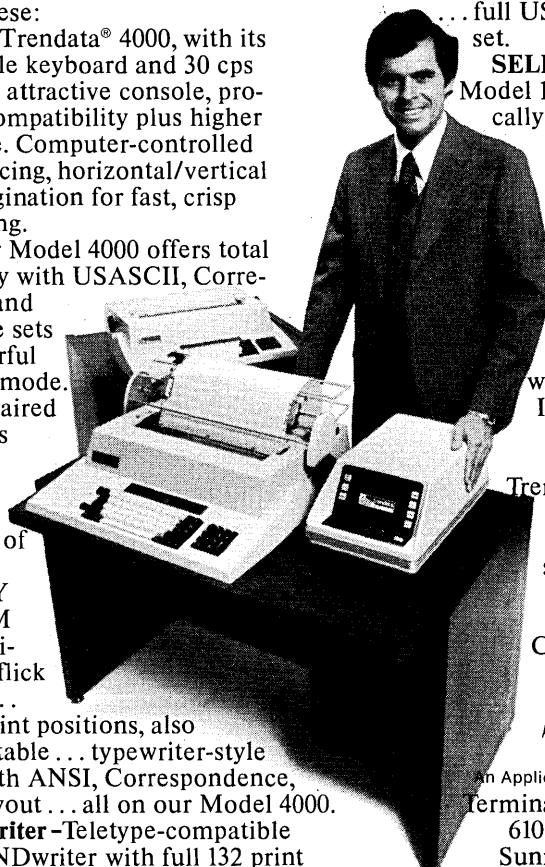
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news in perspective

GE Mark III services directly, or through HB, in 16 countries; GE has kept its relationship with a separate firm, ØK Data, in Denmark, and set up a separate distributor in Japan. Thus the 'assets' of this new company are somewhat vulnerable to GE's continued concurrence with the marketing arrangement.

To cope with its about-to-be unified industry, the French government has re-created the old 'Delegation de l'Informatique' that watched over the ill-fated Plan Calcul since the sixties. The new Delegation, like the old, is likely to have a great deal of money (most of it already committed to CII-HB) but not necessarily a great deal of authority because of the politicized nature of computer-related issues in France. Headed by de l'Estoile, the new Delegation has two groups, one representing the government as user and the other representing government as sponsor for the computer industry. If CII-HB continues to have problems with irate users, the gap between these two parts of the Delegation may yawn wider because so many of the former CII users in France are in the public sector.

In the period between 'signing' and actually breathing life into CII-HB, a great deal of action still has to take

place. Only now are the employee councils of HB and CII being consulted officially about the contents of the agreement regarding CII's contribution to the new company. The document (which will presumably pass through the employee committees unchanged) then will go to the two boards before being presented for final approval at shareholder meetings. After all these approvals, the agreement will then take retroactive effect from Nov. 1, 1975.

—Andrew Lloyd
—Nancy Foy

Overseas Service Rule May be Taken to Court

Smaller-volume overseas datacom users received a boost from the FCC in January when it allowed AT&T to offer overseas Dataphone service. But the decision, which has been in the works since 1972, seems likely to be taken to court by the international record carriers (IRCS), and the service can't begin until AT&T has amended its overseas tariff, now limited to voice-only services.

The IRCS aren't opposed to overseas

Dataphone service as such, but they want to supply the international portion of the message path and limit AT&T to the domestic links. In addition, one international carrier, Western Union International, wants its "Datel" services to be accessible through Bell's long-distance dial-up circuits. Now, a circuit must be leased between the customer's site and the IRC's central office.

Datel is a competing, but more sophisticated (and more expensive) alternative to overseas Dataphone service. It features speed-and-code conversion, store-and-forward capability, for example, which aren't included in the new AT&T offering.

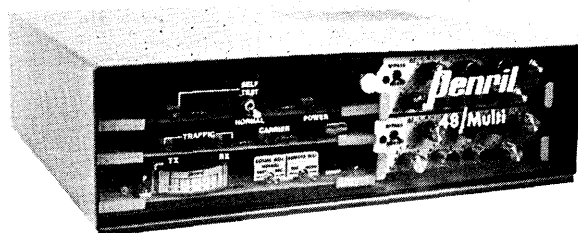
The FCC decision authorizes connection of Datel to the dial-up network but permits AT&T to offer basic overseas Dataphone service end-to-end. The commission apparently chose this latter option because of a conviction that costs to the user would be less than the jointly-provided service proposed by the IRCS.

AT&T's new service will be a switched offering capable of handling facsimile and other kinds of data at speeds up to 1200 bps. The user will pay for each call instead of leasing a circuit by the month, and independently-made modems and terminals will be allowed as well as Bell-provided hardware.

The FCC decision was based partly on

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And deliveries of the 48/MULTI — 30-day ARO beginning January 1, 1976.

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projections indicating that by 1980, 290,000 facsimile terminals will be connected to international circuits (versus 52,000 in 1972); 8 million data terminals will be in similar service by 1985 (versus 600,000 in 1970), and "international leased line data circuits will grow at an annual rate of 21%" by 1980. *

U.S.-Canada Service Planned

Telenet and Bell Canada reportedly are about to launch an international packet switched service between the United States and Canada. A Canadian service bureau is expected to be the first user. "Within a month after the service begins," says a source, "at least half a dozen U. S. customers should also be signed up."

Initially, a multiplexed analog circuit between Montreal and Chicago will connect the Bell Canada and Telenet networks. Messages to or from Canada will be packetized only between Chicago and the U.S. sending/receiving point. When Bell's Datapac system goes into regular operation—this is expected next summer or fall—the analog facility will be replaced by a digital circuit and packetized messages will be transmitted from the entry node in one country to

the exit node in the other.

Telenet now services a total of 16 U.S. cities stretching from coast to coast. Datapac will provide access to customers in Toronto, Montreal, and Ottawa through local dial-up lines, and leased-line access to these and several other cities.

Until an international packet protocol standard is adopted, both companies reportedly have agreed to use an interim specification recently adopted by Canada, France, and the United Kingdom. (The international standard, officially

called a "recommendation," has been gestating within CCITT—the telephone carrier-sponsored standardization group—for some time. It may be finally approved later this year.)

Telenet plans to file a tariff with the FCC covering the U. S. portion of the joint offering. The plan, we were told, is to charge "better than twice the present domestic rate for each packet" but "no more than present rates" for each port. Typically, the packet charge is about 20% of the customer's total bill. *

Interconnection

AT&T Asks FCC To Delay Program

Start-up of the FCC's new certification program for modems, data terminals, and ancillary equipment should be delayed "for a reasonable period," AT&T said in a petition to the commission.

Meanwhile, the North Carolina Public Utilities Commission and the U. S. Independent Telephone Assn. (USITA) each requested a federal appeals court to review, and hopefully overturn, the FCC order authorizing establishment of the program, which is scheduled to begin April 1. In both cases, the request to the appeals court was a one-paragraph statement which didn't go

into the issues.

And IBM, while generally supporting the certification program, recommended a number of changes.

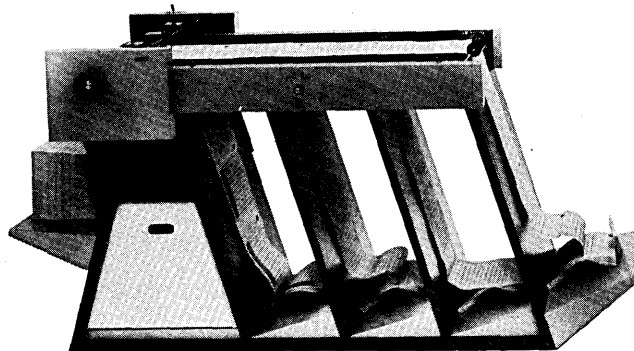
At this writing, action by the FCC on the telephone company's request for a delay was imminent (AT&T must file a number of conforming tariff amendments by Feb. 1 unless the commission acts before then). Basically, AT&T wants more time to study the program, which was authorized last November. The petition filed early this month makes clear what the phone company has in mind:

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news in perspective

ing (these) rules . . . will increase costs to the great majority of consumers and degrade the now-superior service of the telecommunications network," said AT&T Vice President James R. Billingsley in a letter accompanying the petition. "However, we also recognize that, our strong reservations notwithstanding, these rules, or modified rules, may become the law . . . Should that be the case, we share this commission's desire to have rules which will attain adequate

network protection in the most economical, practical, and easily-administered manner."

AT&T's major complaint

AT&T was most opposed to a provision in the FCC plan that would require terminal equipment produced by the carriers after April 1 to be certified before being directly connected to the dial-up network (presently-installed units are already exempt). The company argued

this would increase costs to the Bell System, "and ultimately to the public," by "over \$200 million in the first year alone."

If the telephone companies are required to use registered terminal equipment, "the Bell System will have to maintain additional records, and fundamental changes will have to be made in operating procedures, both administrative and technical. This will require extensive retraining of installation, repair, and business office personnel, as well as the development and processing of a substantial amount of paperwork. In addition, under the present technically inappropriate rules, much of the existing telephone equipment will have to be either redesigned, modified, or withdrawn from service prior to expiration of the normal life of the equipment."

Bell's opponents are virtually certain to argue that the \$200 million estimate is mostly hot air.

One argument they could raise is that registering carrier-provided equipment wouldn't necessarily require equipment redesign, since the program's technical specifications—assuming they're not already congruent with those now used by the telephone company—could be made that way. And even if total compatibility proved impossible, there would be another option: the incompatible Bell devices could be attached to the network through protective connecting arrangements—which would be a kind of poetic justice, considering the many years AT&T has imposed the same requirement on independent suppliers.

Compromise?

Possibly anticipating that its recommended exemption for carrier-provided equipment won't be accepted AT&T suggested a compromise of a sort.

It said the exemption should be extended to "any model of . . . terminal equipment won't be accepted, AT&T suggested for service . . . prior to (April 1). This exemption (should apply) to all such telephone company-provided equipment, including that which is installed or manufactured" after April 1.

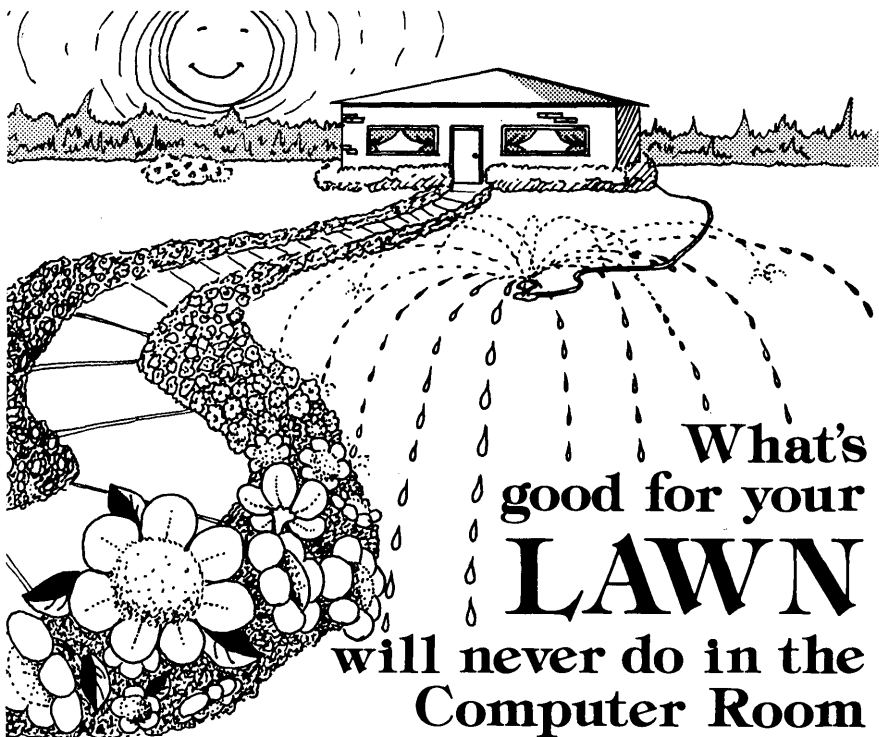
The phone company also suggested a number of technical changes in the certification specs.

IBM's position

IBM thought the certification program should be "expeditiously implemented," although it recommended several changes and objected to others proposed by the carriers:

On the question of including carrier-provided equipment, IBM said that whether or not exempted from the registration procedure, the carriers' terminals should be required to meet the certification program's technical specifications.

IBM opposed a recommendation, ad-



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vanced by GT&E, which called for periodic testing of certified equipment after installation. "Users of data processing equipment cannot afford to neglect defective equipment," so this requirement would be "exceedingly burdensome" and "redundant."

The company also opposed GT&E's recommendation to add network control signaling technical standards to the certification program because this "is not a cause of significant harm." But IBM added that it is "essential" for the telephone companies to provide sufficient network control signaling information so that manufacturers can produce equipment that operates successfully with the network." This same basic idea was repeated a number of times throughout its statement.

Use of standard plugs and jacks should be mandatory for *all* certified terminal devices, IBM said, not just those provided by the customer, as recommended by GT&E. Reason: across-the-board standardization will reduce installation/relocation delays and costs, and enable users to employ non-carrier equipment interchangeably with carrier equipment. If the carriers can't provide standard plugs and jacks immediately,

Hardware

Dial Up Modem From Penril

A new 4800 bps modem, featuring automatic equalization in 50 milliseconds or less on dial-up circuits, has been introduced by Penril. It's called the 48/Micro and the "projected" cost of the standard model will be \$3,800. Options will cost \$375 apiece.

In dial-up service, the standard model of the 48/Micro operates at 4800 bps, synchronous mode. It provides 200 millisecond turnaround time. Other standard features, in addition to the 50 millisecond -or- less automatic equalization, are: analog and digital loopback circuits; self-test, auto-answer, and abort timer. The options include: 30 millisecond turnaround time; reverse channel with remote test; optional 2400 bps operation; auto-call unit or 801-type auto dialer, and a buffer permitting the 48/Micro to handle signals to and from an asynchronous terminal while transmitting and receiving over a synchronous circuit.

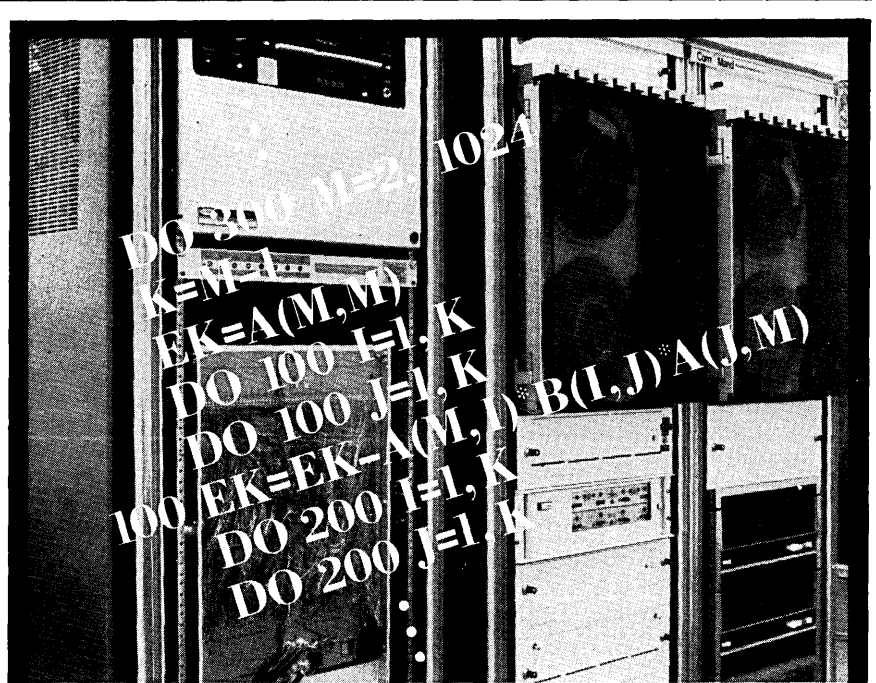
The standard private line version of the 48/Micro operates only at 4800 bps, synchronous mode. It supports point-to-point and multi-point applications. Connected to 4-wire circuits, the new modem provides 50 millisecond turnaround time (including RTS/CTS delay). In 2-wire service, this turnaround time is reduced to 30 milliseconds. *

IBM is willing to give them a one-year exemption.

IBM also said that the environment simulation (durability) tests specified by the commission are "far more stringent than necessary." It called for other changes in the program's technical requirements relating to signal power, longitudinal balance, on-hook impedance, and minimum call duration.

The Computer and Business Equipment Manufacturers Assn. (CBEMA) which also submitted a statement to the FCC, generally supported the program as announced last November, but recommended the following significant changes: a company employee, as well

as an outside engineer, should be allowed to certify that a terminal device complies with the program's technical requirements; the manufacturer's warranty for certified devices should be explicitly limited to normal product life; non-electrical changes, and others which do not affect the protective circuitry of approved units, should be allowed without prior notice to the commission. CBEMA also recommended liberalizing a number of technical requirements—relating to equipment durability tests, signal power, and longitudinal imbalance, for example—to make them more compatible with "basic industry technical standards." *



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News in Perspective

BENCHMARKS

Spending Outlook: The government thinks the U.S. computer industry will ship about \$12 billion worth of equipment this year, an increase of 16% over the 1975 level. About \$2.5 billion of that will be shipped out of the country, an 8% increase over last year. The U.S. will import about \$163 million worth of computer equipment, which is a rise of 20% over the 1976 levels. The report, *U.S. Industrial Outlook 1976* published by the Commerce Dept., also notes a growing technical competence among overseas computer builders, particularly those in Japan, Britain and West Germany. But it also adds that U.S. manufacturers are expected to retain leadership in the market which by 1985 will have grown to \$22.6 billion worth of computer equipment shipped. Another outlook report—based on a study of the spending plans of 128 dp-using organizations—shows a brighter outlook for computer vendors than in the past year and a half. Almost a third of the organizations interviewed in the study by International Data Corp. planned a major cpu upgrade for 1976, roughly double the number who upgraded last year. Most of the users will be implementing major new applications and expanding their in-house dp staffs, according to the study, which notes that only 3% are anticipating a decline in budget appropriations for 1976. Nearly 11% cut back their budgets in 1975.

IBM—Justice Suit Anniversary: The Justice Dept.'s civil antitrust suit against IBM became seven years old last month. The suit, charging IBM with monopolizing the U.S. market for general purpose computer systems, was filed Jan. 17, 1969, one of the closing days of the Johnson Administration. A year ago the complaint was broadened to include markets for related products. Chief Federal District Judge David N. Edelstein has been hearing the case on a schedule of four trial days a week. With time out for a summer recess, holidays and judicial business, the trial has been in session for 76 days since it began last May 19. Judge Edelstein once estimated it would take him one year to hear the case and another year to reach a verdict and write his opinion.

Gag Rule Ended: The 1972 pretrial order forbidding IBM and the Justice Dept. from commenting on the government's antitrust suit against the computer giant, has been vacated by Chief District Judge David N. Edelstein. IBM originally requested the order then re-

versed itself last October and asked the judge to withdraw it. Justice Dept. attorneys didn't oppose the request but they indicated they didn't object to continuing the order either. IBM said it wanted the rule vacated because it had been "construed overbroadly by plaintiff and this court to preclude IBM from communicating about this case with its shareholders and employees, and from responding to false and unfounded media statements."

IBM Announces: IBM ushered in the new year with a rash of product announcements, including the System 3, Model 4, which it says is designed to control a group of terminals in an on-line work-station environment. The firm said the machine eliminates traditional keypunching and card handling operations. A typical Model 4 will rent for \$1,706 to \$1,861 per month and sell for \$50,540 to \$54,460. Other announcements included the 5230 Data Collection System, consisting of three models of controllers, data entry stations and time entry stations and new System 370 software, called virtual storage personal computing (VSPC) and designed to enable people with little or no dp experience to access a 370 via a terminal.

Gets it After All: System Development Corp., picked by the Federal Home Loan Bank in San Francisco to design a switching system to link Electronic Funds Transfer systems (EFTS) put in place by California Savings & Loans, (Dec. '75, p. 109) before the Justice Dept. advised the Federal Home Loan Bank Board to leave development of such systems to private industry, still will design the system. SDC was selected for the job by Savings Association Central Corp., a jointly owned corporation which picked up where the San Francisco bank left off. SDC is to complete a design by the end of March and may recommend vendors for processors, disc and tape storage and multiplexors. An additional contract for concentrators and terminals would follow.

No Sale: A proposed sale of Wily Corp.'s Gulf Insurance Co. subsidiary to Fuqua Industries Inc. (Jan., p. 132) has been called off by Fuqua which said, "The terms of the deal didn't meet our corporate objectives. Cash wasn't involved in the proposed acquisition. Under an agreement in principle announced last November, a two-year grace period would have been allowed for payment of a \$30 million debt of

Gulf Group Inc. through which Wily owns Gulf Insurance. Fuqua said the casualty industry "hasn't shown any indication of turn around." The high interest Gulf debt, of \$30 million, is to cc Leasing Corp., a subsidiary of Commercial Credit Corp., Baltimore.

Debt Offering: Burroughs Corp. this month made a \$100 million debt offering. The company issued \$100 million worth of five-year notes due Feb. 1, 1981, through Kidder, Peabody & Co. Inc. The company said the notes won't be redeemable before maturity. Separately, Burroughs said its fourth quarter orders rose 25% from a year earlier but added that customer deferrals of previous orders may force it to reduce its reported backlog as much as \$200 million. Burroughs had announced a backlog of \$1.29 billion as of Dec. 31, 1974, and a backlog of \$1.54 million as of Sept. 30, 1975.

Cambridge Settles Suit; Reports Loss: Cambridge Memories, Inc. reported a loss of \$658,000 for its first quarter ended Nov. 29, 1975, and said it has reached an out-of-court settlement with Fairchild Camera & Instruments Corp. in a breach-of-contract filed against it by Fairchild last summer. The first quarter loss was on revenues of \$4,718,000. In the first quarter a year earlier the company earned \$102,000 on revenues of \$5,670,000. The settlement with Fairchild involves payments by Cambridge over a ten month period of an amount the company said was less than the requested damages which amounted to \$2.1 million. Fairchild had charged Cambridge with failure to pay for bipolar TTD-RAMS sold and shipped during the first half of 1974.

Shipping Milestones: Two California firms reported milestones in shipments last month. The Peripheral Equipment Div. of Pertec Corp., Chatsworth, called its shipment of its 50,000th tape drive "an industry milestone." Ralph Gabai, vice president, marketing, said "no other independent manufacturer has shipped that many digital magnetic tape transports." For AMS Systems, Sunnyvale, it was its 1,000th IBM-compatible main memory system. "This brings our total semiconductor memory installation base to well beyond the 600 megabyte level—almost equal to the main memory storage capacity installed by all other independent suppliers combined," said Dick Andreini, vice president for systems marketing. *

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(Continued from page 18)

IN PURSUIT OF PRESS CONTACTS

Meanwhile, Katzenbach and IBM continue their pursuit of arch-enemy Computer Industry Assn. In the IBM-Justice Dept. case, IBM is zeroing in on CIA's press relations, seeking the CIA's records of its contacts with reporters. The case could break new ground in the areas of First Amendment and press freedom guarantees. For example, reporters are protected by the constitution from divulging their contacts and sources while IBM is going after reporters' contacts and sources directly. (Assuming the CIA is such.)

IBM is particularly interested in the CIA's contacts with William Rodgers, who wrote THINK, the highly-acclaimed but highly critical biography of IBM. The company claims Rodgers "falsely accuses Mr. Katzenbach of unethical conduct" in an article.

CDC SETS THE STAGE FOR BIG MACHINE ANNOUNCEMENTS

Although most of the public announcements from Control Data in recent years have been about smaller machines and peripheral equipment, look for some big machine announcements later this year. By summer the company is expected to install its STAR 100 system on the Cybernet time-sharing network and hopes this will attract buyers for the system. A CDC official told users recently, "a shared use basis will allow the user to experiment and take the time to test new solutions without making a large expenditure or incurring a substantial technical risk."

Other announcements: A Cyber 170 front-end for the STAR in which the 170 would be used for conventional data processing and the STAR for work requiring vector technology; a 7600-class machine (12-15 million instructions per second) will be introduced at year-end as a high end to the 170 series.

To direct supercomputer activity, the company has formed a new post within the Systems & Service Co. of vice president and group executive for large systems operations. Headed by Boyd T. Jones, it will direct activities of the company's Cyber 175, 76 and STAR programs.

RUMORS AND RAW RANDOM DATA

Honeywell will drop the one-time charges and perhaps the licenses on unsupported operating software that it instituted last summer for customers buying used Honeywell equipment from third parties (Nov. '75, p. 132). A spokesman said the charges, ranging from \$1,000 to \$15,000, may be "legally questionable"...NCR is expected to announce the first members of a new family of medium to large scale mainframes this spring, probably at a users' meeting in April. Name and series numbers hadn't been finalized at this writing but it was expected the Century nomenclature would be retained and that the machines will be fully compatible with the current Century series... Motorola this month began sending samples of its new ECL (emitter-coupled logic) slice microprocessors to oem customers for testing. With a 75 nanosecond worst case cycle time, the company believes the series to be fastest of its kind. The family will include four chips with a four bit slice being the first. Prices were expected to be \$50/chip in 100-up quantities...How does the marketer view the technician? Peter Overmeyer, a technical vice president of Wells Fargo Bank offered this example. Overmeyer was called upon as a last minute substitute for a Wells Fargo marketing vp, Douglas Brown, to deliver a talk describing the bank's WellService (Jan. p. 110). He noted that the paper Brown had given him first contained the paper's title, and underneath that, the word "smile".



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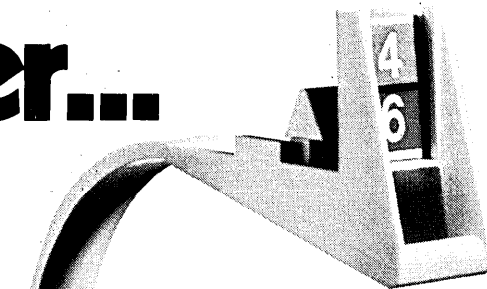
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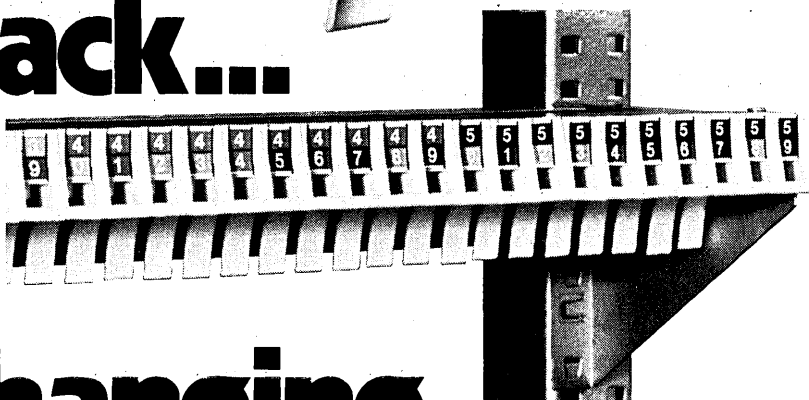
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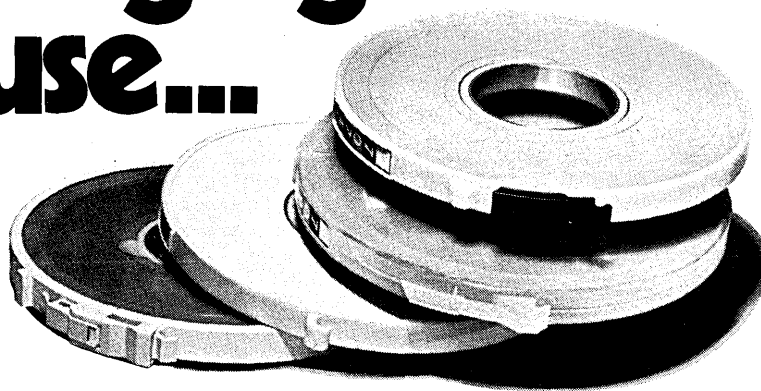
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Off-line

Designs for two pilot electro-optical telecommunications systems, for which business opportunities should be available within 10 years, are being developed by Arthur D. Little, Inc., Cambridge, Mass. One system is digital, the other analog. Both are short-haul (intrabuilding or intracity) and can carry voice, data or video signals. The value of short-haul trunking, using conventional technology, installed in the U.S. alone, should exceed \$400 million annually by 1980, rising to \$600 million by 1985, based on current costs according to Dr. David A. Curtis, electronics systems section manager at Arthur D. Little.

Increasing user preference for the silence and reliability of impact-less printing have led to a major upsurge in usage of non-impact printers, according to a 200-page report published by International Resource Development Inc., a New Canaan, Conn., market research consulting firm. The IRD report, entitled "Non-impact Printers" points out that the market has increased almost tenfold in the past five years, and predicts a 30-40 percent per year growth in shipments for the next several years. The report includes a survey of one hundred "Fortune 1,000" users of large scale systems about their plans for future installations of non-impact printers. An analysis of suppliers' market shares is also included. The study is priced at \$595.

When a company says it's bringing up a van, one can't assume it's in the packet switching business anymore. National Semiconductor Corp. is the latest firm to load its products into a leisure van and take it to prospective customer sites. The van is touring southern California engineering facilities daily and has been a large success, says Santa Clara-based National.

Now that Memorex has recovered from its foray into the mainframe market, it is moving ahead with major peripheral developments. The latest is an announcement that a functional equivalent for IBM's 3350 high performance disc system is in the works.

Kendata Electronics Ltd. has been formed in Pickering, Ontario, Canada to perform third party hardware maintenance in major Canadian cities.

Scientific Calculator

The 9825A might just be the most impressive desktop programmable calculator built to date, with an order of magnitude increase in performance over this leading manufacturer's previous offerings (specifically the 9820/9821) and enough speed to stay alongside most minicomputers. The 26-pound unit will probably find homes mostly in engineering, research and statistics applications, but its text string manipulation, sorting, and editing functions will probably qualify it for wider application.

Contained in the 9825A are a 32-character upper/lower case display, 16-character strip printer, H-P's small version of 3M's 300 DC data cartridge, a full keyboard, plug-in read only memories to tailor the machine for specific applications, etc. There are 12 special function keys that, together with the shift function, can handle 24 different operations. The 9825A is a bit more unusual because it is possibly the first desktop calculator to feature a live keyboard, allowing the user to perform simple calculations, examine and



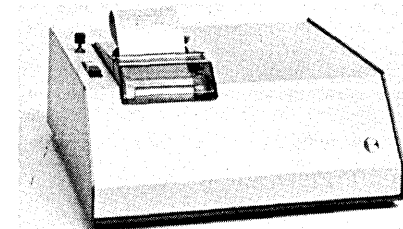
change program variables, and list programs while the calculator is performing other operations. Having seen the machine in operation, we can say that the 9825A can be asked to do a great many things simultaneously (update files, plot print, monitor an oven temperature range, and more) with very little degradation in performance. The new interrupt structure of the 9825A is something to behold. The 16-bit machine uses a 12K system ROM (organized in bytes), and adds from 8-32K of RAM, plus the optional plug-in memories. For interfacing, the 9825A accommodates three optional interface cards simultaneously. A 16-bit parallel

card that can be used for general purpose interfacing, a BCD card for use with BCD devices, and an HP-IB card for instruments that conform to IEEE Standard 488-1975. Programming is done in H-P's own HPL, a formula-oriented language. Prices start at \$5,900, and eight weeks delivery is currently being quoted. HEWLETT-PACKARD CO., Loveland, Colo.

FOR DATA CIRCLE 226 ON READER CARD

Microperipheral

The low cost of microcomputers has created a need for comparably priced peripherals (so the peripherals won't cost more than their bosses!) The MP-01 is a 160 cps printer with EIA and asynchronous bit parallel ASCII interface for use with microcomputers. A Sharp electric discharge printer is used



for printing 20 columns across 2 1/4-inch paper. Prices are \$695 for individual units, or \$395 in quantities of 100. The unit has been designed to facilitate custom interfaces and these can be obtained from the manufacturer. THE BINARY CORP., Mountain View, Calif.

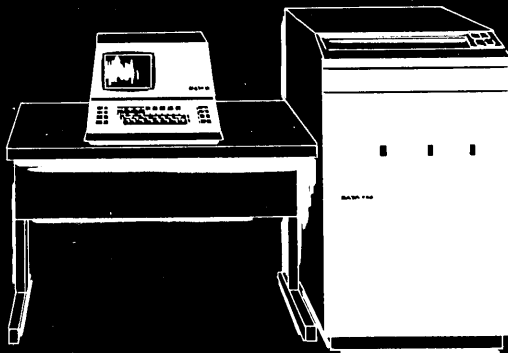
FOR DATA CIRCLE 227 ON READER CARD

LSI Modems

Close on the heels of the 6000 intelligent network processors, this firm has now introduced a complete line of LSI circuitry. Network applications supported by the LSI series include point-to-point, multipoint, dial network, and CCITT V.27 use in international applications. The LSI 9600, LSI 7200, and LSI 4800 operate at 9600, LSI 7200, and 4800 baud respectively for full-duplex operation over standard 3002, M102, or equivalent voice grade lines. The unites have compatible modes that permit on-line operation with the earlier generation of the manufacturer's comparable speed modems. The point-to-point series offers new operating modes that feature improved automatic equalizer operating performance and a wider range of fallback speeds. Multipoint models feature an inbound automatic "gearshift" mechanism that permits inbound poll responses to begin at 2400 baud and automatically

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model 77

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CIRCLE 67 ON READER CARD

hardware

shifts both master and slave modems up to 4800 baud of the length of response message makes the use of the higher speed appropriate. The result is a fast nine msec response time for all messages with an effective inbound

throughput of 4800 baud. There is a full complement of options with the new modems, including eye pattern generator for visual observation of line disturbing phenomena; four-channel multiplexor; remote loopback; dual dial for restoring operation on the dial network; elastic store buffer for interface to centrally clocked digital net-

works; modem sharing, etc. Prices for the LSI 9600, LSI 7200, and LSI 4800 are \$8,500, \$6,500 and \$4,325, respectively, or \$185, \$150, and \$95/month, respectively on a two-year lease. Domestic deliveries start during the first quarter of this year. CODEX CORP., Newton Mass.

FOR DATA CIRCLE 229 ON READER CARD

product spotlight

Burroughs' New Line

There hasn't been much excitement in medium scale systems since IBM announced the 370/145—over five years ago. That may be about to change, however, as Burroughs has taken most of the wraps off three new models, dubbed the B 2800, B 3800, and B 4800. Clearly the interesting architectural organization of the machine and the advanced, high density circuitry implemented, show what cards Burroughs will be playing for the next half decade. Until some other manufacturer announces something very interesting, these new systems will be the class of the middle class.

One B 2800 model was announced. It has one central processor and one I/O subsystem. The cpu runs at a cool three million cycles per second (MHz in Burroughs terminology.) The I/O subsystem can have from 8 to 16 channels which can have data transfer rates as high as three megabytes per second. Main memory is expandable from 100,000 bytes up to half a megabyte in 50 thousand byte increments. The memory has built-in error correcting circuitry and cycles two bytes of information every 650 nsec from MOS storage.

The B 3800 series has three models, the B 3830, B 3831, and B 3832. The 3830 comes with one cpu and one I/O processor, the 3831 adds a file protect memory, and the 3832 has two processors, two I/O subsystems, and a file protect memory. The B 3800 processors operate at 4 MHz (250 nsec), and the I/O subsystems can have 16-40 channels. The aggregate data transfer rate of the I/O subsystem is four megabytes per second. Curiously, main storage on the 3800 is the same rations as the B 2800, which seems a little confining. The MOS memory cycles two bytes of data every 500 nsec.

The B 4800 also comes in three

models, the B 4840, B 4841, and B 4842, with the numbers representing the same hardware description as the 3800 systems described above. The B 4800 cpu's are fast (8 MHz or 125 nsec) and the I/O subsystems can have from 16-64 channels. The aggregate data rate is 8 megabytes. Main storage ranges from 200,000 to one million bytes in 100,000 byte increments. Bipolar memory circuitry is used on the B 4800 and it cycles two bytes of data every 250 nsec.

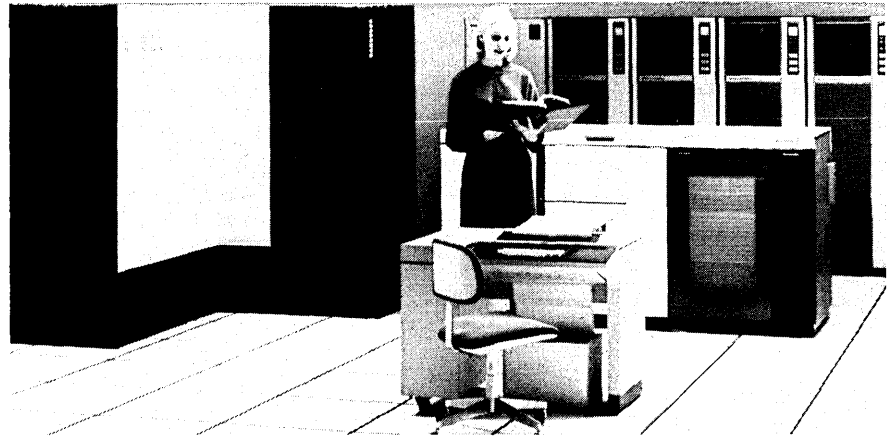
The file protection memory that is standard on the B 4800 and B 3800 (and optional on the B 2800) is charged with resolving conflicts when different programs attempt to simultaneously update the same record in a data file. An interesting feature called memory control regulates the flow of data between main memory, the central processor(s), and the I/O subsystem(s). It allows each system component access to main memory on a priority basis, with highest priority given the I/O subsystem. This memory control unit operates independently of the cpu and thus doesn't need any cycles from it—while the cpu is chugging through a loop, memory control is busy granting memory access from the I/O subsystems.

Each channel on the 800 series can have a Data Link processor to accept I/O commands and execute them independently of the cpu, meaning that I/O is performed asynchronously and in parallel with processing. These boxes have their own LSI circuitry and run as fast as 500 nsec. Each Data Link processor is designed to handle the needs of a particular device family it manages. The processors have single or

dual buffers of varying sizes according to the requirements of the family, and transmit data to the central system in *complete messages*—not bits or bytes at a time. Multiple data paths can be established for subsystems with high activity to enhance the data flow and reduce average access times to data. Very low current circuitry is used in the new cpu's, a technology Burroughs calls BCML for Burroughs Current Mode Logic. It's dense, improves reliability, maintainability, and system speed, and reduces floor space requirements by as much as 50%.

Burroughs seems to have thought of everything the medium scale user might want. The 800 series is object code compatible with current B 4700, B 3700, and B 2700 systems to make upgrades easy—upgrades to as much as four times the performance of 700 series systems. There's even a graceful degradation feature. In the event temperature levels exceed parameters, the system will warn the operator with a console message and warning light. An "intolerable" temperature causes the system to transfer in-process work and data to back-up storage and bring itself to a halt. The machine cannot then be restarted until the environmental problem is solved. A host of new high speed and high capacity peripherals to complement 800 series performance was also announced. Prices range from \$485-750K (\$12-18.5K/month) for the B 2800; \$605K to \$1,135,000 (\$14-26.5K/month) for B 3800s, and \$850K to \$3,725,000 (\$19.5-85.5K/month) for B 4800s. First systems will be in the field before April. BURROUGHS CORP., Detroit, Mich.

FOR DATA CIRCLE 225 ON READER CARD



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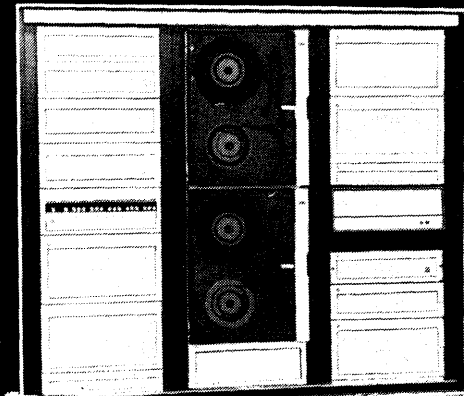
Varian's 190ns WCS, double precision floating point processors and memory map can give you even higher throughput of data during those critical run-times.

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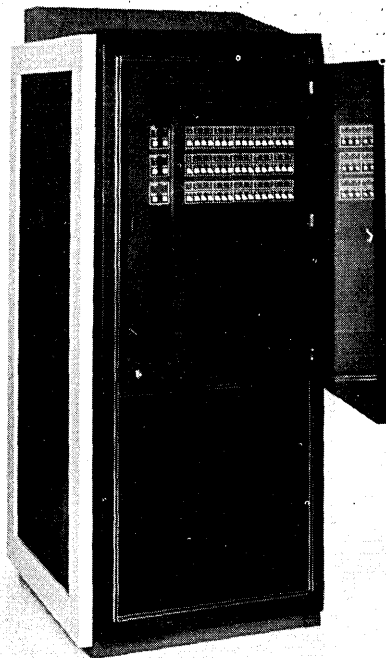
PHONE

CIRCLE 82 ON READER CARD

hardware

Fail Safe Computing

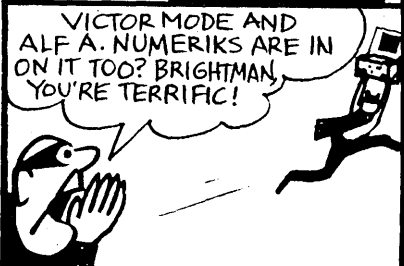
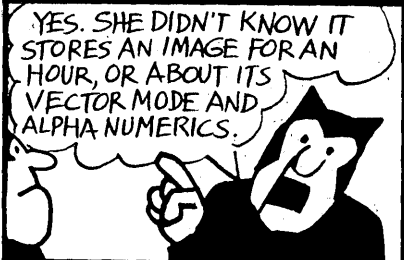
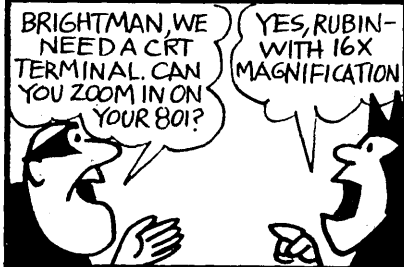
Interesting computer architectures are beginning to reappear after a hiatus of several years. The NonStop system is one of the more interesting approaches. Each system consists of a minimum of two and a maximum of sixteen 16-bit processors interconnected by what the manufacturer calls a redundant Dynabus. Thus equipped, the systems are capable of supporting up 1,000 terminals. The intent is to keep the system running in important, high transaction applications such as banking, insurance, retailing, and transportation. The key to a system like this is that the software has to be good if it's really going to work, and the manufacturer seems to realize this. The specially designed operating system allows each processor to know what is going on in all the other processors and at every peripheral device.



Each processor is controlled by its own operating system and it can request help from other processors, but it cannot demand help. Each processor also has a "kill" command to disconnect itself from the system if it detects that it is having problems. A minimum Non-Stop system, designated the model 204, consists of two T16 processors with 32K 16-bit words of core storage each; a 10 megabyte disc drive; a magnetic tape unit; an operator's console; and 16 terminal lines. The price is \$65,300—about a dollar a memory word. First units go to the field in April. TANDEM COMPUTERS INC., Santa Clara, Calif.

FOR DATA CIRCLE 230 ON READER CARD

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The Princeton 801 is terrific too! Everything you need in a full-graphics CRT terminal plus gray scale graphics and analog video. It's the low cost terminal that stores a high-density image of gray scale computer graphics without refresh. Or store full tone output—Alpha numeric characters—for up to an hour.

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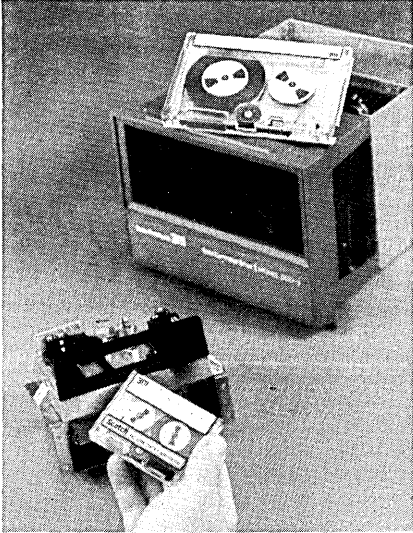
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CIRCLE 93 ON READER CARD

DATAMATION

Data Cartridge

The last cartridge 3M designed became an overnight success, the very successful dc300A. The only problem was—the drives for them were delayed so long that other manufacturers beat 3M



to the punch. The company was embarrassed and vowed it wouldn't happen again. It didn't; the "Son of dc300A" or "Daughter of dc300A" is ready, together with a 30 ips drive for it. The very compact cartridge, measuring only 2½ x 3¼-inches, or smaller than a Philips cassette, can be designed into very small devices. The dc100A holds 100,000 bytes of information and has an average transfer rate of 2,530 bytes per second. The tape speed is 30 ips (76.2 cm/s) forward and reverse, but 60 ips (152.3 cm/s) can be specially ordered. The mechanism has a 27-msec start delay and 5-millisecond stop delay. Drives are priced at \$475; cartridges at \$16/each in orders of five. 3M COMPANY, St. Paul, Minnesota.

FOR DATA CIRCLE 228 ON READER CARD

Small Scale Systems

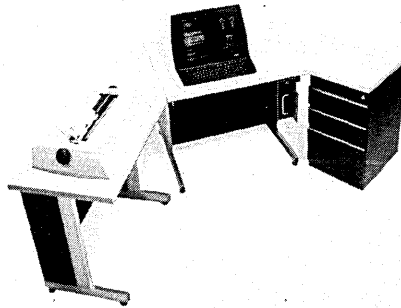
It's no secret that IBM hasn't been satisfied with the performance of its smallest two 370 models, and it has taken some steps to rectify the situation. The 370/115 and 370/125 both now feature cardless data entry and twice the disc capacity of previous models. The Model 115's main memory upper limit has been increased to 256K and the user can now append up to eight 3340 disc drives for a total capacity of 558.4 million characters. The 125 user can have double this amount, and both class users are now offered string-switching capability on the discs, allowing them to be shared by two computers. An additional "satellite" processor has been put into the 115 specifically to handle disc operations and machine-level instructions. The 125's control storage cycle rate has been in-

creased to 320 nsec from 480 nsec. Availability of the new machines and field upgrades are second quarter for the 115 and first quarter for the 125. Monthly rental for the 115 with 64K of memory starts at \$4,250, or \$160,250 on purchase. The new or improved 125 goes for \$227,050 or \$6,030/month for a 96K system. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 233 ON READER CARD

Text Editing

The VYDEC 1146 crt text editor comprises a crt, a floppy disc, and a Diablo printer. The disc stores up to 60 full pages of text, all of which can be searched and displayed in about three seconds. The method for repaginating documents is an automatic high speed function that requires only the touch of a button by the operator. Similarly margination is equally simple, as is double spacing, right-hand/left-hand margin spacing, etc. The 1146 seems to have been particularly well designed

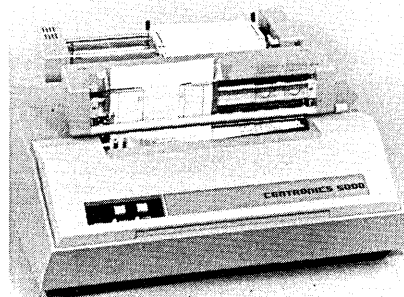


for operator use, up to and including weighted keys that more closely resemble ordinary typewriters, in an attempt to reduce operator adjustment time. The crt can display 4K characters at a time, and the printer runs at 540 words per minute. The entire contents of the screen are transferred to the printer buffer so that the terminal is immediately ready for additional work. Prices begin at \$17,400; leasing and rental plans are available. VYDEC, INC., Whippany, N.J.

FOR DATA CIRCLE 231 ON READER CARD

Printer Series

The 500D series of serial printers has been designed to optionally accom-



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SOFTWARE IMPROVES THRUPUT OF DOS/VS SYSTEMS

JOMO

The Job Mix Optimizer

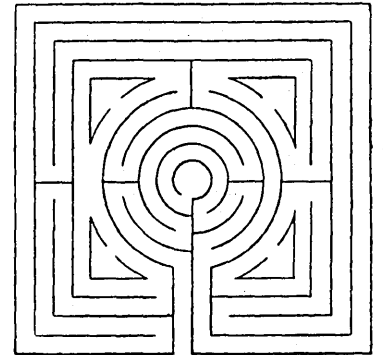
JOMO optimizes job mix in multi-programming environments by keeping the operator constantly informed of the computer system's utilization. JOMO tells the operator which jobs run together for maximum computer usage and informs him, via the console, of system overload. JOMO also produces reports which rate each production job. These have proven invaluable in operation scheduling.

EQLPRTY

The Partition Balancer for DOS/VS

EQLPRTY optimizes computer utilization by dynamically and automatically allocating partition priorities between CPU and I/O bound jobs. EQLPRTY works by continuously checking each partition for which it is responsible. When an executing program is in an I/O bound phase, its partition is immediately assigned a higher priority. When it is in a CPU bound phase, the priority is lowered by EQLPRTY.

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CIRCLE 90 ON READER CARD

hardware

moderate ledger cards, cut forms, or continuous paper by simply changing the detachable forms handling mechanism. Applications include billing/accounting systems, reservations systems, and others where simultaneous handling of ledger and continuous forms is a must. The 500D series can be interfaced to a crt terminal to provide high speed source document data collection capability. There are three basic print speeds: 80, 120, and 165 cps at 10, 12, or 16.5 characters per inch. Additional features include 5x7 matrix printing, elongated boldface characters, a one line buffer, and operator changeable forms handling devices. End user prices range from \$3,530 for a 588D with a cut form front feed device to \$5,180 for a 501D with ledger card and continuous form capability. CENTRONICS DATA COMPUTER CORP., Hudson, N.H.

FOR DATA CIRCLE 235 ON READER CARD

Time-sharing System

How about a fully programmable time-sharing system with a full configuration cost of under \$20K that can serve up to four terminals? That's what DEC is now able to offer with its Multi-

User/11V03 time-sharing system, built around its LSI-11 16-bit micro-computer. The price doesn't include the necessary terminals, but is still impressive. A five year lease/purchase agreement for the mainframe runs only \$472/month.

The system contains 28K (56K bytes) of main storage, with dual flexible disc drives adding more than half a megabyte of mass storage. Purchasers can choose either the 24-line VT52



video terminal or the 30 cps LA36 DEC-writer II as the system's first terminal. Addition of a VT55 graphic display terminal provides interactive graphics capability. Terminals can be situated up to 25 feet from the system without

additional hardware, or in any location with appropriate interfaces. Basic price for the one-terminal MU/11V03 is \$16,220. Four-terminal configurations begin at \$19,970. BASIC and FORTRAN IV are available for the new system. First units have already gone to the field. DIGITAL EQUIPMENT CORP., Maynard, Mass.

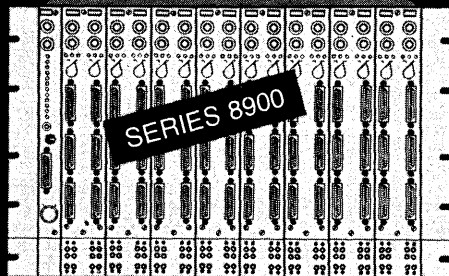
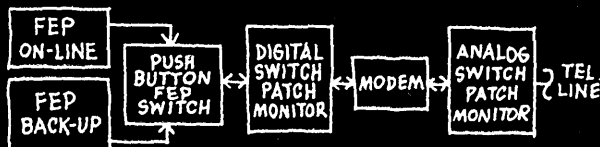
FOR DATA CIRCLE 232 ON READER CARD

Minicomputer

This manufacturer has been so busy manufacturing compatible alternatives to Data General's minicomputer line that it hasn't introduced any new products in quite some time, but the MOD FIVE ends the drought. The new mini is upward compatible with both the company's D-116 and Data General's Nova 1200 as well as the manufacturer's 216, 316, 416, and 616 minis. Though upward compatible, the instruction set in the MOD FIVE is a superset of instructions that includes such mnemonics as: arithmetic memory to accumulator, arithmetic memory to memory, move memory to memory instructions, multiply/divide, and signed multiply/divide as well as bit manipulation, multiple logical/arithmetic shifts, extended logical instructions, byte manipulation instructions, etc. The MOD FIVE also features overlapped instruction fetch concur-

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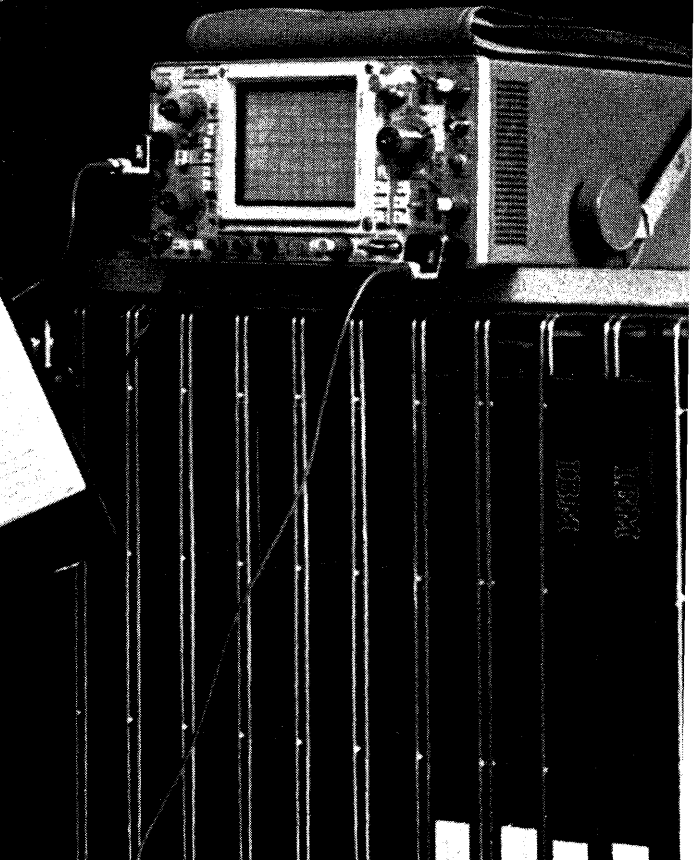
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RAYTHEON

CIRCLE 43 ON READER CARD



hardware

rent with the execution of instructions, as well as triple stack processing, vectored priority interrupt, etc. Interrupt response on the new mini is seven to ten times faster than either the D-116 or the DG Nova 1200, claims the vendor. Pricing of the MOD FIVE has been worked out to be about equal to its predecessor, the D-116. DIGITAL COMPUTER CONTROLS INC., Fairfield, N.J. FOR DATA CIRCLE 234 ON READER CARD

Wang Communications

The wu-7 is probably the first micro-computer ever to team up with a programmable calculator, specifically the Wang 600 and 700 units. Thus equipped, the calculator can communicate with other Wang calculators, with a variety of other devices, or computers at line rates ranging from 110 to 9,600 baud. The wu-7 performs the code translation, formatting, buffering, serializing, and other operations so that the communications task doesn't become too burdensome. Another use for the wu-70 is handling data from instruments and special purpose apparatus. Many manufacturers of these devices offer tty-compatible plugs for printing and connections to

minis. The varying code sequences (protocol) are automatically handled by the wu-7. It's priced at \$2,450. DIGITAL LABORATORIES, Cambridge, Mass.

FOR DATA CIRCLE 236 ON READER CARD

NCR Memory

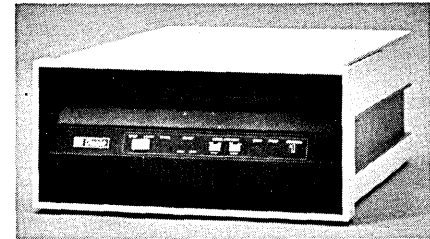
NCR 200/201 system users now have available another source for main memory replacements or add-ons for those machines. The RAM-STOR core memory systems feature low profile cabinet design and some impressive claims for proven reliable performance and fast installation. Configurations utilize up to 16 identical 32K byte modules for a maximum capacity of 512K bytes. Interestingly, the memory cards are manufactured by Electronic Memories and Magnetics, said to be the original manufacturer of Century series core memory systems. Pricing runs from 25 to 70% under NCR's published prices. COMPUTER ENHANCEMENT CORP., Palos Verdes, Calif.

FOR DATA CIRCLE 237 ON READER CARD

Disc Series

The series 400 comprises eight tape drives that range in capacity from 13.3 megabytes all the way up to 53.3 megabytes, all interface in the same manner thanks to microprocessors that also perform diagnostic functions. The

oem discs are general purpose, but alternative products for IBM's System/32 disc were specifically mentioned since the 400 series is not a fixed medium unit and the pricing schedule should insure competitively priced finished products. All units are the same size—8.75 inches high and designed to fit a standard 19-inch rack. One of the principal design features of the 400 series is a dual head positioning mechanism based on an inertial actuator that provides the capability for independently moving two head positioners per disc drive. One head can be seeking while the other is reading or



writing. The removable disc cartridge does not have to be in place in order to write on the fixed disc unit. Depending on features selected, prices range from \$2,500 to \$3,600 per drive in typical oem order sizes. First production units will go to the field during the third quarter. DIABLO SYSTEMS, INC., Hayward, Calif.

FOR DATA CIRCLE 238 ON READER CARD

*

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CIRCLE 83 ON READER CARD

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CIRCLE 85 ON READER CARD

DATAMATION

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Updates

If you're an aficionado of "computers and music," which includes everything from computer assisted composition to computer assisted performances (and even computer aided research), you have to drool over the set-up at the Massachusetts Institute of Technology. For starters, Digital Equipment Corp. donated a PDP-11/50, one of the more potent minicomputers in existence. And instead of the usual process of laboriously entering letters and numbers on punched cards to specify musical scores, the keyboard of a standard organ is used for direct input so that would-be musicians don't have to communicate through an intermediate language. Moreover, an IMLAC CORP. PDS-4 graphics scope is used by the composer to display as many as 20 lines of music for editing purposes. The mini is also being used to search for the "unknown" composers of old scores by comparing their characteristics with those of known composers.

In one store and out the other: Pansophic Systems, Inc., Oakbrook, Ill., has stopped marketing a plug-to-plug compatible sorting package developed by Computer Associates International of Zurich, Switzerland that has enjoyed reasonable success in the U.S. (more than 200 installations). All is not lost for prospective users, however, as Standard Data Corp. of New York City has taken over marketing of the package, called CA-SORT II. Pansophic will continue support of the packages it placed, but in the future will only market its own products.

Computer scoring of bridge tournaments is now a reality thanks to First Data Corp., a Waltham, Mass., time-sharing company. Two Boston tournaments have already been scored by the program, requiring only 10 minutes to accomplish instead of the usual 40.

NCR's SPIRIT package is now available to Century 101 and larger Century system users. SPIRIT (Sales Processing Interactive Real Time Inventory Technique) was introduced in 1974 for NCR's 8200 minicomputer-based small business system. The program provides real-time processing of orders and enables customers to produce picking tickets, packing slips, and invoices as a by-product of entering an order.

Operating System

The Interactive Real-time Information System (IRIS) was developed by this systems house to equip its Data General Nova-based systems for duties in the educational market, but the operating system very possibly can be used by other Nova users and is now being offered in a multi-tasking version to them. The key attributes are the system's multi-tasking and real-time interrupt handling capabilities which allow it to run real-time tasks in foreground, time-sharing tasks in middleground, and batch processing jobs in background, all concurrently. Tasks can be either core resident (for fast response) or swapped in and out from disc to conserve memory, and jobs can utilize any combination of core-resident and swapping tasks. More than one thousand priority levels are provided for efficient task scheduling. Priorities can be dynamically adjusted to reflect the job's resource usage.

IRIS will run on any Nova computer with 16-32K of memory, and it has multiple disc capability, including any combination of fixed-head, cartridge, floppy, and disc pack drives. Teletypewriter and crt terminals for operator interactions, and peripherals, including card readers, line printers, and magnetic tape drives can be added to the system simply by adding a driver which has a standard interface to the IRIS I/O monitor. The system is priced at \$2,500 and includes a 30-day warranty. EDUCATIONAL DATA SYSTEMS, Irvine, Calif.

FOR DATA CIRCLE 213 ON READER CARD

IMS Reference Card

Boeing Computer Services has been offering a reference card for helping systems analysts find their way through the intricacies of IBM's Information Management System. A revised edition of the card is now available that has been updated to release 1.1 of IMS/vs and provides a quick reference to Data Language/One parameters and status codes. The price for the card is the best possible one: it's free from the firm's Education and Training Division. BOEING COMPUTER SERVICES, INC., Seattle, Wash.

FOR DATA CIRCLE 214 ON READER CARD

Production Fortran

Here's an interesting package now available on GE's immense time-sharing net: "Production FORTRAN," a FOR-

TRAN derivative that lacks features such as line number references in error messages, warning messages and subscript checks. The idea is to provide a faster running FORTRAN for use on proven, stabilized production-type programs that currently run in FORTRAN IV core image or object code. It's estimated that processing cost savings can approach 30% with PFN. FORTRAN IV is upward compatible with PFN, and conversion to it is claimed to be very simple: ASCII mode FORTRAN IV programs are automatically compiled under the Mark III system, then loaded and executed given just a simple RUN command. Object mode programs are immediately loaded and executed with the RUN command. Core image programs are directly executed. PFN seems like a good idea and it will be interesting to see how well it will be accepted by GE's users. GENERAL ELECTRIC INFORMATION SERVICES, Vienna, Va.

FOR DATA CIRCLE 215 ON READER CARD

Retail Sales Info

A unit management system that provides detailed unit information on sales, inventory and customer credit is now offered users from this manufacturer's 38 U.S. data centers. The system is designed for both single and multi-store retailers and is based on the NCR 250 electronic cash register. The 250 records sales, inventory and credit transactions on magnetic tape cassettes which are then taken to the data center for processing. Fully 30 reports on unit sales, inventory, productivity and exceptions are generated by the program, as are three different customer credit statements. Also generated are several accounts receivable reports, including an authorization report, selective account analysis and exceptions report, a collection report and an aged trial balance report. Processing charges for the unit management system will vary according to the number of inventory items, number of transactions processed, number of reports and volume of pages, but charges begin in the \$300 to \$400/month range. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 216 ON READER CARD

Performance Evaluation

LOOK is another product designed to peek into the international operation of IBM systems using OS/MVT, vs1, or vs2 operating systems and ferret out hard to obtain measurements of how

7 programmers, 2 supervisors, the "impossible" 2500 programs, and MARK IV



As reported
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"We did it in three years from scratch — designed, implemented, and went operational with:

1. a product-costing data base covering 5000 products
2. an order-entry and invoicing system for annual sales of \$90 million, and
3. programs covering all divisional DP requirements for daily operations — personnel, payroll, accounting, product planning and marketing.

"And we did the entire job — some 2500 programs in all — with just seven analyst/programmers and two supervisors.

"The key to this 'impossibility,' as some genuinely felt it to be, is the MARK IV® System.

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

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

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

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An up-to-date status report on the theoretical, as well as practical, aspects of microprogramming is presented in this book by discussing the basic hardware and software concepts in this field. The implementation of microprogrammable architecture on various commercially available machines is also examined, along with a discussion of the applications of microprogramming. The subject is introduced at a level that a novice can easily follow.

CONTENTS: Introduction to Microprogramming Concepts. Architectural Characteristics of Microprogrammed Computers. Microprogramming Languages and Support Software. Computers with Vertical Microinstructions. Computers with Diagonal Microinstructions. Computers with Horizontal Microinstructions. Developments in Microprogramming Languages. Applications of Microprogramming. Perspective.

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Combinatorial Algorithms

by ALBERT NIJENHUIS and HERBERT S. WILF

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Lively interaction among combinatoric problems, mathematical algorithms, and computer programs characterizes this book. It consists of 28 chapters, each of which discusses complete algorithms for the solution of a particular combinatorial problem. In each case, the authors have selected a single algorithm from among the many possible candidates and have implemented it for computer use as a FORTRAN subroutine. By using this approach, they have developed a book of value for its mathematical and theoretical discussions of algorithms as well as a source of complete programs. Topics covered include: the sequential and random generation of families of combinatorial objects; Möbius function of a partially ordered set; chromatic polynomial; connectivity of graphs; random trees—labeled and unlabeled.

1975, 272 pp., \$19.50/£10.15

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system resources are being utilized. The object is to ascertain whether there are any roadblocks that might not ever be seen except for such a package as LOOK, problems that might include channel contention, lost I/O interrupts, thrashing, excessive disc arm movement rates, or other maladies that contribute to poor turnaround, slow response times, sluggish processing rates, etc. Immediate results are provided in the form of console or terminal displays, as well as hardcopy for later in-depth analysis. The overhead required to run LOOK (only one percent) is impressively small. Commands are used to display summary information on cpu utilization, I/O activity, paging activity (vs only), storage utilization, and wait conditions. LOOK can be used under rso (time-sharing) in the operator mode; an MVS version is in the works. LOOK is licensed per cpu at \$4K, or \$350 per month. APPLIED DATA RESEARCH, INC., Princeton, N.J.

FOR DATA CIRCLE 217 ON READER CARD

Mini Operating System

os/16 MT2 is a multi-tasking operating system designed to take better advantage of this manufacturer's 16-bit minicomputer line, particularly in real-time, program development and computational applications. The new os resides in 16K bytes and can be installed

software spotlight

Program Design

This firm always seems to be pushing the state of the art in computer programming science, it seems, and its latest product, PDL (Program Design Language) is another example of where structured programming techniques may be taking us. The intent of PDL is to reduce program design and implementation time and cost while producing software that is better documented, more reliable, and easily maintainable. The "language" contains a vocabulary of only eight keywords to allow program designers to use terms and concepts that match the program to its intended function. The vendor points out that it isn't very hard to learn how to use these eight keywords.

on any 16-bit Interdata processor equipped with an I/O device. All of the manufacturer's peripheral equipment are supported.

The major features of three previous operating systems are combined in os/16 MT2 and include a command substitution system that allows multiple operations to be executed with only one command, multiple shared libraries, round robin scheduling, file protection conforming to ISA standards, taskhandled traps, systems overlays and task-to-task communication. User tasks with up to 256 priorities are supported by the task management feature of os/16 MT2. Memory management, file management, and a simplified user interface are additional attributes of the new OS, says Interdata. Languages supported include Extended FORTRAN IV, FORTRAN V, Extended BASIC, and assembler. The one-time license fee for os/16 MT2 is \$1,400. INTERDATA, INC., Oceanport, N.J.

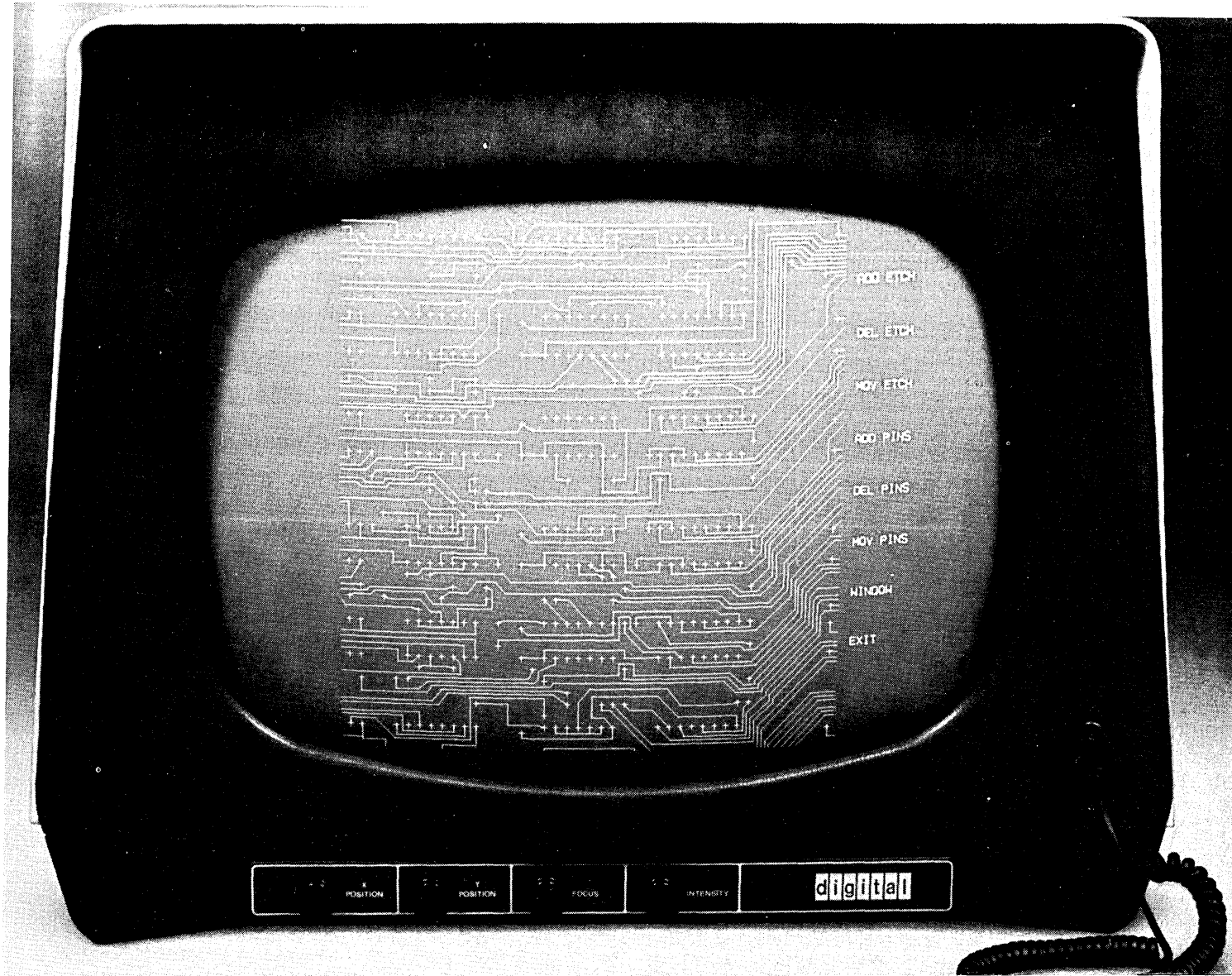
FOR DATA CIRCLE 218 ON READER CARD

Bill of Materials

This Germany-based software vendor has installed so many ADABAS data base management systems in the U.S. that it has now come out with a significant enhancement: an alternative to IBM's Bill of Materials Processor called ADABOM. The package is free, providing you've already acquired ADABAS, which is priced at \$120K. ADABOM is the interface between application programs and the ADABAS files that contain bill of materials data. Simple calls to ADABOM allow the user to access and maintain bill of materials data so that the com-

As you might have guessed, the output is an overall structured design of how the target program should be organized. It's claimed that early use of PDL on a project greatly reduces management risk, as designs can be tested against requirements early in the development cycle and alternative designs economically produced and compared. Priced at \$3,200, PDL might just pay for itself the first time it's used. The price is \$3,200, and IBM 360/370, Univac 1100 series, CDC 6600, PDP-11 and MODCOMP II users can obtain it now. Other versions are in development. CAINE, FARBER & GORDON, INC., Pasadena, Calif.

FOR DATA CIRCLE 212 ON READER CARD



Digital's PDP-11 just improved its image.

Introducing the VS60, Digital's high-performance graphics system for the 11 family.

You're looking good if you start off with a great mini-computer like Digital's PDP-11. Adding VS60 high performance graphics is one way to look even better.

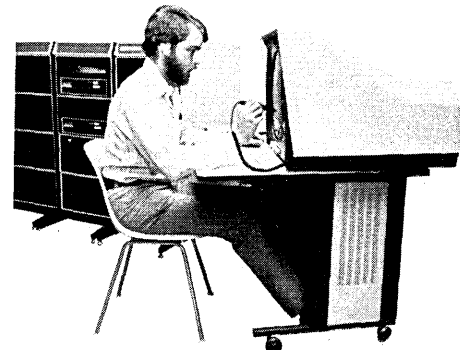
With the VS60, you get a 21-inch CRT with light pen and a display processing unit with hardware vector and character generators. You also get sub-routining with automatic stacking, scaling and 2-D translation standard. Subscripting and superscripting — standard. Plus upwards compatibility with over 500 VT11 graphics terminals already installed.

And the VS60 gives you something no other high-performance system offers — the Digital name plate. It means full line compatibility with 6 different PDP-11 processors. 60 different peripherals. And 2 different operating systems, RT-11 and RSX-11. With RSX-11 software, the VS60 can be configured as a satellite terminal called the GT62.

A Digital name plate also means you get one source for all your equipment. Plus the support represented by a worldwide sales and distribution network of over 3,500 software and service specialists in 36 countries.

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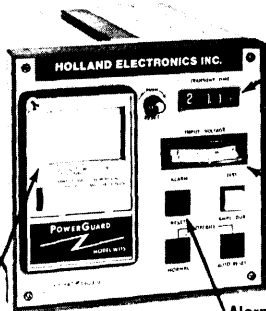
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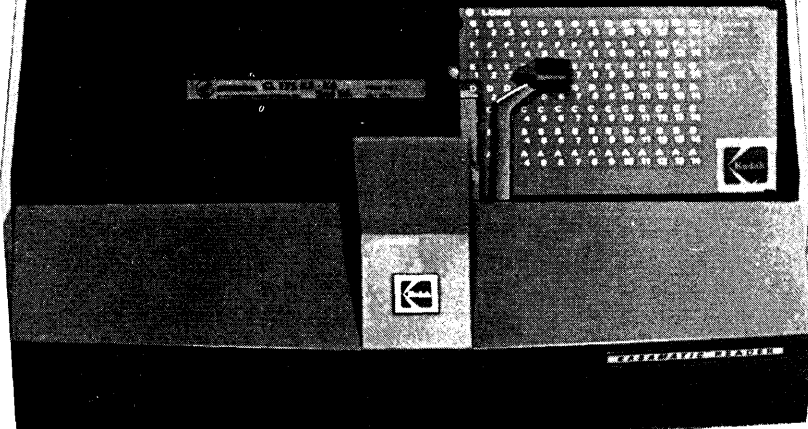
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plex retrieval and update logic need not be duplicated in a number of application programs. ADABOM also includes routines to convert IBM DBOMP, Material Requirements Planning, and CMS files to files that can be loaded by ADABAS for ADABOM use. The user's bill of materials data base may contain any number of interrelated files, but two files are essential: the product structure file and the part master file. All ADABAS selection and read commands are available to the user, and, in addition, ADABOM provides some special bill of materials capabilities such as explosion, implosion, routing, and work center where used. SOFTWARE AG, Reston, Va.

FOR DATA CIRCLE 219 ON READER CARD

System Cross-reference

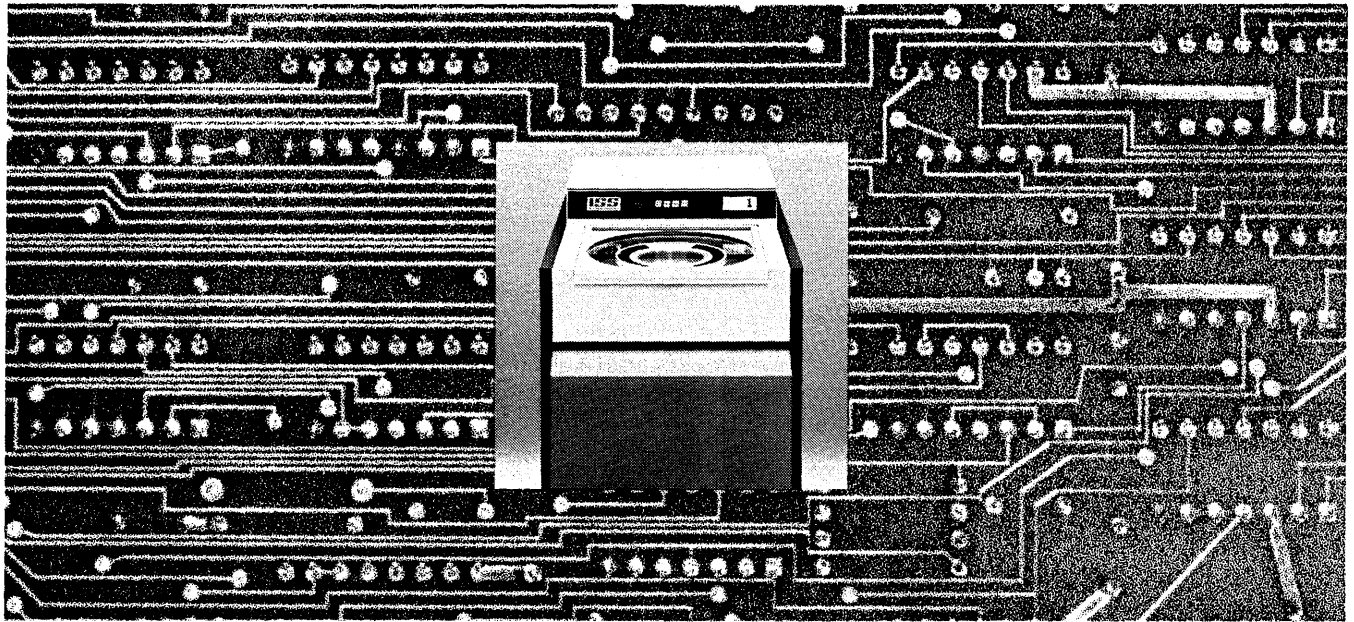
SGINDEX is a PL/I program developed at the Goddard Space Flight Center that might be a real boon to systems analysts working in os/360 shops. The program provides an easy-to-use but comprehensive index of the system generation results that can be used to modify the operating system, apply program temporary fixes, or write subsystems to interface with os. The program collects key data from the Stage II input for an os/360 system generation, sorts it, and prints a formatted listing of the index entries collected. A number of parameters are available for controlling the content and format of the output listings. A 200K storage region is required in an MVT (Multiple Variable Task) system. The program is priced at \$610; \$5.50 for the documentation. The program reference number is GSC-11612/D. COSMIC, UNIV. OF GEORGIA, Athens, Ga.

FOR DATA CIRCLE 220 ON READER CARD

System/32 CPA Package

Five application programs designed by certified public accountants are now being offered for other IBM System/32 users. The programs are written in RPG and are distributed on diskettes. Included in the package are a general ledger/financial statement program, a professional time analysis program, a payroll check writing program, an accounts receivable/balance forward program, and an accounts receivable/open item program. The price for the complete package is \$4,500. PACIFIC COMPUTER SYSTEMS, Long Beach, Calif.

FOR DATA CIRCLE 222 ON READER CARD



Introducing the industry's most advanced 100/200-megabyte OEM disk drives.

ISS 733-10/11 — benefits for all.

The new ISS 733-10/11 disk drives are, by far, the most advanced random access mass storage devices ever designed for the OEM market. Their numerous features are designed to benefit both you and your customer. For example, the 733-10/11 offer exceptional speed in both head positioning and start/stop times. Compactness, advanced sound insulating, and waist-high pack loading are just a few of the additional design considerations. The big news, however, is the 733-10/11's field-upgrade capabilities. ISS 733-10, with a 100-megabyte capacity, can be easily field-upgraded to 200 megabytes. Or the 200-megabyte capacity is available immediately with ISS 733-11. In addition, either unit can be ordered with, or field-expanded to, dual port capability.

Advanced interface design for extended compatibility.

The advanced design of the ISS OEM interface permits functional compatibility between ISS 733-10/11 and most current model 40, 80, 100 and 200-megabyte drives. As a result, controller modifications are minimal.

ISS designed-in performance features:

Standard power supply — The integral power supply is designed to tolerate

wider variations of AC power, greatly reducing susceptibility to powerline brownouts.

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Industry standard media — 3336 and 3336-11 or equivalent disk packs.

Programmable sector mark — Allows user to pre-select sector size to suit his specific application.

Important extra-performance options:

Dual port — ISS 733-10/11 can be upgraded from single to dual port in the field. Or, if you prefer, dual port can be factory installed prior to delivery.

Sector counter — Permits system to interrogate which data sector is approaching the read/write heads.

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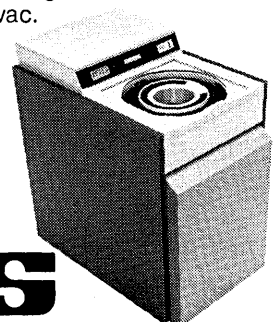
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source data

(Continued from page 42)

Southwest Computer Facilities

Directories of Computer Facilities in the Southwest lists 656 organizations operating 977 computers in Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. Business firms, municipalities, public schools, universities, and hospitals are represented. Both an applications index and an equipment index are included; however, it is "not meant to be a complete listing." Price: \$20. Industrial Economics Research Div., Box 83 FM, TEXAS A&M UNIV., College Station, Texas 77843.

IBM Alumni Directory

The 16th issue of the *IBM Alumni Directory* lists more than 2,200 former IBM employees, their titles, companies, and business addresses. Additional data includes the year the individual left IBM, and the division or subsidiary involved. Two supplements sort the alumni by zip codes and by present company affiliation. Price: \$10. EX-IBM CORP., 7034 Dartbrook Drive, Dallas, Texas 75240.

courses

Yourdon Courses

Yourdon's winter schedule of seminars features a number of courses in structured programming, structured design, data communications, etc., to be held in various cities around the country. New are two day courses in software engineering for microprocessors (New York—Feb. 23-24) and survey and applications of microprocessors (Chicago—Mar. 8-9; San Francisco—Apr. 5-6). Prices range from \$150 for one day courses to \$600 for five day courses. YOURDON INC., 1133 Avenue of the Americas, New York, N.Y. 10036.

Variety of Seminars

A number of seminars on a variety of topics are scheduled for various cities. Topics include management of structured design and programming (Feb. 23-24, San Francisco; Mar. 22-23, Washington, D.C.), administration and control of data base (Feb. 25-27, Washington, D.C.; Mar. 24-26, Chicago; Apr. 12-14, New York), and advanced programming techniques (Feb. 25-27, San Francisco; Mar. 24-26, Washington, D.C.; Apr. 21-23,

Chicago).

Numerous other courses are also scheduled. Prices for two day courses are \$295 and for three day courses, \$485, with discounts available for more than one participant from the same organization. THE INSTITUTE FOR ADVANCED TECHNOLOGY, 6003 Executive Blvd., Rockville, Md. 20852.

Microcomputer Short Course

"Microprocessors and LSI in Telecommunications Applications" is a two day course scheduled for several cities. A third day on "Software Development Techniques for Microcomputers" follows immediately in each city. These courses are designed to provide a comprehensive introduction to microprocessors and LSI as they apply to the telecommunications industry, and to program microprocessors and interface them to external devices. Microcomputer hardware will be available to illustrate concepts. Cities where the courses will be held are New York (Feb. 25-27), Chicago (Mar. 2-4), Washington, D.C. (Mar. 31-Apr. 2), Dallas (Apr. 6-8), and San Francisco (Apr. 13-15). Price: \$375 for the first course; \$185 for the second; and \$495 for both. INTEGRATED COMPUTER SYSTEMS, INC., P.O. Box 2368, Culver City, Calif. 90230.

Technical School Directory

A 1975-76 directory of accredited vocational schools, including a listing of over 60 computer schools which teach programming, computer maintenance, and other aspects of dp, is available. The schools listed in the 104-page directory have been examined on-site by the NATTS Accrediting Commission for both teaching capability and business practices. NATIONAL ASSN. OF TRADE AND TECHNICAL SCHOOLS, Washington, D. C.

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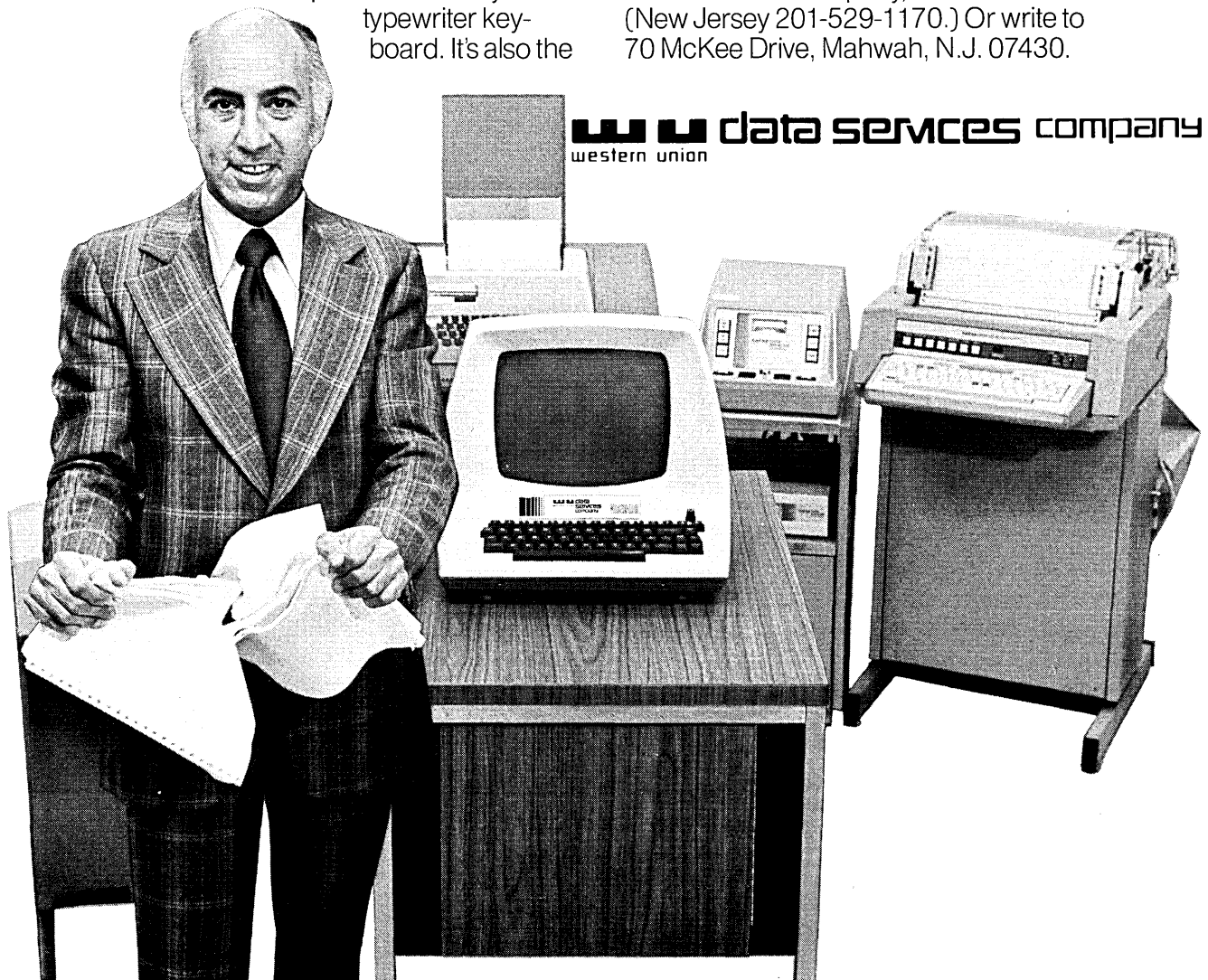
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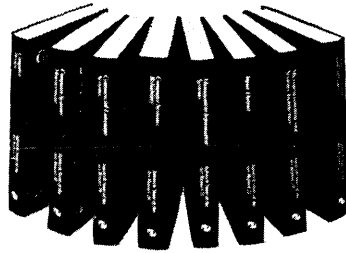
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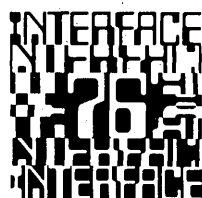
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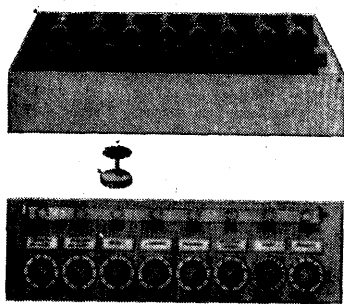
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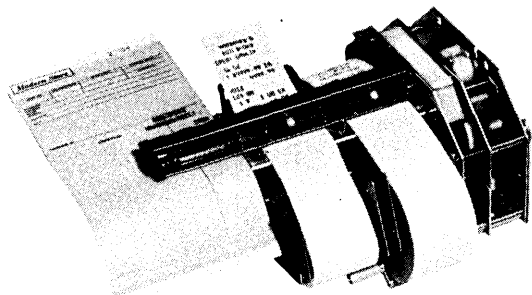
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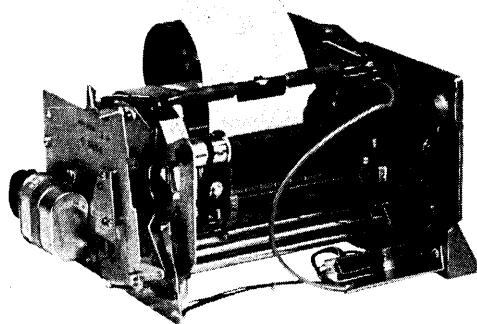
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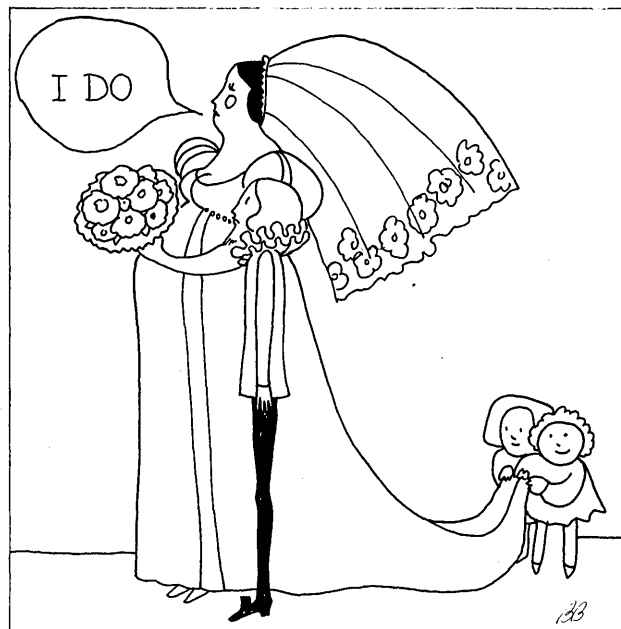
CIRCLE 99 ON READER CARD

This forum is offered for readers who want to express their opinion on any aspect of information processing. Your contributions are invited.

the forum

Privacy and Anonymity

In November of 1582, Anne Hathaway married Will Shakespeare of Stratford. Historians have taken notice of this fact because of the later notoriety of the groom. But as for the marriage itself, there are two interesting points for conjecture. First, Anne was pregnant. We know this because the marriage was executed in haste without the usual banns and because Susanna Shakespeare was born six

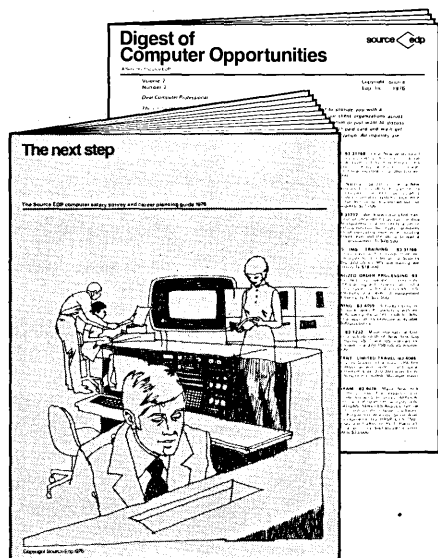


months later. Church records reveal both these facts.

The second point that scholars have considered is that it was a strange match. He was only 18; she was 26. He was the son of a poor glovemaking; her father was a well-to-do landowner. After the marriage, Will spent most of his adult life in London; Anne did not accompany him. In his will, Shakespeare mentions his wife only once: to leave her his "second-best bed."

Two theories are proposed to account for these facts. One is that Will married Anne for her money and got away from her as fast as he could. The other is that Anne, at age 26, was anxious for a husband; better the wife of a Glover than

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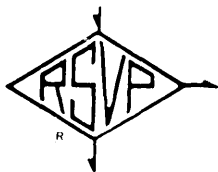
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CIRCLE 108 ON READER CARD

the forum

an old maid. However, the events that could support either contention are now unknown and unknowable; they are the conversations between two people, conversations that must have occurred in private.

This bit of Elizabethan gossip explains and clarifies the distinction between privacy and anonymity. It is a distinction that is frequently ignored in contemporary discussions of privacy, especially in the context of computer-based data banks and personal information systems.

Anne Shakespeare lived all her life in the small town of Stratford where everyone knew that her first child was conceived out of wedlock. This is the kind of fact people's "right to privacy" is frequently supposed to allow them to suppress. Anne couldn't suppress it. In fact throughout most of history, most of the human race has lived in small villages and people have been forced to live with their histories.

The ability to become anonymous is a byproduct of the Industrial Revolution. We are losing this ability because our world is becoming smaller again; Marshall McLuhan has referred to the situation as a "global village." Of course there was some consolation to Anne and to others with embarrassing facts that were not secrets; they were not alone. One out of three of Anne's married friends probably bore a similar burden on her wedding day.

To attempt to hide publicly known facts, to remove or obscure such facts from the historical record, is to seek anonymity, not privacy. Privacy does not protect you from being associated with the records in the town hall, in the police station, or in the village church. The right to privacy protects Will and Anne from having us learn *why* they got married and the *kind* of a marriage they had. We know the facts—about the second-best bed, about Will's affairs in London (or the gossip about them, anyway), about the difference in their ages and social stations. But we don't know anything at all about their personal relationship. This is protected by the right to privacy. The right has been reflected in legal and moral restrictions against eavesdropping in most societies.

The right to privacy is the right to do or say things and not be covertly observed. What I do in public anyone has a right to observe, to remember, to record, to report. Those who claim a right to anonymity ask us to forget what has taken place in public, to erase the record, to decline to report. This is something totally different from protecting privacy and has to be defended on totally different grounds—if it can be defended at all.

Our privacy has historically been defended by our own tact; it is today threatened by technology coupled with subterfuge. Our anonymity has been protected—when it has been protected at all—by inefficiencies of record keeping, and is attacked by efficiency and computer technology. The right to privacy must be protected by focussing on the illegality of stealth; what is to protect us against efficiency?

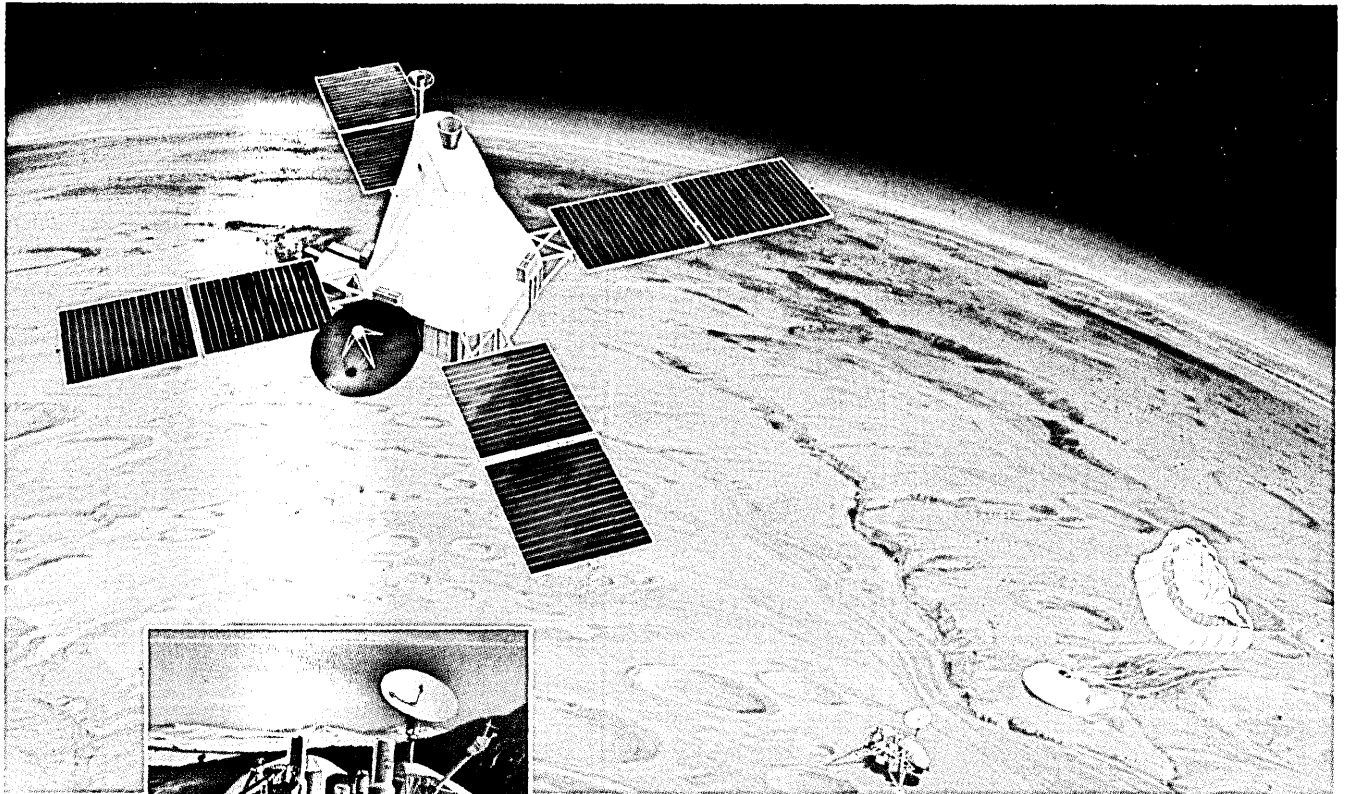
—Charles Mosmann

Mr. Mosmann is director of user services at the Computing Facility of the Univ. of California, Irvine. He is co-author with Stanley Rothman of "Computers and Society," the second edition of which will appear shortly.

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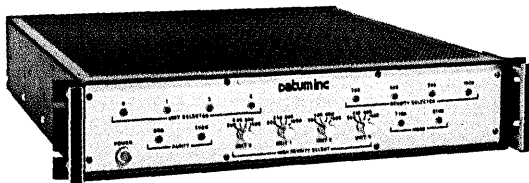
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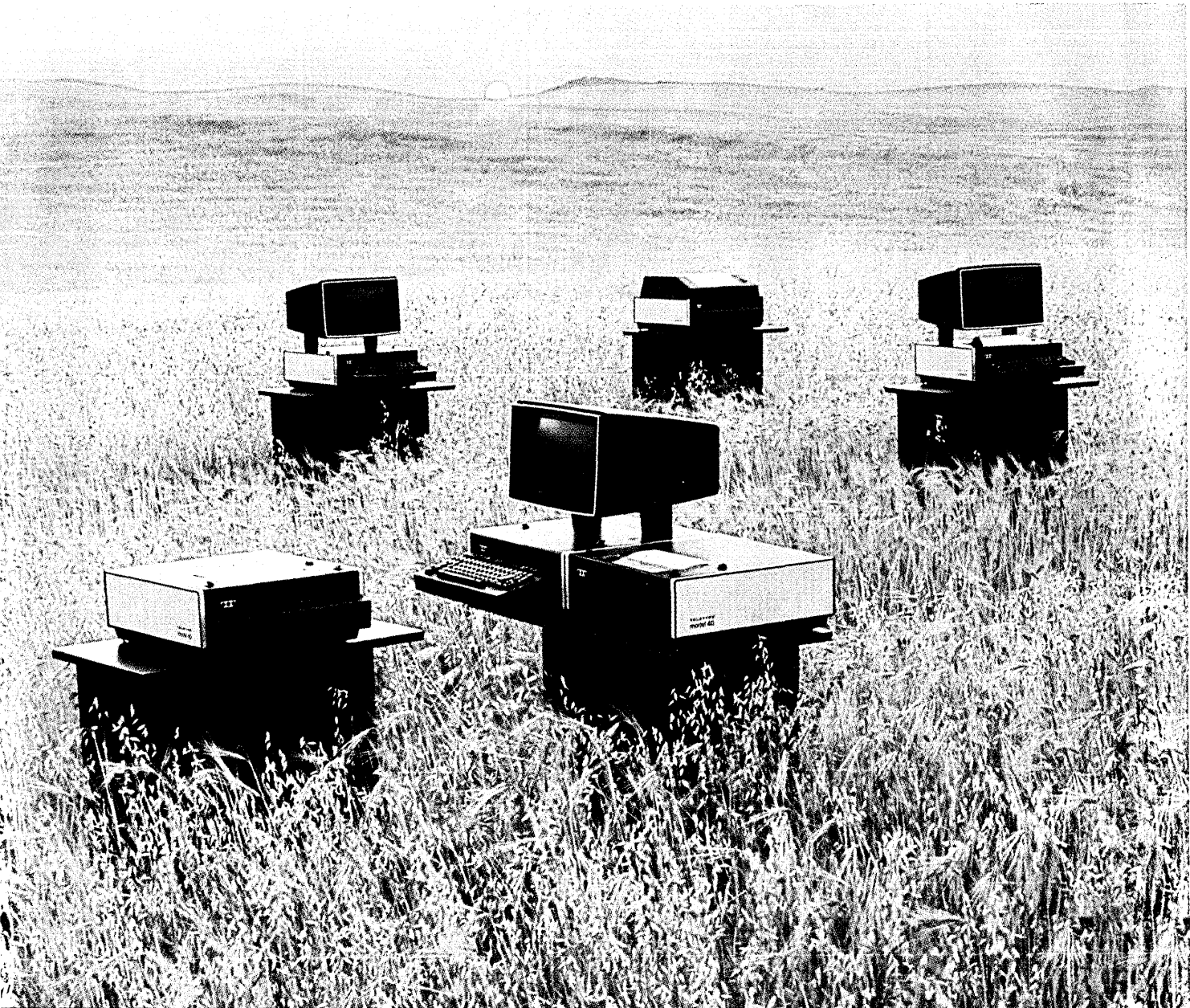


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