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September 15



computers
in
architecture



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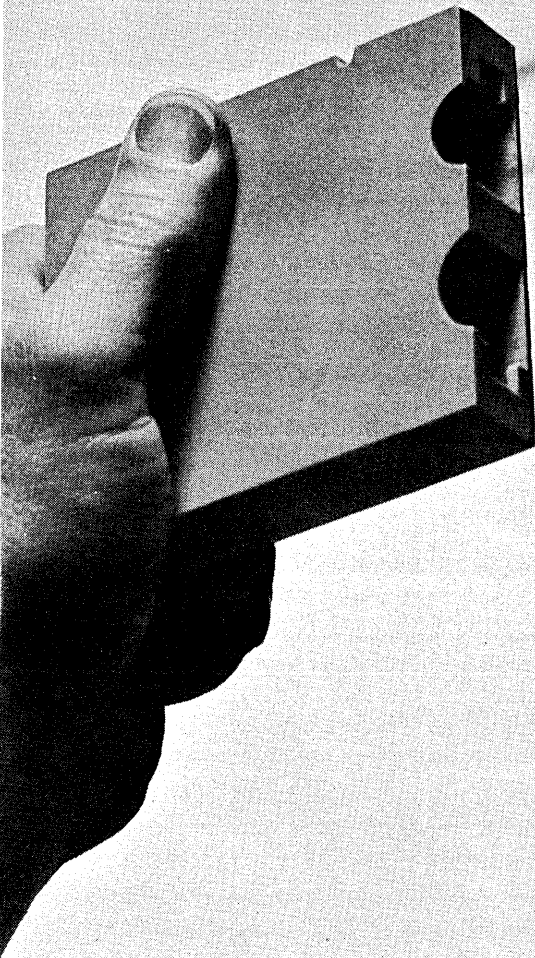
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22115

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DIGITAL COMPUTERS

a tape cartridge and deck designed (not adapted) for digital use



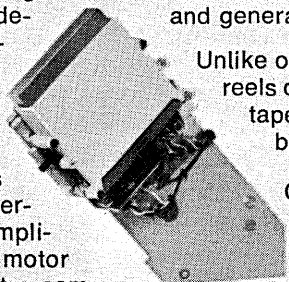
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spring-loaded reels
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the two extra motors
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Cartridge capacity is 190 ft., 0.15" wide computer-grade tape with BOT/EOT sense markers; removable plug for file protect; tape speed is 7 ips; rewind is 21 ips; recording is at 400 bpi with more than 900K bits on a single cartridge. — For computer quality performance in a miniature tape transport, contact a Digitronics representative listed in EEM or EBG.

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CIRCLE 32 ON READER CARD

SEPTEMBER 15, 1971

volume 17 number 18

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37 INTERMAG - 1971

A conference report.

TECHNICAL

30 Retention of Data . . . for the Long Term

BELDEN MENKUS. It's time now to plan for storing data for ten years or more. If mag tape won't do the job, is microfilm the answer?

COMMENTARY

40 Perspective

President Nixon's new science advisor, Edward E. David, Jr., looked to by many to provide the information science community with more influence over federal policy, doesn't believe that automating the service industries will swallow up jobs, contrary to a popular view that these industries need less automation rather than more. David sees his new job as that of a loyal member of the White House team. As he put it in an interview, "I belong to the President."

71 The Forum: APL — a Potential Liability?

RAYMOND J. D. REEVES. Instead of a panacea, this "sporadic user of APL" finds it to be a "singularly unsophisticated" programming language.

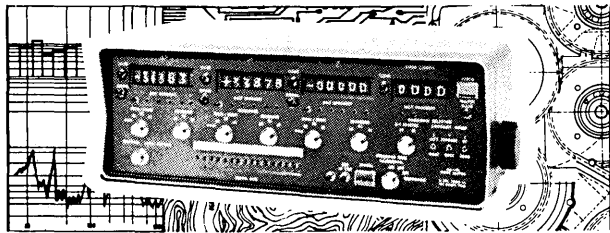
About the Cover

Barbara Benson's design projects the architect's computerized vision onto multiple levels and the emerging shapes reflect the increased options available to designer and planner when the computer is put to optimum use.

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CIRCLE 31 ON READER CARD

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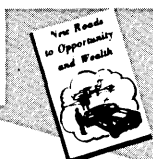


JOHN SAUER, Pres.

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CIRCLE 22 ON READER CARD

DATAMATION®

SEPTEMBER 15, 1971

volume 17 number 18

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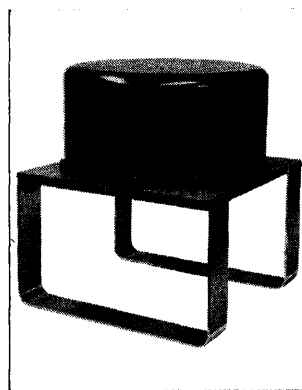
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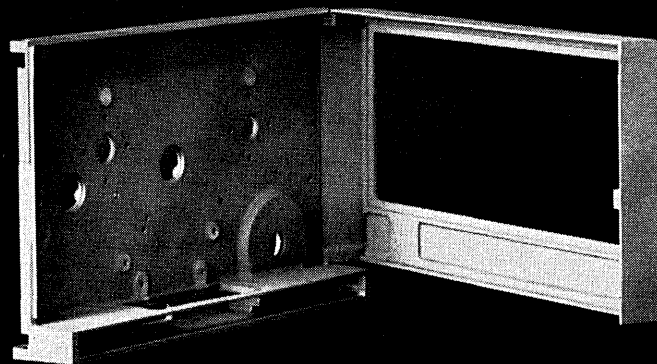
We've ingeniously eliminated tape cupping with a technique that provides uniform tape tension no matter what the buffer arm position.

We've meticulously ensured uniform packing density and tape speed by tying all timing and spacing to the capstan encoder.

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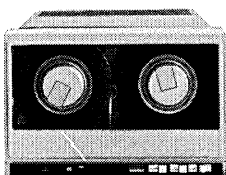
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LOOKS AT EARLY



NEW ACTIVITY SUGGESTS
370/125 ANNOUNCEMENT

WALL STREET SAID COOL
TO COGAR MONEY QUEST

IBM EMPLOYEES GROUP
FORMING IN ALABAMA

TRIBE CLAIMS KEYPUNCH
PRICE EDGE OVER TAIWAN

The revelation that IBM has a 370/125 is not particularly new and exciting. However, we hear there is new activity in the 125's group--perhaps in preparation for the unveiling of the machine before the end of the year. One problem for IBM with the 125: the machine would likely impact the new Mod 22.

Cogar Corp.'s \$9 million money quest wasn't meeting with resounding enthusiasm on Wall Street at press time, and there were some who believed founder George Cogar would have to end up biting the bullet; Cogar could be acquired. More than a few companies are interested, it's been learned.

Ironically, Cogar's concept that monolithic semiconductor memories would be the big computer memory of the 1970s was a sound idea--fortress IBM has been stuffing them into some of its 370 models. But IBM hardly could be expected to turn to Cogar as a supplier, since Cogar picked up ideas and key men from IBM to start its monolithic business. And none of the dwarfs is going the semiconductor route as yet, leaving Cogar with lagging sales and in desperate need of new money to finance R&D efforts.

George King, senior systems engineer with IBM's Mobile, Ala., office, is forming a "Professional IBM Employees" group which, if it gets off the ground, will be the closest the big computer company has ever come to having a union of salaried employees. King, of course, says the association, which encompasses offices in Alabama and Louisiana, is not a union and was formed to help members exchange professional information. IBM's employee appraisal techniques and its open door policy (anyone can see president Frank Cary if he asks) are sufficient safeguards, says King. But he adds that the association would act "if there were an urgent need to go beyond these safeguards." He also says the association has been "a long time coming," but refuses to explain what he means by that.

So far, the association is an informal one with no dues-paying members. But it has an attorney, T.O. Howell, and is considering incorporating, King says. At first it would appeal to systems engineers, but eventually could take in "IBM employees at all levels." At this writing, IBM corporate offices in Armonk had not heard of the association, a spokesman said.

"Some of our best keypunch operators are men," says Roger McKenzie, general manager of a keypunching service on the Pima Maricopa Indian Reservation. The business, owned 51% by the tribe, has all Indian operators--21 in number--and after six months of educating and training, it's off and running. Plans are to have 60 employees by the end of the year.

Although based in Sacaton, Ariz., just outside Phoenix, the Gila River Corp. is promising 48-hour turnaround from Los Angeles, and one customer found

ONE SMALL STEP FOR
MA BELL, INDEPENDENTS

THEY BOUGHT LOW

ILLIAC IV: PUTTING
IT ALL TOGETHER

RUMORS AND
RAW RANDOM DATA

their prices lower than for keypunching in Taiwan. McKenzie says their newest effort will be to keypunch from microfilm, eliminating the necessity for a client to ship valuable original documents.

AT&T and independent equipment makers are understood to be ready to announce agreement on certification and inspection procedures that would allow direct attachment of automatic answering or recording devices to the voice network. Such a pact, almost certainly, would spur similar agreements covering other independently made peripherals. Ultimately, says one source, private line connecting arrangements will be made mandatory, at no direct cost to users. AT&T would make up for this by adding the costs to its private line rate base.

The one-time chairman of Tenet, Inc., Thomas H. Bay, may have had problems when he headed the Sunnyvale time-sharing machine company, now in bankruptcy court; but another investment worked out for him. He has made more than \$1 million on his investment in Data General Corp., Southboro, Mass. Information from the recent DG prospectus also shows that another industry figure who has fallen on bad times of late, George R. Cogar, of Cogar Corp. (see above), made more than \$1.5 million when he sold out his original investment in Data General many months ago.

Though slipping its original schedule by several years, the Illiac IV supercomputer hardware and software are approaching completion. According to Burroughs, all 64 processing elements plus 8 spares have been checked out, and the machine is being integrated--no mean task with cables in effect hooking each PE to every other PE. Software, including GLYPNIR, the assembly language ASK, and the Fortran-like COCKROACH ("because it has survived from paleolithic times relatively unchanged"), are running, and version 1.0 of the OS will be ready when the machine is, according to a Univ. of Illinois Illiac IV spokesman.

What remains is site preparation at the Ames Research Center near San Francisco. Although the Illiac is due for installation there early next year, we hear there's no contract yet for the preparation job.

Nobody could accurately assess the effect on dp of the President's new economic policy; but some guessed that hardware firms would benefit if Congress OKs the tax credit. Software firms may have to be more explicit about the formulas they use to price new packages... There's a booby trap in the Navy's Cobol compiler validation routines. If run on an 1108, they destroy the resident operating system--bad news for NBS, which wants to do Cobol validations and has an 1108...The French have a word for everything, including badly documented software. A French firm calls it "fogware" in an advertisement that reads "La lutte anti fogware s'accentue" (The struggle against fogware is stepped up).

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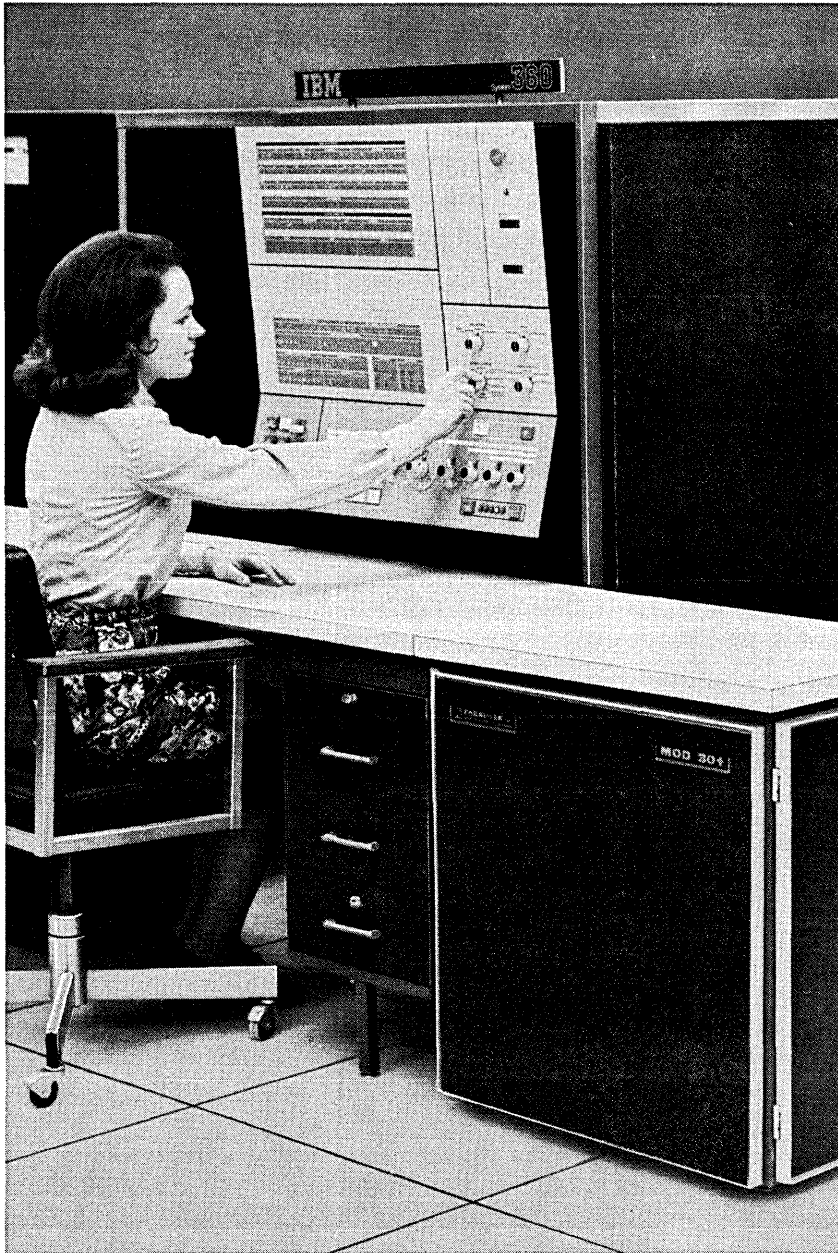
Even greater capability for 340 users. Once you've tried our Program Library, you may also want to write special programs of your own. Soon we'll be announcing this further capability. Keep watching, and . . . keep talking to Sycor.

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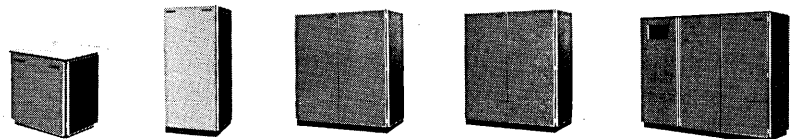
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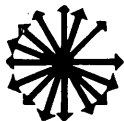
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LETTERS

Not so helpful

Sir:

I am referring to Mr. G. C. Kinney's letter "Sight/performance" in the July 15 issue (p. 11). My comment to his offer to provide his expertise on the performance of people in reading ocr: Someone who thinks that Farrington 12L2/12F2 is like OCR-B should refrain from communicating this information to the computer community.

D. HEKIMI

European Computer

Manufacturers Association

Geneva, Switzerland

Misguided?

Sir:

Re "The Hidden Speed of ISAM" (June 15, p. 48): Mr. Coyle's figures for improving the ISAM rate from 8,000 to 33,000 transactions an hour does not give a performance throughput improvement of 400%, as he says, but of 312%; and if he calculates his own performance improvement in terms of throughput improvement, he should also use the same measure when quoting the competition's improvements.

Instead he uses 20-70% figures which apply to time saved, not to throughput improvement. In fact, his 400% "improvement in performance" for ISAM vs. 70% "performance improvement" for the unnamed competition (presumably Comress's AMIGOS) comes out at a claimed difference of only 3½ minutes of running time saved per hour (45½ minutes saved as against 42 minutes).

With this sort of apples-and-oranges calculation going on, perhaps we needn't wonder about why he did not take into account the cost to Chase Manhattan of investigating IBM's "free" software. As I read his article, Chase would have been dollars ahead by buying AMIGOS rather than letting Mr. Coyle spend his time and their computer time on that "long, hard road" doing the work that an outside software supplier would have done for them (free).

I can't see any justification for a user being asked to invest these dollars on an IBM "free" product *before* he looks around—and I don't see why

a GUIDE project chairman should ask them to. It just gives substance to Herb Grosch's claim that the IBM user groups have sold out to IBM. ALAN TAYLOR, CDP
Framingham, Massachusetts

100.0000000000%

Sir:

In response to the letter from Mr. Theodore Shapin in the July 15 issue (p. 11), let it be known that Remote Computing Corp.'s time-sharing system does give the correct answer to all six problems. I shall expect a contract from Mr. Shapin as soon as he is told.

LARRY H. NEBEL

Remote Computing Corporation
Los Angeles, California

Two other services claiming to get "A's" on Mr. Shapin's test are Allen-Babcock Computing, Los Angeles (RUSH, a PL/1 subset), and The Computer Co., Richmond, Va. (ACTION/APL). Also, Programatics, Los Angeles, reports that their PI FORT (FORTRAN for system/3) gave the correct results in all cases.

Point missed

Sir:

You perform a real service to the industry with letters like Ted Shapin's—and so does he, of course.

The system I use, which I hasten to point out is excellent in most regards, got all but one of the examples wrong! I can readily sympathize with the systems programmers who will tell you that it is a damn difficult problem to solve satisfactorily, but it's damn annoying for the user, too, and worth more attention than it gets.

DANIEL D. McCracken
Ossining, New York

Standard communications

Sir:

It is in order to express appreciation for referring to a new magnetic tape cartridge announcement by Digitronics in the footnotes of "The Forum" article of your Aug. 1 issue (p. 63).

However, I also think it is in order to state that I have had no communications from the Philips organizations

indicating any abandonment of the ECMA standards or any other standardization efforts in regard to the Philips-type cassette.

We at Digitronics are enthusiastic about our recent cartridge announcement and do feel there is a good potential for the segment of the market for which the specifications of our cartridge and/or deck applies—but again, this should not be interpreted as an abandonment by the Philips associations of the standardization of the Philips cassette.

CLIFTON W. SINK
Division President and
General Manager
Digitronics Corporation
Albertson, New York

Gag lag

Sir:

I live in far-off Australia, hence the enormous time lag. I am not a computer professional, just a humble design engineer, but I can laugh as loud and as long as any of you guys. And I did. Oh, that April 1 issue was beautiful. It now resides alongside my collection of Goon tapes, and that is high commendation indeed. Many, many thanks, and roll on April 1, 1972.

D. L. BLACK
Doncaster, Victoria

P. S. Ethan Shedley for President.
P. P. S. Hoo Boy, that Shedley!

Bells and tassels

Sir:

Congratulations to Dennie Van Tassel for outlining computer security problem areas and remedial measures so effectively ("A Contingency Plan for Catastrophe," July 1, pp. 30-33). But a word of caution! After three years devoted to computer security consulting, I have concluded that there is a widespread tendency to base computer security programs on the latest gadgets. This not only wastes money, it also leads to a dangerously false sense of security which can only be compared with reliance on a magic amulet to ward off evil spirits.

I am convinced that to be sound and cost-effective a computer security program must be based on a systematic and comprehensive analysis of one's own specific security requirements. The reference by Wessler, Myers, and Gardner in the same

issue (p. 37) to a security program rejected because "it cost too much" points up the need to understand that losses are as much an expense of doing business as payroll and as such should be included in the budget of the organization. Only then can the cost of a security program be evaluated realistically.

ROBERT V. JACOBSON
New York, New York

Enough is enough

Sir:
Is there an optimum middle ground of adp knowledge for top management? Can too much or too little knowledge be self-defeating for men who make the ultimate decisions for new equipment or new systems?

An Army Reserve officer is now assembling background material to support an Army War College study on what a senior executive should know about adp and is seeking suggestions, conclusions, and illustrative case histories from DATAMATION readers.

Material on this concept, as well as recommendations for appropriate levels of knowledge, is requested.

CULLEN GULKO
2430 Federal Avenue
Los Angeles, California 90064

Neighry a word

Sir:
It was surprising that the article on sports and edp in your June 1 issue made no mention at all of the use of computers in the racing industry. Actually, horse racing was probably the first sport to use computers—the first totalisator was installed by the American Totalisator Co. at Arlington Park in June 1933. The heart of the system was an electromechanical computer.

The first digital computers were introduced in the 1960s. Since then great strides have been made in applying computers to racing. International Computing Co. designed and developed the software for the new totes that have been deployed by American Tote throughout the country.

The new systems utilize duplexed Varian 620/i computers. These systems record bets, compute odds, keep account of ticket sales, compute prices, drive displays, and produce many accounting reports essential to

the parimutuel operation. Computers are also used off-line for accounting, auditing, and payroll. In addition, computers will make possible the development of off-track betting systems, an area with tremendous growth potential.

I would venture that computers have had and will have more impact in racing than in any other sport.

BURT H. LIEBOWITZ
Bethesda, Maryland

Futile fight

Sir:
NCR continues to claim that its three-color bar-code merchandise tags and credit cards cannot be altered. In your July 1 issue (p. 16), they assert that the tag which had been altered by coloring over the optical bar-code was indeed read successfully . . . the NCR reading wand actually read the original price code; that is, the wand



could see through the new markings and read the old colors underneath . . .

The fact remains that several people witnessed the test in New York when the NCR register accepted two altered tags and printed the markdown prices rather than the original prices. Transaction Systems has the tags and the receipt to prove this . . .

Any further exchange of correspondence seems futile; we await the time when NCR finally consents to a test before the public.

WILLIAM H. BURKHART
Transaction Systems, Incorporated
Palo Alto, California

Problem-oriented problem

Sir:
In your July 1 News Scene (p. 58), you reported the approval by CODASYL PLC of the CODASYL Data

Base Task Group report. It was also indicated that Burroughs was one of the four dissenters of the report. I would like to explain the reasons for the Burroughs objection.

There seem to be two schools of thought in the implementation of a data management system. One is a procedure-oriented approach; the other is a problem-oriented approach. The former requires that the applications programmer have knowledge and control over record placement, accessing techniques, search strategy, etc., in order to implement an application in the most efficient manner. The problem-oriented approach involves an implementation in which an applications programmer need not concern himself with how data is physically maintained within the system. He need only specify what data is needed, with little or no concern for the mechanism by which the data is made available.

It is felt that a procedure-oriented system has an advantage in increased run time efficiency but has the disadvantage of increased implementation time due to increased complexity; also, changes to the data base structure will cause applications to be more susceptible to major rewrites. A problem-oriented system, conversely, while perhaps running less efficiently, is felt to have the advantages of quicker application implementation time, and changes to the data base structure can be more readily made . . .

The CODASYL DBTG proposal represents a very sound procedure-oriented data base management system. However, user response indicates a large interest in the problem-oriented approach. It is also felt that near future advances in the state of the art would allow the implementation of a problem-oriented system at an efficiency level very nearly equal to that of a procedure-oriented system. As a result, there will be an ever-increasing demand for the problem-oriented system.

It is felt that the current DBTG proposal has certain aspects (such as explicit references in DML to AREA and DATABASE-KEY, and also the concept of currency indicators) which preclude the implementation of problem-oriented systems—and therein lies the objection.

LEROY R. GUCK
Burroughs Corporation
City of Industry, California

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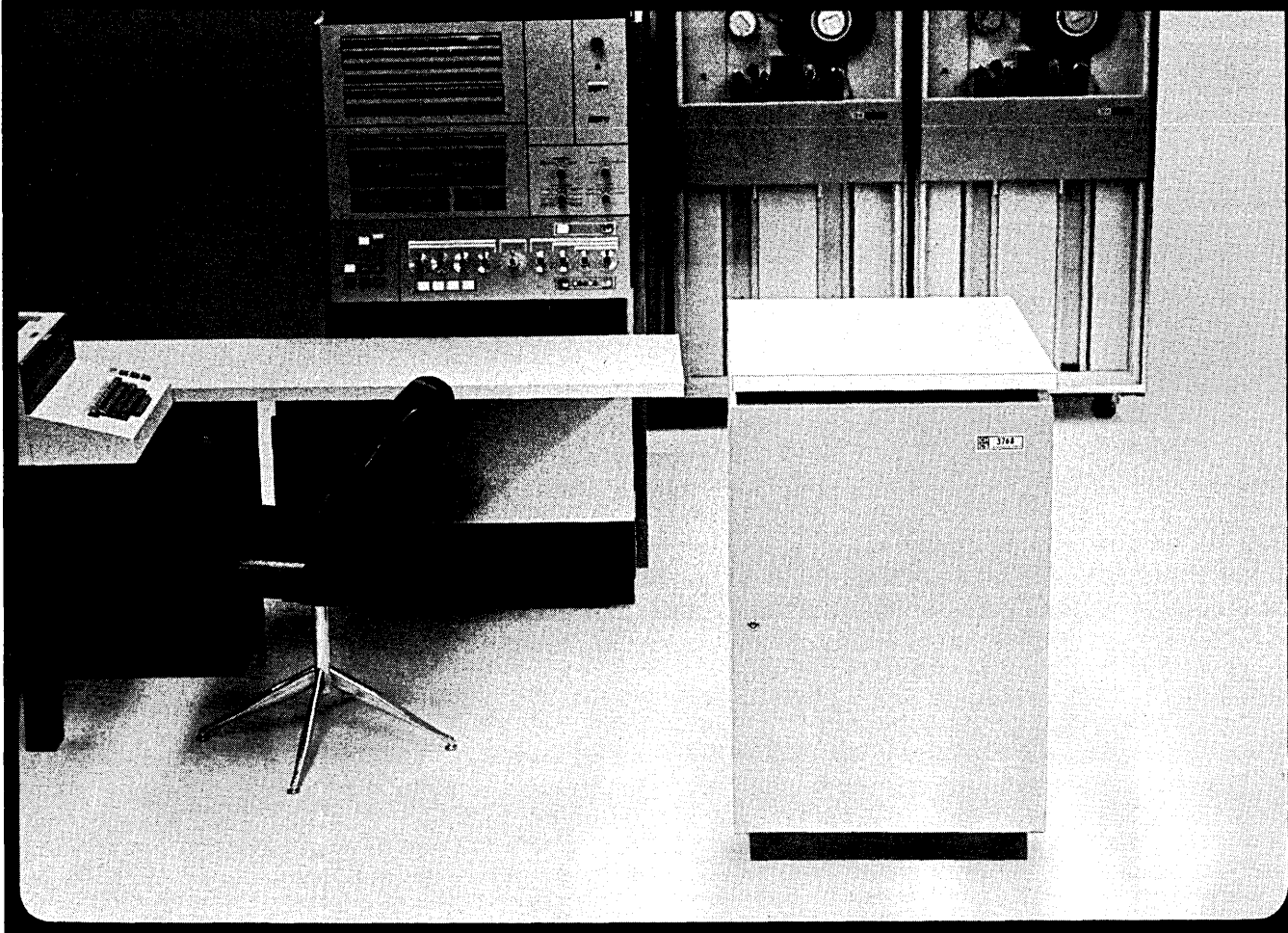
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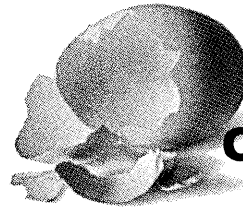
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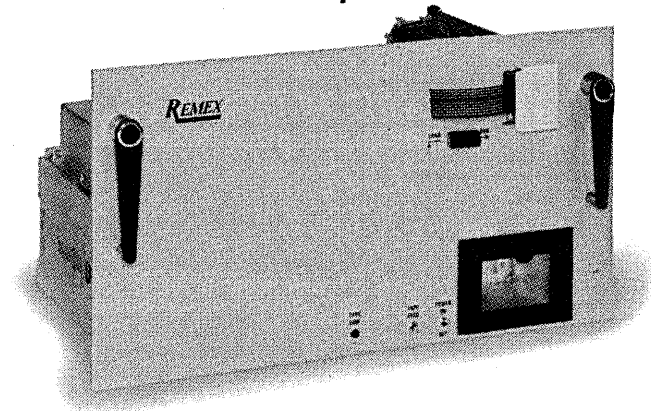
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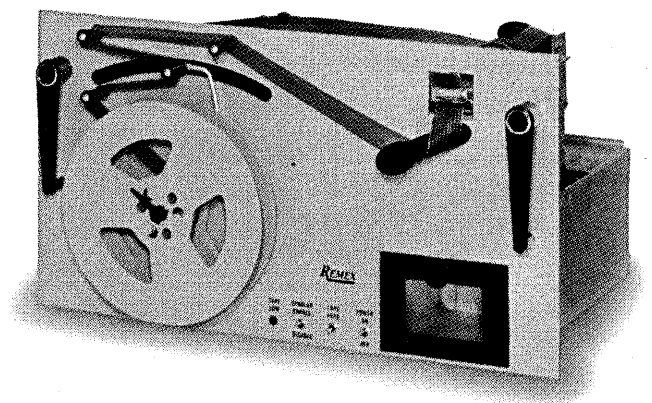
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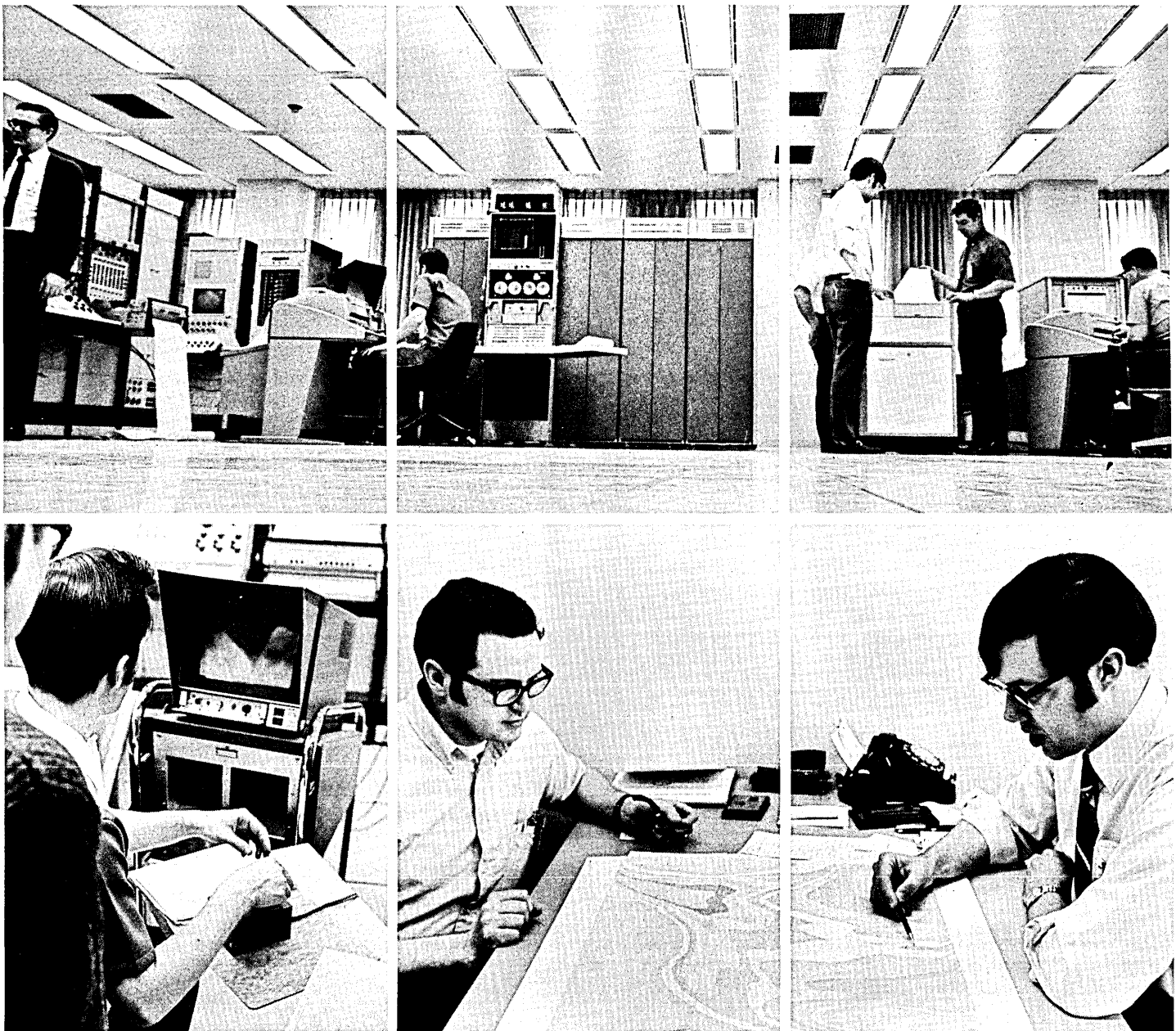
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The Gould 4800 helps Battelle-Northwest analyze thermal discharges.

The Gould 4800 high-speed printer is playing a big part in the thermal pollution research being conducted at Battelle-Northwest.

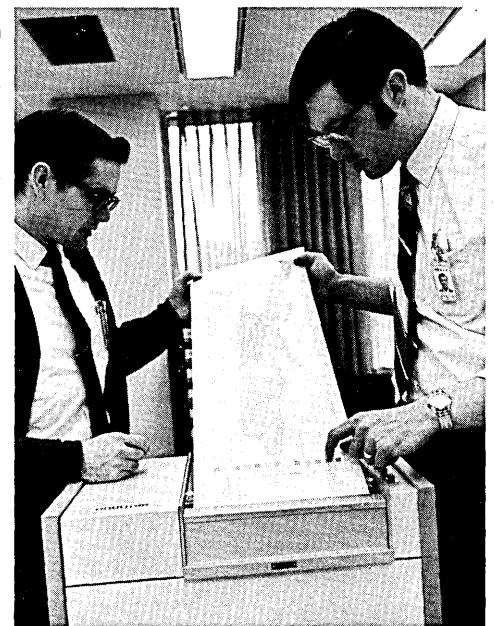
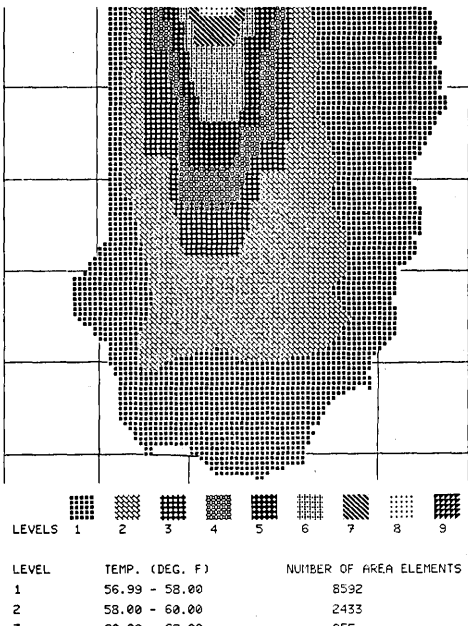
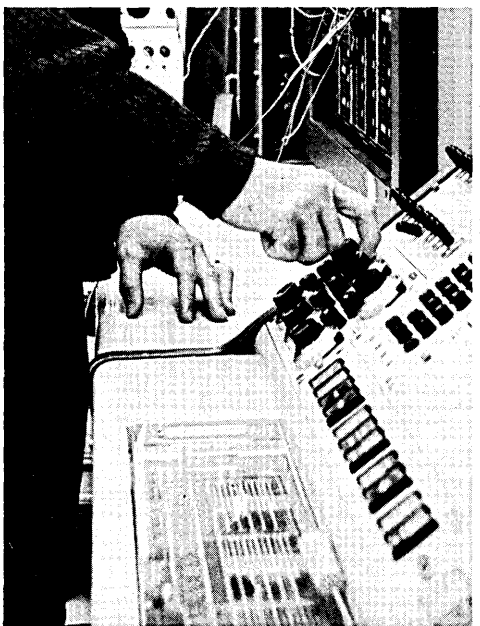
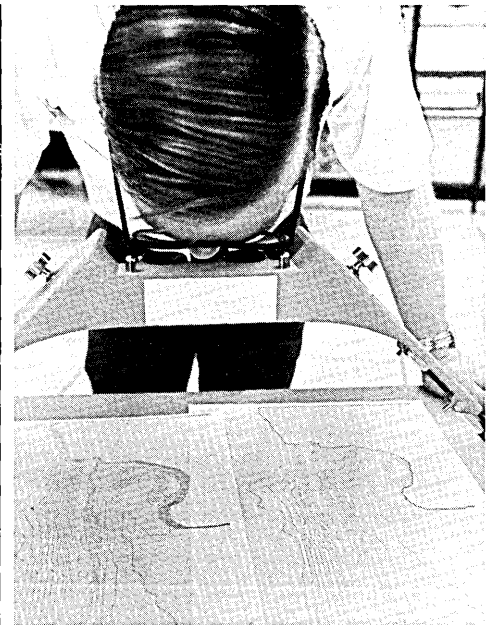
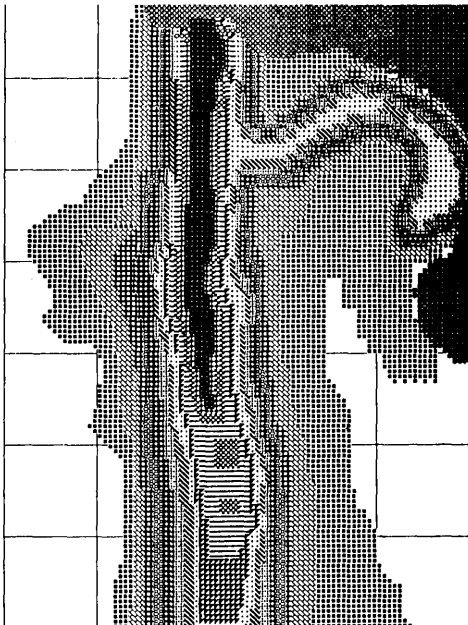
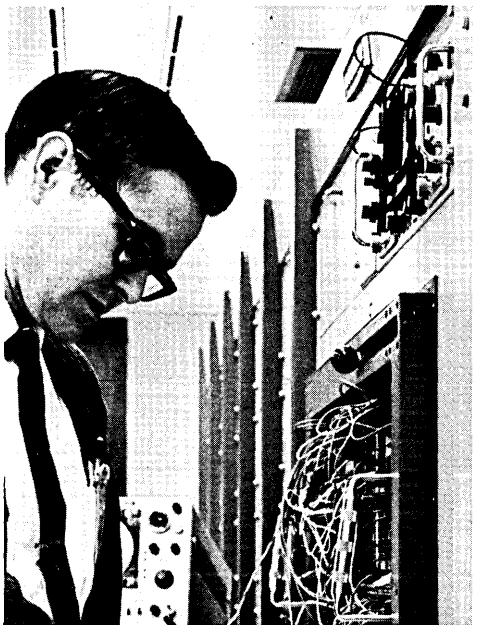
Battelle Memorial Institute, established over 40 years ago, is a not-for-profit research corporation with four major labs and offices around the world. Battelle handles many projects on a contract basis, with heavy emphasis on applied research.

Projects currently underway at Battelle-Northwest in Richland, Washington, include studies that determine patterns of wastewater discharges from industrial and muni-

cipal operations and to evaluate their effects on surrounding waters. The research technique, developed by Battelle, consists of collecting aerial infrared and tracer dye imagery of surface water discharges.

Data recorded from the infrared imager is processed by Battelle's computer system, a unique hybrid facility. A Beckman EASE 2133 analog computer is coupled to a DEC PDP 7 digital computer.

The Gould 4800 then prints out isothermal plots, density plots, and contour plots. The contour plots provide two different views.



COMPUTER PRODUCTS



Used with a stereoscope, these two views provide simulated three-dimensional temperature contours.

Researchers depend heavily on the Gould 4800's graphics capabilities for output of the simulation and modeling projects. And even with their small computer, they get high speed alphanumeric and graphics.

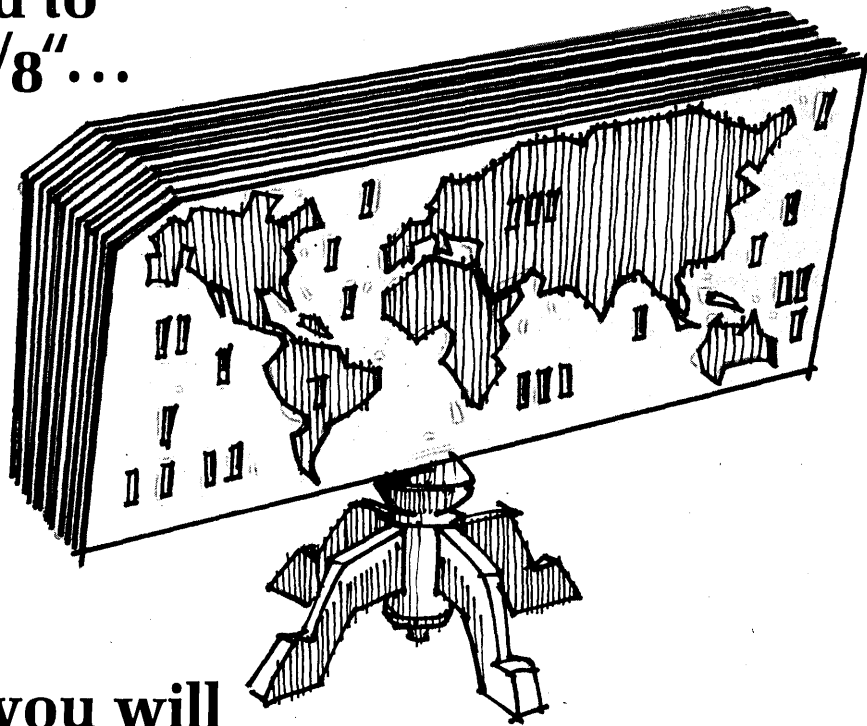
The Gould 4800 operates with the hybrid system in many other projects at Battelle, ranging from physics to social sciences. In addition, by means of a time sharing system, the 4800 operates simultaneously with an

SEL 840 computer for basic math and science calculations.

Battelle's initial investment in the Gould 4800 was less than the cost of impact printer and plotter equipment, and they developed their own interfaces and software for it. Since the 4800 has few moving parts, as well as solid-state electronics, there is also a minimum of maintenance and servicing.

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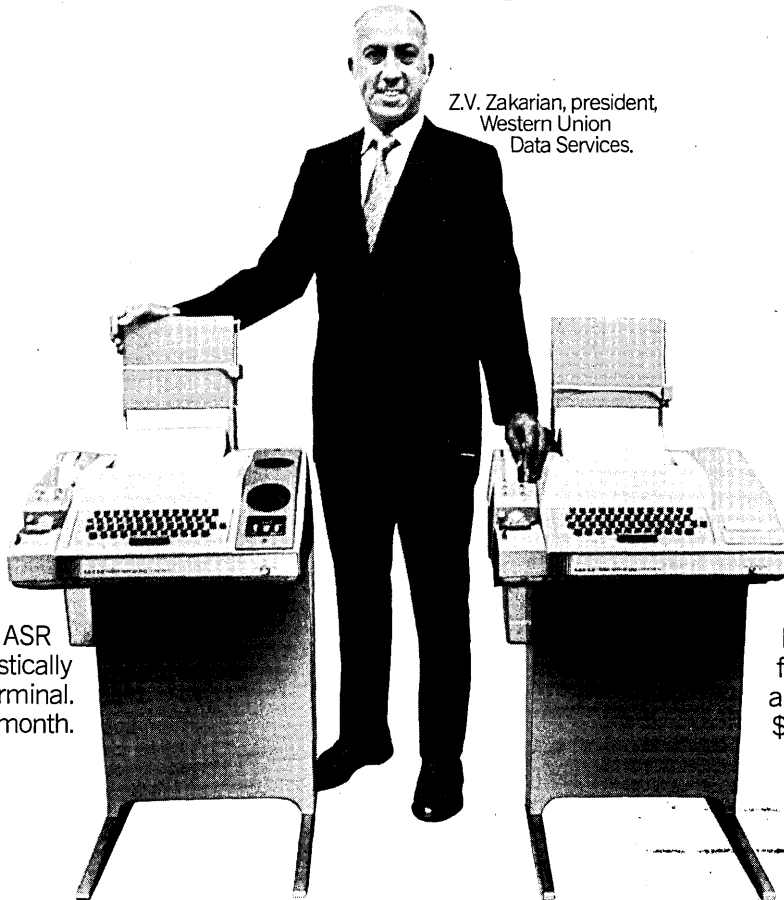
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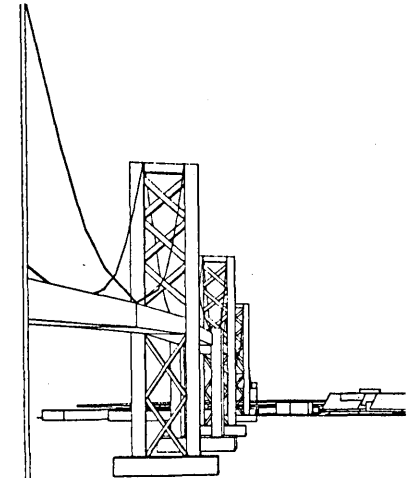
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computers in

G The advent of computer applications in architecture began in the early 1960s. Much of the work at this time, however, was in the form of academic research. The Boston Computer Conference in 1964 marked the first formal gathering of computer enthusiasts in architecture. Most of the attendees at this conference were from the greater Boston-Cambridge university complex. Many of these individuals were looked upon by their senior professionals as young, misguided academics with little or no understanding of what it "really" took to become an architect. These early enthusiasts were often referred to as computer freaks and thought to have ideas too fancy for the commercially oriented architectural practice. These new enthusiasts, however, turned out to be neither freak nor fancy but rather the avant garde of a major new movement in the field of architecture.

Prior to discussing the extent of computer applications in architecture it would be well to review some background information. When offering computer services to the architectural industry the provider must think of a broad-based industry composed of many different types of professionals. These include planners, project architects, architectural designers, interior designers, graphic artists, draftsmen, construction specifiers, cost estimators, civil engineers, structural engineers, mechanical engineers, electrical engineers, construction inspectors, computer scientists, managers, marketing and public relations personnel, and clerical staff. It is the architect, however, who is the primary leader of this industry.

There are over 30,000 registered architects in the U.S. and over 15,000 architectural firms. As well could be expected, many of these architects practice as individuals or in small groups. Most smaller architectural firms (1 to 15 employees) generally do not include the peripheral disciplines listed above. These related services are provided by consultants. But whether an architectural practice is large or small it likes to think of itself as being able to offer comprehensive services to its clients.

Typically, only the larger architectural firms offer the luxury of in-house computer services to their clients. Most of the firms with in-house computer capability utilize remote-entry data processing techniques. A few firms, however, have their own computer. A few of the medium size and smaller architectural firms offer computer services through the use of outside service bureaus.

Hardware manufacturers and general software companies have been slow to develop programs for the architectural industry. There are two reasons for this apparent lack of interest: 1. the market size of the architectural industry is limited relative to other industries such as aerospace, etc., and 2. computer specialists typically have a lack of understanding regarding computer potential within the architectural industry.

Most application programs have come from university sources, in-house programmers, and consultants. The programs originating within the circles of academia (which, by the way, are closely guarded) reach the profession through the hands of the indi-



architecture

by William R. Miller

vidual researcher as he matriculates from the university. The Laboratory for Computer Graphics and Spatial Analysis at Harvard is the only formally organized university group developing and distributing computer programs to the architectural community. Most of their application programs are in the area of urban planning. Many of the larger architectural firms using computers are writing proprietary programs using their own programming staff or private consultants. Their hope, which is often realized, is to gain an edge over their competition.

There are many different types of programs used by the architect and his related professionals. The list shown in Fig. 1 (p. 22) contains a sampling of some of these different types of application programs. This list should in no way be considered to be complete, nor does it suggest that any one office using computers will be active in all the listed areas. It does, however, serve to introduce the reader to the extent of application programs currently utilized within the architectural community as a whole. Many of the application areas, such as the engineering, economics and management activities, are probably already familiar to the reader. Others, however, may be unfamiliar.

One application area currently receiving much attention from the architectural community is that of computer-aided space planning. Space planning is an architectural phrase used to describe the process of locating the functional areas within a building facility. These areas may be either rooms, as in the case of laying out building floor plans, or work stations, as in

the problem of "office landscaping" (a term used by interior designers describing the act of arranging furniture and partitions in large office open spaces).

MATRAN, a computer program developed by people associated with Design Methods, uses a space-adjacency matrix for identifying clusters which can then be mapped into line-dot diagrams. This program has proved quite successful in the architectural offices of Albert C. Martin and Assoc. and Daniel, Mann, Johnson and Mendenhall. MATRAN has been used on over 100 space-planning projects including the generation of architectural floor plans, interior space planning and site planning. James Olsten, assistant professor at California State Polytechnic College in San Luis Obispo, has extended the program to include geometric constraints, thus enabling the computer to generate rectilinear floor plans. A number of other architectural firms are using programs similar to that devel-

Computer specialists typically have a lack of understanding regarding computer potential within the architectural industry.

oped by Olsten. Fig. 2 (p. 23) shows the graphic output achieved from a space-planning program developed by Welton Becket and Assoc.

The architect is also using the computer to create perspective drawings of his building forms and urban environments. Albert C. Martin and Assoc., architects

in Los Angeles, use a program called **THREED-I** for drawing perspectives and orthographic projections. This program has been used to generate visual-design studies as well as for preparing background line drawings for final presentation renderings. The program has also been used by their structural engineers for visually checking member connectivity in large structural space frames.

The San Francisco office of Skidmore, Owings and Merrill uses a program for generating perspective graphics of their projects. In conjunction with this program the firm has developed a graphic data base of downtown San Francisco which it can utilize for showing its clients projects as they visually relate to the rest of the city (see the computer drawing of the San Francisco skyline at the beginning of this article).

Additional computer applications in architecture include building optimization studies, the preparation of construction specifications and cost estimating. The Skidmore, Owings and Merrill firm in Chicago uses a program called Building Optimization Program (**BOF**) for analyzing and selecting architectural subsystems for high-rise buildings. Both the American Institute of Architects and the Construction Specifications Institute are currently developing automated construction specification programs. **CRS Design Associates** (formerly Caudill, Rowlett and Scott), architects in Texas, use the computer for preparing cost estimates as well as in a number of other application areas.

These brief application descriptions point to the fact that architects are currently using computers and can be expected to use them to an even greater extent in the future.

Planners are generally more receptive to computer

applications than architects. Their problems are more complex and the scope of services that must be integrated in the course of generating planning solutions is much broader. Many of the early computer applications in architecture have actually originated in the area of urban planning. Maps show statistical data in a graphical form using the high-speed printer. **SYMAP**, a program available from the Harvard lab, was one of the first mapping programs of this type. The recent 1970 population census coupled with the capability of a program such as **SYMAP** allows the planner to display and analyze population growth data relative to his specific project in a very effective manner.

Maps similar to those shown in Figs. 3, 4, and 5 (pp. 24-25) are used by planners for overlaying site data for the purpose of identifying the best location for various land uses.

Fig. 3 is an attractiveness map showing the best location of a golf course when considering the existing growth of trees on the site. The dense blue symbols in the center represent the best location, the next most dense symbols in the lower right corner of the map show the next best location, and the least dense symbols in the upper portion of the map show the least desirable location of the golf course.

Fig. 4 is an attractiveness map showing the best location of the golf course when considering wind conditions. Again, the dense blue symbols represent the best location, the next most dense symbols represent the next best location, etc.

These two attractiveness maps can be overlaid internally in the computer to produce one composite attractiveness map as shown in Fig. 5. This map identifies the relative attractiveness of locating the golf course when considering both trees and wind simultaneously. This type of grid mapping allows the

FIG. 1

Types of Application Programs Now Used in the Architectural Industry

Planning

Census Data Analysis
Density Maps
Grid Maps
Perspectives of Surfaces
View Analysis

Architecture

Space Planning
Perspectives of Buildings
Drafting
Cost Estimating
Specification
Interactive Design Systems
Building Optimization Studies

Civil Engineering

Coordinate Geometry
Cut and Fill Analysis
Soil Stability Analysis and Design
Hydraulic Network Analysis
Water Surface Profile
Digital Terrain Model
Roadway Alignment
Storm Drain Analysis and Design

Structural Engineering

Space Frame Analysis
Dynamic Analysis
Truss Analysis and Design
Beam Analysis and Design
Plate and Shell Analysis
Column Analysis and Design
Wall Analysis and Design

Mechanical Engineering

Heating and Cooling Loads
Airconditioning Piping
Hot and Cold Water Piping
Wet Stand Pipe Analysis
Waste and Vent Analysis
Duct Design
Energy Analysis
Equipment Selection

Electrical Engineering

Lighting Optimization
Short Circuit Analysis
Feeder Sizing

Economics

Case Flow Analysis
Depreciation
Amortization
Land Evaluation
Investment Analysis

Management

Project Control
Project Performance Reporting
Personnel Systems
Accounting Systems

General Systems Analysis

Movement Simulation
Linear Optimization
Mathematical Subroutines
Statistical Subroutines
Non-Economic Evaluations

Miscellaneous

Elevator Simulation
Acoustical Analysis
Classroom Scheduling
Hospital Bed Analysis

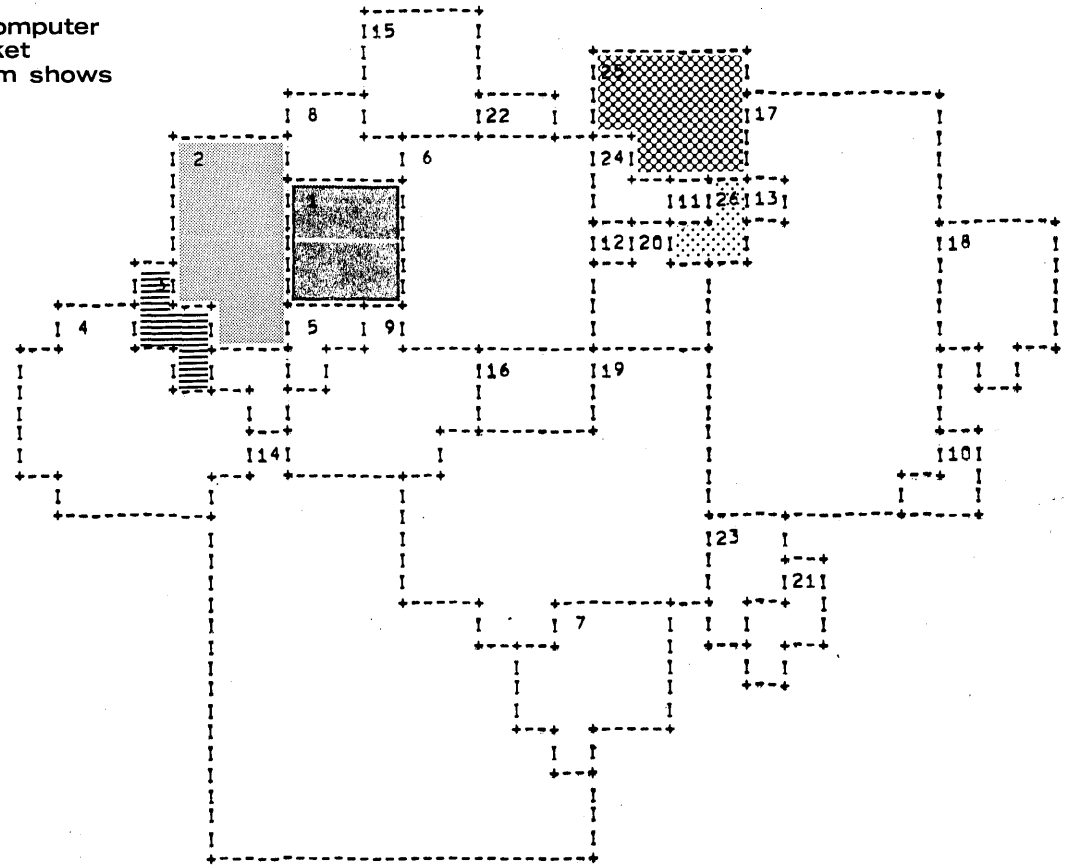
planner to separately analyze large amounts of data and integrate them into one over-all land use evaluation model.

Another program used by the planner is VISTA, written by the U.S. Department of Forestry. After identifying the terrain of the planning area and the

location of an observer, the program will plot out, within a given search radius, those regions of the planning site that are visible from that point and those that are not. This type of program is quite useful in the design of recreational facilities such as golf courses and ski runs, where visual control is an

FIG. 2

Graphic output of a computer used in a Welton Becket space-planning program shows optimum locations for various departments based on specified adjacency needs. Although it appears to be a floor plan, architects must still work windows, doors, hallways, etc. into final plan.



ELEMENT NAME	NUMBER	AREA	ADJACENCY PREFERENCES													
EXECUTIVE OFFICES	1	3625	2	3	16	24	15	8	9	0	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
DISTANCE BETWEEN DEPARTMENTS (FEET)			63	107	116	145	89	63	63	0						
ADMINISTRATION	2	5435	1	3	8	16	24	6	5	0	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
DISTANCE BETWEEN DEPARTMENTS (FEET)			63	72	56	178	200	141	72	0						
FINANCE MANAGEMENT	3	1600	4	2	1	8	11	19	10	13	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
DISTANCE BETWEEN DEPARTMENTS (FEET)			44	72	107	128	286	215	404	325						
CLIENT SERVICE GROUP	4	4505	24	8	11	10	12	19	4	-0	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
DISTANCE BETWEEN DEPARTMENTS (FEET)			44	181	63	228	82	208	322	0						
SALES	5	1000	11	8	2	15	13	9	15	-0	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
DISTANCE BETWEEN DEPARTMENTS (FEET)			0	203	240	152	40	178	152	0						
REQUIRED			26	26	25	25	25	25	25	8						
SATISFIED			25	6	7	2	5	3	4	0						

computers in architecture . . .

important part of the recreational activity.

Many people have been considering the potential application of aerospace systems technology in the fields of architecture and urban planning. Applications, however, have been slow to emerge. This is primarily due to the fact that those people familiar with the computer models, such as simulation, linear optimization, etc., have not been familiar with architectural and planning problems. Simulation techniques, however, are beginning to be employed on such projects as local city traffic networks, parking garages, airports, etc., where movement systems dominate the design of the project. Optimization techniques are currently being explored by architectural students in the academic environment and will eventually find their way into the architectural office. The more sophisticated mathematical approaches, however, will be slow to catch on.

There are a number of other architectural application areas, such as the simulation of elevator systems, acoustical studies, classroom scheduling and hospital bed analysis, etc., which relate to specific project types. These specific types of applications are serving as guinea pigs for computer modeling that will eventually be used on building projects of a more general nature.

Even with what appears to be a large amount of activity regarding the application of computers in architecture there are a number of things currently inhibiting the use of computers by architects. One of these is the architectural fee structure.

The traditional method for calculating an architectural fee is to base it on a percentage of the total construction cost of the project. Another method is the fixed fee. Using this method the architect estimates the scope of work required to perform design

services at the beginning of the project and then establishes a fixed estimate. Both these methods have been heavily criticized and most of the larger architectural practices are billing clients on a cost-plus basis. Using this method the architect earns his profit on the salary dollars of his employees. This tends to inhibit the use of computers by architects because the cost of running the computer is often billed to the client as an expense with little or no profit markup. Thus, the use of the computer, which will often decrease the man-hours required to perform a particular phase of work, will also decrease the architect's fee. Some computer scientists within the architectural offices are advocating the client be billed for the computer services using an adequate markup to cover the cost of overhead and profit. In a sense they are saying that the computer should be considered as a professional team member and that its services should be billed accordingly. Most clients, however, consider the computer closer to a photo-copy machine than to a human professional and are reluctant to accept a professional markup on its use.

Another factor underlying the limited use of computers by architects has been the traditional architectural educational process. The traditional educational process for an architect focuses on product design with very little emphasis given to the study of process design. Architects who have been focused on product design are many times unwilling to look at the process that they use in order to create their products. Many go so far as to say the design process is intuitive, subjective, and unidentifiable. Thus, when someone suggests computerizing all or part of the design process he is met with great skepticism and resistance. Many architects, however, are recognizing that much of the design process is actually one of analysis and

FIG. 3

The "attractiveness" shown in computer-generated map is the existing trees (blue area best) on this golf-course site.

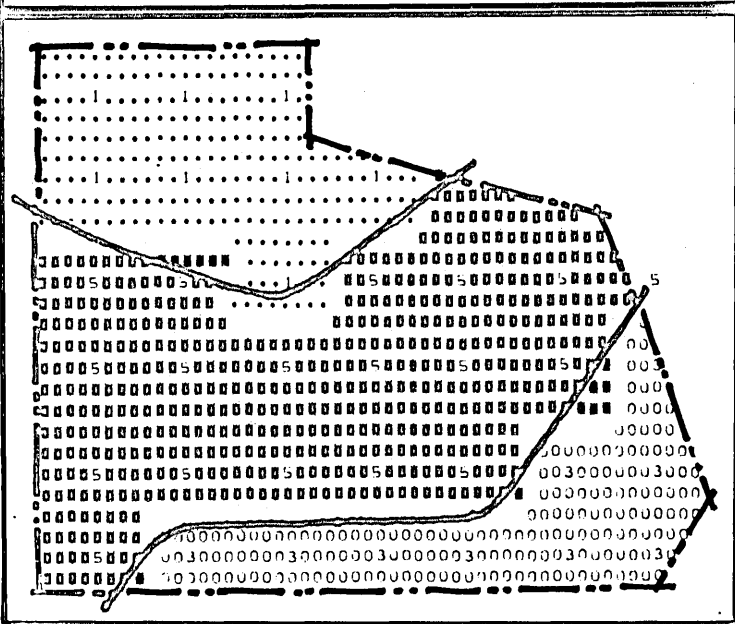
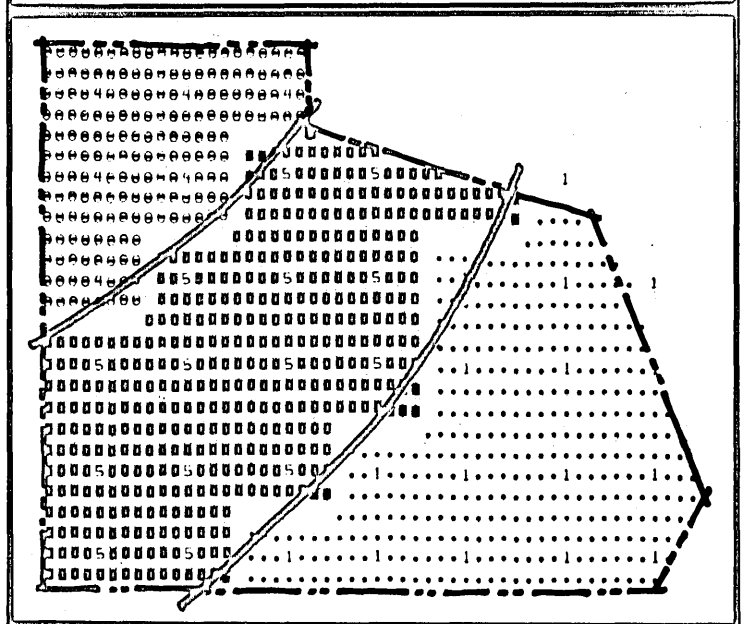


FIG. 4

Wind conditions is the attractiveness factor on this map of the same site (blue again represents best location).



verification and that these portions can, potentially, be computerized.

Probably the most inhibiting factor regarding the use of computers is the knowledge gap. Many architects and related professionals are yet unaware of the computer's application potential within their own industry. Even of those informed, few actually know how to make use of the computer. And, of those, even fewer know how to use it efficiently. Computer scientists unfamiliar with architectural problems often tend to widen this gap by presenting application programs and price structures totally unacceptable to the profession. It is only the man with knowledge in both fields who can properly facilitate the application of computers in architecture. In this context, it has often been stated that it is easier for an architect to learn how to program than it is for a programmer to learn architecture. This does not mean, however, that there have not been and will not continue to be exceptions.

There are two major factors currently enhancing the use of the computer within the architectural office: competition and client sophistication. An architectural firm offering comprehensive services is keenly aware of its competition. This type of firm goes after many projects commissioned by corporations, institutions, and governmental agencies, all of which will review a number of architects or architectural engineering firms prior to selecting an architect for their particular project. During this interview period the client attempts to identify the ability of the architectural firm relative to the services they desire. They are interested in the firm's past experience, financial stability, and credible solution procedures. Up until recently architects competing in this environment have relied heavily upon their own charisma.

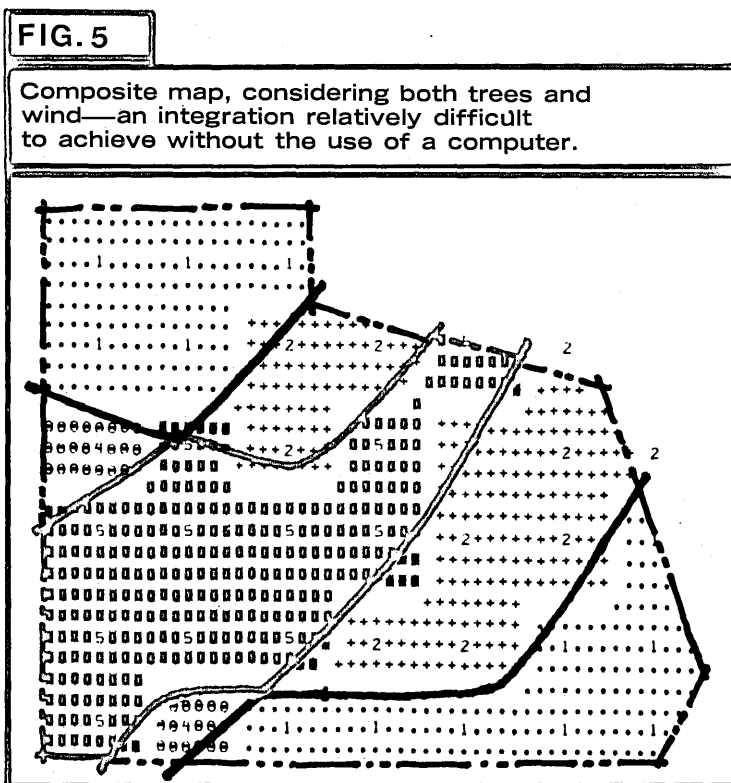
the view from the small office

With some 30,000 registered architects and 15,000 architectural firms in the U.S. (as Mr. Miller points out in the accompanying article), it is clear that the great bulk of the firms—by number if not by volume of work—are small offices with one or two architects. The nature of most such small practices at present—custom-designed residences, remodeling kitchens, additions, etc.—involves a large amount of personal service for which the computer cannot be substituted.

Aside from the obvious computer capability in office management, bookkeeping and billing—for which time-sharing services are sometimes the answer—the most likely areas of computer application are in analysis and computation of structures by the structural engineer consultant, and in the preparation of specifications. In this area, even a small office can make use of such services as Masterspec (a subsidiary of Bechtel Corp.) or similar services offered by the AIA. Other than this, the best utilization of the computer in assisting the small architect appears to be by the manufacturers of building materials and equipment in the preparation of concise data relative to the application and performance of these products.

The computer can provide much broader assistance, however, to the small planning office. These firms (formally titled city and regional planners), though comparable in size to the small architectural office, normally work for a bigger client—perhaps a small municipality or a large private landholder. The nature of the work, usually involving varying types of land classification and analysis (i.e., land use, zoning, assessed valuation of land and improvements, type and size of constructions, resident and/or employer population, ownership) lends itself to computer utilization. Many of the county regional planning commissions and city planning departments already have such information stored in their computer facilities and readily accessible in the form of tabulations and maps for minimal fees. The time is coming when such information on all urban land parcels will be available in this fashion, with a resultant increase in accuracy and considerable time saving in planning studies.

—James G. Pulliam



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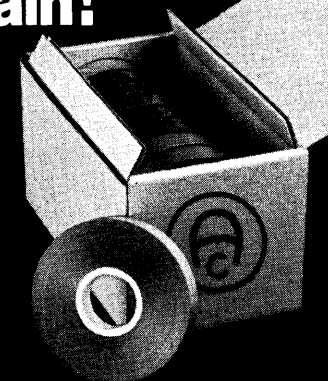
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computers in architecture...

In the past, white-haired men making grand theatrical presentations would often capture the large prestigious projects. Today, however, the client is more sophisticated and we thus find architects making presentations showing their processes as well as their products. It is at this point that the computer represents a very powerful asset to the architect for it provides him with tremendous credibility in the areas of process and performance design that he often can not supply using manual techniques. Thus, the competitive environment, coupled with greater client sophistication, is acting as a forcing function to get the architect to use the computer more frequently in his day-to-day tasks.

Over the next few years the architectural industry will see an increased absorption of the current state of the art. By 1975, the majority of medium-to-large architectural firms will be using the computer to

By 1975, the majority of medium-to-large architectural firms will be using the computer to solve design problems on a day-to-day basis.

solve design problems on a day-to-day basis. Most of these firms will be using conventional data processing modes such as batch, remote batch or time-sharing. During this period the industry will also begin to explore the potential of interactive graphic systems. Eventually, a firm well educated in the use of computers will be using interactive graphic systems such as that developed by General Electric's Visual Simulation Laboratory in Syracuse. This system allows the user to interact in real-time through a colored television display with any three-dimensional data base. The GE system is extremely powerful and serves to give us a glimpse of things to come. Architects desirous of using the computer today, however, would be well advised to gear up using conventional modes of operation, thus making good use of today's art while at the same time preparing for the future. ■



Mr. Miller is general partner and cofounder of Design Methods, a Los Angeles-based consulting firm providing computer services to the environmental design profession. He was formerly architectural systems engineer for Albert C. Martin and Assoc., a planning, architecture, and engineering firm in L.A. A registered civil engineer, he holds a BS in architectural engineering from California State Polytechnic College in San Luis Obispo.

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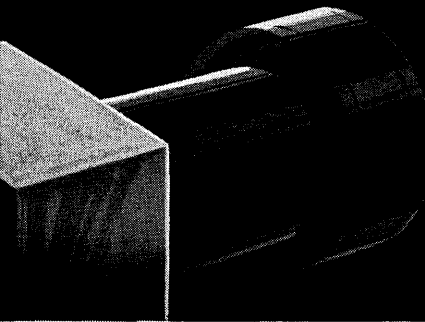
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CIRCLE 15 ON READER CARD

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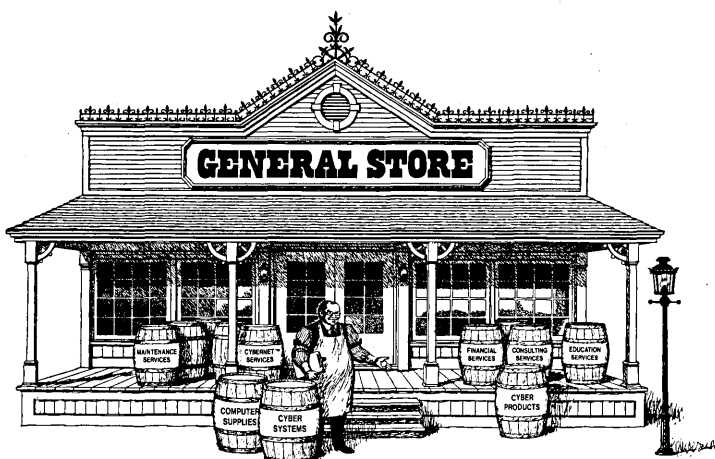
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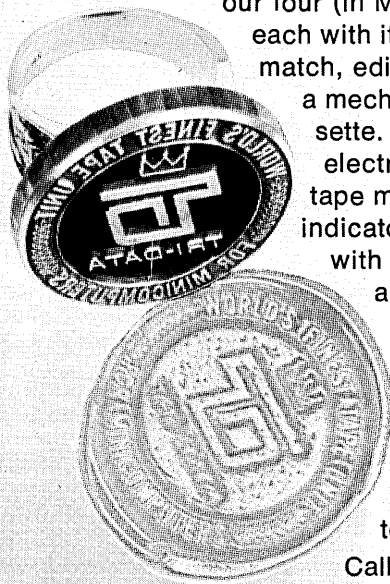
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CIRCLE 6 ON READER CARD



It's time now to plan for storing data for ten years or more...and mag tape won't do

Retention of Data ...

Faced by rapid advances in hardware and software technology, and by urgent pressures to resolve organizational information handling problems, data processing managers have tended, understandably, to concentrate on short range problems and to defer serious study of the long term aspects of their operations. In particular, little thought has been given to the possible problems of reuse in later years of machinable data accumulations. It may be necessary to make additional use of this sort of information five, ten or more years in the future.

It is not practical to retain only as printout large blocks of data for this later use; present technology would require expensive, error prone, and time-consuming data reentry. And, in some instances—such as displays—where no hard copy is generated, basic data that must be available for later use must be retained in some machinable form. Economy and efficiency

There is no agreement . . . as to how long magnetic tape will hold its magnetic signals . . .

would seem to dictate storage of this data on reels of magnetic tape. For the present, these tapes may be left safely in a corner of the tape library. Eventually, operating workload expansion will require that the space occupied by these reels be used for more current data. What then?

One measure of the maturing of data processing is realization that there is a significant accumulation of these data archives tapes. Some managers are beginning to recognize that the question of how best to handle them must be answered. Dr. Everett Alldredge, former assistant archivist of the United States for records management, has discussed the twin problems of long term retention of machinable records:

1. Tape stability over an extended period.

2. Difficulty in interpreting poorly documented programs and in processing badly organized files.

Drawing on the results of a several year study of this situation in federal government agencies, Dr. Alldredge wrote about it in the summer 1970 *Records Management Journal*.

Tape stability in storage: "There is no agreement among tape librarians and manufacturers as to how long magnetic tape will hold its magnetic signals, even assuming the best of care is given the tape from date of purchase and thereafter . . . (T)he National Bureau of Standards . . . has found that tape stored from one to seven years can be expected to show varying rates of error. Magnetic tape in storage can be subject to a long list of ills. The storage itself tends to set the tape more firmly in any physical imperfection such as occurs from cinching, cupping, skewing, overhanging, buckling, ridging, etc. Exposure to any magnetic field is disastrous to tape, and even proximity to electrical fixtures and conduits can do harm. Tape cannot be stored in any building near nuclear or electrical generating or radiation facilities, and it is also susceptible to damage by lightning. High temperature or high humidity can damage tape beyond salvage, as can rough handling, dropping or improper packing for shipment . . . (M)agnetic tape is too fragile, ephemeral or impermanent to be (a) . . . medium for the preservation of data of permanent value."

Tape file inadequacy: "The form in which most computer tapes now provide data is in large degree the result of the limitations of early computers, in terms of memory and capacity to deal with a wide variety of formats . . . Despite . . . improvement in the form and appearance of the final output, the characteristics of input tapes have not changed significantly. Users generally put on a computer tape simply a title as a header, followed by the data . . . In most cases, there is also a label on the tape container giving an abbreviated title and a tape identification number. Information concerning the format, layout, arrangement of the tape and the labels which should accompany it is sometimes written down in systematic form, but often the person using the tape must try to obtain

this information from those responsible for erasing it. As a result, fragments of the necessary documentation are provided on a . . . piece of paper which is easily lost or destroyed. It is common experience in using tapes obtained from others to find that insufficient information is available, and that a series of experiments is needed in order to find out how to use the tape."

Only the most unsophisticated among us would believe that the problems Dr. Alldredge describes are limited to federal agency data processing operations, or that conditions are not far worse in many non-governmental organizations.

refusal of many systems analysts and programmers to document adequately their work. One measure of a true professional is adherence to the standards of the profession. Since long before the introduction of computers, truly professional systems analysis work has been fully documented. Adequate documentation assumed a new importance in the computer program. Where documentation is lacking or is incomplete, the program itself must be considered to be defective. This is true even if the program has been debugged properly and performs in a technically sophisticated manner.

Despite consistent use of a documentation header,

for the Long Term

by Belden Menkus

Improvement of program documentation practices obviously holds one answer to these problems. Dr. Alldredge suggests that ". . . all essential documentation relating to a computer file (be) put into both human and machine readable form and placed at the beginning of the file." Many others have suggested over the past decade that file definition data be stored with the file. However, the full file and program documentation called for exists in very few data processing operations. Ideally, this documentation header should be more than an expanded header label. It might include the console operator's instructions in addition to the various elements of conventional program documentation. This header statement also might be used to initialize running of the program.

Dr. Alldredge points out that this documentation header would have three major functions. "First, it would provide as part of the file itself the essential human readable documentation relating to the file. Reproduction of (it) would be automatic with any printout of the file. There would be no problem of information getting lost or mismatched. Second, if every file had to be accompanied by well-defined human and machine readable documentation, those creating the file would be required to provide it . . . Third, developing machine readable documentation as part of machine readable files will automatically provide the information necessary for processing the file. This will not only reduce error, but it will also make possible use of standard programs which can call on the machine readable documentation for the required (processing) information and thus allow the use of generalized rather than specialized programs."

Practically speaking, implementation of the documentation header as a standard programming practice may require modification of the operating system in use to provide a test for the presence of the header—and, possibly, a test for its latest revision date. More importantly, data processing managers may begin to explore more fully the generally neglected self-documenting features of some of the higher level program languages. And they may face finally the professional implication of the consistent

two problems may be encountered when attempts are made to process a particular file when some time has passed since it was last active. Changes during that period in (a) program language and processing subroutine structure, and/or (b) file content definition may make it difficult to process the file *as is* even though it can be read by existing input equipment. The solution to both types of problem lies in constructing utility software that will compensate for

Where documentation is lacking or is incomplete, the program itself must be considered to be defective.

these language and file content changes and avoid the need for extensive reprogramming to make the file processable. The impact of program language changes probably can be reconciled most directly by creating an emulation-like processing environment for this particular file. A straightforward edit routine should be able to handle most of the file content changes that must be adjusted. In the main these changes will involve such things as field deletion or addition and alteration of field size and format.

The other answer to the problems described by Dr. Alldredge lies in recognizing that magnetic tape never was intended for long term data storage—defined in this context as "retention without further file processing for more than one year." Magnetic tape is suitable for short term data manipulation and should be reserved for such use. Routine conversion of data archives tape contents to microfilm is the key to long term retention of machinable data. The computer output microfilmer (COM) especially is suited for such conversion processing. COM bypasses the impact printer and converts magnetic tape data contents directly into human readable microfilm images. COM operates at high speed with extremely low per page

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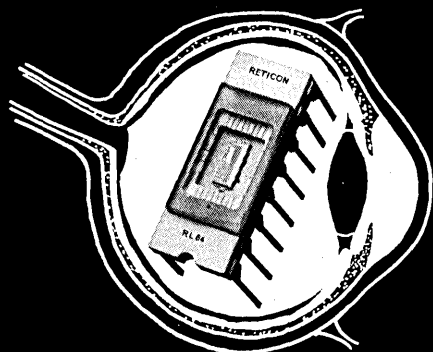
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CIRCLE 23 ON READER CARD

Retention of Data . . .

conversion costs.

Converting this data into microfilm form offers five advantages:

1. Microfilm is a more stable data storage medium than magnetic tape.

2. The data is available directly from storage in a human readable form.

3. Release of the tape reel for use in processing other data makes possible a tape replacement cost saving.

4. Retention of data archives material on microfilm reduces overall storage space requirements. (The exact percentage reduction is a function of tape format and blocking factors. However, in one large scale data archives conversion storage space was reduced 84%. Reductions of as much as 96% are feasible.)

5. Application of optical scanning technology makes possible later high speed tape file re-creation that avoids costly and error prone manual data re-entry and preserves original file content without change.

The file may be re-created for future processing in one of two ways. First, a continuous flow microfilm printer can be used to create a paper copy of the entire film file. By passing this copy through an ocr page reader, file content can be read back onto tape. Second, it is simpler and less expensive to process the film itself through a programmable film reader. This computer input from microfilm operation transfers file content from the microfilm image to a magnetic tape or disc file or directly to core storage. An outgrowth of the same technology that produced the computer output microfilmer, the programmable film reader may be described best as a universal font optical character recognition system that reads filmed—rather than paper—document images. (Successfully operated for several years, these devices at present are available only in a few service facilities. However, over the next five years they should alter radically data acquisition, transportation and conversion practices.)

Problems created by the instability of tape for long term data retention and the difficulty of effectively using poorly documented files can be solved by creative and forward-looking data processing managers. More than adequate technology already is available for use in the solution. ■

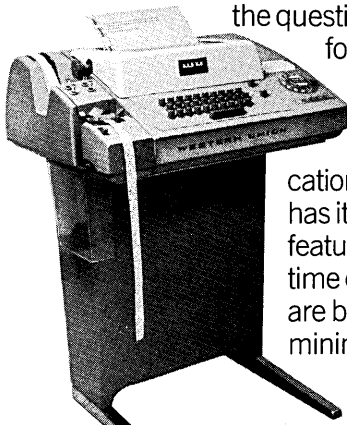


Mr. Menkus has been a staff specialist and consultant in administrative systems and information management techniques since 1953, holding progressively responsible positions with the U.S. Air Force, the Southern Baptist Sunday School Board, Prentice-Hall, Kennecott Copper Corp., and REA Express, where he was director of administrative systems. In addition to writing and lecturing on aspects of this field, he founded and edited for five years Records Management Journal.

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subscribe to Telex or TWX or neither.

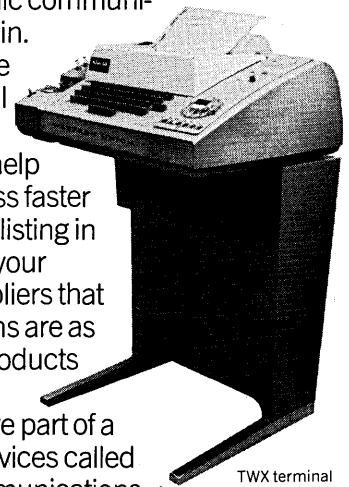
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CIRCLE 25 ON READER CARD

A Conference Report

INTERMAG-1971

G The 1971 International Magnetics Conference held in Denver April 13-16 aired advances in all levels of the memory hierarchy and in potentially useful magnetic logic devices. The meeting continued the trend started in 1960 by emphasizing computer applications of magnetic phenomena and devices. The relation between computer and magnetic R&D was further acknowledged in this year's conference by holding a one-day joint session titled "Bulk Storage—Technology and Systems," in which system and device papers were alternated.

Following a welcome to Denver by Colorado's Governor Love, the keynote address was given by Jack Morton, vice president, Bell Telephone Labs. Mr. Morton, in a talk on the strategy for memory technology, discussed the proliferation of memory devices and pointed to the many almost successful memory developments which were put on the shelf instead of advancing into production. One of his key criteria for judging the worth of a memory research program was adaptability, meaning the ability of the element to provide a wide range of memory functions economically over a wide range of sizes. Other test criteria for good programs included batch fabrication at all processing levels, ability to economically mix memory and logic, failure rates of a fraction of a failure in 10^9 hours per bit, and low power dissipation.

Mr. Morton contrasted the developing LSI technology and the new, much-publicized magnetic bubble device with present memory workhorses, the magnetic core, discs and drums. Core memories were seen bottoming at 1-usec cycle times, a cost of one cent a bit and power dissipations of 100 microwatt per bit in sizes of over a megabit. The rigid constraints, particularly in minimum module size imposed by cores, discs and drums, were pointed out as severely limiting computer architec-

ture. LSI memories were predicted to reach costs below 0.1 cent per bit at cycle times of 10^{-8} seconds and power dissipation of 10 microwatts per bit. However, he saw magnetic bubble devices as being the promising computer device of the future with cost falling below that of semiconductors and power dissipation at least equal. The nonvolatility of bubbles was seen as a definite plus for device reliability. Both LSI and magnetic bubbles permit an intimate mix of memory and logic.

Mr. Morton pointed to recent breakthroughs in epitaxial growth of magnetic garnets on nonmagnetic single crystal substrates as justifying

Bell Labs' enthusiasm for bubble technology.

Emerson Pugh of IBM chaired a session on storage hierarchies. The access time gap of a factor of 10^4 in size between electromechanical and core memories was emphasized as an important lack in hierarchy structure.

During the "Bulk Storage" joint session, W. J. Worlton of Los Alamos Scientific Laboratory discussed storage requirements for large-scale scientific calculation. In the type of problems with which he was concerned an archival data base of 10^{12} bits was needed. This presently may be satisfied by the IBM 1360 Photo Digital Storage System or the Precision Instrument Unicon 690. A dynamic requirement of 10^{11} bits with an access time of 50 msec was also presented.

Robert F. Elfant, general chairman for the 1971 Intermag, was pleased with the international nature of the conference. Of the 368 authors of the 214 papers, 139 of the authors and 54 of the papers were from countries other than the United States. The total attendance was about 750.

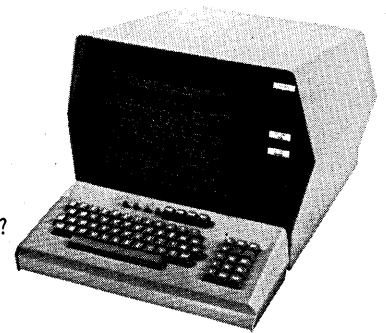
—A. J. Kolk, Jr.

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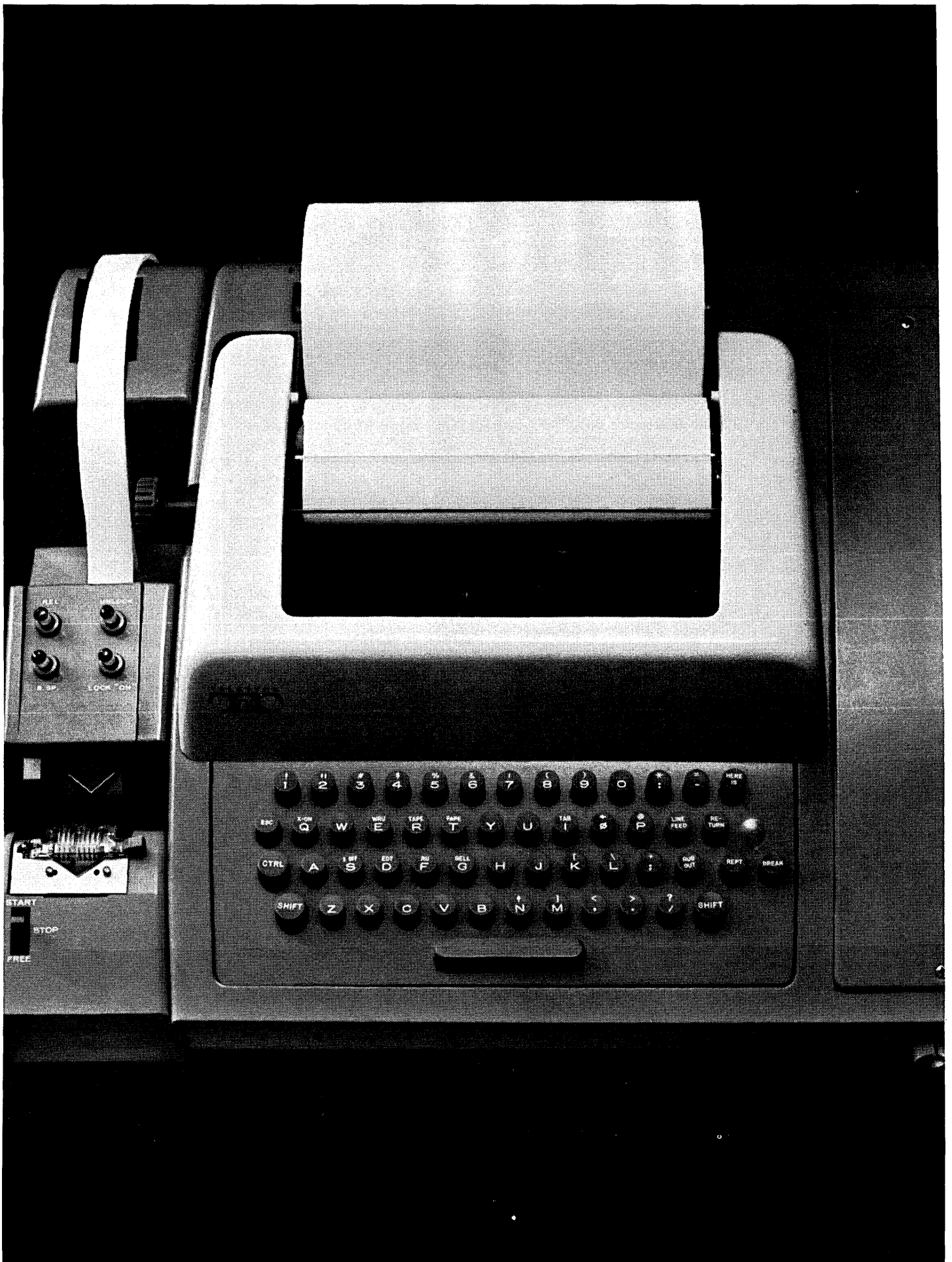
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PERSPECTIVE

an interpretive review of significant developments

Edward E. David, Jr. — "I Belong to the President"

DP equipment contributes more to a favorable U.S. trade balance than almost any product, "so we are particularly interested in seeing the industry prosper," said Presidential science advisor Edward E. David, Jr., in a recent interview.

Federal subsidies to help develop/improve dp products with a high sales potential abroad are possible, David indicated. Indirect assistance is another possibility. It could take the form of low-interest loans, accelerated depreciation for capital investment, and/or amendment of the antitrust laws to permit joint r&d ventures, among a number of possible alternatives.

David emphasized that products assisted in any of these ways will have to have "domestic utility" as well as a capability of improving the U.S. trade balance. They will, in other words, have to provide social benefits and/or increase productivity. Other comments by the President's science advisor during a 60-minute interview suggest that education and health care are the two social service areas the Administration is most concerned about. David said that in both of these areas, federal financial support has so far been focused primarily on developing new techniques, or as he put it, "finding out what can be done." In the future, the emphasis will be on developing educational and health care systems that provide services at optimum cost. David mentioned regional health and education centers specifically as one promising means of achieving the new goal. He "wouldn't be surprised" if a higher percentage of federal r&d money is invested in such centers, and in the computerized information systems needed to help them operate.

Shifting Emphasis

It will be some time before any of these new initiatives surface, said David, partly because Congress must concur and partly because the whole analysis of problems, goals, and implementation within the Executive branch is in a very early stage. He

added that the present emphasis on basic r&d, as opposed to support for end product development, probably will continue. However, no rigid policy is likely. Instead, the decision regarding extent of support will be made on a case-by-case basis.

Another possible shift in the federal science program involves unemployed technicians. David indicated that the feds, probably through the Dept. of Labor, will put more money into the self-help groups formed during the past several months to find jobs for displaced aerospace technicians and scientists. These funds, besides enabling the voluntary groups to promote their human wares to industry and set up in-house service/manufacturing operations, might also be used to help defray the moving expenses of unemployed workers who found jobs far from home. The money would also support retraining. David indicated the Administration is looking more favorably at the self-help organizations at least partly because recent pilot efforts to promote more technical jobs in state and local government have not lived up to expectations.

The President's science advisor is an electronics engineer who formerly headed communications systems research at Bell Labs. He became science advisor in September 1970 at



EDWARD E. DAVID, JR: Service industry automation won't put people out of work.

the age of 45. His predecessor, Dr. Lee DuBridge, a physicist and ex-president of Caltech, was 69 when he left. This shift in age and background reportedly was intentional rather than accidental, leading some observers to comment that the information science community now has more influence over federal policy.

Closer Relationship

Reportedly, David has established a much closer working relationship with the White House than DuBridge had. One result, according to these same reports, is that \$100 million was added to the FY'72 budget of the National Science Foundation.

David refused to comment on the reports except to say that he was "one of those" who helped persuade the Office of Management & Budget to approve the extra money for NSF. David made it clear that he is not a special pleader for the scientific and technological community — a sin widely attributed to DuBridge. Rather, he's a "staff assistant to the President." More specifically, he advises the White House — the President, the National Security Council, and Domestic Affairs Council — together with certain federal agencies like OMB on a continuing basis regarding science/technology problems and opportunities. He also directs studies undertaken at their request.

He can suggest questions to be considered by his "clients" and studies to be undertaken. Apparently, he makes an effort to persuade the top policy makers if they don't accept his idea at first. Reportedly, there have been a number of occasions when he has applied such pressure, and at least some have been successful. But David appears to view the Presidential science advisor primarily as a loyal member of the team rather than as a diplomat/politician striving to cultivate support for his own views about the role of science and technology in society. As David put it during the interview: "I belong to the President. We are the President's people."

Whether this is the kind of science advisor the country needs right now is an interesting question.

David is not the sole source of scientific advice to the President, but he is clearly the primary source. The basic inputs come from 225 Presidentially appointed part-time consultants, who work for the Office of Science and Technology. David, as head of OST, manages the activities of this group. OST also has an in-house staff of 26 professionals who supplement the work of the consultants.

Nineteen of the consultants comprise the President's Science Advisory Committee, a top-level group which monitors federal science activities in relation to needs and recommends corrections to the President. (Three computerniks are members of PSAC — Dr. Herbert Simon, Carnegie-Mellon Institute; Kenneth Olsen, president of DEC; and Pat Haggarty, board chairman of Texas Instruments — which seems to refute industry complaints that information scientists aren't adequately represented.) PSAC meets directly with the President four or five times a year, reports David, the committee chairman; but also he is at the President's elbow full time, so he must act as PSAC's pipeline on many occasions. David is also chairman of the Federal Council on Science and Technology, which includes representatives from all the major federal agencies and is concerned with coordinating science/technology-related activities that cross department lines.

Because of all the hats he wears, the President's science advisor clearly should have a broad, multidiscipline view of science and its applications. Whether David has this kind of outlook can be judged from what he said about automating the service industries.

Automation and jobs

There is a widely held view that these industries need less automation, if anything, rather than more, so that additional jobs can be provided for workers who aren't able to qualify for more glamorous and rewarding toil. Asked about this, David explained that service industry automation won't put people out of work. Rather, it will allow those already employed to supply the tremendous demand — in hospitals and schools, for example — for additional services at lower unit cost to the consumer. This may be

true, but it overlooks the serious and immediate need to provide jobs for thousands of currently unemployed workers who have few marketable skills.

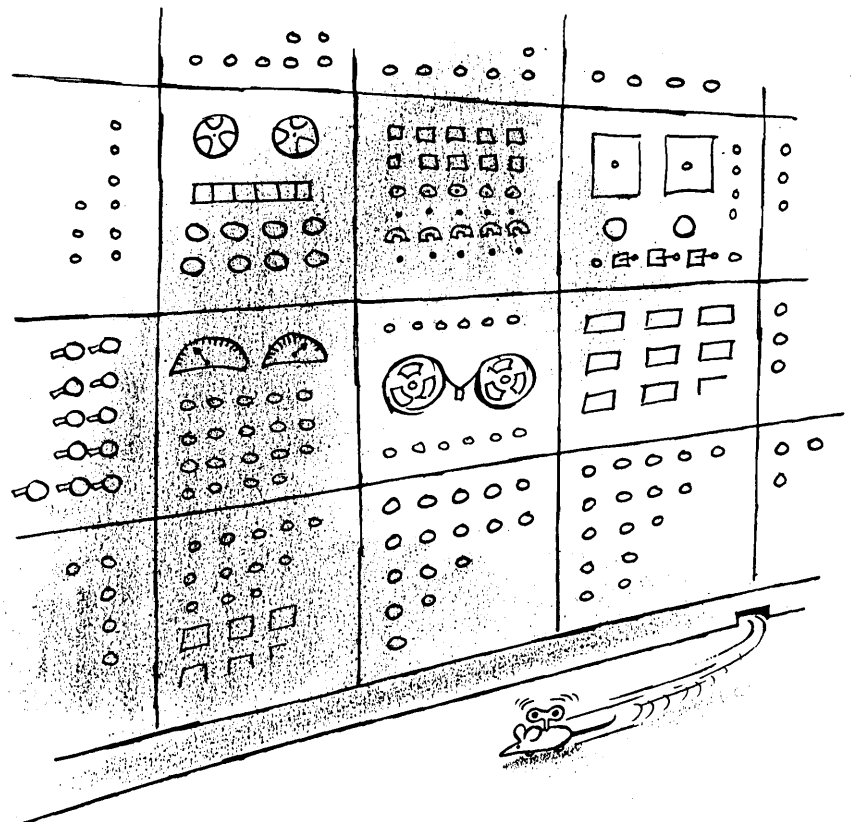
David's belief that automation won't displace any workers, he explained, is based on what happened in the communications industry. There, automation has been accompanied by rapidly growing demand; the result is that no mass layoffs have occurred. When it was suggested that automation *has* displaced workers in other industries — notably coal — David replied that the cause there was not increasing automation but, rather, declining demand for the product.

There is a good deal of evidence disputing this view, including reams of Congressional testimony — so much evidence, in fact, that the whole question of whether automation swallows up jobs is still being hotly debated by social scientists. If the President's science advisor has made up his

mind, it indicates he isn't in touch with a significant segment of the science community. This can't help but be a serious handicap to a Presidential advisor who is obviously sincere when he says he wants to use technology in ways that benefit society.

Automation is one of many crucially important social issues that respected scientists are currently questioning on technical grounds. Another is the ABM. The President already has decided, largely on nontechnical grounds, that Safeguard is needed. The key question is whether David, who stresses that he "belongs to the President," can adequately evaluate the technical objections to the Safeguard system, and — assuming some are valid — get a fair hearing for them within the White House inner circle. He insists that the record, if it could be opened to the public, would show that his office has demonstrated such a capability in the past.

—Phil Hirsch



H. Martin

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NEWS SCENE

DECsystem Line of Five Machines Has Single OS

Snow White has found a new seventh dwarf — the Digital Equipment Corp.

The Maynard, Mass., firm, which has traditionally been best known for its minicomputers and its scientific computers, has unveiled a new line of mainframes that compete across a broad range from the IBM 370/135 to the 165.

"Not many months ago, we were selling our big machines almost exclusively in the r&d and scientific markets," says Ward MacKenzie, marketing manager for the new line. "Thus with the new line we'll be moving into the edp market more and more. We see fantastic growth in the commercial market." DEC is using its PDP-10 as the foundation for the new five-machine line, which is now called the DECsystem-10. The firm is dropping the PDP label to avoid confusion with its minicomputers.

As a selling point, DEC is hammering home the idea that all systems in the new line will have the same operating system and the same user command. "We think we're unique in offering one operating system across an entire line of computers," says Rod Belden, Jr., marketing planning manager for the new line. "Customers can use it for everything from multi-programming batch and time-sharing to remote batch and real-time monitoring and control."

The new DECsystem machines are the 1040, 1050, 1055, 1070, and 1077. There are no claims being made by the company that the new equipment is pushing the state of the art in either software or hardware. The firm is emphasizing price and performance in its marketing plans. In brief, the details on the new machines are as follows:

The 1040 is the smallest machine in the line and will compete with the 135. The company expects to pick up most of its business in this area from its traditional customers — the r&d and scientific market. Depending upon configuration, the machine will sell for between \$390,000 and \$600,000 and is already available for delivery.

The 1050 is expected to be DEC's biggest entre into the commercial edp market. It is essentially the same machine as the PDP-10. Slated to cost between \$600,000 and \$1 million, the 1050 competes in the range of the 145. Like the 1040, it is ready for delivery now.

The 1055, which will be available for delivery in December, might best be described as a souped-up version of the 1050. It features a dual processor which DEC feels will particularly appeal to customers who must attain fast execution of compute-bound jobs. Typical configurations will sell for between \$1 million and \$1.4 million.

The 1070 is a completely new cpu which employs virtual memory. DEC is stressing the advantage of raw computer power in the machine plus what it says is a low price — \$1.2-1.6 million. Scheduled for first customer deliveries in mid-1972, the 1070 is expected to see use in remote communications in addition to other more traditional markets.

The 1077, like the 1070, will be competing in the 155 range and will even brush the 165. It will have a dual processor, which DEC claims enables the machine to surpass the computing power of the 155. It will cost from \$1.8 to \$2 million and be available for delivery towards the end of 1972.

MacKenzie expressed optimism for the marketing plans of the new line. Besides the nearly 200 PDP-10s already installed, MacKenzie said that orders for the existing model are up sharply. He observed that DEC's PDP-10 customer base will be an asset to the marketing efforts of the new line. "Now we can go back to our customers and tell them they can upgrade," says MacKenzie.

MacKenzie noted that DEC has been gradually moving into the more traditional edp markets and that the new line will step up that trend. There are no plans to change DEC's marketing approach other than to continue to beef up the marketing force. "DEC now has DECsystem-10 marketing specialists all over the world," said MacKenzie. As an example, he noted that the Los Angeles area office has

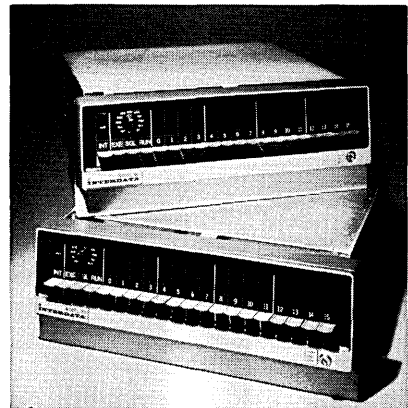
three DECsystem-10 salesmen, each specializing in a different applications market.

Here's a Switch: Mini Maker Now Courts OEMs

Going against the market direction of most minicomputer makers, Interdata, of Oceanport, N.J., is now spreading from the end-user market into oem supply. Key instruments of this effort are the recently introduced Systems 70 and 80, first models in a series that is better but no more expensive than the top end of the current line — the model 5. The 70 has twice the speed of the 5 and is cheaper. The 80, with five times the speed, is about the same in price.

The firm tells us it's confident expansion into oem markets will be successful because a lot of its software development costs are behind it. Interdata has been concentrating on the data communications and industrial control markets, and the software and market development costs that are part of reaching end users have already been incurred, while many of the competitors have the investment still ahead of them.

Interdata said it has 500 model 4s and 5s installed, including 20 data communications systems which it calls the 270x. It thinks it will double this volume to 1,000-1,200 in the next year by aiming at the oem market dominated by DEC and Data General and offering a 15% oem discount.



SYSTEMS 70 AND 80: Something for the oem markets.

With the models 4 and 5, Interdata was the first mini maker to adopt IBM 360 and 370 architecture. It's maintained most of the same features in the new series, as well as complete compatibility with the predecessors. But it also has moved further into use of bipolar and MOS circuitry, thus achieving increased speeds. The compatibility is particularly important for the Real Time Operating System (RTOS) developed for the 4 and 5, said to be similar in capability to IBM's CCAP.

The new models have the same multiple-register (16), addressing (up to 64K bytes), and bus structure of the models 4 and 5. The 70 has a bipolar read-only memory with a 250-nsec cycle time, providing about double the execution speeds of the 5. The 80 has a user-alterable writable control store with a 75-nsec cycle time and an MOS/LSI main memory with a 360-nsec cycle time. Its execution times are 400-800 nsec, about 8 times the model 5. Ultimately the 80 or future models will be able to handle up to 256K bytes of main MOS memory, we're told. Both systems are said to have "almost militarized construction."

The 70 starts at \$6800 (vs. \$11.2K for the model 5) for an 8K system with Teletype and standard hardware multiply/divide and floating-point features. "Typical" will be \$28K-35K. The 80 starts at \$16K for 15K bytes, with a typical configuration ranging from \$30-45K. The RTOS costs an additional \$2000.

CIRCLE 546 ON READER CARD

First, a Brown Bag Luncheon in Boston

The show must go on?

Not if the paying players don't show up.

That's what electronic professional groups are finding out during these hard times as they attempt to finance technical conferences by holding paid trade exhibits with them. Although the annual summer Western Electronic Show and Convention was a success last month in San Francisco, the 700 booth spaces sold were 400 fewer than a year ago.

In Chicago, the Institute of Electrical and Electronics Engineers (IEEE)

rescued the technical conference that was to have been part of the National Electronics Conference and Exposition. NEC was cancelled because it couldn't attract enough paid exhibitors. The affair will be held as an IEEE event Oct. 18-20 at the Pick-Congress hotel in Chicago under the new name, Fall Electronics Conference.

In Boston, the IEEE Computer Society Conference is being held next week without the exhibits that were originally planned for the show. And later this fall the IEEE Northeast Electronics Research and Engineering Meeting (NEREM), Nov. 3-5 in Boston, will be open to exhibitors, but at one-third the usual cost.

A hint of what was ahead was offered at NEREM in 1970 when the keynote luncheon was a brown bag affair and the speaker drawing the biggest crowd was Dr. Edward M. Bennett, deposed head of Viatron Computer Systems Corp., which later was to go into bankruptcy.

50 Watch Five From IBM Watch One Downed S/3

Some 50 persons showed up in Los Angeles last month for the first meeting of the newly formed National As-

sociation of IBM System/3 Users (NASU). And although it wasn't planned that way, the meeting consisted of everyone standing around waiting for an S/3 Model 10 to be repaired.

NASU was formed this spring by Los Angeles consultant Irwin Cohan as an idea-swapping organization "dedicated to discouraging the continual reinvention of the wheel." Through a monthly newsletter, members learn how each other's problems were solved. Routines, programs, and application packages are shared. Cohan said 300 firms had joined NASU by August, paying a membership fee of \$30. He said the association hoped to have from 1,000 to 1,500 members by year-end. The address is 7251 Owensmouth Ave., Canoga Park, Calif. 91303.

Its first meeting was held in the offices of Programmatic, Inc., Los Angeles software house which recently introduced a FORTRAN compiler for the System/3, called PI FORT. Although the meeting was billed as an informal affair with cocktails and a demonstration of PI FORT on Programmatic's new System/3 Mod 10, it became even more informal when NASU members and a large contingent of vendors arrived to find the computer down and five IBM people furiously trying to find the problem.



THROUGH SMOKE AND DUST: S/3s are designed to operate in plants and warehouses without benefit of climate-controlled computer rooms. One test to insure they don't go down is this "smoking" procedure where two cylindrical "lungs" puff and exhale the equivalent of a full pack of cigarettes into a test chamber containing an S/3. At IBM's product test lab in Rochester, large concentrations of dust also are swept into the chamber. But no test to protect it against user meetings has been developed.

Dave Ferguson of Programmatic said the computer had worked well since he received it two weeks prior to the meeting. It had been down the afternoon of the meeting, was repaired in time for the opening of the meeting, but then had gone down again.

Two hours and 20 minutes after the meeting had started, the computer sputtered to life; but then someone dropped a deck of 96-column cards to the floor, and those who had waited promptly retired to the bar. Some returned later to engage in a game of tick-tack-toe.

System/3 is considered one of the most reliable of IBM's products. In Los Angeles the company is understood to employ less than 10 field engineers to maintain some 200 S/3s installed. "But even the most reliable of products often go down," said Cohan, "and it was fitting that many of our members who are about to install S/3s had the opportunity to see first hand what they're in for."

COMMON "Sounds Off" for Small IBM Users

IBM's user group, COMMON, is trying to establish itself as an aggressive infighter for the rights of the small IBM user (everything from System/3s to 256K 360/40s). It started its public campaign with an ad in a trade paper just before its semiannual meeting in New York in August, declaring: "We've been after IBM for years to pay attention to the small users. We've got legitimate gripes. We want IBM to listen better, and IBM better listen."

Those gripes, or demands, include incompatibility of the System/3 with the 360 and 370 lines and the attendant question of how to use the 3 as a remote job entry terminal; paying for computer time devoted to IBM's software problems; difficulties of using the 360 operating system in the confines of small-memory computers; development of new compilers; microcode for small machines, etc.

The Aug. 9-11 meeting was devoted to questions like those, plus the issue of cooperation between COMMON and other small IBM user groups. While the press was not permitted to attend the "sound-off" ses-

sions between the users and IBM (most user groups like to talk things over with IBM unfettered by the press), the officers and board of COMMON decided to tear down some of the wall of silence between the group and the press by holding interviews. While the officers made it clear that COMMON did not want to jeopardize its communication with IBM, they also emphasized that it wanted public airing of serious problems not being resolved. (Passing a general session, we heard one speaker say, "How often we ask IBM for something and how seldom we get it.")

COMMON president Larry Baker noted that competitive small-user groups, GUIDANCE and NASU, have contended that there should be no affiliation with IBM. He felt, however, that "the affiliation has its advantages, including the dialog we have with the design and development people, who continue to come in significant numbers." COMMON wants to make clear it is not a tool of its computer provider, and emphasized IBM did not pay for the advertisement noted above. Like the other user groups, COMMON feels it has impacted future IBM developments and led to needed software modifications. The officer said the System/3 is evolving into a larger system with 80-column cards, tape, and RJE support, partly as the result of COMMON efforts.

This user group, which has "under 1,000 members," is trying to attract a larger membership to have more power in asserting the demands of the small user.

Besides a direct pipeline to IBM, COMMON feels its greatest contribution is year-round interchange of information among its members. Mod 40 user Jack Palmer, Univ. of New Hampshire, noted for example that the small OS user has no other home. At large-computer user groups, SHARE and GUIDE, users are not concerned with "squeezing out another 64 bytes," he said. "My problem is surviving with OS," and COMMON is where Palmer finds out about new techniques, such as a method developed at the Univ. of Maryland for using alternate tracks on a disc pack; it increased efficiency 20%. Program interchange is said to be strong; "for every program I give away, I get six back," said Palmer.

Wimmix Selection Next Month, Source Says

Winner of the big Worldwide Military Command and Control (Wimmix) computer buy will be announced next month, says a Defense Dept. official.

One bidder, understood to be Burroughs, who flunked the benchmark, won't be given a second shot. The buy is for 15 systems, and an option for 20 more. Some of the latter will replace IBM 360s, even though an avowed aim of the buy is to "concentrate available resources on replacement of obsolete computers."

A source said a follow-on procurement of unspecified size is being considered later. A prime reason for limiting the buy to 35 systems, he said, was to forestall congressional criticism. But the most prominent critic, Rep. Jack Brooks of Texas, is reported to be concerned because DOD isn't lumping all its present Wimmix computer needs into a single procurement.

The House Appropriations Committee, which has to provide the cash for Wimmix and has been critical in the past, remained to be heard from.

NYC Betting System Ills Ending Soon, Jones Says

By early October, Computer Sciences Corp. expects to have wiped out all of the bugs in the com-



JONES AT ANNUAL MEETING: The trouble with Howie is over?

puterized betting system it developed for New York's Off-Track Betting Corp.

The word came from CSC's chairman and founder Fletcher Jones who was questioned at the firm's annual meeting in August about the highly publicized glitches in the system that eventually led OTB's chief, Howard Samuels, to hold up payment of \$800,000 in fees to CSC and call in Control Data Corp.'s Ticketron subsidiary to operate two of 16 parlors being installed. OTB sought penalties because CSC was late in installing the system and because shortly after its installation this summer the system broke down.

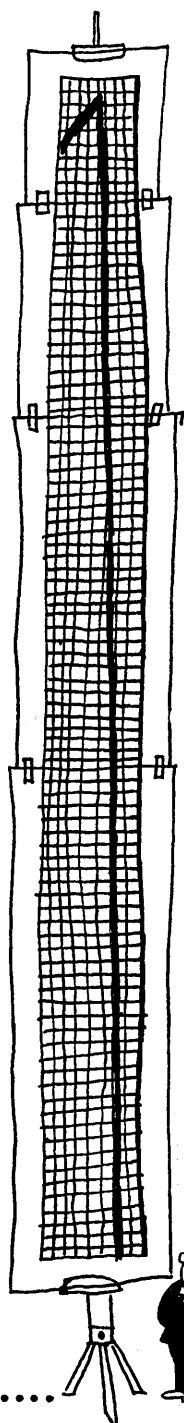
"Breakdowns are not abnormal at this stage of any large and complex system," Jones assured his shareholders, noting that it's the first of its kind in the world. And he said he was not concerned if, in a system of this magnitude, OTB officials had "found it fit to carry some form of backup in the wings," and if of 16 parlors opened, it decided to give that backup firm "several betting windows."

In the fact sheet CSC issued earlier this year, it said it had total responsibility for hardware, as well as software and operational support. This has changed, and an OTB official has been quoted saying, "We may use both (CSC and CDC) systems."

In the CSC system, racing bets are registered in a central computer (dual 360/50s and banks of 2314 disc drives) from ticket terminals that are linked by telephone circuits. Tickets are printed at the betting parlors on a ticket-issuing machine with a mini-computer used as a controller. The main system computes the pools for bets, re-enters progressive bets such as parlays into the proper pool, and enables the cashier to cash any ticket sold by the system.

It also is designed to accommodate telephone betting. Some 150 telephone betting stations and 100 betting parlors are planned by the OTB, which said it could expand the number of parlors to 200.

Last June CSC said it was awarded a contract to do planning studies for a similar system in Australia. Australia also is the site of another automated betting system installed some time ago by Control Data Corp., CSC's apparent close competitor in



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13,000,000 MILES OF DIGITAL
COMMUNICATIONS CHANNELS,
AND IS ADDING TO THEM
AT THE RATE
OF 8,000 MILES EVERY DAY.**

If this is welcome news to you in the data field, good. But our purpose is broader. Our purpose is better service for all Bell System customers.

You see, we have one fully integrated network. It has both "analog" and "digital" channels...and has had for many years. Signals travel as waves on one and as pulses on the other. Regardless of the original source or form of the signal, whether human voice or computer, we readily transform it to travel over either channel.

This flexibility makes virtually all of our network available for data transmission. It keeps charges low. And it gives us alternate routes should trouble arise.

Then why are we going heavily digital? Because with modern electronics, especially solid-state circuitry pio-

neered at Bell Labs, digital transmission is better not only for data but for many other services as well.

Digital transmission is better because it eliminates many kinds of noise, thereby getting more information over the same size cable with greater accuracy.

Digital is clearly technology's best answer to many of America's future communications needs. It will benefit everybody, not just our data customers.

We have 13 million channel miles of digital now, and we have definite plans for the near future.

- For 1972, a new digital system that will operate at 6.3 megabits per second, four times the speed of our present all-digital lines.
- By the mid-'70's, initiation of private line service on an end-to-end, fully digital basis which will ultimately serve every major city in the country.
- By the late '70's, waveguide systems capable of thousands of megabits per second.
- By 1980, the Bell System's network will be four times its present size. A large proportion of it will be digital—enough to provide ample capacity to meet America's data-handling needs.

The American Telephone and Telegraph Company and your local Bell Company are continually working to improve service to business.

This time by increasing digital services to benefit all our customers.



New York, and is supported by dual 3300s.

Jones said at the Aug. 9 meeting at the Century Plaza Hotel next to CSC's headquarters, that the New York system should achieve "absolute reliability" within two months.

Jones also attempted to soothe shareholders worried that virtually all of the firm's assets have been hocked at the banks — primarily to finance

CSC's fledgling Information Network (Infonet) — and that the company is paying interest rates that are 3-10% above prime. Jones noted that Infonet's revenues are exceeding \$500,000 a month and that it was a good investment. "When the smoke clears," he said, "we will find that the return on this investment will have made the rates we paid worthwhile."

Place your bets.

Model 33ASR with dial-up set and complete maintenance service for \$74 per month.



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

Now — lease Teletype equipment from RCA for just \$37 per month (send/receive model 33KSR) including maintenance. With dial-up set, only 80¢ a day more!

- Prompt installation and maintenance services by RCA technicians based in over 130 cities.
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RCA

IBM Voice Recognition Only "Experimental"

IBM customer engineers servicing terminals anywhere in the U.S. can use an experimental speech recognition and audio response system called Automatic Call Identification by phoning the firm's Raleigh, N.C., Maintenance Technology Center. The system recognizes a vocabulary of numerals 0 through 9, yes and no, plus "zero" as a substitute for "oh." The objective is more efficient use of phone service by automatically routing the calls to specific remote testing routines with a minimum of incoming phone lines.

The computer queries the caller in a pleasant drawl, asking questions that establish the specific terminal being serviced. If the system fails to comprehend the caller, or if he requires live assistance, it is readily available: All the CE need do is remain silent and the call will be switched to a human.

The ACI is controlled by a 360/30 (not dedicated), and speech information is stored on disc. The voice equipment consists of an audio analyzer and an audio response unit, both of which are experimental. But they could easily portend future product announcements. IBM does not as a matter of policy comment on future products.

Home Grown Hotel Automation in Hawaii

Virtually every U.S. systems firm working on hotel automation, and there are many (see May 1, p. 53), has cast a hungry eye toward Hawaii, and quite naturally. There are 17,000 hotel rooms in Waikiki alone.

Just as naturally, computer firms based in the island state are taking a long look at this lucrative market in their back yard. One, Kentron, has developed an on-line integrated control system which is seeing its first use in the Kuhio hotel. Another, Data International, has a computer-based reservations system used by two chains, Hawaiian Pacific Resorts and Inter-Island Resorts, and plans to tie in accounting and other hotel opera-

tions functions.

Probably the most ambitious bid for a share of the market is being made by Computing Management Inc., Hawaii's second largest locally owned software service. Segments of a modular hotel information system it is developing are in use in 23 Hawaii hotels. In Waikiki, hotels serviced by CMI account for some 9,800 rooms of the 17,000 total.

Called Ho-Tell-It, the system, when fully developed, will consist of nine subsystems: reservations control, travel agents commission systems, guest processing, accounts payable, accounts receivable, general ledger, payroll-personnel, food and beverage control, and inventory control. Hardware is a communications-oriented RCA-2 system. In-hotel terminals are Bunker-Ramo Model 2206-17R with keyboard/display units and 960-character screens. Printers have not yet been selected, but William T. Treadwell, CMI vice president, says they will print at least 30 characters per second to a maximum of 120 cps. The cost of the total system will vary both in terms of the number of terminals needed and in relation to the transaction volumes of the subsystems. Each subsystem can operate autonomously or can be consolidated with one or more of the others. Although not all subsystems are in operation yet, Treadwell predicts the cost of the total system will be less than the \$10-12 per room which the American Hotel-Motel Assn. uses as a standard.

Treadwell said Sheraton-Hawaii hotels is using the payroll-personnel system and is considering others. Western International Hotels is using the payroll-personnel system and a profit sharing plan system. InterIsland Resorts is on the accounts payable system. Cinerama Hawaii Hotels, which is working with CMI on Ho-Tell-It's development, is on the reservations, travel agents commission, general ledger, accounts payable, and payroll-personnel systems.

CMI wants to master the total system in Hawaii before taking it elsewhere, but future plans include marketing on the U.S. mainland and in the Far East, where the firm's parent company, Crown Corp., has established business.

NEWS BRIEFS

CMC Head to Paris

Computer Machinery Corp., Los Angeles data entry firm, said it is turning more of the personal attention of its founder James K. Sweeney to the European market where a third of the firm's revenues originate. Sweeney will step down as president to become chief executive officer and spend six months of the year in CMC's Paris offices. Thomas L. Ringer, the firm's vp of sales, will run U.S. operations as vp and general manager of the CMC Data Processing Div., Los Angeles, which becomes an operating company of CMC. The company also has operations in the U.K., France, and West Germany.

Has Computer, Will Travel

Thanks to a rolling CAI lab, rural elementary school teachers in Pennsylvania can now take an otherwise unavailable course in dealing with children who have educational problems. Penn State Univ. operates the 40-foot Gerstenslager semi-trailer, which contains an IBM 1500 educational computer and crt/keyboard terminals, plus photo-image projectors for 15 students. The trailer expands from a traveling width of 8 feet into an 18-foot classroom.

Help for the Unemployed

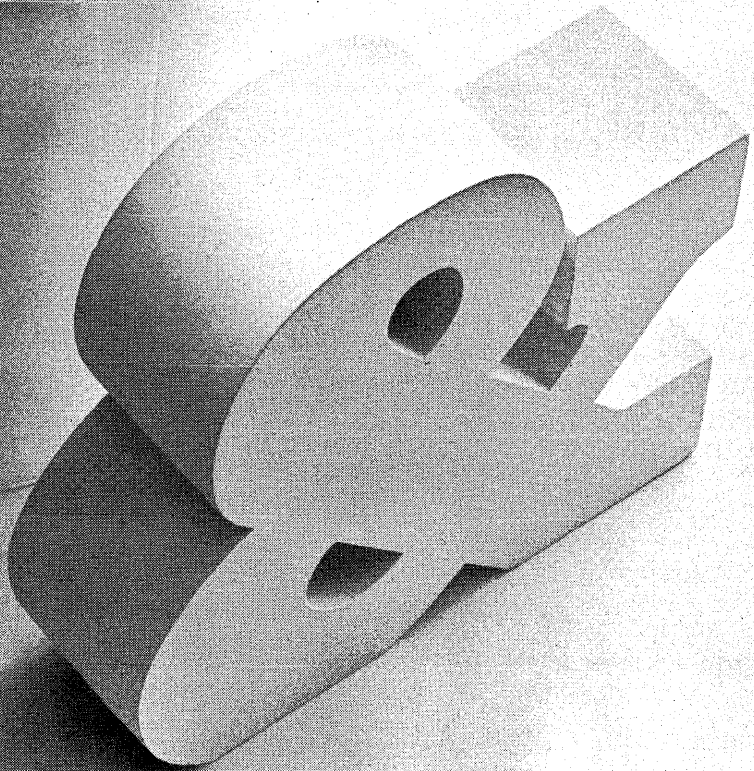
In a concession to the times, the American Society for Information Sciences (ASIS) is waiving payment of dues by unemployed members. The society also operates a job placement service for members through its Washington headquarters and at its annual conventions. This year's convention will be held Nov. 7-11 at the Denver Hilton Hotel. For those employed members who have to pay dues, the ASIS council had a concession too. Consideration of a dues increase was postponed for one more year, the dues level being maintained at \$25 for regular members and \$10 for student members.

SHORTLINES

Univac climbed aboard the price raising bandwagon just ahead of the

Presidential freeze with increases of 5% on purchase and rental prices for "selected processor and peripheral equipments" and 7% boosts on monthly maintenance service charges for "almost all products." The increases will be partially offset for some users by a reduction in purchase and rental prices for the 8414 disc system ... Shoppers for used computers have it a bit better. According to Joseph W. Kirby, vice-president, equipment division, Time Brokers, Inc., prices of used 64K 360/30 machines dropped 22% in the past year, while prices for 40s dipped 9%. He predicted "a further substantial drop in 40 prices" in the next 12 months ... Control Data Corp. cut prices on its 200 series crt terminal products. Typical prices now include: \$2,500 for a 1,040-character crt display with full edit capabilities; \$11,550 for a 136-column, 300-lpm double-buffered printer; and \$9,700 for a local controller on the IBM 360 that can act as a 2848/2701 replacement ... Bell & Howell Co.'s Electronics & Instrument Group has acquired the document reader line developed by Motorola Inc.'s Control Systems Div. ... Logica Ltd., London consulting firm 25% owned by Planning Research Corp., will study a computer network to handle international payments transfer under contract to some 70 European and U.S. banks. A subcontract to provide "expertise" on computer and communications applications to American banking went to Greenwich Data Systems, Inc., recently acquired by PRC ... Bucode Inc., Hauppauge, N.Y., received a \$5 million contract from Tracor Data Systems Inc. under which Tracor will purchase and remarket automatic loading magnetic tape systems plug-compatible with IBM 2401, 2420, and 3420 equipment ... Sycor, Inc., Ann Arbor, Mich., signed a three-year marketing agreement with Mitsui & Co., Ltd., Tokyo ... A new Denver software company, Data Tech Corp., is going after the mutual fund market with proprietary computer systems designed to handle that industry's accounting and management information requirements ... Tymshare, Inc., Palo Alto, Calif.-based time-sharing firm, agreed to purchase the time-sharing operations of Computer Complex, Inc., Houston. ■

Bell & Howell &



Kiss the Girls Good-bye

Sorry. But cute as they are, key punch girls are a thing of the past. You don't need them anymore. Thanks (or no, depending on how you look at it) to MDR. The Mark Document Reader.

It's a remarkable machine. We bought it lock, stock and the best people, from Motorola.

What it does, as we said, is knock out the need for key punching. It reads simple pencil marks. Nothing fancy, and anybody can make it work. (Incidentally, it also reads pre-print and key punch. But the nice thing about it is it's set up to be simple).

Reads tab cards (standard, long or short), snap sets or page formats.

Has over 200 combinations of character speeds, bit rates and languages.

With several interfaces. It's compatible with incremental recorders, modems, etc.

That's the hardware. But there's more. We've got a nationwide installation and service group. And a forms expert that designs the most efficient form for the job. So a customer gets on stream right away. No fussing around with expensive trial and error. All part of the package.

Sorry girls, but this is also a remarkable machine. MDR. Only from Bell & Howell. Electronics & Instruments Group, 360 Sierra Madre Villa, Pasadena, California 91109.

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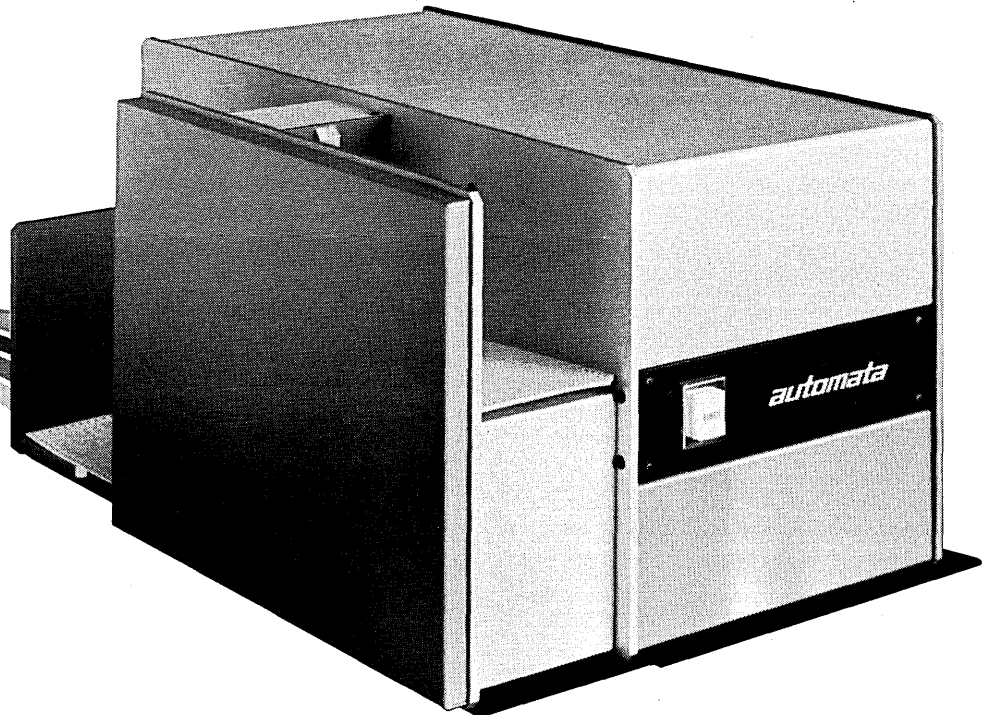


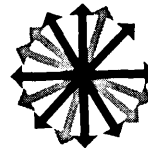
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For a fast, simple, low-cost way to collect source data, you're unlikely to find a more agreeable collector than the AUTOMATA 3600 Optical Mark Reader. This collector gets along with punched, printed and pencil-marked cards. Even if they're bent, folded or crumpled. Even if they come mixed up in different sizes. And when it has collected, the AUTOMATA 3600 knows all the ways of talking to a computer — TTY, RS-232C, magnetic tape or perforated tape. If you'd like more information, give us a call or drop a line. We're compatible, too.



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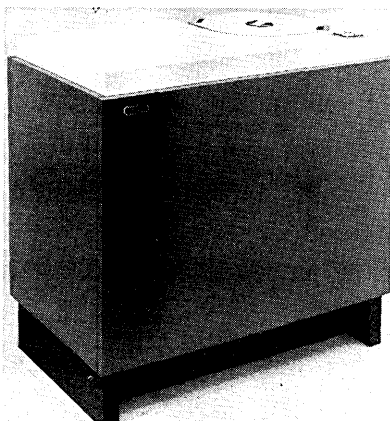


Mass Storage Memory

If oem's can figure out a way to get organized information in and out of the model ivc-1000 memory device—and doubtless some clever oem's will—end users may shortly have access

PRODUCT SPOTLIGHT

to a storage system with roughly 10 times the capacity of the IBM 3330 disc storage unit at a fraction of the cost. Information is recorded on one-



inch video tape contained in a sealed cartridge at densities of 1 megabit per square inch. The tape is searched bidirectionally at 400 ips, and the fast data transfer rate of 8 MHz should satiate nearly all manufacturers' data channels for the foreseeable future. Helping out with the interfacing program are standard logic levels and TTL circuitry. Delivery is six months ARO, and the ivc-1000 is unit-priced at \$50K. INTERNATIONAL VIDEO CORP., Sunnyvale, Calif. For information:

CIRCLE 501 ON READER CARD

Son of COM

In the beginning there was COM, but then many users decided there should be CIM (Computer Input Microfilm), and now this COM vendor has CIM for anyone willing to wait three or four months for deliv-

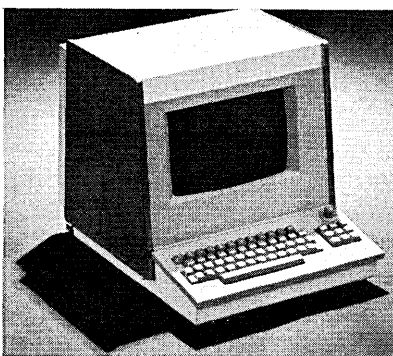
ery. There are two systems, the SCAN 200 and the SCAN 210, and each converts microfilm into computer-compatible form, usually magnetic tape. The SCAN 200 is a high-resolution crt film scanner that transforms visual data into electrical form. Prices start at \$49K. The SCAN 210 is essentially

the same system, except that it has some additional features and includes a 12-bit computer. In its most sophisticated configuration it sells for \$65K. BETA INSTRUMENT CORP., Newton Upper Falls, Mass. For information:

CIRCLE 515 ON READER CARD

Display System

Although the Series 8000 crt display system will initially be marketed to oem's, users should keep it in mind for replacing the IBM 2848/2260 configurations since there are definite plans to offer the system to the end-user market in the near future. Up to 16 terminals can be handled by one controller. Standard screen sizes are of 480 or 960 characters displayed on 12 (40- or 80-character) lines. The



terminals are equipped with editing features, including insert and erase, and a cursor. Optionally available are a columnar tab, upper and lower case characters, a 1,920-character screen, hard-copy printer, and 4800- or 9600-baud data sets. Delivery is 90 days ARO for the 8000, and a full 16-display system is priced at \$39,900. WYLE COMPUTER PRODUCTS, El Segundo, Calif. For information:

CIRCLE 512 ON READER CARD

Nova Disc Drives

Peripherals for the Nova line of mini-computers appear to be growing geometrically. The latest additions to the peripheral line are two compact moving-head disc cartridge drives, each of which operates at 1500 rpm with an average latency time of 20

msec and transfers data at one word every 11.5 usec. Each disc has 406 tracks and a storage capacity of 1.247 million 16-bit-words.

A complete configuration comprises a controller, a disc adapter, and a disc drive. Software includes a complete disc operating system. ALGOL 60 and FORTRAN IV compilers

are also available. The 4047A drive, containing a single removable cartridge, costs \$5K. The 4047B, which has both a fixed and a removable disc, sells for \$8K. DATA GENERAL CORP., Southboro, Mass. For information:

CIRCLE 514 ON READER CARD

Small-scale 1130

Though the IBM 1130 16-bit scientific computer wasn't all that large to start with, its creators felt that an even smaller version was needed. So the 1130 model 4 is offered with 4 or 8K of memory (only) and is rated at about 70% of comparable 1130s now in the field. But while the performance dropped somewhat, the price took a real beating, dropping to \$44,845 (\$1,090/month) for an 8K

model with an interchangeable disc cartridge, a console printer, and a card reader/punch. First units go out the door this month. IBM CORP., White Plains, N.Y. For information:

CIRCLE 517 ON READER CARD

S/3 Debug Aid

A template containing all seven specification forms of the RPG II language

is offered free of charge to System/3 programmers. It is said to ease the problem of locating errors in the source code of RPG II programs written for the S/3. Interestingly, the first customer to respond to this offer reportedly was an IBM employee. NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS, Canoga Park, Calif. For information:

CIRCLE 518 ON READER CARD



Ain't he a beaut, boss?

This is the guy from COMRESS who told me that by replacing ISAM with AMIGOS, he could save us 30% run time, 20% core and a lot of disc space to boot.

Remember the hard time we had justifying the cost with our current budget squeeze?

Well, he came through . . . guaranteed us that if we didn't realize these MINIMUM reductions he'd take the program back and it wouldn't cost us a dime.

Now we're here to tell you that the installation is complete . . . went like a breeze—and you know what we're saving . . . 80% on some runs, and 55% average . . . we don't need more core or disc like we thought—we're saving there too . . . should be able to get another 18 months out of our computer.

Hey, boss . . . that's the first time I saw you smiling since the summer of '69!

COMRESS HEADQUARTERS

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CIRCLE 34 ON READER CARD

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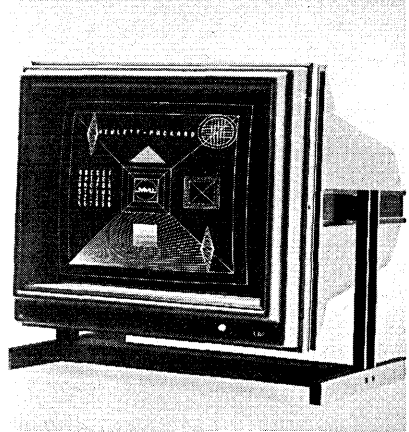
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CIRCLE 39 ON READER CARD

HARDWARE...

Graphics Display Tube

The model 1310A 19-inch graphics display crt, though strictly an oem component for building graphics terminals for now, seems to offer enough advantages over existing crt's that manufacturers of end-user terminals may soon start developing a whole new family of products from



it. The unit has a linear writing speed of 10 inches/usec (565,000 mph), enabling more characters to be displayed on the screen and refreshed at rates that eliminate the flicker found in slower speed crt's. The unit comes complete with solid-state deflection and blanking amplifiers and power supplies that consume less than 100 watts. The price is \$3K. HEWLETT-PACKARD CO., Palo Alto, Calif. For information:

CIRCLE 508 ON READER CARD

360/40 Memory Add-on

The past few months have seen several manufacturers unlock the secret of offering 360/30 users a 100% increase in memory capacity—up to 128K bytes. Now many of the same techniques are being used to offer the less-numerous model 40 users the mod 40+ mainframe memory that can take original core above 32K past the previous system high of 256K up to 512K. A two-year contract on the full 512K works out to \$10,300/month, or the same configuration can be purchased for \$441,200. Maintenance on the 512K mod 40+ is about \$650/month for 24-hour, 7-day service. Performance specifications are the same as the original memory. Deliveries start early next year. FABRI-TEK, INC., Minneapolis, Minn. For information:

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CIRCLE 14 ON READER CARD
September 15, 1971

... HARDWARE

Commo Product Family

Any firm that has been quiet in the sense of announcing new products during the soft economy can be suspected of working hard on something in the back room. That's certainly the case with this company, and in this case *eight* products are involved—more than doubling its total offering. One of the products is the model 7-70 data collection system for recording data from other Novar terminals and recording it on 9-track, 800-bpi tape. Information comes to the 7-70 over phone or dedicated lines and may be transmitted from the 7-70 to another 7-70 or a computer on command. It rents for \$315/month. For information:

CIRCLE 521 ON READER CARD

The model 5-80 auxiliary printer is for use with model 5-50 and 5-51 terminals that have a need to print faster than Selectric speeds. The 5-80 goes up to 50 cps. The monthly rental is \$125. For information:

CIRCLE 522 ON READER CARD

The model 5-60 is a 2741-type terminal with a 350-character buffer and a Bell 103 equivalent modem for handling transmission rates of 110, 300, 600, 1200, 1800, or 2400 baud. The storage medium is magnetic tape, and this unit rents for \$199/month. For information:

CIRCLE 502 ON READER CARD

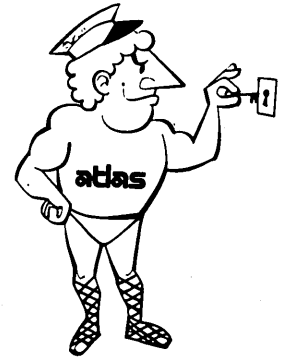
A Touch-Tone telephone becomes a remote data entry keyboard to the vendor's 5-50 or 5-51 terminals when the model 5-10 translator is attached, opening up payroll, order entry, and franchise system applications (among others) to the 1050-type 5-50 and 5-51. The 5-10 rents for \$30. For information:

CIRCLE 523 ON READER CARD





Also announced were the 5-11 recording adding machine which stores input on a cartridge for subsequent transmission from a 5-50 or 5-51 terminal (\$65/month), a buffered terminal called the 5-12 that rents for \$95/month, and two versions of a unit dubbed the 5-40 for in-house data collection and on-line polling systems. These units parallel the IBM 2740 models I and II, respectively, and rent for \$95 and \$125 (per month). NOVAR CORP., Mountain View, Calif. For information:

CIRCLE 503 ON READER CARD


Want to know the key to sound file security for your tape library?



atlas AUTOMATED TAPE LIBRARY ACCOUNTING SYSTEM

-  **IMPROVES YOUR FILE SECURITY** by providing all necessary information on data set movement, remote storage and inventory control.
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OS _____ DOS _____

CIRCLE 35 ON READER CARD

Magnetic Tape Subsystem

This manufacturer set out to build a minicomputer tape subsystem that could be interfaced to almost any domestic minicomputer. And apparently they've succeeded—we can't think of any name brand that has

been overlooked. The Mark I system offers 7- and 9-track, 10-inch, single-capstan drives with recording densities of 200, 556, or 800 bpi (1600 bpi is on the way) at any speed a user specifies between 2 and 45 ips. A starter set, consisting of one 45-ips tape unit, a controller that accom-

modates up to four similar drives, the coupler, and associated I/O drivers and diagnostic routines, is priced at \$8225, with delivery 30 days ARO. CIPHER DATA PRODUCTS, San Diego, Calif. For information:

CIRCLE 511 ON READER CARD

Paper Tape Reader/Punch

We once commented about a terminal replacement for the tty that it lacked the paper tape capability which might have made the product an even better competitor. This manufacturer took us at our word and has developed a paper tape reader/punch that can be installed with any RS232C or 103A-compatible hard-copy or crt terminal. The MSD 300 operates at switch-selectable speeds of 10, 15, or 30 cps and allows the user to create, edit, and duplicate tapes. The unit is priced at \$1850 and is available 30 days ARO. MARK-SPACE DEVICES, INC., Irvine, Calif. For information:

CIRCLE 520 ON READER CARD

Selectric Terminal

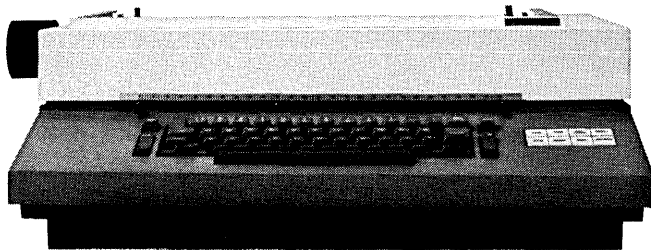
The Tycom 35/37 terminal consists of a Selectric typewriter equipped with a communications baseplate, a logic translator, an acoustic coupler, and an optional paper tape reader/punch. Available models include the KSR (keyboard send-receive), ASR (automatic send-receive), CSR (console send-receive), and LASR (letter writing with automatic send and receive). The units may replace Teletype models 33 or 35. A standard KSR is \$3200 with delivery in 30-60 days ARO. TERMINAL EQUIPMENT CORP., Pompton Lakes, N.J. For information:

CIRCLE 505 ON READER CARD

Data Scrambler

\$1595 might be a low price to prevent theft of information. That's the tag on the CRS 110 Secre/Data code scrambler, featuring automatic cipher synchronization and resynchronization. It can operate synchronously, in full-duplex mode, at any rate up to 1 million baud, independent of code format; or asynchronously it can be switch selected to handle 5-, 6-, 7-, or 8-element codes at any of four rates up to 9600 baud. Interfaces for both EIA RS 232-c and tty are included. Delivery requires 90 days ARO. COM/TECH SYSTEMS INC., Richmond Hill, N.Y. For information:

CIRCLE 507 ON READER CARD



This is the new Novar 5-40 MOD II. It has both software and communication compatibility with the 2740 Model 2. There is one big difference, however. The 5-40 MOD II transmits at up to 2400 baud.

NOVAR

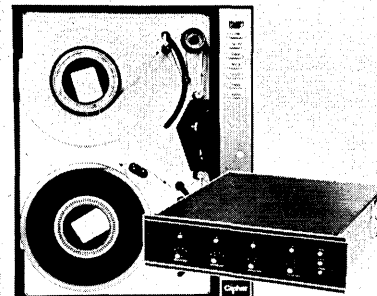
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CIRCLE 18 ON READER CARD

Magnetic Tape Subsystem

Users of the Digital Equipment Corp. PDP-11 minicomputer are offered a tape subsystem containing from one to four tape units, the controller, and the interfacing cables. The drives have 7- or 9-track recording heads; speeds of 12.5, 25, 37.5, 45, or 75 ips; and recording densities of 200, 556, 800, or 1600 bpi. Prices start from \$7800 for a single 12.5-ips



unit and associated controller including I/O subroutines, diagnostic and maintenance routines. Models for other minicomputers are also available. Delivery is 60 days ARO. DATUM, INC., Anaheim, Calif. For information:

CIRCLE 513 ON READER CARD

DATAMATION

Head-per-track Discs

Eight models of head-per-track disc units are offered oem customers. Four versions rotate at 1800 rpm, have latency times of 16.6 msec, and range in capacity from 2.4 to 19.2 mega-

bits. The other four units operate at 3600 rpm, dropping the latency time to 8.3 msec for applications requiring the quicker response time, and range in capacity from 1.2 to 9.6 megabits. The transfer rates for all units are uniform at 4.5 MHz. Available in No-

vember, these latest FASTRACK models range in price from \$4K for the lowest capacity model of each speed to \$8K for the large-capacity versions. PACIFIC MICRONETICS, INC., San Diego, Calif. For information: CIRCLE 519 ON READER CARD

Magnetic Detection

Warning of the presence of magnetic fields is provided by the 5100 Magnesearch Systems, which may also be used for the detection of con-

cealed weapons, opening of doors, presence of vehicles, etc. A basic unit with a single probe is \$700. Additional probes, for a total of up to four, may be ordered at \$150 each and come with 10 feet of cable. Delivery

requires 60-90 days ARO. RFL INDUSTRIES, INC., Boonton, N.J. For information: CIRCLE 504 ON READER CARD

Selectric I/O Interface

Just plug in the Hyper-Typer and your IBM model 731 or 735 I/O typewriter can be used as either an output printer or as an input station.

The Hyper-Typer provides all the interface circuitry necessary to convert ASCII—or other codes—to Selectric code. A 96-character ASCII set is standard. Single units, including necessary cables, are \$1K. Delivery is 45



days ARO. HYPERTECH CORP., Harwood Heights, Ill. For information: CIRCLE 516 ON READER CARD

Nova Tape Reader

A 50-cps Tally R50 paper tape reader is available with interfacing for the Nova computer. It is said to be able to load programs five times

faster than a model 33 tty. Called the N101, the reader uses Nova software. The price is \$1545 mounted on a customer-supplied Nova 4007 I/O interface board, or \$1675 mounted on an N100 printed wiring board

(requiring one subassembly slot in the Nova). Delivery is 60-90 days ARO. PIVAN DATA SYSTEMS, INC., Lincolnwood, Ill. For information: CIRCLE 506 ON READER CARD

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My secretary, the trouble-shooter.

DETECT makes her a data transmission expert.

There's been a major breakthrough in data transmission testing. It's called *detect* (for data error test and evaluation of communication terminals). And what it does is enable anyone to perform end-to-end testing simply by pushing a button.

Detect consists of a single central diagnostic unit and as many, or as few remote test units as your system requires. To isolate trouble anywhere in the system, all you do is press a button. The front panel promptly displays the result of the system analysis...and pin-points the trouble spot, whether it's the line, the data modem or even your distant terminal equipment.

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Detect reduces delays, minimizes costly service calls and cuts system down-time dramatically.

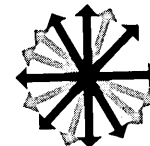
It has plug-in compatibility with existing communications modems and terminals, and, unlike other diagnostic systems can be used economically with any size network. And detect costs less than you think.

Detect. It takes the trouble out of trouble-shooting.



DATA PRODUCTS *detect*

DATA PRODUCTS Telecommunications Division 65 Commerce Road, Stamford, Conn. 06902



Real-time Executive

The addition of a real-time executive to this manufacturer's 620/f mini-computer is significant for several reasons: It puts the 620/f in the market place of the xds Sigma 3, the IBM 1800, and the CDC 1700 for real-time and concurrent background processing, and at a competitive price. It's also the vendor's first unbundled software offering. The monitor is called VORTEX and requires a minimum 16K of 620/f core to perform file management, i/o, and other functions. Multitask foreground processing and the VORTEX system run in protected memory to reduce the chance of a background program clobbering the monitor. The demarcation line separating protected and unprotected memory can be dynamically altered. The price of VORTEX ranges between \$2500 and \$5K depending on customer needs. VARIAN DATA MACHINES, Irvine, Calif. For information:

CIRCLE 532 ON READER CARD

Application Development

The O-PLEX I set of programs approaches the job of getting customer application programs on-line in a different manner than most other packages. Instead of being oriented from the cpu outward to the terminal and procedural end of the application, O-PLEX I looks at the application from the terminal side inward. That seems to make sense—if a procedure needs to be changed, it's a lot easier to change coding in a small module at the outside of the system than change the basic supervisor with its interrelated logic. O-PLEX I is written in BAL for os/360 systems and requires a minimum of 80K bytes of memory. The price of \$75K includes the supporting documentation, or the program may be rented for \$1500/month. Installation and education are handled separately on a fee basis. OMNIS CORP., Dallas, Texas. For information:

CIRCLE 534 ON READER CARD

Key Word Indexing

KWINDEX is a COBOL program that generates cross-reference listings of the key word content of books, articles, procedures, or practically any information data base. A free-form input format field allows specification of 100 sort positions, and the program can produce multiple-index listings from a single sort pass. Other features allow the user to suppress unimportant words in each record or file and control the appearance of the output. KWINDEX requires at least a 32K 360 running either dos or os, and is priced at \$700 including a user's manual and supporting documentation. Although the package has been installed in many large firms' information centers since 1968, it has not been actively marketed until now. GOLDEN GATE SYSTEMS, San Francisco, Calif. For information:

CIRCLE 527 ON READER CARD

S/3 Brailer

A Braille programming feature is available at no cost to System/3 Model 10 card system users. It's an addition to the RPG II compiler that causes the period in the System/3 printer to be used to form the Braille characters. Users are supplied with the necessary cards and instructions but must supply their own elastic strip to be stretched over the type to make the proper print impression. IBM GENERAL SYSTEMS DIV., Rochester, Minn. For information:

CIRCLE 528 ON READER CARD

Cobol, RPG Aids

COBOL Aids and RPG Aids are assembly language subroutines that allow programmers to use os and dos facilities not normally accessible by them. These include abnormal termination, obtain date and time, date computation and editing, etc. The routines require 2-4K core each. The os versions are priced at \$600 for COBOL, \$400 for RPG, \$800 for both: the dos Aids are \$500, \$300, and \$640. DATASONICS, INC., New York, N.Y. For information:

CIRCLE 529 ON READER CARD

Report Generator

A COBOL report generator for Honeywell mainframes provides simplified English instructions for use by non-computer personnel. A dictionary and handbook are provided. Called Vision, the package enables the user to obtain routine statistics and analyses. It requires minimum 20K and runs on any Honeywell cpu supporting COBOL. A one-year contract is \$5K including support. DICTAPHONE COMPUTER SERVICES, Norwalk, Conn. For information:

CIRCLE 530 ON READER CARD

File Generator

The Pro/Test file generator allows conditional field and record generation and can create segmented hierarchical file structures similar to those of DL/1, modify previously defined records, and create files in ascending or descending sequence on up to nine levels of control. All processing is done in main memory. It runs under System/360 os or dos and on Honeywell Series 200. Purchase is \$3900 and up; rental prices begin at \$100 per month. SYNERGISTICS CORP., Burlington, Mass. For information:

CIRCLE 510 ON READER CARD

Optimization Aids

The ETA family of optimization aids consists of three separate programs for counting the execution times of FORTRAN, COBOL, and PL/I programs, as well as the frequency of statement usage. Routines are also available for producing computation time histograms on systems that allow timer interrupts. Each program in the ETA series is written in FORTRAN IV, occupies about 1K bytes of core, is supplied in tape or object deck form, and is priced at \$4500. Lease terms are available. COMPU-TREND, Cupertino, Calif. For information:

CIRCLE 524 ON READER CARD

Cross-assembler

The Extended ATI-16 assembler takes DAP-16 source code written for any Series 16 Honeywell computer, assembles it on any os/360 machine that has 44K bytes to spare, and delivers an object program in paper tape form back to the Honeywell computer. Features include conditional assembly, complex relocation calculations, parenthesized subexpressions and arithmetic operators, triple precision data type, and readable text on the paper tape. The price is \$3500. AUTOMATION TECHNOLOGY, INC., Champaign, Ill. For information:

CIRCLE 533 ON READER CARD

Books for the Computer World

- Simulation with GASP II: A FORTRAN based Simulation Language**—A. Alan B. Pritsker and Philip J. Kiviat
Offers a thorough description of GASP II, discussing its implementation and illustrating its application in different problem areas.
1969 352 pp. (81042-4) paper \$ 7.50
(81043-2) cloth \$10.95
- Computers and Telecommunications: Issues in Public Policy**—Stuart L. Mathison and Philip M. Walker
Covers recent changes in FCC regulations, technological developments, and new trends in the rapidly growing computer/communications services industry.
1970 270 pp. (16591-0) \$13.50
- OS/360 Job Control Language**—Harry W. Cadow
Presents the rationale for computers (specifically the S/360), data processing, and multiprogramming with the S/360 Operating System.
1970 301 pp. (64292-6) \$12.50
- The SNOBOL4 Programming Language, 2nd Edition, 1971**—R. E. Griswold, J. F. Poage, and I. P. Polonsky
A revised, expanded instructional and reference guide to Version 3 of the SNOBOL4 programming language.
January 1971 256 pp. (81537-3) paper \$7.50
- Data Structure and Management**—Ivan Flores
Provides a thorough introduction to the various techniques available for organizing and using data.
1970 390 pp. (19732-7) \$13.95
- Assemblers and BAL**—Ivan Flores
Covers assemblers and assembly language in general and the OS/360 assembler language in particular.
March 1971 420 pp. (04956-9) \$12.00
- Job Control Language and File Definition**—Ivan Flores
Geared to the latest computer equipment, it gives techniques for streamlining the amount of information needed in describing any job.
August 1971 approx. 288 pp. (51000-8) \$12.50
- Perspectives on the Computer Revolution**—Edited by Zenon Pylyshyn
Lends perspective to the computer revolution by placing computer science into social, scientific, intellectual, cultural and historical contexts
1970 576 pp. (66076-1) \$10.50

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... SOFTWARE

S/3 Back Office

The Disc Brokerage Accounting System is for use by smaller brokerages transacting from 25 to several hundred trades a day. It runs on System/3 models 6 or 10 disc versions with minimum 16K characters of storage. Trade data is keyed into cards which are input daily, and the RPG II program updates the files and prints as many as 35 reports, including customer confirmations, trade and settlement date blotters, and daily journals. License for the first year is \$350/mo. IBM CORP., White Plains, N.Y. For information:

CIRCLE 531 ON READER CARD

360 Compiler Assembler

Compiling, assembling, and link-editing functions have been consolidated into one software package called CAL. It operates in an IBM 360 environment having at least 350K of memory (model 50s and up) and the OS/360 monitor. CAL works on mixed job streams containing FORTRAN, BAL, and object decks. Compiler options can be switched between decks, and either the G or H FORTRAN IV compiler may be selected for individual source decks. Source deck translation from BCD to EBCDIC with automatic sequencing and labeling are also offered as part of the software. The price is \$2K. AVCO COMPUTER SERVICES, Wilmington, Mass. For information:

CIRCLE 525 ON READER CARD

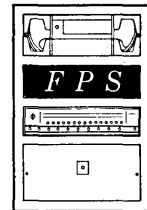
Efficiency Analysis

LEAP, the Lambda Efficiency Analysis Program (March '70, p. 217), designed to evaluate OS programs, now has a companion that monitors such things as hardware utilization, the operating system, and the job stream being executed. Whereas LEAP is intended to pinpoint inefficient code in a problem program, System/LEAP locates bottlenecks in the overall system resource utilization. It also includes the vendor-developed Select One Language that enables generation of statistics not included in standard System/LEAP reports. The programs run under 360 or 370 OS and require about 16K core. System/LEAP is priced at \$4K. LAMBDA CORP., Arlington, Va. For information:

CIRCLE 535 ON READER CARD

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transcendentals?



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	Arctan: 625
	Log: 441
	Exp: 392
	Sq. Root: 384
Note:	Add: 31.1
These are	Subtract: 31.1
Total times, including set-up.	Multiply: 36.7
	Divide: 39.1
	Fix: 20.5
	Float: 16.7

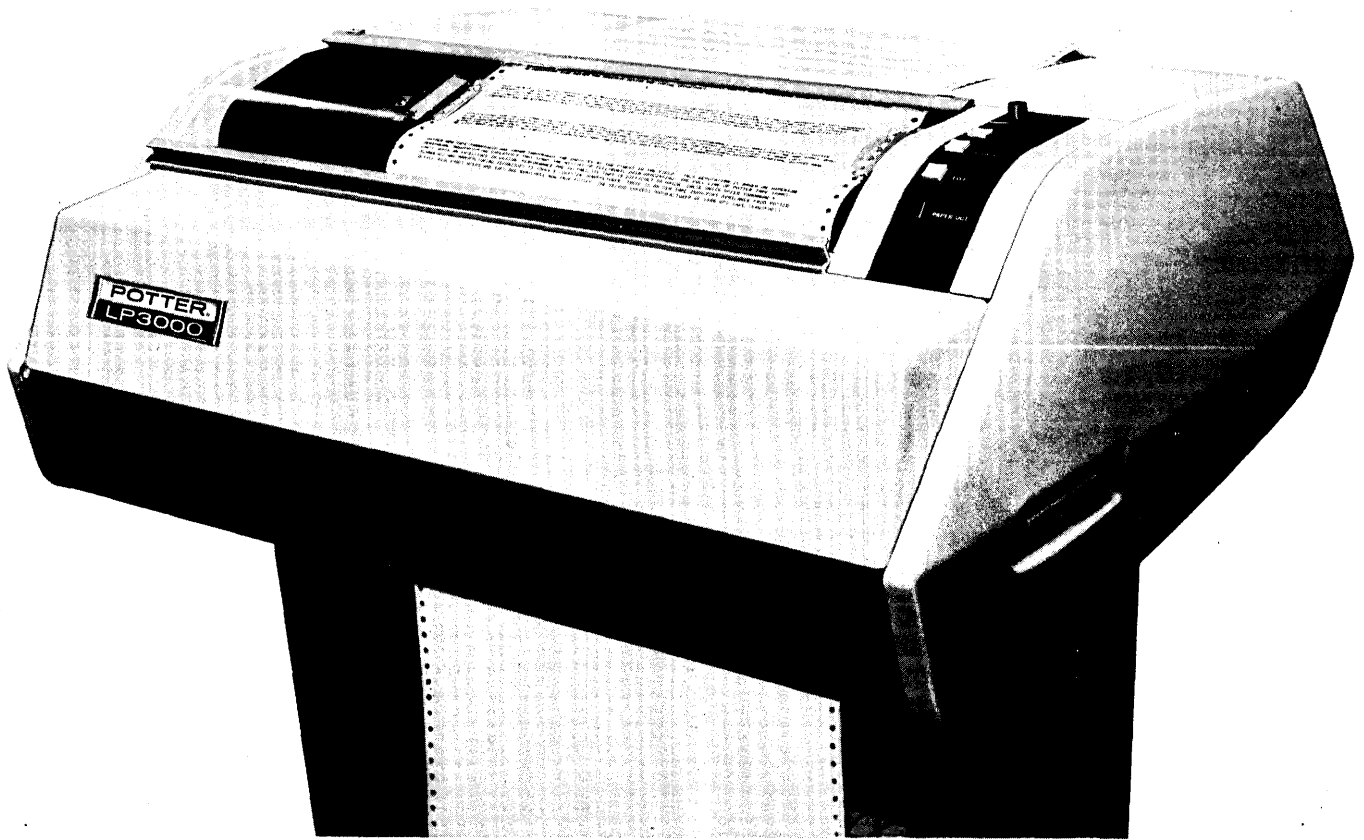
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CIRCLE 10 ON READER CARD

DATAMATION

A new concept in durable line printers and plotters.



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The Potter LP 3000 series printers have been designed for maximum reliability. The mechanical simplicity of these units lets them operate day after day without maintenance. For mini-computer data systems or terminals, the Potter LP 3000 and LP 3300 offer the lowest cost, high performance line printers available. These two outstanding products feature a unique printing principle which provides clear, sharp multiple copy printout.

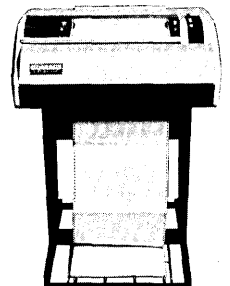
LP 3000 — Prints 135 lines per minute with 64 characters on 132 columns. Its sharp, clear multiple copy printout makes it ideal for mini-computer or data terminal use. It is available now at just \$3,385 each in quantity 100.

LP 3300 — Same rugged design and simplicity as the LP 3000 but operates at a speed of 300 lpm. Well suited for applications requiring medium speeds. The price for this unit is just \$4,220 in quantity 100.

The LP 3000 and LP 3300 are also available in printer/

plotter versions, the LP 3050 and LP 3350 respectively. These graphics versions of the Potter Printers perform high resolution digital x-y plotting under cpu control. The LP 3050 operates at a speed of 15,000 points per second. The LP 3350 plots at a speed of 32,000 points per second. Both of these units can print and plot simultaneously.

Potter Line Printers increase system reliability, reduce maintenance and build customer confidence. For more information on the complete line of Potter printers, magnetic tape units, disk drives and 96-column card equipment, write today to Potter Instrument Company, Inc., 532 Broad Hollow Road, Melville, N. Y. 11746 or phone (516) 694-9000.



POTTER. A lot more than less expensive.

An open invitation to the 1,000 data processing managers in America who want to reduce data preparation costs and errors at the entry point. See DATA IV/70, the most intelligent data entry terminal system in the industry.

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DATA IV/70 is a key-to-disc system that reduces the elapsed time from data creation to completed data processing.

The key features of DATA IV/70 are:

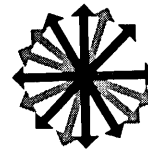
- Complete functional capabilities of the IBM 029/059 and 129 keypunch verifier as well as stand alone key-to-tape units.
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- Six levels of program control.
- Variable length records.
- Video display of entire record.
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- Dynamic allocation of disc storage.
- Remote, local, or magnetic tape output options.



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Chicago, Dean Marr, Branch Manager (312) 693-5020
Los Angeles, Tom Bowers, Branch Manager (213) 641-6060
San Francisco, Randy Craven, Branch Manager (415) 692-4360





Mini-Simulation

An eight-page brochure describes Mini-Sim, a programming method designed to simulate any small computer within a large computer using the host computer's added facilities to develop and test programs that will be fully operational and ready to load into the mini. The brochure also differentiates between simulation and cross-assembler methods and lists "advantages" to be derived from simulation methods. TRIPPE SYSTEMS INC., San Francisco, Calif. For copy:

CIRCLE 526 ON READER CARD

Voice Response

Sixteen-page brochure describes "the only voice response system to electronically store phonemes (the smallest parts of speech)," which gives it a vocabulary that is "virtually unlimited" and multilingual. It also covers advantages of voice response over printouts, crt's, and other information retrieval terminals. PHONPLEX CORP., Jericho, N.Y. For copy:

CIRCLE 536 ON READER CARD

Flowcharting Software

"An Atlas for the Visual Comparison of COBOL Flowcharting Software" is a 96-page publication which indexes uniform samples of the output of 18 flowcharters after first outlining issues and criteria for design or selection of software for machine generation of program flowcharts. Formats and systems of notation are emphasized. Copies are available for \$3 (specify item R-71-129). INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, 345 E. 47th St., N.Y. 10017.

Data Communication

Updated eight-page catalog of data communications products includes descriptions and technical specifications on a full line of standard modems operating at speeds of 2000 bps, 2400 bps, 3600 bps, 7200 bps, and 9600 bps and up to 1 million bps. It also covers multiplexors, transmission test equipment, and specialized modems. ICC DATA COMMUNICATION PRODUCTS, Miami, Fla. For copy:

CIRCLE 537 ON READER CARD

Mini-Digital Recording

Twenty-eight page "Design Digest for Mini-Digital Magnetic Recording" is a collection of applications information compiled for personnel working with minicomputers, programmable desk-top calculators, credit-card verifiers, input-output systems, point-of-sale terminals, and other peripheral equipment. NORTRONICS CO. INC., Minneapolis, Minn. For copy:

CIRCLE 538 ON READER CARD

Basic Programs Index

Titles and order numbers of more than 100 time-shared Basic programs are covered in a six-page index which includes operating and programming systems, data handling, math and numerical analysis, probability and statistics, scientific and engineering applications, management sciences and operations research, and business and manufacturing operations. HEWLETT-PACKARD CO., Palo Alto, Calif. For copy:

CIRCLE 539 ON READER CARD

Computer Scheduling

Catalog describes kits for scheduling one, two, and three computers and for scheduling multiprocessing jobs where one, two, or three jobs are running simultaneously on one computer. EDWARD OCHMAN SYSTEMS, Fairfield, Conn. For copy:

CIRCLE 540 ON READER CARD

Microfilm Duplication

Capsule descriptions of eight microfilm duplication and distribution systems with case histories are contained in a booklet titled "New Frontiers in Micro-Image Data Distribution." SCOTT GRAPHICS, INC., Holyoke, Mass. For copy:

CIRCLE 541 ON READER CARD

DP Accessories

Sixty-four page catalog of data processing accessories is divided into three major media categories: tape, disc, and card. The card section includes a new range of accessories developed specifically for the IBM System/3. WRIGHT LINE, Worcester, Mass. For copy:

CIRCLE 542 ON READER CARD

Data Entry System

Eight-page brochure describes vendor's newest data entry system, the CMC 5, hardware and software compatible with its larger systems and consisting of 12 Keystations con-

nected to a supervisory console housing a general-purpose computer, a magnetic tape unit, and a magnetic disc file. It is described as capable of operation both at centralized edp facilities and at remote satellite locations where it can send and receive

data via common carrier data sets at up to 2,000 baud. COMPUTER MACHINERY CORP., Los Angeles, Calif. For copy:

CIRCLE 543 ON READER CARD

Computer Bibliography

Brochure describes a "Quarterly Bibliography of Computers and Data Processing" described by its publishers as "designed specifically for the practicing computer and data processing professional." The bibliography is cumulative since 1968 and

reviews more than 50 periodicals from the computer and management fields. APPLIED COMPUTER RESEARCH, Phoenix, Ariz. For copy:

CIRCLE 544 ON READER CARD

Guide to Cassettes

The whats, hows, whens, and whys of cassette use are spelled out in a pocket-sized guide which also includes maintenance tips. TDK ELECTRONICS CORP., Long Island City, N.Y. For copy:

CIRCLE 545 ON READER CARD

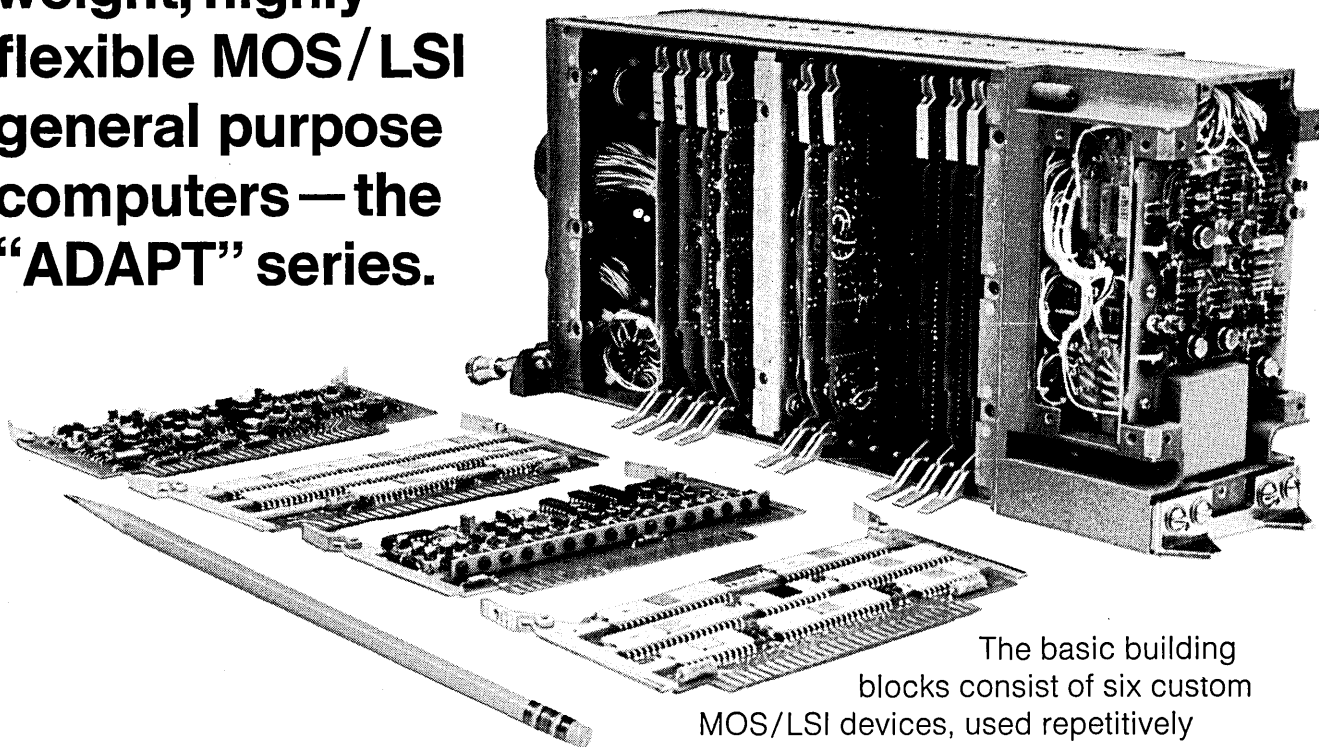
Garrett has a new family of minimum weight, highly flexible MOS/LSI general purpose computers — the "ADAPT" series.

The first application of the "ADAPT" G. P. Computer concept has been the air inlet control system for the Navy's F-14. It meets all the requirements of MIL-E-5400, Class 2 and is in quantity production.

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Even more remarkable is the flexibility of the "ADAPT" series, achieved through

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The basic building blocks consist of six custom MOS/LSI devices, used repetitively to tailor a task-oriented processor for your application with a minimum of non-recurring cost.

Garrett has a family of MOS/LSI general purpose computers; and you can learn more about them with a phone call or letter.

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PRIVATE LINE PROTECTION TARIFF DELAYED 90 DAYS

AT&T has agreed to FCC's request for a 90-day delay in the effective date of a proposed tariff re protective devices on private lines, which was scheduled to begin Aug. 15. The commission said it needed more time for consideration, particularly in view of Bell's own statement that "protection already has been incorporated in the circuits provided to many of these customers." AT&T said that, contrary to criticism it was discouraging competition in favor of its own manufactured protective devices, Bell System Companies actually had purchased over 45% of such arrangements installed in 1970 from producers other than its Western Electric subsidiary. However, it noted, while other manufacturers and customers have the technical competence, only AT&T has legal responsibility for maintaining service quality.

Meanwhile, the U.S. Court of Appeals (Second Circuit) upheld FCC's view that Telpak sharing provisions were unlawfully discriminatory. But it rejected the commission's remedy of unlimited sharing and ordered the case back to FCC for reconsideration to determine a prescription for "just and reasonable" rates. Next probable step will be an FCC order telling the carriers to come up with an alternate proposal. One possibility is a joint use arrangement similar to the exclusive one Arinc already has won on behalf of the airlines.

CENSUS PANEL WARNS ON DATA SYSTEM INTEGRATION

Individuals should never be required to provide information that could be integrated with any data system not operated exclusively by the Census Bureau under its confidentiality provisions, a special census review panel stressed. In its report to the Secretary of Commerce, the Decennial Census Review Committee said that names should be separated from statistical data on microfilm records retained. The panel recommended creation of an advisory group to protect the privacy and confidentiality of census data. It said "creative vigilance will be required in the future because enumeration methods, data-handling technology and the need of governments" are changing rapidly. It recommended using new technology for additional safeguards. Meanwhile, Rep. Charles Wilson (D-Calif.), House Census & Statistics Subcommittee chairman, is seriously considering legislation to authorize a mid-decade census, despite Administration resistance. The bill would provide a basic population/housing questionnaire far shorter than the decennial census, but would include the basic data for small area planning.

CAPITOL BRIEFS

The President has signed legislation permitting the Export-Import Bank to finance sales to Eastern Europe and Red China (with White House approval)...The general patent revision bill's Amendments 23 and 24, guaranteeing states' rights in protecting trade secrets and codifying patent licensing, are expected to be adopted with some modifications by the Senate Patent Subcommittee very soon, committee sources say.

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PEOPLE

Disc file pioneer **Reynold B. Johnson**, an IBM Fellow at the firm's Los Gatos (Calif.) Laboratory, has retired from the company that he joined in 1934. Johnson began work in direct access storage products in 1952 when he established IBM's first West Coast laboratory at San Jose, which is still engaged in this effort. He has 82 patents (and two pending), including the one for Mark Sensing which brought him to IBM . . . Firing-and-hiring department: Singer Co., which recently laid off more than 600 people in San Leandro, has announced two new appointments in the Friden Div. there. **Dr. Franklin P. Dixon**, former IIT product manager for European electronics, has been named vp, product management-systems, with responsibility for the planning, direction, and coordination of product development for the division's systems line, including computers and peripherals, data origination, and data communications systems. And ex-Uni-Tote marketing vp, **Patrick C. Byrne**, is now vp, product management-MRCS, a new position . . . Speaking of Uni-Tote, **Ralph D. Ketchum** is its new vp and general manager. He comes from Control Data, where he had been vp/gm of the Data Services Div. . . **John R. Rodfong** has been elected president and chief executive officer of Cavanaugh Leasing Corp. in addition to his positions as treasurer and board member. The company has just consolidated its administrative and operational functions at Richmond, Va., headquarters with the exception of the Computer Leasing Div., which will remain in NYC . . . Also in leasing, Randolph Computer Corp. has formed a new Computer Equipment Financing Div. to handle special financing programs for peripheral makers and other independent manufacturers in the computer industry. **J. J. MacIsaac**, who worked as a consultant in establishing the new operation, was named its vp and general manager . . . Military appointments: **Major General Henry C. Schrader** has assumed command of the Army's Computer Systems Command, Fort Belvoir, Va.; and **Col. Leon A. Wilson** is the new director of Procurement and Production at the Air Force Electronic Systems Div., Hanscom Field, Mass. . . Rounding out the team at Infomax Corp., Sunnyvale, Calif., manufacturer of com-

puter-oriented electrostatic printer/plotters, are president **Gene Applegate**, a founder and former division president at Data Technology; operations vp **Richard Thornton**, most recently operations manager at Mark Systems; and vp of marketing **Barry Gottlieb**, formerly director of marketing at Sibone, Inc. . . Promoted from executive vp to president at BASF Systems Inc., Bedford, Mass., is **Franz J. Leibenfro** . . . **Edward J. Pesce**, a former Justice Dept. attorney and planner recently instrumental in the reform of the District of Columbia courts and previously in the creation of the Law Enforcement Assistance Administration (LEAA), has been appointed director of justice systems program development for Westinghouse Electric Corp.'s Public Management Services (PMS) unit, an effort to help improve the nation's criminal justice system . . . **Charles E. Allen**, a consultant to Itek Corp., Lexington, Mass., for 10 years, has been elected a vp of the company and president of its international subsidiary. Allen, who has extensive background in international business relations, will be headquartered in London . . . **George A. Howard** has been promoted to group vp in charge of product development and production for Edutronics Systems International, Inc., Los Angeles-based producer of multimedia instructional systems . . . **Robert F. Jefferies** has joined Cipher Data Products, San Diego manufacturer of a line of digital mag tape recorders, as controller. His previous experience in the computer and electronics industries includes positions as controller of Microwave Electronics, Applied Radiation Corp., and Lex Computer Systems . . . **Clifford G. Zimmer, Jr.**, is the new product line director for computer peripheral equipment at Hazeltine Corp., Greenlawn, N.Y. . . Computer Diode Corp., Fair Lawn, N.J., semiconductor firm, has elected **Karabet Simonyan** president and chief executive officer . . . **Howard B. Eskin**, former director of computer planning and a partner with F. I. duPont, Glore Forgan & Co., New York-based stockbrokerage, has joined Automatic Data Processing, Inc., Clifton, N.J., as corporate director of technical development for the nationwide computer services firm. He will be responsible for technical administration, R&D, hardware technology, systems software, product applications, systems, and programming. ■

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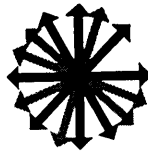
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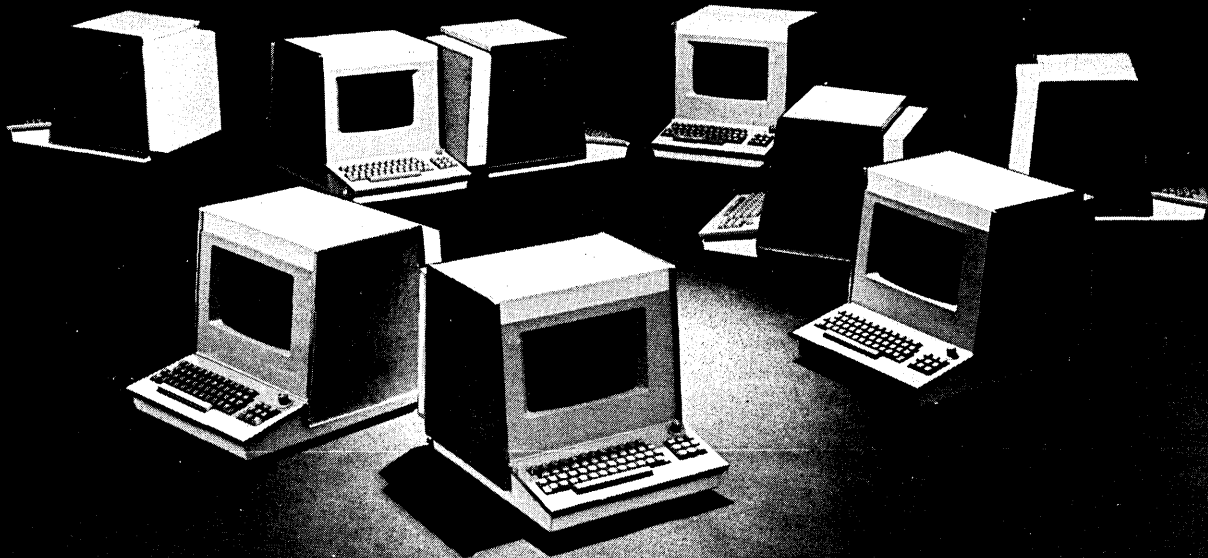


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CIRCLE 12 ON READER CARD

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THE FORUM

APL-a Potential Liability?

C As a sporadic user of APL I am not in accord with the general view that APL is some kind of panacea. On the contrary, it seems to me that as a programming language it is singularly unsophisticated and the fundamental propositions upon which it is based inhibit its use and bound its growth.

Yet we see this language gathering popularity and momentum because of the great liberation it represents over the conventions of BASIC and FORTRAN. The danger in this situation is that which we observe in connection with the established languages—namely, that the user commitment can become so great that no alternative is commercially viable and progress atrophies. At this time it is possible for some conversational time-sharing language to achieve this eminence and there will be many years in which to regret a hasty choice.

APL is founded upon an extended character set and each standard primitive function in the language is introduced as an infix or prefix operator named by a nonalphanumeric character. (Some characters are compounded of overstruck simple characters and there are two functions represented by what seems to be a syntactically anomalous juxtaposition of simple characters.)

This is a bold innovation with fine disregard for existing I/O terminal fonts. Moreover, it sets a bound to the available primitives close to the number which exist now, so they had better be an adequate set! But they can never be an adequate set and only an extensible language in which



instructions are synonymous with instructions. Several interesting facilities result. For example, whereas parameters can now only be called by value they might be called by name because the value of a macro can be the name of a parameter. However, it is not clear that this facility can endure when, hopefully, APL is not interpreted but compiled.

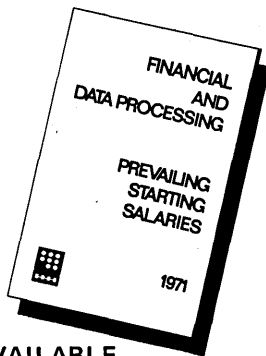
What I am trying to illustrate by this example is that the notion of an extended character set to embrace all necessary primitives is moribund, and that the need for extensions to the set of necessary primitives is felt now and will always be felt.

A consequence of the extended operator set is the rule that there shall be no operator precedence hierarchy, and, surprisingly, that expression execution shall be from right to left, not left to right. A number of reasons are given for this¹ and although I believe some can be paraphrased to support the opposite view I accept a residue of arguments as cogent. Nevertheless, English is not written that way, and an APL line has to be examined on the left to see if it is in English (System Commands, Comments) before it can be scanned from the right. Moreover, print statements must be printed from the left even though evaluated from the right. This is a

unwanted operators can be redefined can use the power of the interpreter in situations unforeseen by the language designer.

At the present time a new primitive called "execute" is adumbrated. This not only takes us one step nearer to the bound of the character set, but happens to constitute a fundamental revision of the language. This is in fact a macro facility, and because APL is completely interpretive pseudo

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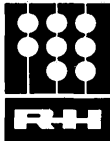
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CIRCLE 304 ON READER CARD

The Forum . . .

tracing disadvantage when the line is a table of function calls and one fails; then nothing is printed. In the case of vector indices the rule does not apply.

A more serious consequence of the right to left rule is that it undermines selection functions by evaluating unwanted expressions. This precludes a satisfactory version of IF . . . THEN . . . ELSE . . . statements and makes the language clumsy in the very places where other languages are simple.

The example:

```

▽ R ← BOMB X
▽ R ← ((X = 0), (X ≠ 0))/
X, ÷ X
    
```

fails with Domain Error when $X = 0$ because it evaluates X even though its selection is meant to be excluded. In fact, even for well-formed expressions this is an unsatisfactory form for selection because of inefficiency and side effects. The same is true for other one-line selectors and so we must revert to IF . . . THEN GOTO . . . forms. It is apparent that left to right scanning would have the enormous benefit of permitting selection before evaluation.

The logical conclusion of right to left scanning appears in the proposed macro facility where macro bodies of more than one line would be executed from bottom to top!²

For these reasons, left to right scanning coupled with left to right assignment might have been, on balance, a better arrangement.

All standard and user-defined functions in APL are considered to be monadic or dyadic operations, and users soon encounter the problem of grouping up multiple arguments into one argument. The higher the rank of the arguments, the more trouble this is and mixed multiple vector arguments seem to be impossible. The policy of attaching arguments by context rather than denotation results in a clean appearance, but creates limitations peculiar to this language.

The available implementations of APL are all interpreters, and although observations upon this may be unreasonable in a language critique, it is all the same subject to the user. Execution is abominably slow!

I have written the world's slowest Fast Fourier Transform, and a Galois

Field Arithmetic package which is too slow to use in an error correcting code simulator. Another problem which took 12 seconds to execute on a FORTRAN time-sharing system (360/50) threatened to take one hour cpu time in APL. No tariff-paying user can put up with that sort of performance.

Is there any alternative to APL? As a matter of fact, there is.

In Britain a language called POP-2 has been implemented on a number of different machines, including the 360 and PDP-10. The compiler interprets main program but compiles defined routines. The standard data types include scalars, words, strings, lists, arrays, but the language is extensible and new operators and new data types may be defined. Declarations are optional except for redefined operators where a precedence rating must be prescribed. With this rating the resident compiler can parse new expressions automatically and yield a tree structure.

The language is built around the lambda calculus and lambda expressions are specifically incorporated. The result of this is that functions can be applied to any number of arguments, or can be partially applied to a subset of arguments and renamed, or an unapplied function can be passed as an argument itself. A function can return any number of functions as a result. In fact, the standard function for creating new data types is one which returns all the functions needed to access the fields in the data map described by the user. The user simply assigns these functions to his field names.

Macro facilities at compile time and "execute" facilities at execution time are standard. System commands are integrated into the language as function calls. The program can be sectionalized to bound the scope of identifiers. Executable source files can be built. And the character set is standard.

After a little exposure to this kind of sophistication the possibility of being locked in to APL is hard to contemplate. In this day and age are we going to adopt a notation?

—Raymond J. D. Reeves

1. "Elementary Functions," K. E. Iverson, Appendix A, S.R.A. 1966.
2. "Quote Quad," Vol. 2, No. 2, July 1970, p. 14.



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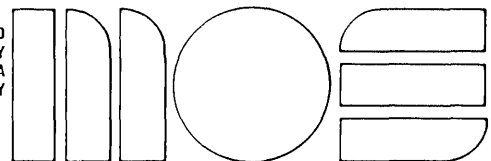
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