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SOFTWARE PACKAGE RATINGS

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- 7 and 9 track NRZI and PE format/ control units to simplify custo[illegible] electronic[illegible] Also, a variety of popular mini-compute[illegible] tape con[illegible]llers are available. Series 9000 [illegible] mance [illegible] impressive as its features, wi[illegible] ansfer rates to 72KHz, and tape speeds from [illegible]ps.

Series 900[illegible] digital [illegible]e transport series around, an[illegible] p it [illegible]way, with constant improvements, rigid [illegible]y c[illegible]ol and greater service capabilities. That sh[illegible] give [illegible]u a warm feeling if you have a requ[illegible]ment for digital tape transports.

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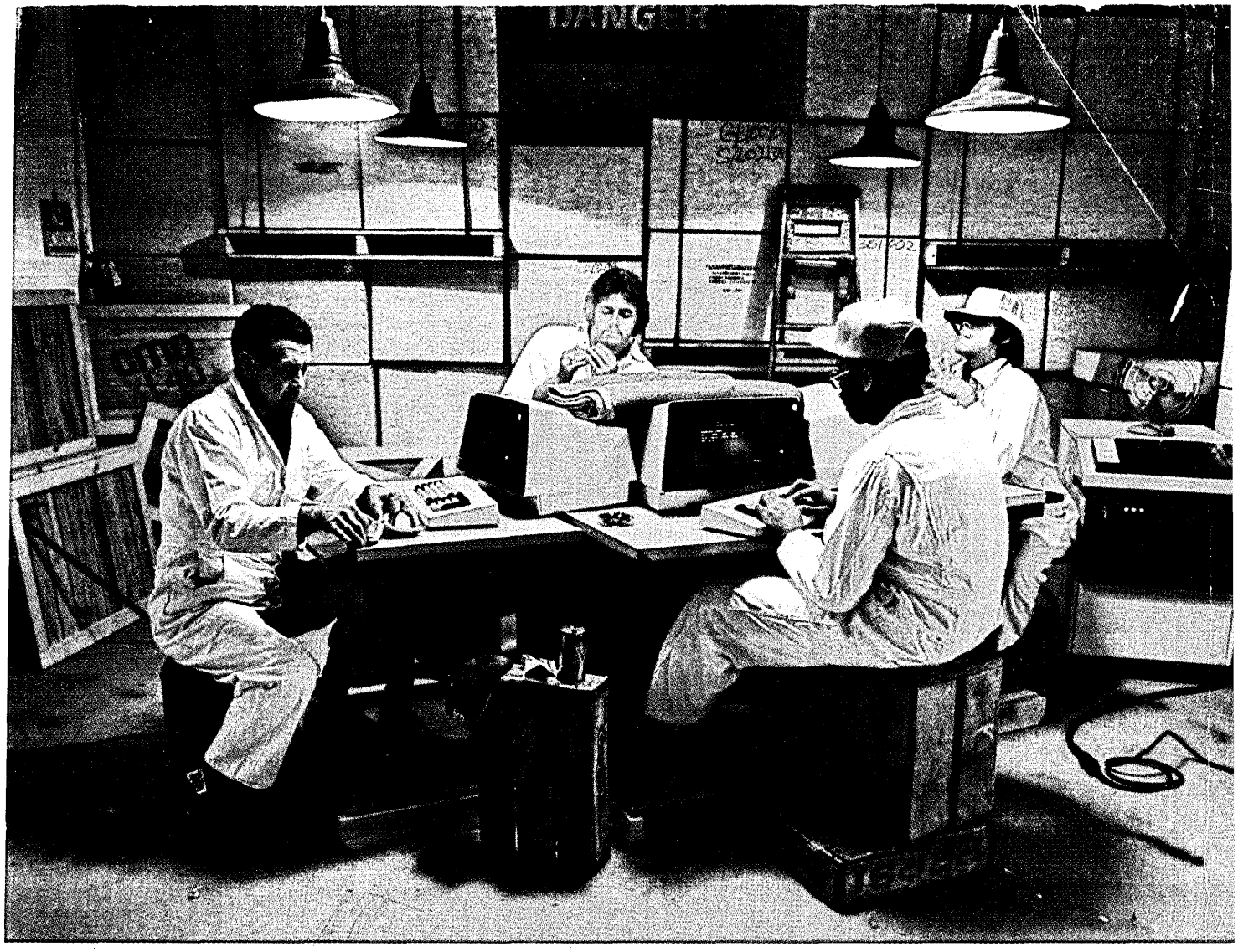

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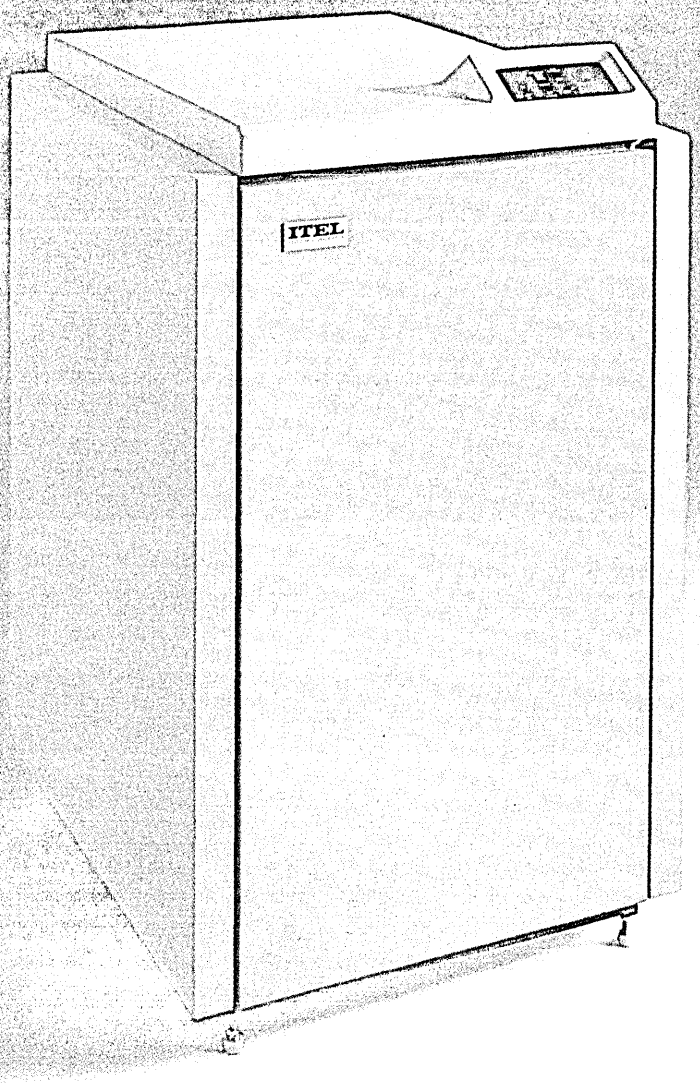

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CIRCLE 27 ON READER CARD

DATAMATION®
1957 77 1977

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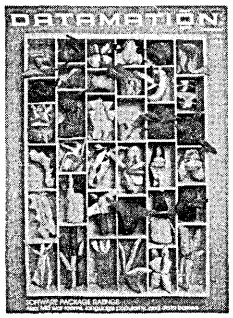

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About the cover
Software packages in all their infinite variety are rated in this issue. Step right up and make your selection from a colorful assortment. Our design is by Susan Anson: Joan Lesser/Etcetera.

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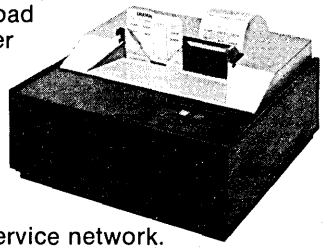

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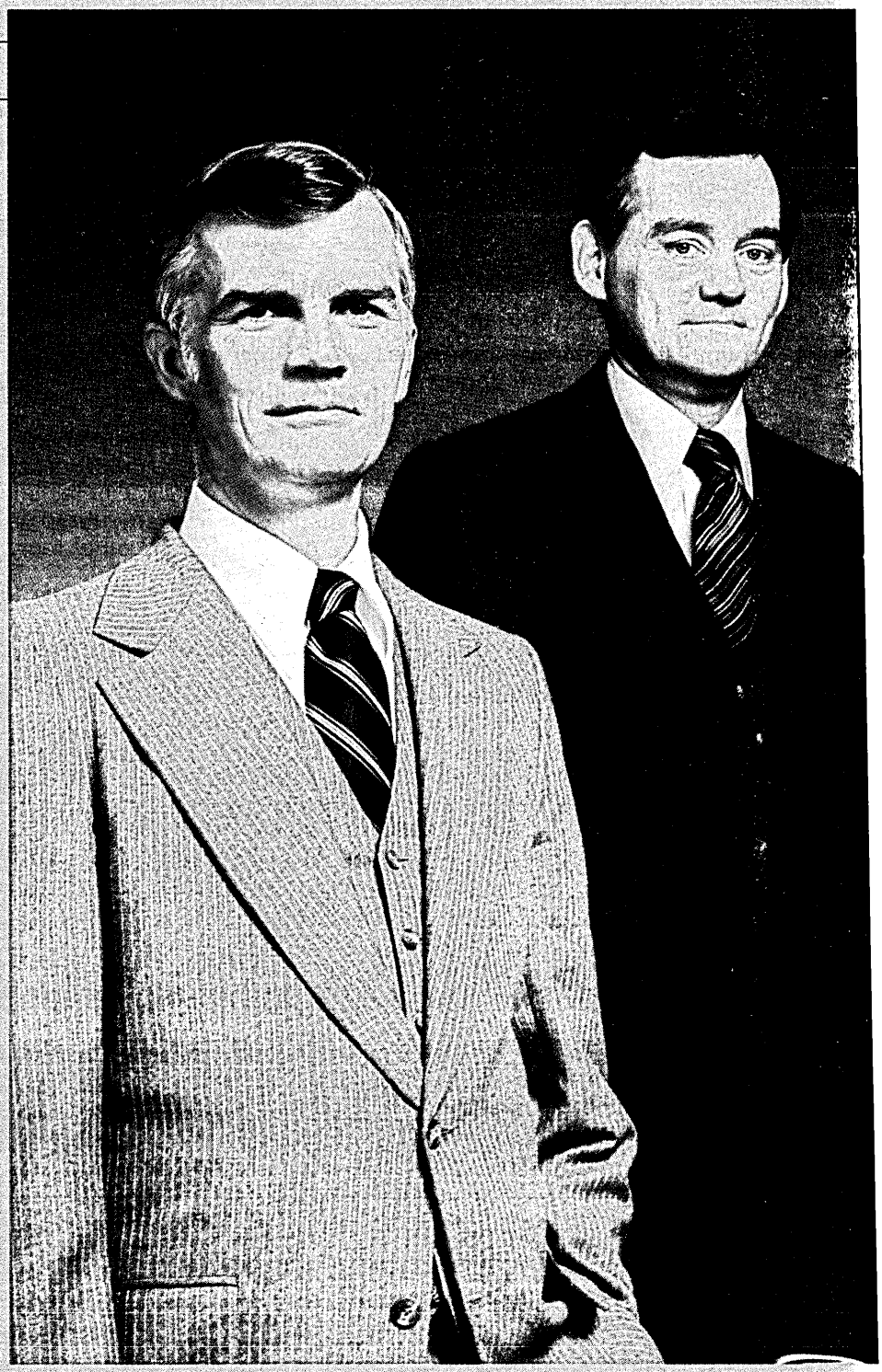

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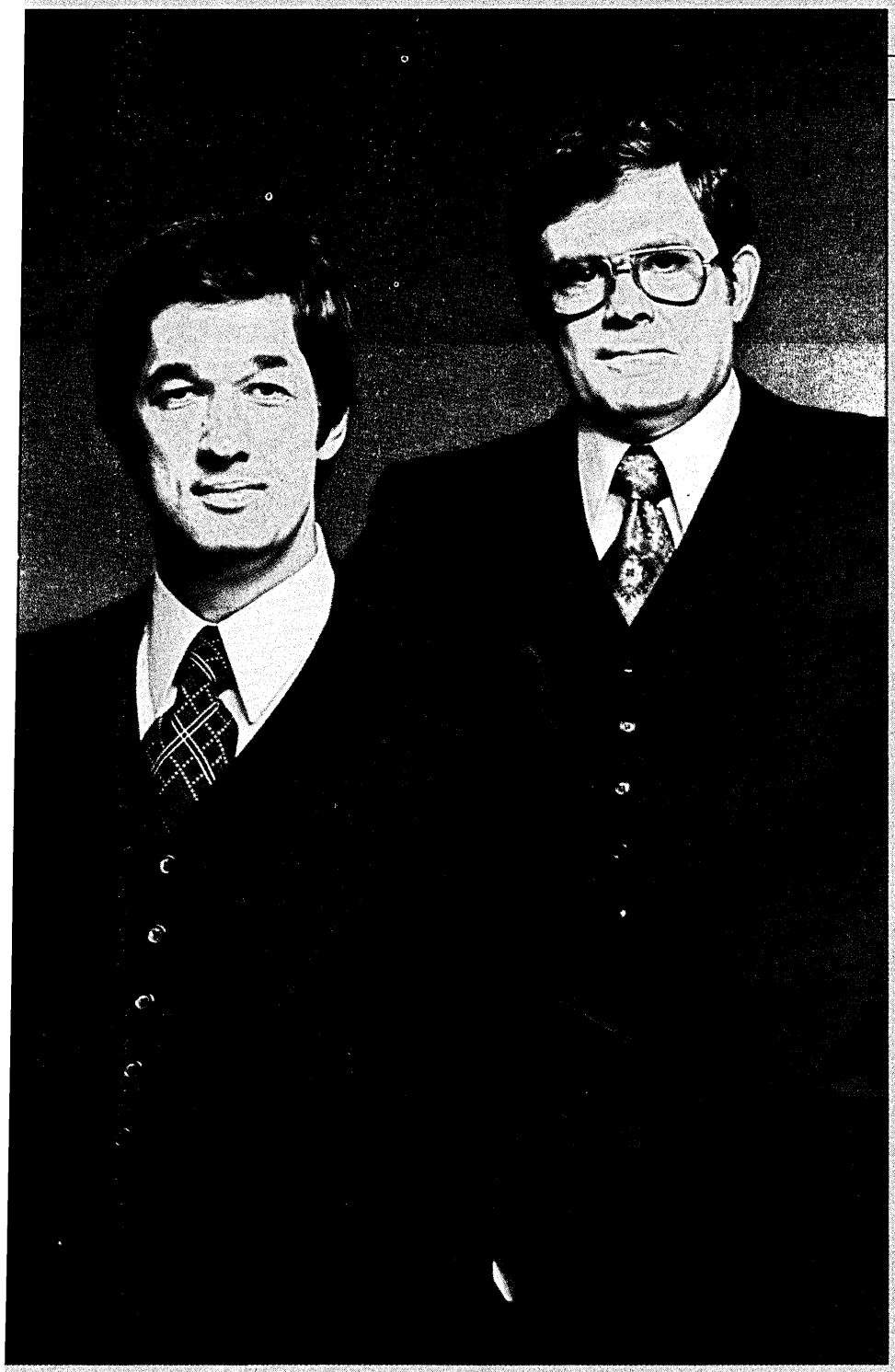
Allen Hufft, VP
Commercial Division

people...lots of them.



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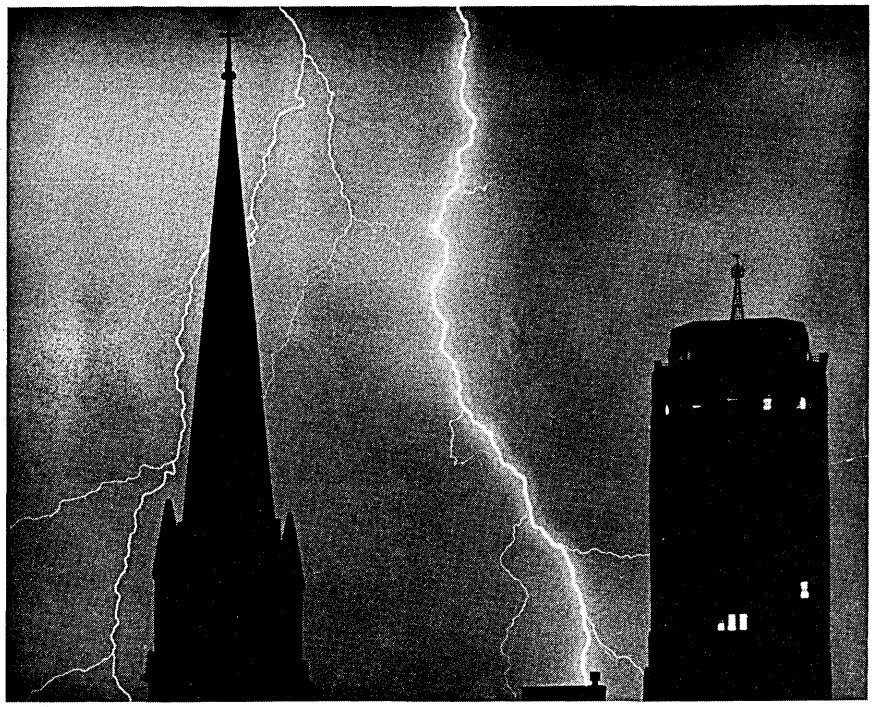

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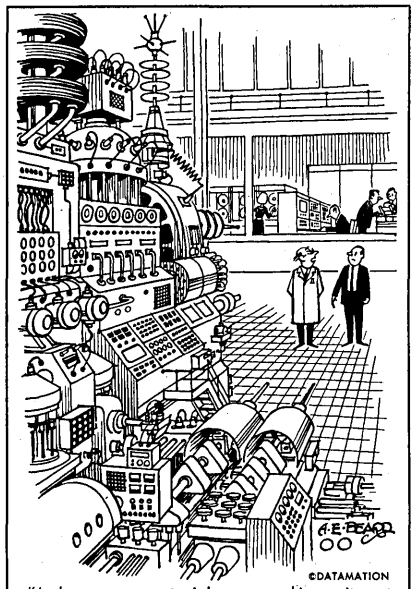
CIRCLE 117 ON READER CARD

Looking Back in DATAMATION®

On our 20th anniversary

November/December 1957

This issue featured 1977 names and claims. "The capabilities of large scale systems at half the price"—not the IBM 3031 and 3032, but Burroughs' Electrodata Div.'s new Datatron 220. A $2.5 million "brain?" The price sounds familiar, but Honeywell's newly acquired Datamatic Corp. hawked a behemoth occupying 5,000 square feet of space. A mini? No, a MinniE, a miniature connector, was advertised by Amphenol.



"And now our computer is busy researching on its vast potential, its staggering implications and why the hell it doesn't work."

Famous (or infamous) personalities even then included Dr. H.R.J. Grosch, who was appointed head of GE's new Computer Applications Laboratories, and Seymour Cray, who became a senior technical staff member at Control Data, compliments of president William Morris.

December 1967

"The Incomplete World of IBM" was the theme of this issue, describing happenings in Japan, Europe, and Australia. The Japanese were trying to wrest more of their own market from foreign interlopers (45 systems were installed then).

The U.K. was suffering "economic instability," and France was pinning all its mainframe hopes on Campagnie Internationale l' Informatique, never dreaming that in nine years it would bite the bullet and merge CII with Honeywell-Bull. ❋

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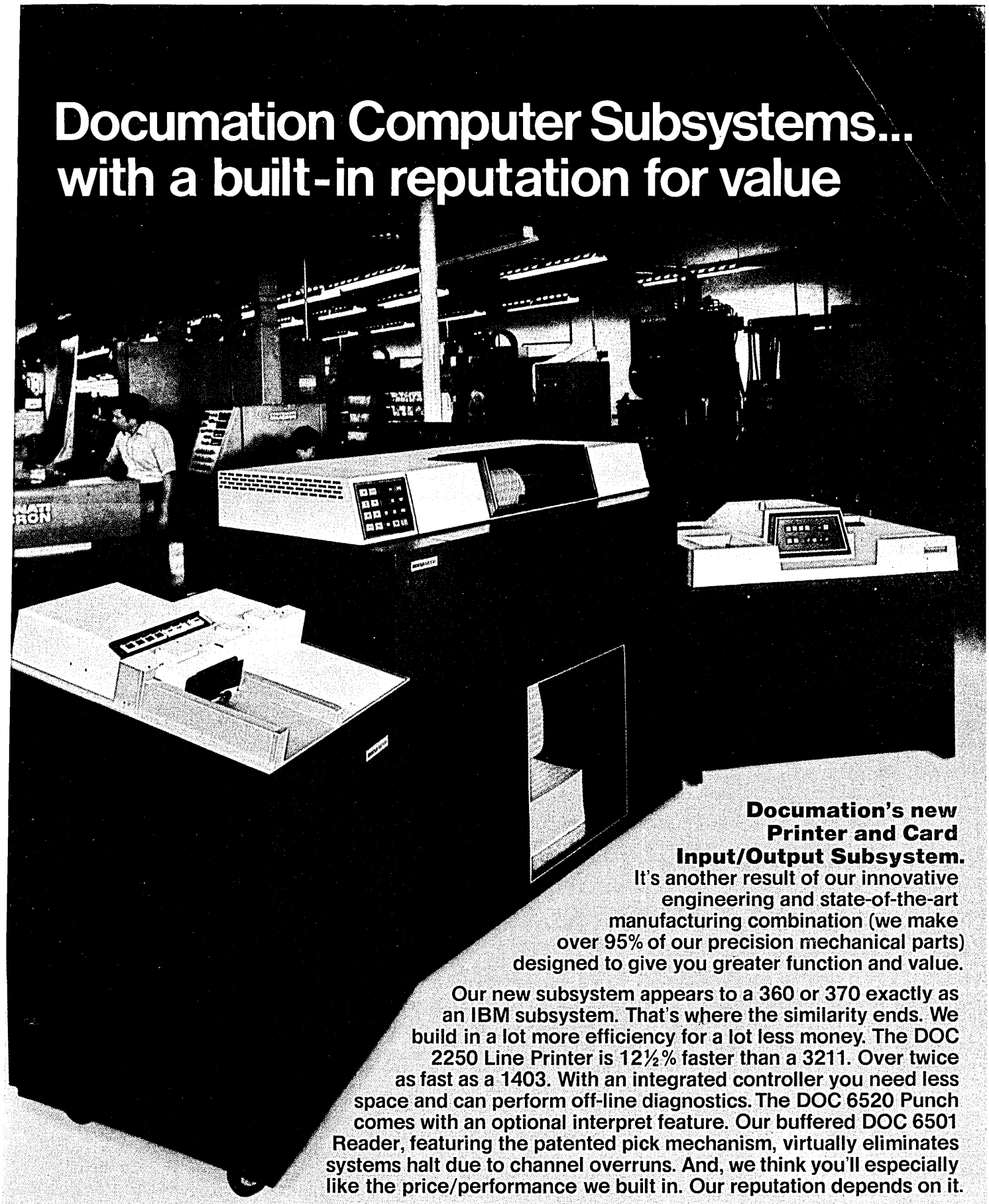

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CIRCLE 45 ON READER CARD

Beckman Instruments had an idea that called for developing a new order service system within 90 days...

When a typical customer order consists of hundreds, or even thousands of precision components, an automated order service system becomes a key element in customer satisfaction and future growth.

Some would have called them dreamers

According to Robert B. Thompson, Manager, Management Information Systems for the Hialpar Division of Beckman Instruments, Inc., as the Hialpar distributor market mushroomed, incoming orders outpaced their manual order service.

So, when Beckman's ability to respond to customer needs started to drop below their standard of a 95% service level, their idea was to start from scratch and design and implement a customized order service system. They gave themselves 90 days to engineer a new system that would not only eliminate current order service problems, but adapt to Beckman's high growth rate projections over the next five years.

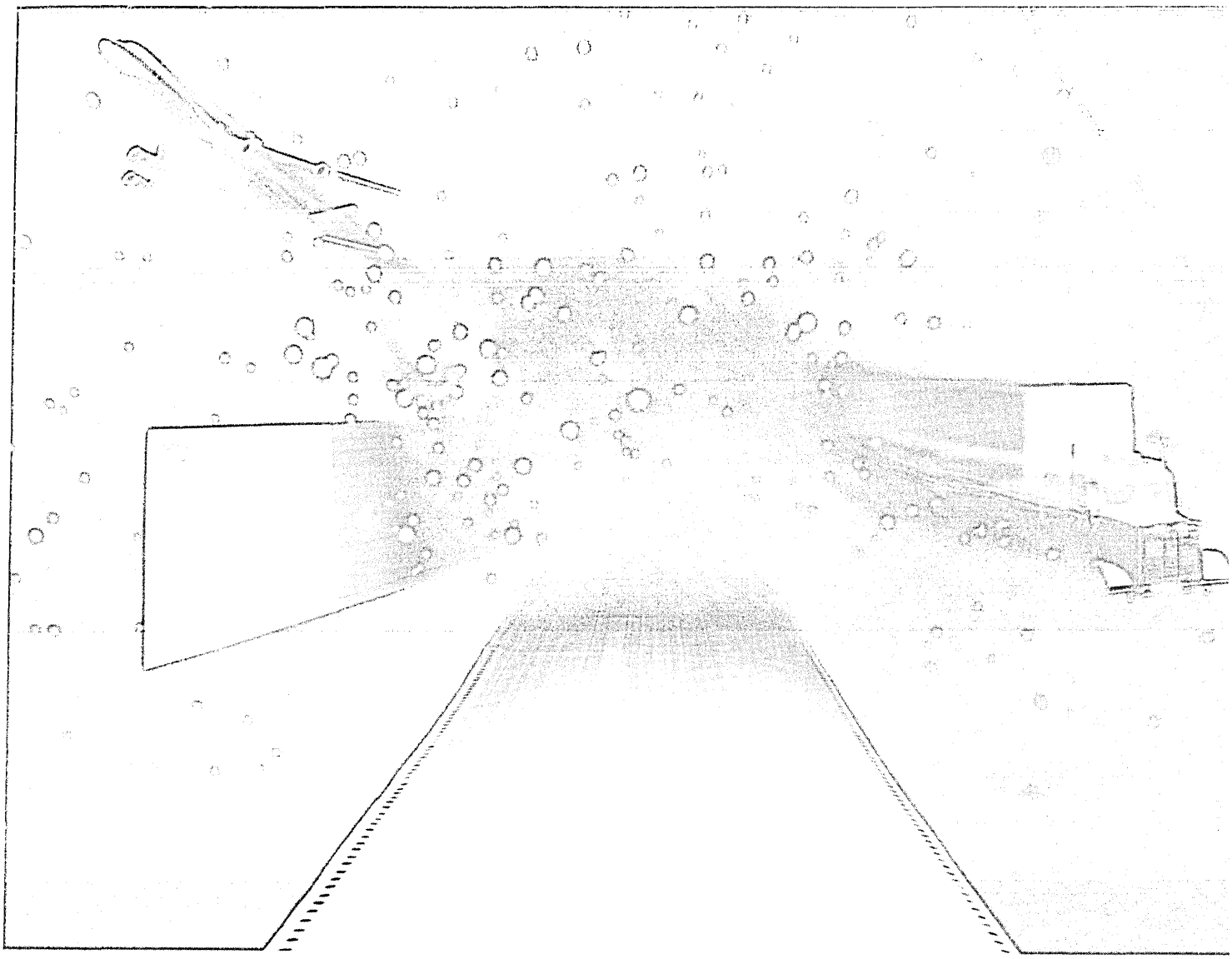
GE system beats schedule by 22 days

Because of its worldwide data processing network and customized programming capability, General Electric computing services was called upon by Beckman to assist in providing a solid solution to their order service problem.

That "solid solution", a customized order service system linking Beckman's Puerto Rico operations and its Fullerton, California headquarters, was up and running on the GE MARK III® computing network in just 68 days.

OMNI, General Electric's order service software generator was the key. Developed by GE to drastically reduce the normal development and implementation times associated with order service systems, OMNI also provides the means to easily customize each system to satisfy particular processing and output report requirements.

Working closely with Beckman's management information systems people, GE application specialists, using the OMNI software, developed a pilot system which satisfied approximately 80% of Beckman's total requirements in only three weeks! The



General Electric computing services helped bring it to reality in just 68 days.

remaining 20% represented customizing features developed by GE to complete Beckman's tailor made system.

Totally compatible with in-house system

The new system has eliminated customer service snags and enabled Beckman to turn around orders quickly and efficiently.

And, the system is totally compatible with Beckman's in-house data processing department. MARK III Service's interprocessing capability automatically consolidates information and stores it ready for transmission to the parent company in Fullerton.

After evaluating several alternatives, Beckman's MIS staff determined that a worldwide computer service was a sound approach for this application. That's when they selected General Electric.

Computing services... think of the possibilities

To see how other managers have harnessed the power of MARK III Service to their ideas, drop us a note on your company letterhead. We'll add your name to our award-winning executive magazine "LEADER", and forward you a current issue. Write to: Roger Hobbs, General Manager, Sales Department, General Electric Information Services Division, 401 N. Washington Street, Rockville, Maryland 20850.

And, the next time you have an idea that you'd like to bring into sharper focus, give our local GE Information Services Branch Manager a call. He can marshal all the people, programs, network, and computer power you need to help you make things happen.

GENERAL ELECTRIC

CIRCLE 37 ON READER CARD

SURPRISE!

We're proud to unveil a s-e-x-y new SyncSort. You'll love it. IBM'll hate it.

Call (201) 568-9700.

Ask for Extension IV-and-a-half.

To paraphrase the old song . . . there is nothing like a SyncSort . . . nothing you can name. It's narrow where a sort should be narrow — in consumption of your computer resources — and where a sort be broad, man does it have interesting features!

These descriptive lyrics are particularly true for a slick new sort in town called SyncSort IV-and-a-half. It's a chip off the old Whitlow block if we ever whittled one.

True, our new sort is not going to be too popular on Nob Hill in Armonk, where the Rich Hardware Merchant is already having enough trouble trying to marry off a somewhat aging debutante named 5740-SM1, Release 3. (Maybe you should have called it "Diane," IBM.)

But how the programmers and analysts down in town are going to love SyncSort IV-and-a-half!

The chief reason, of course, will be performance. Like all its legendary predecessors, our new brainchild has a remarkably ladylike appetite for your computer resources. It eats like a bird.

Compared to IBM's Release 3, for example, SyncSort IV-and-a-half will give you:

- ***20-40% reduction in Elapsed Time;***
- ***20% reduction in Total CPU Time;***
- ***40% reduction in Supervisory State CPU Time;***
- ***25% reduction in Channel Time;***
- ***30% reduction in Disk-Kilobyte Minutes.***

And if you're into multi-programming, our new model can save you 10-40% on other, non-sorting jobs in the mix.

These performance breakthroughs apply to all record types and access methods — including an especially sharp reduction in CPU time for VSAM files.

Then there's that broad array of operating and applications features. We've tried to make your job a little easier and simpler by providing a total sorting capability, including:

- **PARM-EXIT — a sort control system that automatically determines the best executing mode for the sort.**
- **Automatic secondary allocation for SORTWORK and SORTOUT, and release of excess disk space.**
- **DYNALLOC — dynamic allocation of disk work space.**
- **COBOL WRITTEN EXITS — The capability to write sort exits in COBOL, Fortran or PL1.**
- **Control cards for three very useful features:**
  INCLUDE/OMIT—an alternative to writing programs to choose records to be sorted from a file;
  SUM — to add the values in two records that have equal control fields and eliminate one record;
  OUTREC — eliminates or repositions unneeded data and reduces output by the sort;
- **SyncSim — a simulation program to predetermine the resources used by the sort;**
- **HISTOGRM — an analyzer of variable-length records.**

How do you find out if SyncSort IV-and-a-half is really the sort for you? Just pick up the telephone and give us a call. We'll arrange a free sort survey. It's the best way we know to keep you from marrying in haste and repenting at leisure.

OVERSEAS REPRESENTATIVES —

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WHITLOW

COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

THE COMMANDING GENERAL

Why our new General Ledger System enjoys a commanding lead over the competition.

Attention!

Our new General Ledger/Financial Analysis System, G/L PLUS, deserves a twenty-one gun salute. Because even though it's brand new, its remarkable features have promoted it into a leadership position over everything else on the market.

First of all, the system is simple to use, with a revolutionary file design that allows unsurpassed efficiency and flexibility.

Secondly, the system is easy to maintain. We made it so compact that it comprises only 18 programs instead of the typical 50 to 200.

It's also the most comprehensive system available. Because we filled it with unusual features like automatic interface to any application subsystem; extensive planning and modeling facilities; complete user-defined editing and user-controlled error recycle; and comprehensive graphic reporting.

And of course, we included features like multi-corporate processing of both accounting and statistical data; extensive capabilities for any financial reporting requirement; consolidations, cost allocation, fixed and variable budgeting, exception reporting, foreign currency translation, and more.

Finally, there's a user-support program that includes not only installation, but a special user training school.

Now our Commanding General, G/L PLUS, is ready to stand inspection whenever you're ready. If you'll contact Bob Wilbur, we'll be proud to pass in review.

McCORMACK & DODGE CORPORATION
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CIRCLE 28 ON READER CARD

OUR ECLIPSE SPEAKS FOR ITSELF.

	DATA GENERAL COMMERCIAL ECLIPSE	11/70 RSTS/E	11/70 IAS	3000 II MPE
COBOL	✓	✓	✓	✓
RPG	✓	✓		✓
DATA CAPTURE LANGUAGE	✓			✓
BUSINESS BASIC	✓	✓		
EXTENDED BASIC	✓	✓	✓	✓
FORTRAN IV	✓	✓	✓	✓
ASSEMBLER	✓	✓	✓	✓
DATA FILE ACCESS	✓	✓	✓	✓
FORTRAN 5	✓		✓	
SYSTEM PROGRAMMING LANGUAGE	✓			✓
ALGOL	✓			

Comparisons based on most recently available information supplied by vendors and an independent industry research group.

Call (617) 366-8911, Extension 4735 or write for more information.

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Data General

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LOOK AHEAD

TOO MANY UNANSWERED QUESTIONS ABOUT SNA

Large IBM users are shying away from SNA in droves. They say there are too many unanswered questions about the network architecture, that they don't like the host computer concept, that VTAM takes up too much real and virtual memory, and it's just too expensive to install.

A study just released by SBS Publishing, San Jose, Calif., concludes that none of the 22 large users surveyed was prepared yet to commit to SNA. The users, representing a cross-section of industry, didn't like being restricted to IBM gear, didn't like being pioneers and wanted to keep options open. Some of them are looking elsewhere for their front-ends, several anticipating more vendors of SNA-compatible products. An MVS user figures the addition of 3790 and SDLC would require a $100,000 training budget.

IBM'S PROBLEMS WITH SECURITY OFFERING

IBM seems to be having problems with its Resource Allocation Control Facility (RACF) software. On the market 15 months, the data security aid for MVS systems has a piddling worldwide installation base of some 30. The reasons for this less than overwhelming market response, industry sources claim, are difficulties in implementation and the high cost of operating the setup.

Priced around $12,000 per cpu per year, RACF has attracted many debunkers who contend that the expensive data set security tool creates serious overhead problems by generating "rivers of data flow." Other critics charge that the process of defining to RACF which data sets are to be secured and how, is far too cumbersome. Giving credence to these gripes, one large Chicago-based retailer, which had considered switching to RACF, decided to stick with its own home-grown security system because of the product's alleged implementation, conversion and overhead drawbacks. And it's these drawbacks, industry watchers speculate, that will send IBM back to the drawing board to come up with new security software that may or may not be based on the lackluster RACF.

TELENET OFFERING: WILL IT, WON'T IT?

Telenet Communications Corp. in late November was anticipating an imminent public offering of 625,000 shares of common stock at a price range of from $16 to $20 per share in what some observers saw as a last-ditch save-the-company move. The firm was awaiting final SEC approval of a registration statement filed in late September. Stuart L. Mathison, vice president, said the SEC's questions were "minor in nature" and he had little doubt the registration would become effective before the end of November. What was less sure was the date or even the assurance that the offering would be made by the underwriters, L. F. Rothschild, Unterberg & Towbin.

One observer, who admittedly hoped the offering would be made and would be successful allowed as how, since Telenet is not profitable and has a net worth of only $2 million, the offering could be made and yet "fall on its ass." The success of Telenet, pioneer of independent packet switched networks, is seen by many as key to the ultimate success of all independent specialized common carriers.

TAXES: WILL CALIFORNIA FOLLOW NEW YORK?

An action last month by New York's State Tax Commission which effectively exempted software, time-sharing and computer services from sales and use taxes in the state was heralded by many fighting the tax battle on a multi-state front as a major victory. New York, in late August, declared a moratorium on audit and assessment activity which had been conducted following a September 1976 reinterpretation of existing tax laws which led to hefty retroactive assessments for many computer firms.

Closely monitoring the New York activity were firms in California, the state that many say "started it all." California has been imposing sales and use taxes on software and some services since 1972 and recently has been reinterpreting some sections of its Rule 1502 covering "Automatic Data Processing Services and Equipment." Stephen Hollman, general counsel, Optimum Systems Inc., Santa Clara, a spokesman for the state's Sales Tax Action Group (STAG) said late last month that STAG "verbally was made aware of the decisions in New York and we are

optimistic that we will achieve our objectives in California." He said one hoped-for immediate means toward that end would be an open meeting with the state's Board of Equalization in January.

TWO APPROACHES TO A SUPER-SUPER COMPUTER

Two different approaches are being taken in the design of a mainframe 100 times faster than the super-scale Control Data 7600. To achieve the goal of performing a billion floating point operations a second, CDC is said to be working on an architecture with eight parallel processors, each a highly sophisticated pipeline machine. But Burroughs, producer of the Illiac IV with 64 processors, is thinking in terms of using 512 parallel processors. Both mainframers are doing the research for NASA's Ames Research Center, which has the Illiac and is hoping for an early 1980s completion date.

ISRAEL'S ELBIT OFFERS A SMALL BUSINESS SYSTEM

The Israeli minicomputer firm, Elbit Computers Ltd., soon will be offering a small business system in Europe at six to seven percent below prices offered by U.S. companies. Called PACT (Programmable Asynchronous Clustered Teleprocessing), it uses a disc-based operating system to govern the 16-bit cpu and up to 32 terminals, local or remote. A limited operating system and a series of environment-tailored "executives" adapt the system for specific applications programs.

Three executives announced so far are KeyPACT, a data entry and data capture system; DataPACT, a standalone, multiterminal business system; and InterPACT, Elbit's distributed processing system that still is under development. Two or three more executives are still to be introduced, one for a time-sharing system, one for data base management and another perhaps in data retreival.

Elbit is a subsidiary of Control Data Corp.

AT&T TACKLES DATA NETWORK PROBLEMS

More details on AT&T's long awaited Bell Data Network continue to surface as the giant company inches closer and closer to a public announcement of the highly touted service. Inside sources at Bell have now targeted the BDN announcement for sometime during the first quarter of 1978, with intrastate customer trials scheduled to begin about the same time. Full network operation, slated to get underway in 1979, is expected to be nationwide by 1980.

To satisfy IBM user needs, Bell BDN designers have come up with a data network access method that will serve as a plug-to-plug replacement for VTAM (IBM's telecommunications access method). But other nagging problems still remain, one of which has cropped up at the New York Telephone Company which is running a prototype BDN system test. While sources claim the test system is working reasonably well, they also point to a hangup which still has to be resolved--how to handle and charge for store-and-forward services since messages can have widely varying lengths.

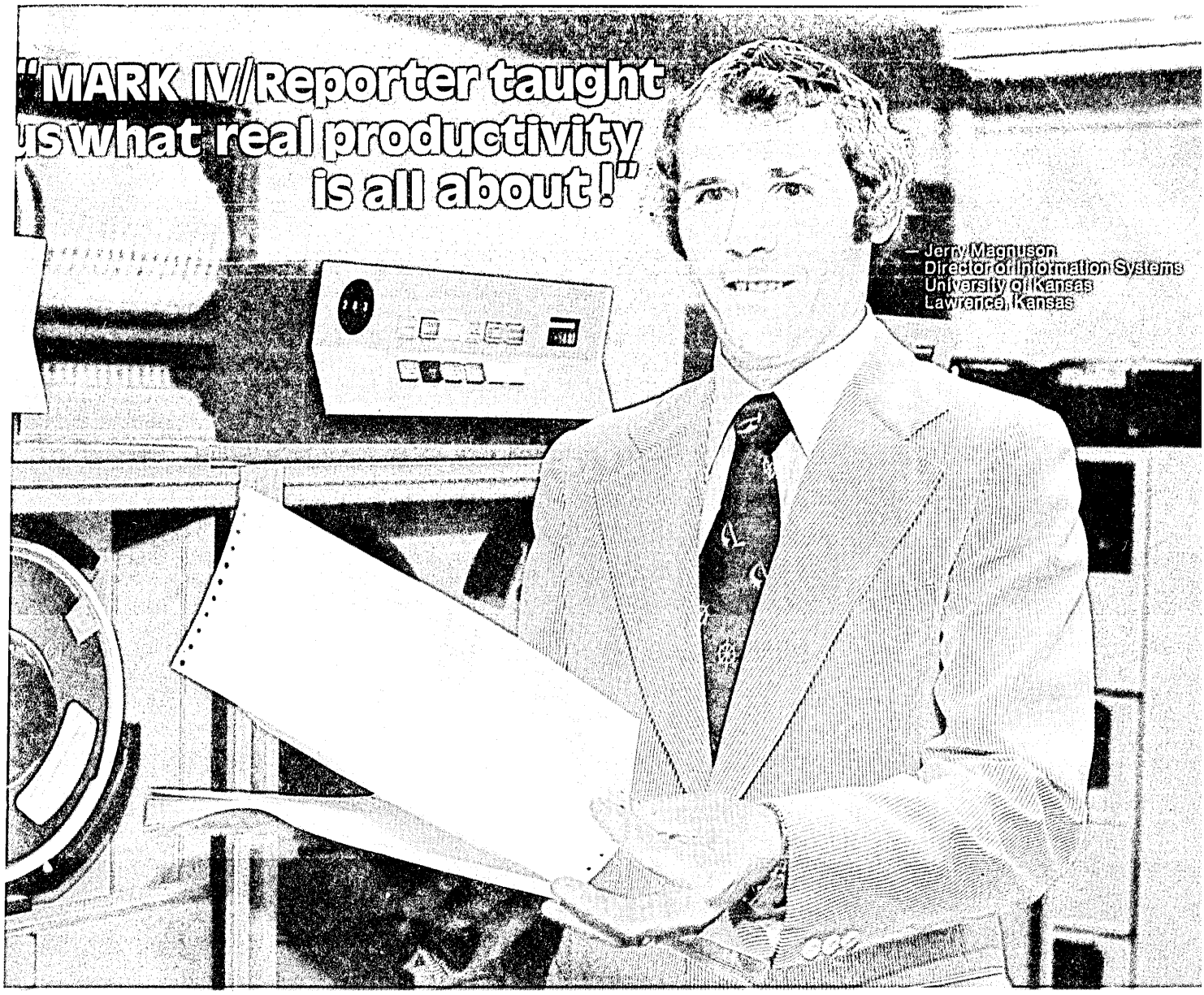
SHAKEUP AT THE TOP OF DATA 100

Fast growing Data 100 Corp., Minneapolis, recently handed the post of executive vice president of operations and chief operating officer to Bruce Bambrough, a founder of the company. It was part of a change in management style in which the company's v.p.'s would report to Bambrough and allow president Ed Orenstein, to whom they used to report, to devote most of his time to "knowing where we want to be in the future" (September, p. 29). All of that changed last month when Bambrough was fired, although he remains as a director, and Orenstein resumes direction of the company's operations. Observers think, though, that Bambrough, by training a market and product planner, was uncomfortable in his new post and a successor from outside the company may be named soon.

GREEN LIGHT FOR SSA's OVERHAUL SCHEME

The high-powered National Academy of Sciences panel, set up to oversee the Social Security Administration's monumental new system overhaul scheme, has given the sprawling agency a conditional green light. In a report due out this month, the prestigious panel, led by former Univac president Dr. J. C. R. Licklider,

(Continued on page 214)



"We purchased a General Ledger accounting system from a major vendor. After investigating, we found that we were going to have to drastically change the Cobol programs in order to generate all the required reports.

"Rather than this, we concluded that it would be far better to start from scratch and use MARK IV/Reporter for the 75 to 100 daily, weekly, monthly and year-end accounting reports that we produce. We made the right decision. If we had tried to modify the Cobol report writer that came with the system, it would have taken us at least two months longer to complete the project.

"MARK IV/Reporter was installed on our 370/145 within a few hours. The four people who attended a basic MARK IV/Reporter class were using it comfortably within a week. We also have a competent Cobol programmer who took the MARK IV® manuals home and read them over a weekend. He started using MARK IV/Reporter the next Monday morning.

"It runs very efficiently and it's helped increase the productivity of our systems and programming staff. With the confidence we've gained in MARK IV/Reporter we can commit to new projects now that would have been impossible before. We'll be using it for 50% of our new work, which includes a new student records information system. MARK IV/Reporter will be a key part of this new system. "As for Informatics Support, our staff here is very impressed; their people have been extremely competent and the systems engineering support has been excellent."

WHAT IS MARK IV/REPORTER? MARK IV/Reporter is an information processing system which handles all reporting requirements for existing file and/or data base systems. Although extremely flexible and powerful, the system allows non-programmers to produce error-free reports in a fraction of the time required with conventional programming methods. MARK IV/Reporter can be installed and implemented in the U.S. and Canada for as little as $306.00 a month. MARK IV/Reporter is upward-compatible to MARK IV whose 1,300 installations worldwide make it one of the most successful software products of all time.

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The acquisition of Mark IV was made possible by a grant of the University of Kansas Endowment Association. Mr. Magnuson oversees administrative DP activities for the Lawrence campus. The views expressed are those of Director Jerry Magnuson and not necessarily those of the University of Kansas.

CIRCLE 17 ON READER CARD

Hard copy made easy.

With the help of a high-speed microprocessor, Hewlett-Packard combines exceptional performance and convenience in a new low-cost printer and printing terminal.

The HP 2631A printer and HP 2635A printing terminal with alphanumeric keyboard are the first members of a new Hewlett-Packard family of hard copy terminals.

Each machine was designed to give you a number of high-performance features. And both can support a variety of interfaces, including RS232 and CCITT.V24, to fit into systems made by HP and other manufacturers.

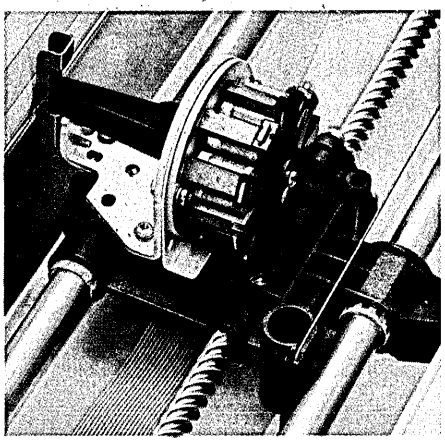
Bi-directional printing increases throughput. Both printers zip along at 180 cps in both directions, depending on your line layout. The microprocessor chooses the quickest path, and increases the speed even more by suppressing leading and trailing blanks.

High-speed slew for columnar data. When the microprocessor senses more than ten blanks in a row, it slews the print head at 45 inches per second to the next print position.

Three ways to print. The Character Compress/Expand Modes let you print more data on a page and emphasize points with headlines and titles. You can get as many as 132 characters on an 8-inch line, or 227 on a 14-inch line.

High-quality print, with six copy resolution. A 7 x 9 dot matrix (versus the usual 7 x 7) gives you clear, crisp printouts, right down to the sixth copy and meets the 128-character USASCII standard. And the extra two dot rows allow true underlining and descenders without character blurring.

Programmably interchangeable character sets. The HP 2631 can be made to print alternate character sets without reconfiguring the printer.



Long lasting, quick change print head saves service calls. The 9 wire print head is conservatively rated at a 100 million character life-span. It's also self-aligning. When you finally replace the head, you can do it yourself in a couple of minutes.

Long-life cartridge ribbon for a clean change. With a life span of at least 10 million characters, this innovative drop-in cartridge takes the mess and trouble out of ribbon changes.

Self-test for quick status checks. One key tells you if the printer is ready to go. If it isn't, the self-test feature helps you isolate the problem, reducing the time and cost for repairs.

Run everything under program control. All the features described and more can be programmably controlled. The software can take you in and out of the various modes. Or you can make a change yourself using one of the front panel switches or keys.

In a network or as part of a standalone system, HP now makes it simple to get the hard copy you need. If you'd like to see our printer or printing terminal in action, call the Hewlett-Packard sales office listed in the White Pages and ask for a computer systems representative. Or send us the coupon.

Yes, I'm interested in your new
☐ **Printer** ☐ **Printing Terminal.**
☐ Have your representative contact me.
☐ Send me more information.
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Company

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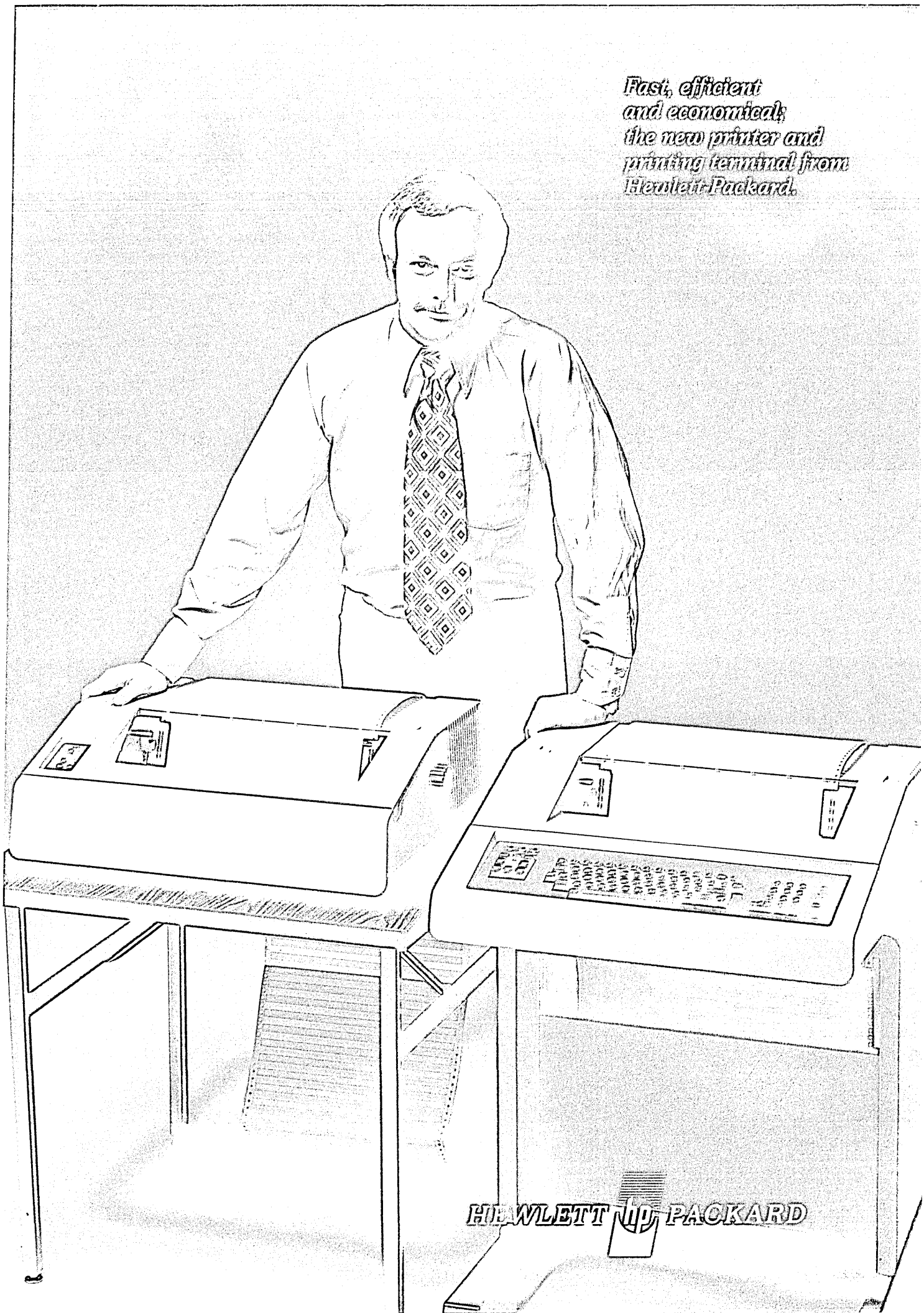
Mail to: Bill Murphy, Marketing Manager, P.O. Box 15, Dept. 408, 11311 Chinden Blvd., Boise, Idaho 83707

4670IHPB2

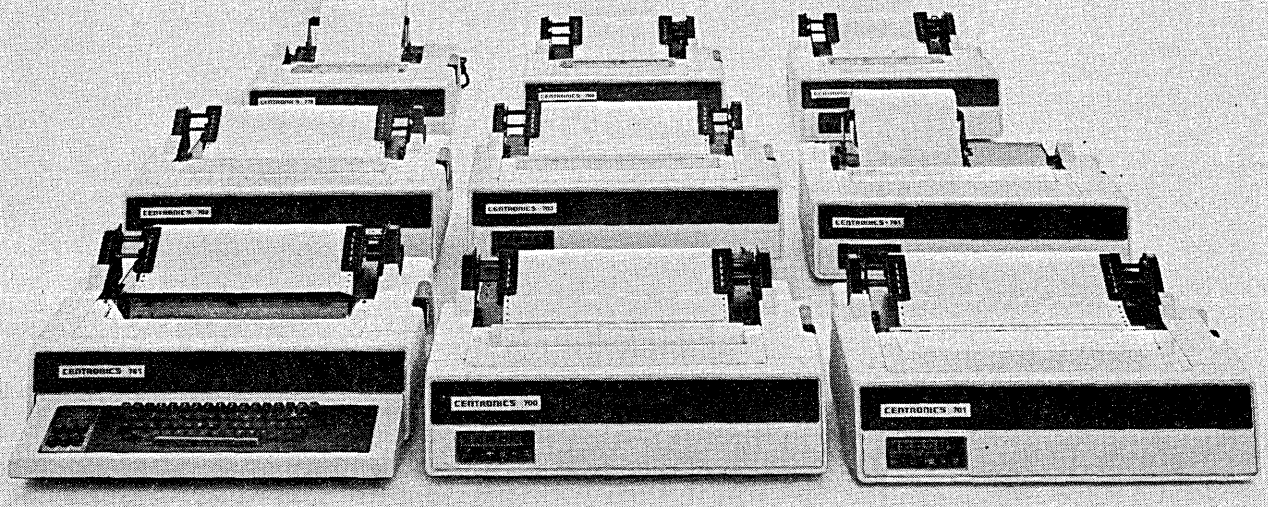
CIRCLE 84 ON READER CARD


Fast, efficient
and economical:
the new printer and
printing terminal from
Hewlett-Packard.
HEWLETT PACKARD

Does its broad line make Centronics' matrix printer family the best?

NO. Even though the Centronics 700 series is a continually expanding printer family—currently 9 models and a range of print speeds from 60 to 180 cps—there's much more to it than just breadth of line. For example, there's a choice of 6 different types of forms handling capability; choice of uni- and bi-directional operation; and choice of 80 and 132-column formats. Why so much choice? It comes from the simple, highly flexible modular 700 series design that delivers superior reliability, exceptional parts commonality—and competitive prices.

And like all Centronics printers, the 700 series is fully supported by the largest worldwide service organization of any printer company. For complete 700 series information write or call today. Centronics Data Computer Corp., Hudson, NH 03051, Tel. (603) 883-0111.



CENTRONICS® PRINTERS
Simply Better

letters

Consumer's comment

I don't know a thing about manufacturing, except as a consumer. But Mr. Appleton's article ("A Strategy for Manufacturing Automation," October, p. 64), seems to recommend a manufacturing process which will increase our cookie cutter products and give the auto industry an even greater incentive to resist innovative new designs that will eliminate some of our pollution and traffic problems. Doesn't anyone who makes anything care about the people who need (or want) their products? Sometimes I wonder about the real value of computers. I feel they are encroaching on me at about the same rate as government—two horses of the apocalypse.

MARGARET MILLIGAN
Publisher
Data Processing Digest
Los Angeles, California

People problems

Mr. Sobczak's "A Data Base Story" (September, p. 139), points out very vividly the problems that might be encountered with the installation of data base technology into an operation which has been previously running using other methods.

One of the goals of a data base is to cut down on the redundancy of data contained in the data processing installation. The main problem seems to be that the user is seldom educated to the point where he can appreciate the scope of the undertaking and, therefore, does not cooperate in the spirit which could advance the data processing effort positively.

Possibly the major point brought out by the article (and one we should all thank Mr. Sobczak for) is that before we jump into the details of the data base structure, or for that matter any complicated change in data processing procedure, we must attempt to humanize the data processing effort by working with the user in an attempt to correct and/or circumvent the "people" problems which will be encountered during the implementation of the project.

BRADLEY D. HALLIN
Systems Analyst
Electronic Data Preparation Corporation
Sarasota, Florida

"Heart" rate: 1M/hour

No wonder the Japanese are in trouble. "Eight large-scale mainframes, 700 minis, and 4,000 terminals have been handling an average of 5,000 on-line transactions a day at Japan's largest bank, 'the bank with a heart.' " ("A Japanese On-Line Banking System," September, p. 89).

I decided to not read any further. That works out to be 1.25 transactions/day/terminal. Clever people—driving a tack with a sledge hammer.

ALF A. NIMERICK
Washington, D.C.

It's too bad no one earlier caught that error by one of our editors. By not reading the article, you missed the fact that the system actually handles as many as 3,000,000 transactions a day, and can be expanded to process —get this, Alf—more than a million an hour. Our apologies to author Abe for this slip-up.

Small system or small business?

The "Survey of Small Business Computers" (September, p. 189), was complete rubbish insofar as the comparison tables were concerned.

In the first place, there was no attempt to restrict the field. Systems like an HP 3000 or a Modcomp IV, at $75,000, hardly fit the term "small," nor are they "business" systems. A system like Prime or Digital Systems Galaxy/5 does not qualify either, even though the listed price looks right. These are *general purpose* systems, although they may obviously be used for business.

There are some definitely off-beat entries, too. I noticed the DSC Meta/4-1130 and the CHI line both are intended as IBM 1130 plug-to-plug replacements. Tal-star had a printing industry system in, presumably because they said it would do accounting.

In the charts, for any given processor used by more than one house, the processor specs differed. No distinction was made between bytes and words for storage size, thus we have the same Nova 3 (cs/40) system listed as both 64-192K and 32-96K in one instance. The add times quoted were ridiculously wild.

Far worse, some of the most important aspects were not even touched. No mention was even made of hardware service, for example, except in the text. Service contracts for hardware (and software, too) can make or break the cost picture. Purchase was discussed, but with no mention of resale value. There was no mention of crash-recovery or backup, nothing on power or environment, nothing on space required.

By the way,

Small (business computer) $\neq$ (small business) computer.

Lest I case only thorns and no roses, let me note that your "distributor" article in the same issue ("Terminal Distributors: 'Our Most Important Asset,' " p. 159) was excellent, very informative, and helped me avoid making some very tragic mistakes.

LAURENCE F. WYGANT
President/Chief Programmer
The Toolsmith Organization, Ltd.
Schaumburg, Illinois

The information contained in the article was condensed from the full Datapro report, as stated on the first page. Datapro offers additional reports that address most, if not all, of your other criticisms.

Count them in

As a marketing person selling a small business computer, I confess to some consternation when I read the article

© DATAMATION ®

"We'd rather look at something dumber than we are."

CENTRAL INTELLIGENCE:

The data formatter that came in out of the cold.

Tape drive intelligence has crossed the iron walls. And taken up residence *inside* a broad series of transports—through a special Microformatter™ that Pertec installs internally.

A real technology breakthrough for sure. But it's the hot savings potential that intrigues OEMs most.

Eliminates the need for any external formatter to control the reading and writing of data. Makes interface chores much easier.

Now add in the convenience and cost-efficiencies you'll realize with just one system to handle (and ship), instead of two separate devices.

Saves integration time. With the Microformatter built-in, a single interface can be used for 800 cpi NRZI, 1600 cpi PE, or dual formats.

Saves redesign. Formatted Tape Transports use the same Pertec industry-standard formatter interface. And the same Microformatter, to maintain parts commonality.

Saves daisy-chain hassles. Every master Formatted Transport can daisy-chain up to 3 more tape drives—either Pertec standards or our new Formatted models.

Saves rack costs. You free up former external-mount slots. And the single-board LSI Microformatter is so compact it fits into each drive without restructuring standard rack mounts.

Internal Formatting. Deep down inside, you know it's right! And it's available in a flexible configuration range.

Formatted tension-arm: *FT7000*—compact 7" reel, NRZI or PE, 12.5 to 25 ips. *FT8000*—10½" reel; NRZI, PE, or dual NRZI/PE to 45 ips.

Formatted vacuum-column: *FT9000*—10½" reel, 37.5 to 75 ips NRZI, PE or dual. And *FT1000*—10½" reel, our vacuum column 125 ips high speed auto-thread, auto-load series, dual NRZI/PE.

Fully proven product. All are microformatted extensions of field-proven drives, produced by the world's largest independent manufacturer of peripheral equipment.

And backed by international sales/service facilities, with a long-term commitment to responsiveness. Making emergency assistance available on a 24-hour, 7-day basis, accessed through our toll-free 800 line.

At every level—product, sales, maintenance—Pertec intelligence has always recognized that cost-effectiveness is the central issue with OEMs.

☐ Please send full details on the Pertec Formatted Tape Transport Series.
☐ Send pricing information as indicated on the RFQ below (no obligation or cost).

Request for Quote

Formatted Series #	Reel Size	Tape Velocity (ips)	Recording Mode	Quantity Required	Date Wanted	Send Specs
FT7000	7"	12.5-25	PE or NRZI			
FT8000	10½"	12.5-45	PE, NRZI, Dual			
FT9000 Vacuum Column	10½"	37.5-75	PE, NRZI, Dual			
FT1000 Vacuum Column	10½"	75-125	Dual NRZI/PE			

Name_____

Title_____ Phone_____ Ext_____

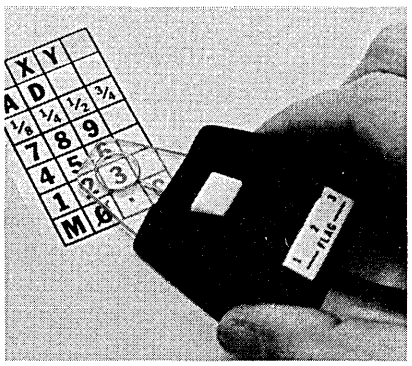
Please attach coupon/RFQ to company letterhead and return to Pertec, 9600 Irondale Avenue, Chatsworth, CA 91311.

For immediate requirements, call your nearest Pertec regional sales office: Los Angeles (213) 996-1333. Ann Arbor, Michigan (313) 668-7980. Hudson, New Hampshire (603) 883-2100. England (Reading) 582115.

PCC PERTEC

a division of Pertec Computer Corporation

How to program a digitizer.



Just touch the free-moving cursor to the program menu pad. It automatically programs the Summagraphics ID (Intelligent Digitizer) for scaling, skew correction, area calculation, linear distance or other user defined functions.

That's because the Summagraphics ID has built-in microprocessor control. And we've done the programming. So when you touch the menu pad, you call up the program for the function you need.

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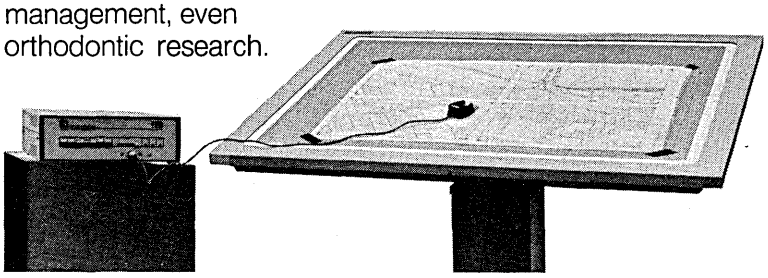

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letters

"Survey of Small Business Computers," and saw how many competitors I had to do battle with. (Anything I hate, it's competition.) But what really made me clutch my throat was the omission of (the best) Lockheed's System III computer. More than competition is being ignored.

HANS W. NINTZEL
Branch Manager
Lockheed Electronics Company, Inc.
Dallas, Texas

Not more—faster

I feel it is important to point out the fallacy of Mr. Knox' thinking regarding the high speed of line printers ("9,453,600 papers to shuffle," September, p. 21). Having been in data processing for 40 years, I have heard the same argument each time a new device is developed.

In 1969, after RCA developed the Video-Comp, the identical analysis regarding its speed was made. It was capable of typesetting thousands of characters per second on a crt. Someone quickly determined that one VideoComp had the capacity of typesetting in one day, every newspaper in the U.S.

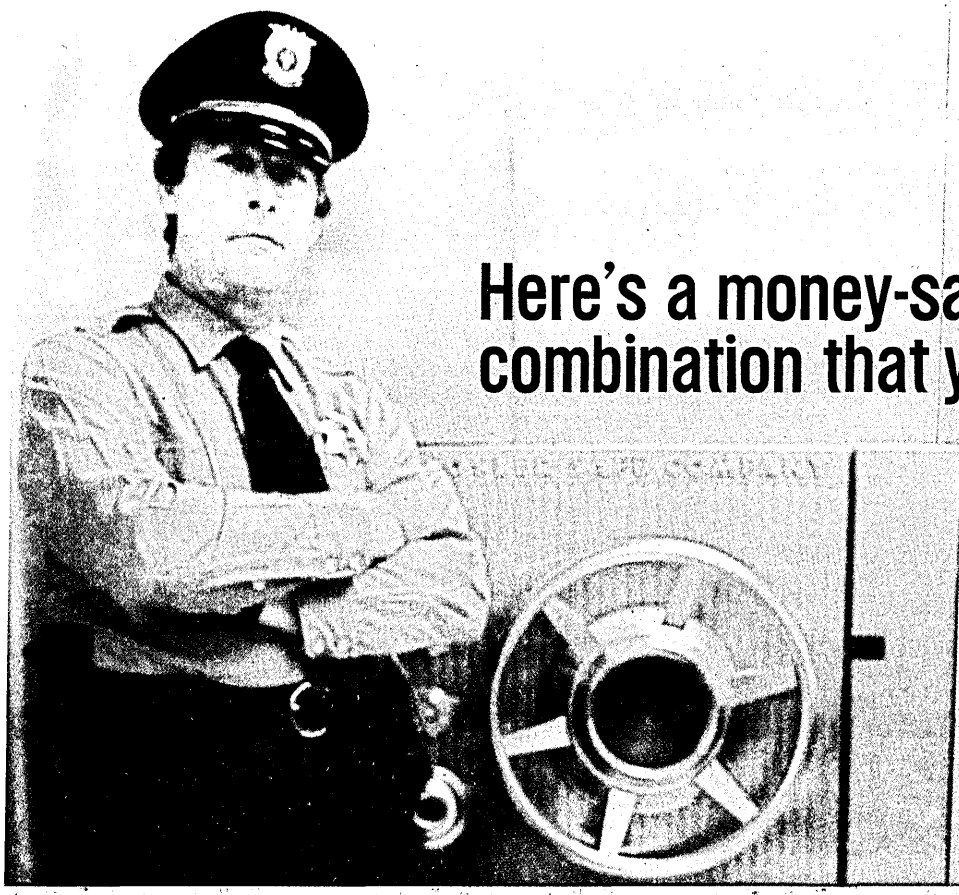
The purpose of a faster device is not to produce more, but to produce the present requirements in less time! How important can it be to present the printed word today rather than next week or next month? How much more valuable is the information to the user if he can obtain the results sooner? Mr. Knox is wrong! Data is needed faster than we can produce it even with the newest devices. Twenty years from now today's speeds will seem slow. It makes no difference if a device stands idle; the speed must be there when we need it.

JEROME D. VRAGEL
Cranbury, New Jersey

First round to the P.O.

An item in your September "Rumors and Raw Random Data" section (p. 278) is incorrect. There is no "quarrel" between IBM and the British Post Office over the maintenance of the IBM 3750 switching system. It is now standard practice that the Post Office maintains the 3750 on the telephone network, and we have no evidence that maintenance issues are causing any significant concern to prospective purchasers.

A. B. CLEAVER
DP Director
IBM United Kingdom Limited
Portsmouth, Hampshire
England



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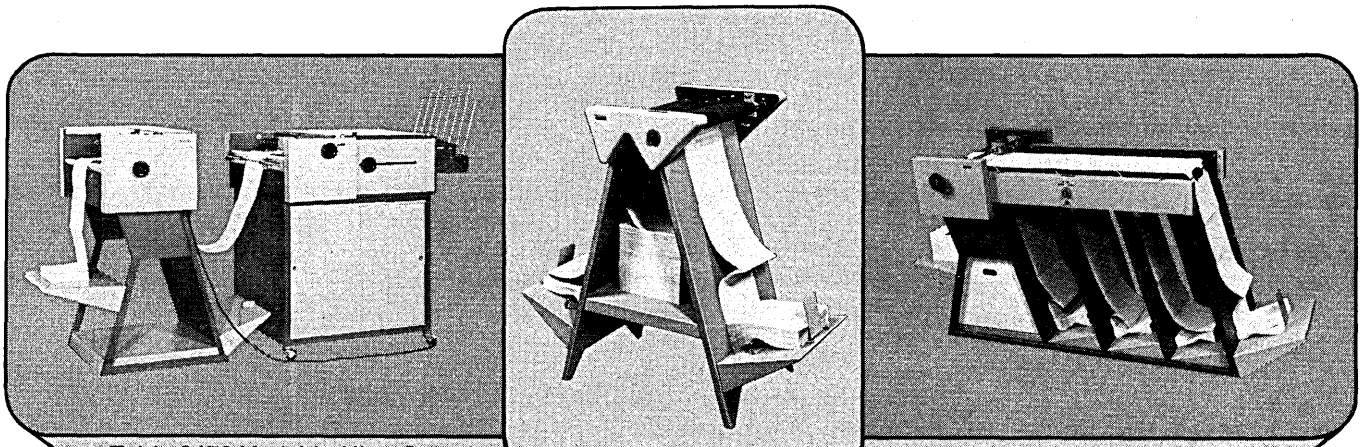

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CIRCLE 41 ON READER CARD

letters

Review received

May I thank you for the generous review in your June 1977 issue of the study on the implications of distributed computing in the U.K. undertaken by Dr. Frank Taylor and myself ("Why Distributed Computing?" p. 41).

Mr. Dorn's suggestion for an updated bibliography is, I believe, being considered by the U.K. National Computing Centre for a second edition of the book.

I recognize his concern that we skirted the issue of "local programming," but as much of the field work was done in late 1975, I believe that our apparent indecision reflects the uncertain attitude of U.K. users at that time. No doubt attitudes have become more sure with another 18 months' experience, but I continue to encounter extremists of both camps: the courageous, who delegate authority and accept the risks and additional costs of disbursed programming staff, and the cautious, who insist on centralized control of programming as a means of ensuring quality control. I suspect that the "correct" policy is a function of the exposure of the organization to successful development of data processing projects, and of the personal qualities of the programmers.

One final comment on Mr. Dorn's able review. His comment on our "strange nomenclature" I found perversely satisfying. We British more frequently find ourselves in a problem situation comprehension-wise, faced with transatlantic jargon. It is some comfort to learn that the tables may occasionally be turned.

PETER J. DOWN
Computer Systems Advisor
U.K. Colombo Plan
Kuala Lumpur, Malaysia

Cobol committee correction

The August "Letters" column included a letter from me about changes to COBOL in the last year or so. In the letter I gave the zip code for CODASYL incorrectly. The correct address is: CODASYL, P.O. Box 1808, Washington, D.C. 20013. I understand some persons trying to receive information had their letters sent back. I must apologize for any inconvenience it may have caused.

DONALD F. NELSON
Chairman
COBOL Committee
Washington, D.C.

Wish fulfilled

One of Paul Strassman's wishes ("Computer Wishlist," January, p. 56) was for ". . . a structured application definition process of user specification preparation, application, documentation generation, program definition, and program testing . . ." which he said he would like to see by 1985.

Here at the United States Railway Assn. we were not willing to wait until 1985. We needed a process for computer modeling that would permit financial model development at a reasonable cost . . . a process that would allow the user to bring together several hundred formulae and data elements into a system; permit easy modification; be readable (by users as well as programmers); be of reasonable cost; be self-documenting; and provide a testing methodology.

We have developed a process for doing just that. For example, the user's specification for a balance sheet is entered into the computer in very much the same form in which it is received from the user. That specification is the documentation of what the balance sheet represents and may be printed at the terminal in either of two forms, as entered or as evaluated. The evaluated form is the final form—the balance sheet itself. This process is followed for all reports and supporting schedules.

An additional feature is inherent in the system—any subset of items of the balance sheet may be printed without printing or even calculating the entire balance sheet. Also, structure of accounts implicit in the specifications in outline form may be displayed as the computation occurs.

The user specification, application documentation, and program definition are reduced to a single task-user specification. User programming is the simpler task, a matter of assuring that the specification is syntactically correct. Testing is greatly simplified because it is a matter of testing for correctness of definition and each definition can be individually tested. Automatic programming does occur, but it is not necessary to look at, list, review, catalog, or even know the precise names of the automatically created programs and variables.

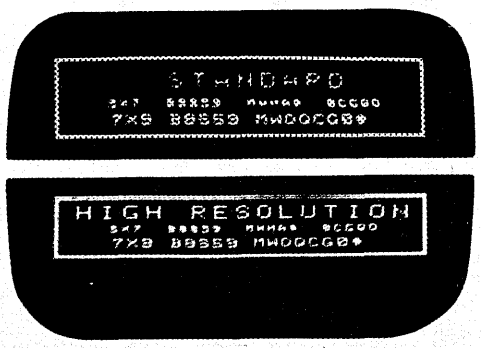
The system described was developed in response to USRA's own needs in applications programming, with a total effort of approximately eight man-months.

The environment of the system is APL. The development work was done on the IBM 360/91 at the Applied Physics Laboratory, Johns Hopkins Univ. A medium-sized financial projection model has been implemented using SDL's IBM 370/168 installation in Ottawa, Ontario.

ROBERT JERNIGAN
Manager, Financial Analysis Support
United States Railway Association
Washington, D.C.

CIRCLE 104 ON READER CARD →

New RGB ultra-high resolution monitors



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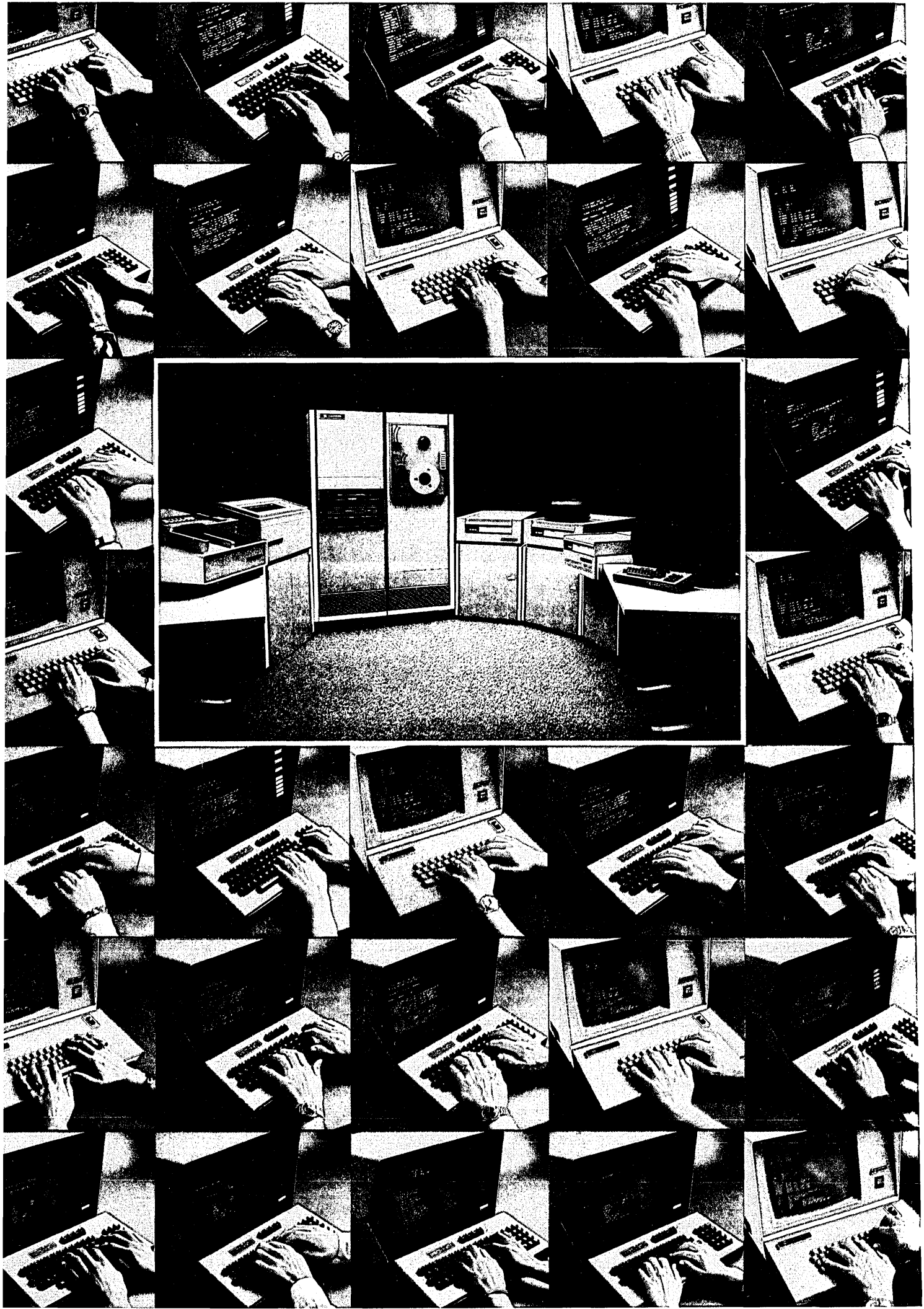

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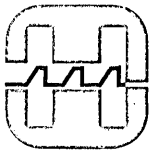

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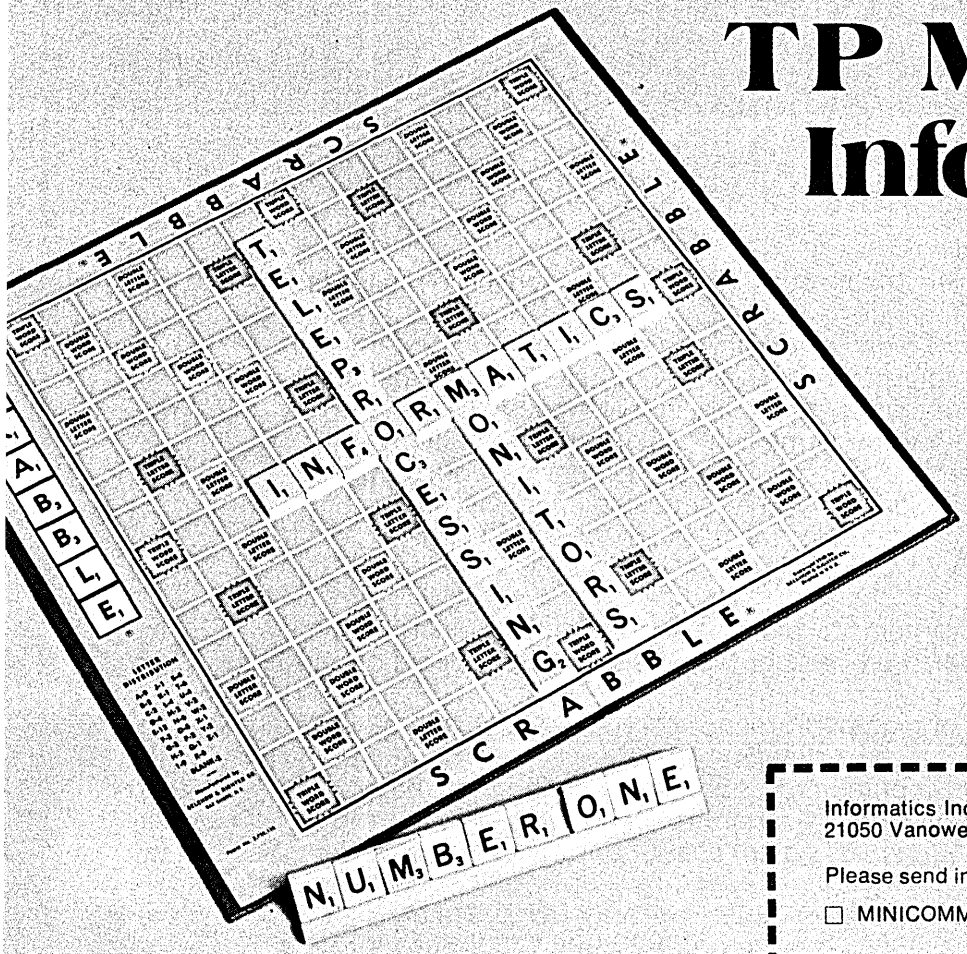

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people

Man of the Year

Dr. J. Daniel Couger may have done more to advance the dispersed processing phenomenon than all the minicomputers and networks in existence today.

He spent 10 years convincing the nation's business schools to add computing courses to their curriculums. For his efforts, last October he received the Computer Sciences Man of the Year award from the Data Processing Management Assn. which cited him for having "had more impact on the improvement in education for future managers than any other single individual in the U.S." It added:

"The majority of the graduates of the U.S. schools of business today have a computer efficiency, due to the results of the 10-year effort of Dr. Couger to make such proficiency a requirement in these schools."

"In the last five years," Couger said recently, "about 500,000 persons have been graduated from the nation's business schools, and about 94% of them are schools that have computer or information systems options. They're enthusiastic and knowledgeable about computers and when they get into business, they want to use them."

Impatient when told by a data center that such projects may be two and three years downstream, they acquire their own low priced computers and do it themselves, says the 48 year old professor of computer and management science at the Univ. of Colorado at Colorado Springs. Last year his own school, whose students previously communicated with huge systems via terminals, acquired its own mini, a Hewlett-Packard 9896, to give the students hands-on experience.

When he left Martin Marietta 12 years ago to join the Univ. of Colorado as assistant professor of management science, Couger said he was appalled by the lack of computer content in the business school curriculum. (He had spent seven years at Martin Marietta as a project leader in dp applications and rose to become chief of computer plans and controls.) A national survey he made disclosed that only 11% of all accredited schools of business required computer efficiency from students.

Couger launched a program to change this. First he wrote a book, *Computers and the Schools of Business*, which outlined how to form and expand computer curriculums. He began publishing a *Computing Newsletter for Schools of Business* that now has some 750 readers, and wrote a manual, *FORTRAN for Schools of Business*. Under a grant from IBM Couger also conducted two-week courses over a seven-year period for faculty members of business schools. "The professors who attended first had to read a program instruction book and write several programs, so they were serious when they came," Couger recalls. And they came from all disciplines—professors of accounting, finance, marketing, business law, economics.

DR. J. DANIEL COUGER
A four-mile run before work

With much of this missionary work behind him, Couger's schedule nevertheless remains hectic. On the three days that he teaches, he puts in 12 to 15 hours of work—writing, teaching, preparing lectures. He's also a consultant, and among his clients have been Control Data, Dow Chemical Co., Hewlett-Packard, NCR, and IBM. He's traveled 1,500,000 miles, he estimates, lecturing in 42 countries, 30 of them under IBM sponsorship.

His day begins at eight when he runs four miles in a half hour through rural Colorado Springs, "spotting deer and cottontails and doing my greatest thinking." In the winter he dons cross country skis. And in that mountainous land, he's climbed 18 of the 14,000-foot mountains with his sons, Dan, 24, Todd, 21, and Tim, 19. His daughter Julie, 18, is a professional ice skater. His wife Shirley, "who helped isolate me from family crises at times when I was extremely busy," is an accomplished tennis player and was a music major in college.

As for the future, Couger has taken a sabbatical from teaching to embark on his next project for the computer industry—an investigation to determine the key factors in motivating dp personnel. "The aura of excitement that attracted people to this field has gone," he says. "We now detect such things as attrition and absenteeism that characterize any business that has matured." In his study, Couger will test 60 factors he's identified as contributing to motivation. The first part of his three-year study will be of government dp, which he's doing under a grant from the Dept. of Labor and on which he'll report at next year's National Computer Conference.

people

A Philosophical Computer Man

Dr. Arthur W. Burks is both a philosopher and a computer scientist.

He's been widely acclaimed in both fields and he will talk about both when he delivers the Univ. of Michigan's Henry Russel Lecture for 1978 next March 21 at the university's Rackham Amphitheater. The Henry Russel lectureship is the highest honor the university can bestow on a senior faculty member. When he was notified of his receipt of this honor in late October, Burks wasn't sure exactly what he would talk about except that, "It will have something to do with computers and philosophy."

At the Univ. of Michigan, where he has been since 1946, the 62 year old Duluth, Minn., born Dr. Burks divides his time 50-50 between the departments of Computer and Communication Sciences and Philosophy.

"I was trained as a philosopher before the war (World War II)," he recalls, "and when the war came along there weren't many jobs for philosophers." Burks then fell back on his undergraduate training in math and physics. He joined the Univ. of Pennsylvania in 1941 as an instructor in electrical engineering and research engineer.

Burks received his BA from DePauw Univ. in 1936. Subsequently he received MA and Ph.D. degrees in philosophy from the Univ. of Michigan.

His job at the Moore School was the beginning of his career in computer science. And he was in at the beginning. At the Moore School he worked with J. Presper Eckert and John Mauchly on development of the ENIAC. His principal responsibility was the machine's multiplier. Later, at the Institute for Advanced Study at Princeton Univ. he worked with John von Neumann and Herman Goldstine in developing the basic design for a digital computer which led to the EDVAC. This work also led to production of a paper by Burks, von Neumann, and Goldstine which has been called "the first conceptual paper on an internally programmed computer" and the "definitive" work on the subject. This was first published by the Institute in 1946 and appeared in DATAMATION in two parts in September and October 1962.

It was while at the Univ. of Pennsylvania, too, that Burks met and married Alice Grace Rowe. "She was a computer before there were such things," he said of his wife. She was one of a group of girls using calculators to develop firing tables at the Aberdeen Proving Ground. Part of the group was transferred to the Moore School under supervision of then Army Lt. Goldstine. "They were called computers," Burks recalls.

With all his involvement in the early developments in computing, Burks never forgot or gave up his philosophy. He always, he says, has managed to find parallels in the two fields. While still at the Univ. of Pennsylvania on a full time basis, he became a part-time instructor of philosophy at Swarthmore College, Swarthmore, Pa.

Of his work with John von Neumann and Goldstine at Princeton, Burks

ARTHUR W. BURKS
ENIAC, EDVAC, and casual questions

says, "The basic design we produced became the prototype for many other computers built by universities, government research units, and IBM," He particularly cited the Illiac I at the Univ. of Illinois, the Johnniac at The Rand Corp. a machine at Argonne National Laboratories, Whirlwind at Massachusetts Institute of Technology and, as the first commercial version, the IBM 701.

At the Univ. of Michigan, Burks, "with a colleague of mine from speech science" founded the program in Computers and Communications Science. His long career at the U of M has been interrupted by a variety of visiting assignments.

Among these was a stint at Harvard in 1955 during which he edited the papers of Charles Sanders Peirce, founder of the philosophical doctrine of pragmaticism. At the Univ. of Illinois in 1960, he posthumously edited two von Neumann papers which were published in a single volume titled *Theory of Self-Reproducing Automata.* "Johnny had left tapes of a series of lectures and one unfinished manuscript on this subject and I was asked to put them together," said Burks.

His published works in both philosophy and computer science, many combining both fields, total some 60. His latest, a 700-page volume, titled *Chance, Cause, Reason,* was issued by the Univ. of Chicago Press Dec. 1. Burks said it has to do with "the nature of causation and such questions as determinism versus indeterminism."

He notes that many of his works have been translated, "more into Russian than into any other language, but that's my computer stuff, not my philosophical thoughts."

In New Posts

DELBERT W. ATWOOD, JR., of the Utah State Board of Education, was elected international president of the Data Processing Management Assn. (DPMA) . . . RICHARD W. MARTIN was promoted to vice president and general manager of the Americas and Asia Group of Memorex Corp. . . . GEORGE M. PFISTER was appointed to the new position of manager of client services for Network Analysis Corp. . . . Threshold Technology, Inc., Delran, N.J., named E. JOSEPH SIMMONS, JR., vice president of marketing. . . OLIVER L. WENNEBORG was named vice president and center manager of the National Sharedata Corp. Wichita Falls, Texas, facility. . . DAVID H. STEWART was named head of the computer services department of The Rand Corp. . . . JOHN BUCHEN was appointed president of BNR Inc., Palo Alto, Calif., subsidiary of Bell-Northern Research Ltd. . . . Storage Technology Corp. appointed NORMAN B. PETERSEN a vice president in its marketing division. . . JOHN FAIRFIELD INESON was named director of management information systems for Union Camp Corp., Wayne, N.J. . . . Modular Computer Systems, Inc., Fort Lauderdale, Fla., elected JOHN C. LOBB as chairman of its board of directors. . . ROBERT GILCHRIST joined General Automation, Inc. as vice president, worldwide customer and applications engineering. . . . RAYMOND W. WOLFE was promoted to vice president, business development, of Litton Industries' Mellonics Systems Development Div. . . . Able Computer Technology, Inc., Santa Ana, Calif., named DANIEL P. O'SHEA its director of operations. ❋

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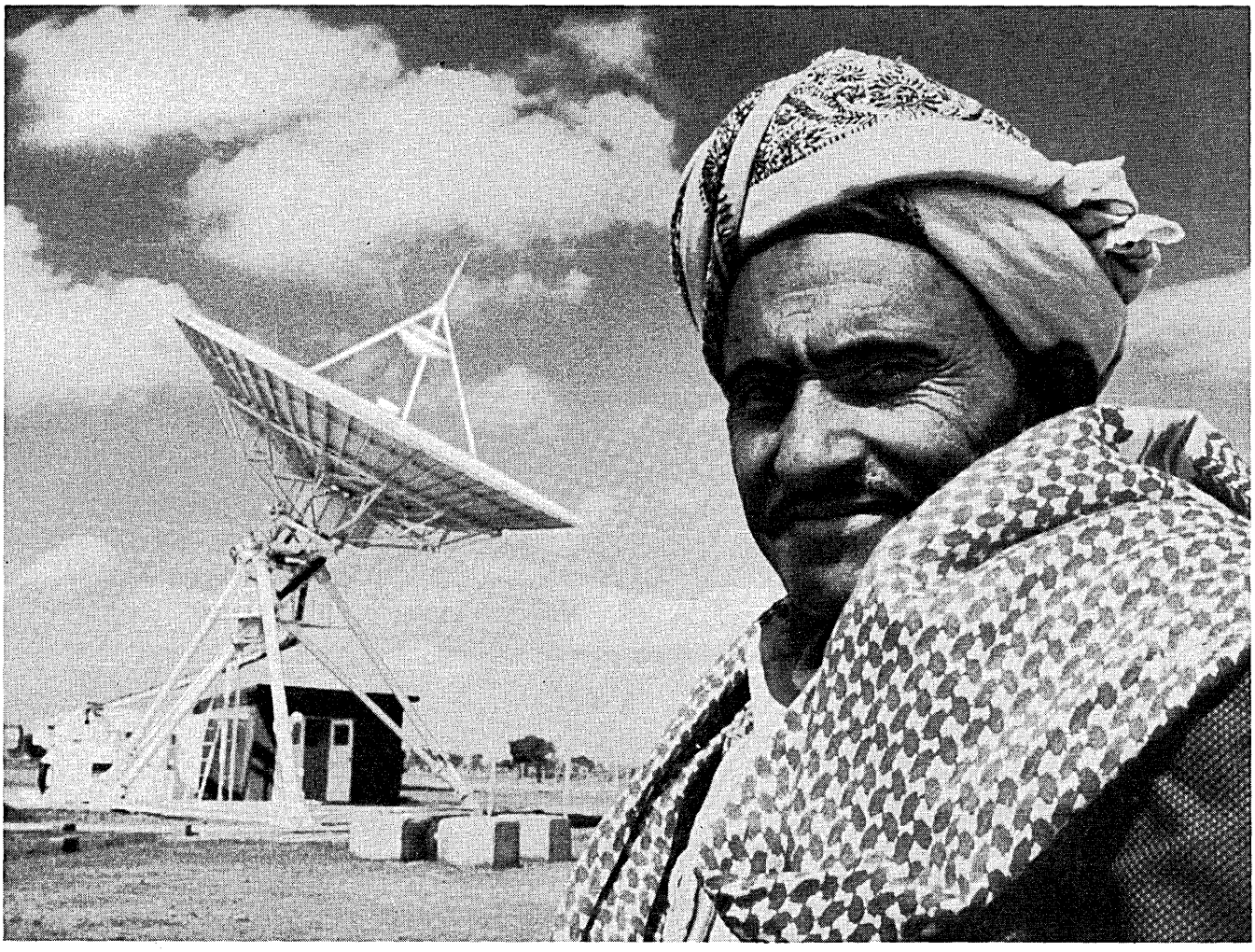

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ForeWord can also be used for direct composition, editing, and final typing of the large documents that once tied up your staff for days. Paragraphs can be retrieved from local storage and updated, chapters reorganized...all at computer speed. And all while other operators are performing their independent tasks.

Nationwide support

ForeWord uses the same proven hardware as our distributed processing systems, and is backed by the same network of experienced service personnel in strategic locations throughout the country.

For more information, call your local Four-Phase office. Or write us at the address below.

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calendar

JANUARY

NRMA Sixth Annual Convention, Jan. 8-11, New York City. Forty-seven general sessions and 50 workshops will be featured at this annual meeting of the National Retail Merchants' Assn. There also will be a retailers' business and equipment exposition run in conjunction with the convention. Fee: $95, NRMA members and associate members; $135, nonmembers. Contact: National Retail Merchants Assn., 100 W. 31 St., New York, N.Y. 10001 (212) 244-8780.

Computer '78, January 16-20, London. The latest in the state of the art computer and peripheral equipment will be displayed at this show organized by the U.S. Dept. of Commerce. The show will feature several products new to the United Kingdom market, and also will include displays by approximately 70 U.S. companies. A one-day seminar on advances in the computer and peripheral equipment field will be held during the exhibition. Contact: George Kemp, U.S. Dept of Commerce, Room 4217, Washington, D.C. 20230. (202) 377-3459.

Hospital Information Systems Sharing Group, Jan. 17-19, Orlando, Fla. "Management of the Information Systems Department" is the theme of this conference. The sessions planned are designed to foster and promote better patient care through the use of advanced systems and information processing, and to improve record-keeping and information dissemination systems. Contact: Clair Naylor, Advanced Health Systems, 54 E. South Temple, Salt Lake City, Utah 84111 (801) 531-6464.

U.S./Southeast Asia Telecommunications Conference, Jan. 19-21, Singapore. The purpose of this three-day program is to demonstrate the latest developments in U.S. telecommunications technology and hardware to the Far Eastern market. The conference will discuss a variety of state of the art advances, and will cover such topics as: telephone equipment and systems, transmission equipment and systems, and mobile communications. Sponsored by the Electronic Industries Assn.'s Communication Div., the conference will present a series of technical and applications seminars, and there also will be equipment displays related to the content of the seminars. Exhibitor and speaker participation is limited to U.S. companies. Contact: Mark V. Rosenker, EIA, 2001 Eye St. N.W., Washington, D.C. 20006 (202)457-4990.

CALLS FOR PAPERS

Ninth Annual Pittsburgh Conference on Modeling and Simulation, April 27-28, 1978. Special emphasis of the conference will be on energy; social, economic, and global modeling; and simulation. Papers should describe significant contributions which add to the knowledge in a particular area, or which describe the origin and progress of research that is currently being conducted. Two copies of the abstract and summary should be submitted by Jan. 27, 1978, to William G. Vogt, Modeling and Simulation Conference, 348 Benedum Engineering Hall, Univ. of Pittsburgh, Pittsburgh, Pa. 15261.

NCC Personal Computing Festival, June 5-8, Anaheim, Calif. Part of the 1978 NCC, the personal computing festival is soliciting papers on the subjects of: tutorials for computer novices, speech synthesis and speech recognition, computer-driven and computer-assisted music systems, computer graphics and video art, personal computers for the physically disabled, personal computers for education, business systems using "home" computers, hardware and software design and implementation, and standards for hardware, interfaces, and software. The three-day program will consist of invited papers, contributed papers, tutorials, and panel discussions relevant to personal computing. Letters of intent to participate, including an abstract of the proposed talk, should be submitted by Feb. 1, 1978, to Jim C. Warren, Jr., Star Route Box 111, Redwood City, Calif. 94062.

1978 Summer Computer Simulation Conference, July 24-26, Newport Beach, Calif. The theme for this conference will be "Simulation Today," and suggested topics for papers include: digital and hybrid simulation systems and application areas such as energy conservation and utilization, biological systems, physical sciences, aerospace, biomedical systems, environmental studies, managerial and social sciences, chemistry, and the emerging simulation languages. Two four-page summaries should be submitted by Jan. 1, 1978, to Dr. Ralph Huntsinger, Computer Science Dept., California State Univ., Chico, Calif. 95929.

ACM Sigmini Symposium on Small Systems, Aug. 2-3, New York. The conference will have a heavy emphasis on business and industrial applications of minicomputer and microcomputer systems. Both hardware and software topics presenting state of the art and state of the industry aspects will be included. Four copies of the completed paper should be submitted by Feb. 1, 1978, to Dr. George Gorsline, Dept. of Computer Science, Virginia Polytechnic Institute, Blacksburg, Va. 24061.

ON THE AGENDA

Hospital Information Systems Sharing Group, Jan. 17-19, Orlando, Fla. **International Word Processing Conference, Jan. 31-Feb. 2,** New Orleans. ❋

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Take highly-seasoned professionals with an uncompromising attitude about quality. Add talented individuals intent on advancing technology. Combine with the experience gained through seven generations of successful disc pack production. And you've got the ingredients of a great data module.

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NCC '78 has what it takes. Everything.

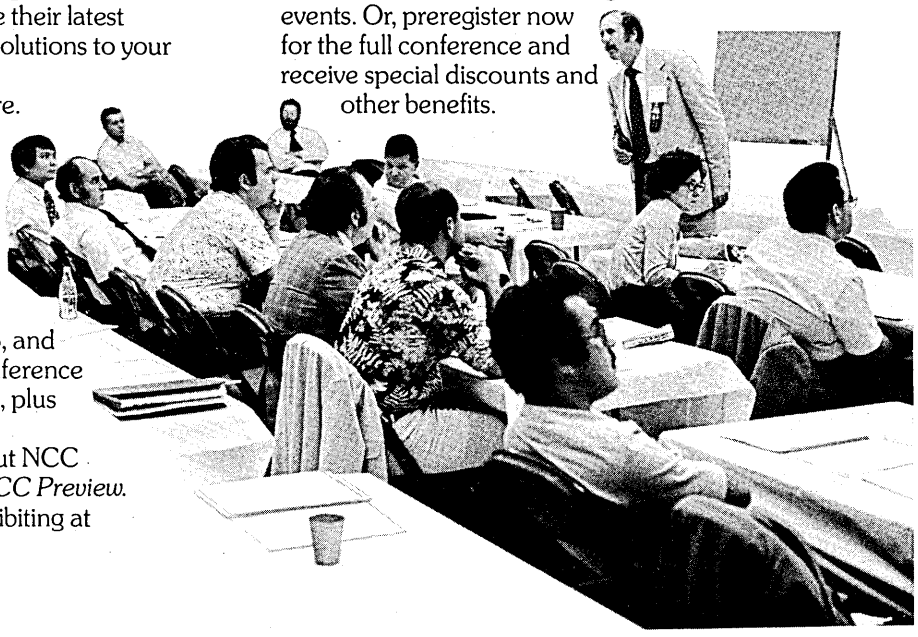
The 1978 National Computer Conference has what it takes to keep you up-to-date on the latest developments in computing and information processing. NCC '78 brings it all together in a conference of unparalleled breadth and diversity...the largest exhibit of computer products and services ever held, a major technical and professional program, a professional development series of seminars, a landmark Personal Computing Festival, featured addresses by leading industry authorities, and much more.

Mark down the time and place, June 5-8 in Anaheim, and plan now to explore new frontiers in information processing at NCC '78.

At NCC '78 you'll get a closeup look at the latest computer hardware, software, systems, and services...all under one roof at the biggest computer show on earth. More than 350 organizations, occupying over 1,300 booths, will be on hand to demonstrate their latest offerings and to discuss cost-effective solutions to your data processing problems.

And this is just one part of the picture. To meet your information needs, a technical and professional program of approximately 100 sessions will cover 25 topic areas dealing with computer methodology, applications, systems, and societal concerns. Supplementing this program will be a professional development series of 12 tutorial seminars...each available for a separate nominal fee. In addition, a special Personal Computing Festival will be held in the nearby Disneyland Hotel complex. Included will be commercial exhibits of consumer computing products; a program of papers, presentations, and tutorial sessions; and a competition featuring individually-designed microprocessor systems and applications.

Act now to make sure you're part of the year's one computer conference that has what it takes to keep you up-to-date on new frontiers in computer technology, applications, and management techniques. Return this coupon to obtain your complimentary subscription to *NCC Preview*—a fact-filled newsletter covering all NCC activities and events. Or, preregister now for the full conference and receive special discounts and other benefits.



☐ I wish to preregister for NCC '78, and have enclosed $60 covering conference sessions, exhibits, other activities, plus preregistration benefits.
☐ Please send me all the facts about NCC '78, including future issues of *NCC Preview.*
☐ My company is interested in exhibiting at NCC '78.

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Company_____

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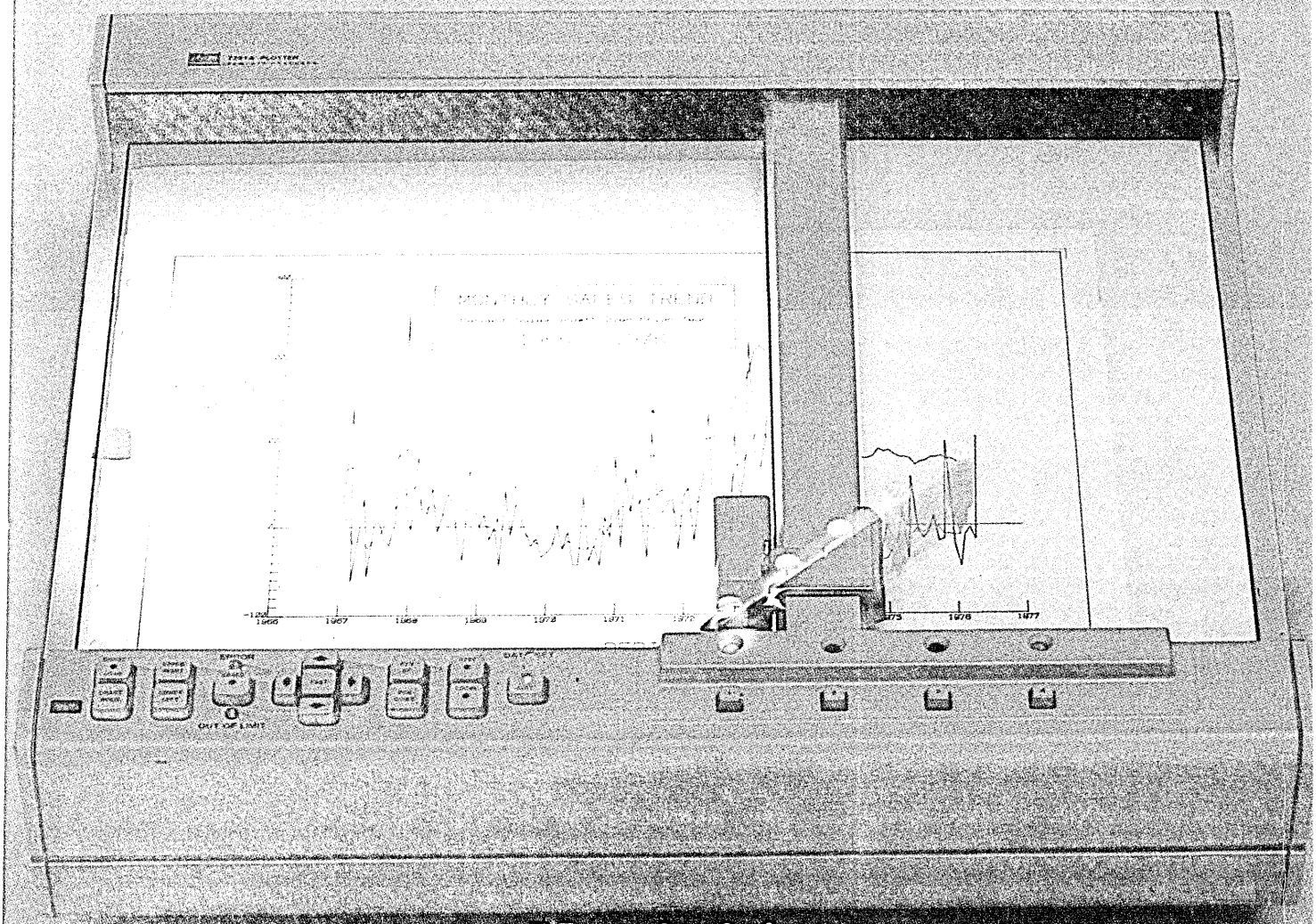
City_____ State_____ Zip_____

DTM

NCC '78...
New Frontiers in Information Processing
c/o AFIPS, 210 Summit Avenue
Montvale, N.J. 07645
telephone: 201/391-9810

From only 90 seconds of transmission time, HP's new graphic plotter drew this chart in four colors, picked up its pens, and put them away.



Neat, isn't it.

Getting this kind of graphics from complex computer data has always been a long, drawn-out problem. Now, arcs, circles, dashes, dots, and alphanumerics—routine shapes that normally take lengthy programs—are quickly drawn by single commands.

And, with only one transmission, any series of shapes and moves can be stored in the plotter's memory and repeatedly executed as macroinstructions.

But the neat trick is the way our plotter instantly changes colors via a programmable command or front panel control. Four long life HP pens stay tucked away until the plotter picks one out, draws, and puts it back (with the cap on).

You have to see it to believe it. HP's remarkable new Model 7221A (RS 232C interface) uses an internal memory and 40 commands that plot efficiently to save you money in computer and transmission time. And it costs just $4,600 (domestic USA price only), with full service leasing available in the USA for as little as $218 per month.

See your Hewlett-Packard representative for complete details on how you can have economical high quality multicolor charts and diagrams of your computer-generated information with the new Model 7221A Graphic Plotter. It's the neat solution to the problem of long, drawn-out hard copy graphic displays.

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source data

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

books

BOOK BRIEFS . . .

Your Home Computer
by James White
Dymax 1977
P.O. Box 310
Menlo Park, Calif. 94025
234 pp. $6.00

This overview of the personal computing scene assumes no previous computing knowledge. It begins with a 46-page explanation of computers and data processing. The second chapter covers "microcomputing fundamentals" such as microprocessor selection, fixed memory, key input, output, and peripherals. From there it moves to the personal computing scene today, covering computer stores, mail order vendors, and kits, as well as used computing equipment. Also included in this section are a few pages on programming. The last chapter covers some possible applications for your home computer.

The strength of this book is its good reference material. While some pertinent subjects are not covered in detail, many sources are referenced. Appendices contain manufacturers' addresses, a list of personal computing periodicals, computing clubs and computer stores, and a chart of ASCII character codes.

Home Computers: 2^{10} Questions & Answers, Volume 1: Hardware, and Volume 2: Software
by Rich Didday
dilithium Press 1977
P.O. Box 92
Forest Grove, Oregon 97116
Vol. 1, 225 pp, $7.95. paperback
Vol. 2, 175 pp, $6.95. paperback

This is a very nicely put together set of books that strikes a balance between the informative authority and the how-to manual. Written to take the potential home computer user through the necessary steps for preliminary understanding, purchase decision, implementation, and use of home computers, the volumes are stuffed with lucid, hand-drawn illustrations of everything from electronic diagrams to graphic descriptions of algorithms.

The books are organized in what might be called a real-time approach: each chapter represents a day. Day 1 is an overview, including such considerations as how a memory is organized, a definition of the controller, and an explanation of I/O devices. The section on programming features a chart comparing the microcomputer to the automobile, with designing and running your own program in a higher-level language roughly comparable to planning and taking a long car journey. Day 2 covers numbers, logic, and building blocks (Boolean algebra, rules of logic, circuit components). Day 3 covers the hardware specifics and structure vs. function and includes diagrams on systems configuration, timing diagrams, and state transition diagrams, concluding with a section on actually hooking things up. Day 4 covers assembling a computer kit. Day 5 covers some specific microprocessors, organization, and memory access instructions.

Volume II, on hardware, contains a brief summary of relevant information from Vol. I, and a repeat of Day 5, with an additional segment on stacks. Day 6 covers assembly languages; Day 8, programming in BASIC; Day 9, generalities about programming (interpreters vs. compilers, definition and explanation of structured programming); and Day 10 is about what you can really do with it. The answers fall under the categories of: control, communications, computation, simulation, organization, and recreation. Each of these categories is covered in terms of personal use, education, and profit-making.

Game Playing With Basic
by Donald D. Spencer
Hayden Book Co., Inc. 1977
166 pp. $6.95

This is a straightforward guide to all sorts of games, simulations, mathematical recreations, and puzzles. The first chapter covers the basics of using the computer to play games, and includes some programming specifics. Chapter two, "Talking in BASIC," covers the language processes and functions with which the game player must be familiar.

The remainder of the book details every sort of game of numerical recreation the user might want to run, from tossing a coin to Fibonacci numbers, gambling games, and a special section of magic squares. There are many, many diagrams, flowcharts, and printouts.

Standard Dictionary of Computers and Information Processing
by Martin H. Weik
Hayden Book Co., Inc., 1977 (second Ed.) 400 pp. $16.95

This is the revised second edition of a glossary originally published in 1969. It is a source/reference book for over 12,500 hardware and software items, and includes explanations, practical examples, and illustrations for those items. Closely related concepts are cross-referenced. Some changes are: old definitions have been updated; new illustrations have been added; and 2,500 terms from hardware and software applications areas such as microprocessors, minicomputers, computer networks, modems, coding schemes, data base management, and information theory have been added. All definitions are said to be consistent with the latest professional usage approved by technical society, government, national, and international standards bodies.

vendor literature

Terminal Supplies
A four-page flyer describes media and accessories available from this terminal vendor. Prices are included for paper, ribbons, paper and cassette tape, as well as a paper tape splicer and a cassette tape eraser. WESTERN UNION DATA SERVICES, Mahwah, N.J.
FOR COPY CIRCLE 536 ON READER CARD

Digitizers
This vendor has prepared a four-page, two-color folder and two product bulletins describing some of its digitizers and some of the applications for which they are suited. The four-page folder explains the process of digitizing graphic data into digital form for input to dp, recording, or transmission systems. One of the two-page product bulletins describes how Phoenix Mutual Life Insurance Co. uses digitizers to enter data quicker and with fewer errors than with keypunching. The second two-page note describes a three-dimensional digitizer. SCIENCE ACCESSORIES CORP., Southport, Conn.
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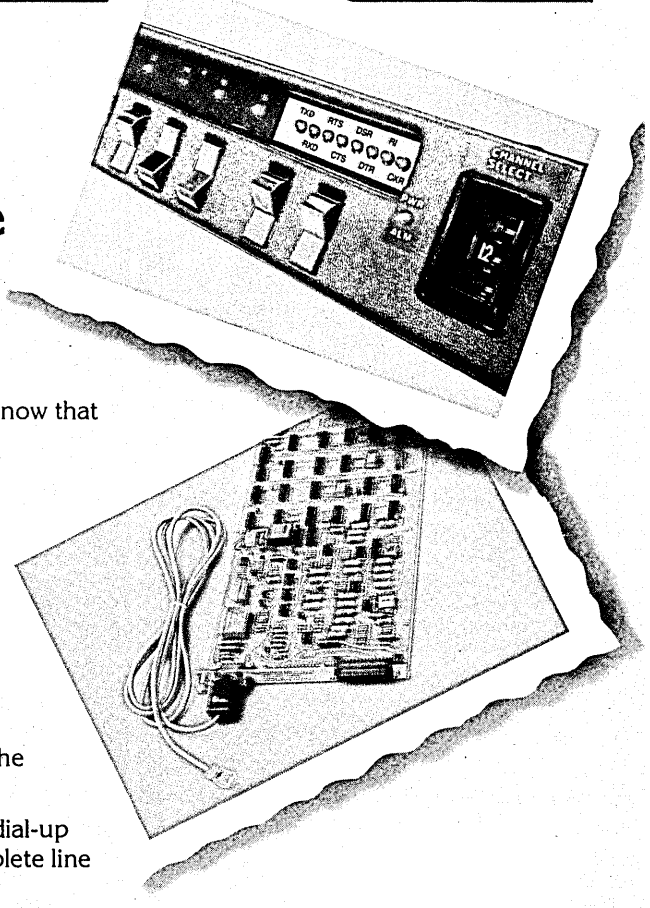
Remote Plotting
This eight-page, four-color pamphlet illustrates the differences between remote batch and time-sharing plotting. Tables compare and contrast the features of both modes of remote plotting,

(Continued on page 44)

Dear Ma:

You may be getting back some DAA's now that Vadic modems no longer need them.



A lot of folks will be moving out of your high rent district, Ma, now that Vadic is delivering direct connect 300 bps modems, the first to be registered under Part 68 of the new FCC rules.

It's an historic occasion, because modem users happily will no longer have to spend from $4 to $8 each month renting your Data Access Arrangements (DAA). Instead, the new Vadic 317S connects directly to the telephone network, using the FCC approved data jack.

For end-users, the VA317S is available, with Vadic's powerful displays and diagnostics, either in a stand-alone cabinet, or in the Multiple Data Set System where 16 modems (including built-in DAA's) take up just 7 inches of vertical rack space. OEM's can buy the VA317S packaged on a single PC board.

The VA317S is only the beginning, Ma. Before long, all Vadic dial-up modems will have built-in DAA's. Also, Vadic has designed a complete line of stand-alone, rack mount, and card form DAA's.

You can get the whole story, Ma, by phoning, or writing, to Vadic today.

Your independent thinking son,

Alexander Graham Jr.

PS: Vadic has shipped over 140,000 modems to date.

vadic

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Tel: (408) 744-0810 TWX: 910-339-9297

Inquire about our new Ma Bell T-Shirts.

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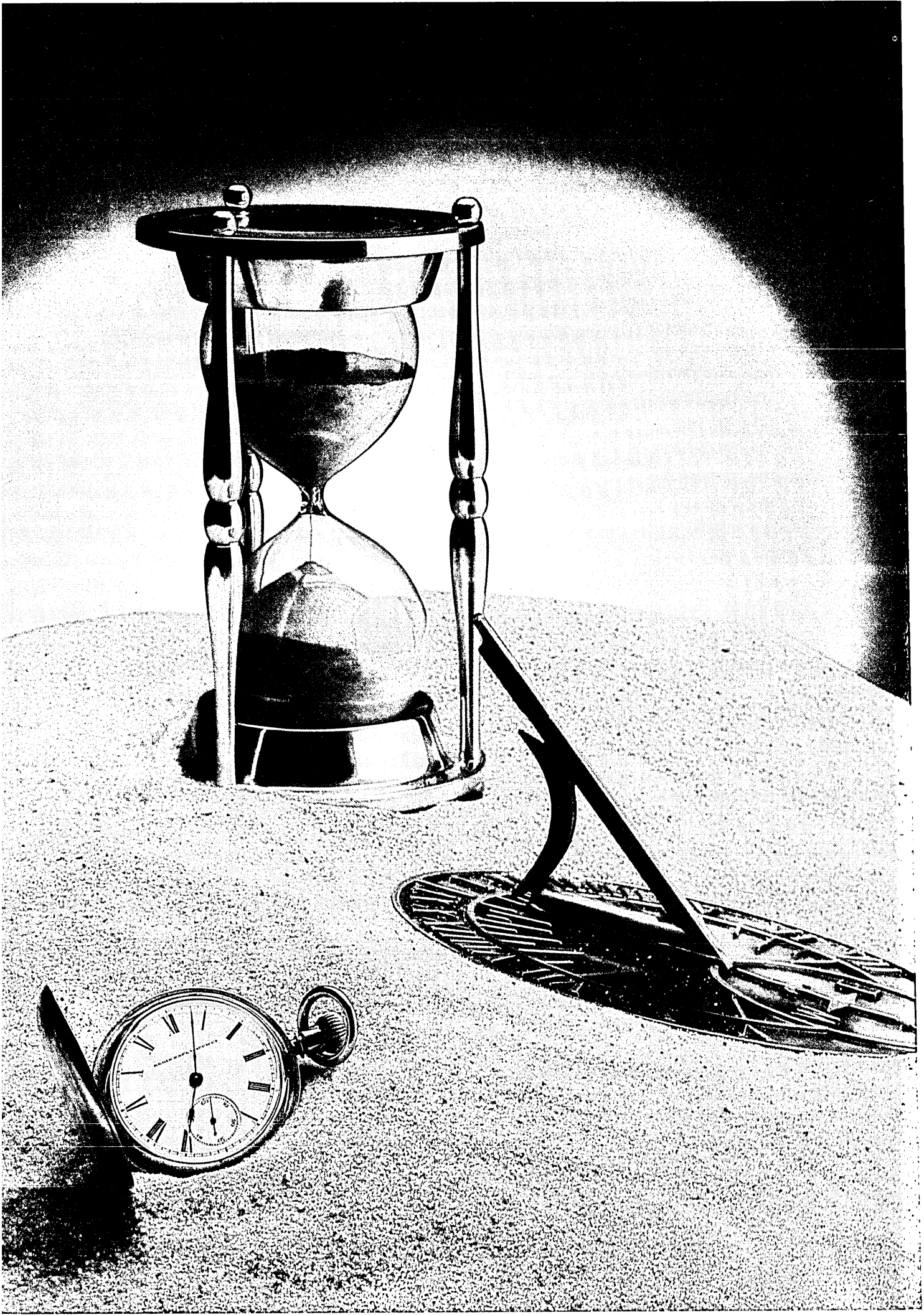

Real-time problems? Systems has timely solutions.

Systems Engineering Laboratories has dedicated its 16 year corporate life to solving challenging real-time problems. The experience gained in solving these problems is what led us to pioneer the development of true 32-bit computer systems.

Look into the operating systems, the languages, the data base system, the real-time device handlers and terminal systems, and you will see that we build for the real-time environment. That's our business.

Choose from a well-bred family of computing systems: The SEL 32/35, the SEL 32/55, or the SEL 32/75. Unlike other so-called "32-bit minis" that are only bridge-the-gap systems developed from essentially 16-bit architecture, all SEL 32 systems are true 32-bit machines. This results in richer instruction sets, more precision in data representation and larger, directly-addressable memory. All are available with throughput rates in excess of 26 million bytes/second.

Systems computers fit the term "minicomputer" in price alone. If your application is performance-sensitive, we'll save you money. If you're budget-sensitive, we'll give you more performance for your dollar.

The SEL 32/35 can be configured from 64K bytes to 512K bytes of 900 nsec memory. Resembling its more powerful brothers, the SEL 32/35 is a complete package, including control processor with floating-point arithmetic, memory, chassis, power supplies and cabinet.

The SEL 32/55 is offered in a variety of both single and multiple CPU configurations, with from 32K bytes to 1 million bytes of 600 nsec memory.

The SEL 32/75, with up to 16 million bytes of main memory, has a concept so new, we had to coin a special term to describe one of its main features: Regional Processing Units. Working independently, these RPU's contain sufficient control and buffer storage areas to process an I/O region and transfer the resultant data directly to main memory. Computer system throughput is further enhanced by High-Speed Floating- Point Hardware and Writeable Control Storage.

Just circle our number on the Reader Service Card, or call us today. We'll send you the powerful story of the SEL 32 family.

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☐ SEND ME MORE INFORMATION
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SYSTEMS Engineering Laboratories
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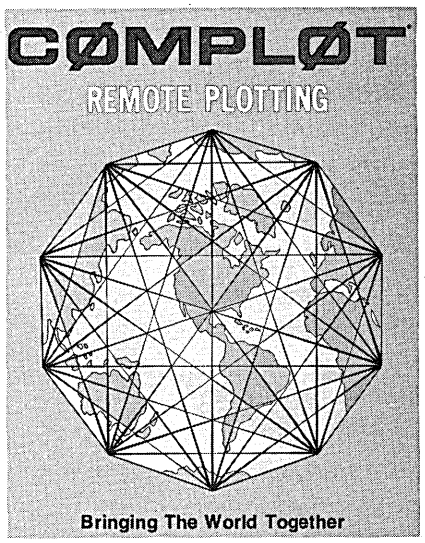
(305) 587 2900

source data

(Continued from page 40)



and also show how this vendor's product line fits into each. HOUSTON INSTRUMENT, Austin, Texas.
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Alarm Systems

This 68-page catalog of alarms and security devices includes several items of particular interest to dp installations. Included are a water alarm which can shut down a dp system in the event of a burst pipe or flood, and a number of intruder detectors. MOUNTAIN WEST ALARM SUPPLY CO., Phoenix, Ariz.
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Media Accessories

Diskette and digital cassette tape accessories are described in this four-page illustrated brochure. Products described include a portable diskette file,

hanging racks, diskette carousel units, a cassette carousel, and a wall or desk-mounted cassette storage center. ROBINS INDUSTRIES CORP., Commack, N.Y.
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Acoustic Coupler

A technical brochure outlines the applications and features of this vendor's Baudy 12 (or 1200B) acoustic coupler. The 1200 bps coupler is designed for use over dial-up phone lines. OMNITEC DATA CORP., Phoenix, Ariz.
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Network Control Systems

This 12-page, four-color booklet describes how users of point-to-point and multipoint communications networks can use this vendor's Network Diagnostic Control Systems to provide centralized monitoring, testing, and restoral capabilities. Diagrams and step-by-step explanations show how the vendor's network control systems operate in typical data communication networks. RACAL-MILGO, INC., Miami, Fla.
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Business Systems

Insurance brokers and agents can learn how this vendor's Series III business computer can fit into their operations. The two-color, 12-page brochure describes how the system can handle general accounting, premium notices, past due notices, monthly statements, commission statements, sales analysis, and other functions required to administer and manage an insurance business. Options, such as payroll and policy writing also are discussed. LOCKHEED ELECTRONICS CO., INC., Plainfield, N.J.
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Plotting

"Improving Output From 360 and 370 Computers," a six-page, black and white brochure, tells of applications of this vendor's 360/370 output system. Included are descriptions of applications in computer-aided design, mapping, business reporting, and general purpose graphics. In interviews, nine users discuss advantages they perceive in the system. Case histories and output samples, system diagrams, application photos, and time trial results are also included. VERSATEC, Santa Clara Calif.
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Disc Drives

An eight-page, two-color product bulletin describes this vendor's 3300 series of Winchester technology disc drives. Included are descriptions of design features, operating benefits, specifications, and interface data on the eight-model family. OKIDATA CORP., Mt. Laurel, N.J.
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Minicomputers

Four brochures, each including color photos, describe this vendor's line of George minicomputers. Written in understandable, nontechnical terms, the brochures show how the George-series fits a variety of business applications in both small businesses and departments of larger concerns. Specifica-

tions are also included for more technically minded readers. Software is also described. CINCINNATI MILACRON, Electronic Systems Div., Lebanon, Ohio.
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Remote Computing

Remote computing users in the U.S. and Canada may be interested in these two booklets on remote computing services. Entitled "Remote Computing Services in the U.S. (or Canada): Cost-Effectiveness and Key Issues—A Summary," the eight-page booklets cover the results of extensive research among users and vendors of remote computing services in the two countries. Hardware, software, networks, and applications are all discussed. One interesting trend noted is the recent entrance of Amdahl mainframes into the remote computing environment. INFODYNE, INC., Minneapolis, Minn.
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Minicomputer Acquisition

Prospective minicomputer users will find guidance in "The Mini and The User," a guide with the avowed purpose of "keeping the vendor and user out of court and assuring delivery of a working 'turnkey' system." The booklet is based on hundreds of minicomputer purchases, installations, and surveys of user problems. It covers topics including: what the potential user should expect and demand, how the system should perform, what should be delivered, the selection process, contractual considerations, and leasing and financial services. The source of the guide says it is unbiased because it is not tied in to any single minicomputer vendor. TURNKEY SALES AND LEASING, INC., New York, N.Y.
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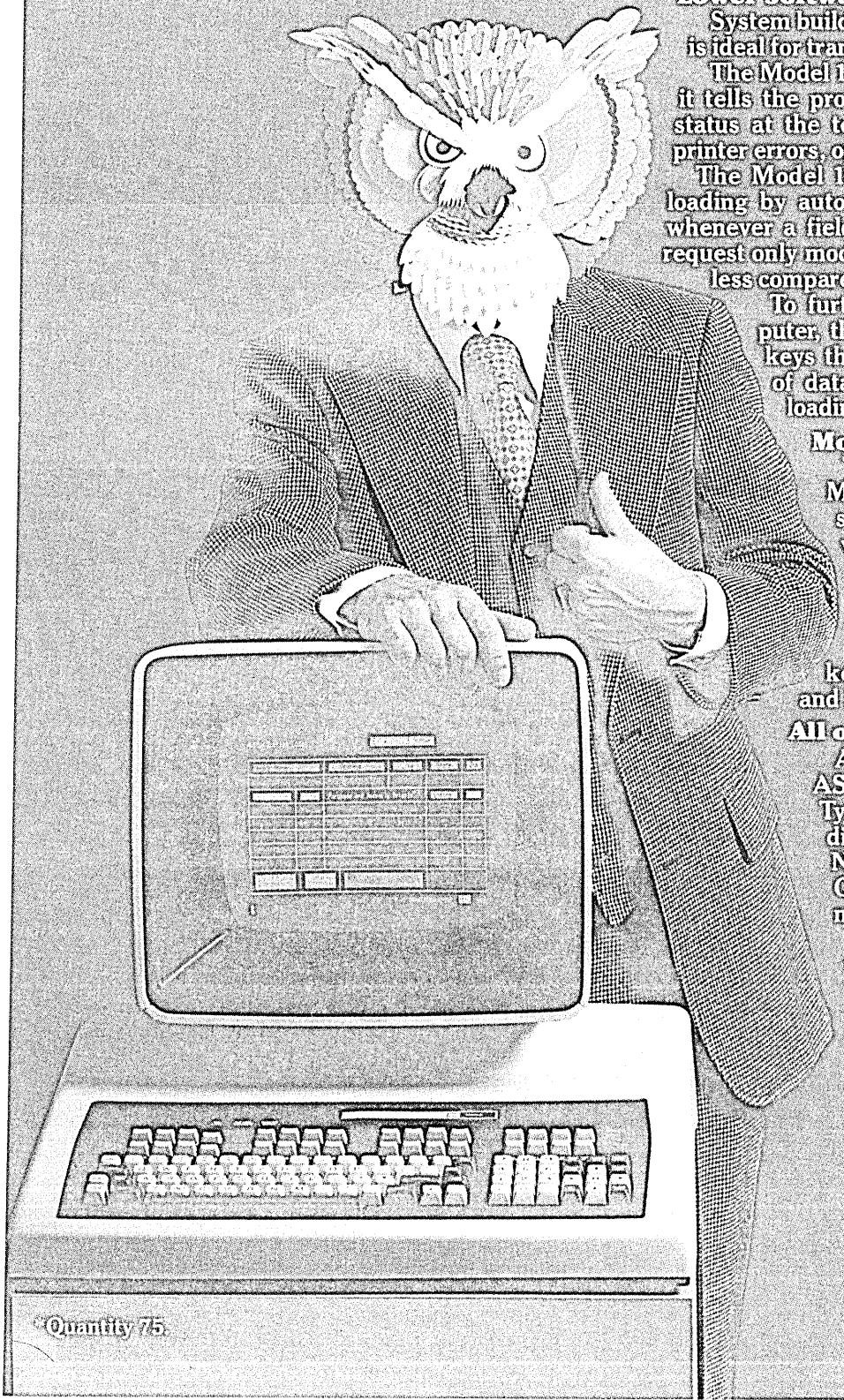
reports & references

Terminals Industry Report

Principally concerned with describing the industry, forecasting the market,

Rare bird.

An editing CRT that's ideal for transaction processing.



Lower software costs. Easier programming.

System builders say our Model 1200 Editing Terminal is ideal for transaction processing. We agree.

The Model 1200 makes programming easier because it tells the programmer (and the host computer) the status at the terminal. Communications strap setting, printer errors, operator mode key setting, and more.

The Model 1200 also cuts down on host computer loading by automatically setting modified data "tags," whenever a field is updated, so the host computer can request only modified fields, and skip thousands of needless compare operations.

To further lighten the load on the host computer, the Model 1200 has programmable send keys that let the program regulate the amount of data returned to the computer as terminal loading varies.

More productive operators.

Thanks to a 9 x 12 character matrix, the Model 1200 has crisp, clear, strikingly sharp characters. So operators see their work better and make fewer mistakes.

Data entry is incredibly accurate due to field attributes like low intensity, numeric only, blink, and inverse video.

Editing is fast and easy, too. Single keystrokes insert and delete characters and lines.

All our standard goodies. Only $1383.*

A big, 12-inch screen, 128-character ASCII set, upper and lower case, 15 cps Typamatic repeat on all keys, and a 24-line display are standard. So is our exclusive No Hassle toll-free 800 number for service. One call gets you service. Where you need it. When you need it. World-wide.

So go ahead. Get a CRT terminal that's specifically designed for transaction processing. Perkin-Elmer's Model 1200 Editing Terminal.

*Quantity 75.

PERKIN ELMER DATA SYSTEMS | TERMINALS DIVISION

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(312) 437-3547 Chicago, IL
(214) 234-8880 Dallas, TX
(714) 544-9093 Los Angeles, CA
(201) 229-4040 Oceanport, NJ
(408) 249-5540 San Francisco, CA

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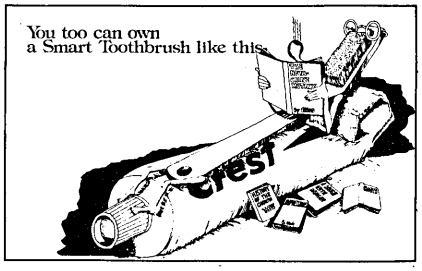
source data

assessing the impact of the technology, and analyzing the competitive environment of the non-intelligent and smart crt and teleprinter market sectors, *Computer Terminals II: Crt's and Teleprinters* reports on an industry expected to grow from 1,484,000 installed base units in 1977 to 3,602,000 units by 1981. The terminals covered in the report are divided into three categories: crt non-intelligent, crt smart, and teleprinters. Each category is further divided into traditional markets: IBM, independent suppliers of IBM and TTY-compatible, and other markets. The 88 page report includes seven tables and 15 figures. Price: $595. CREATIVE STRATEGIES INC., 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

How to Build a Smart Toothbrush

An IBM 370/168 computer (or equivalent), a tube of Crest toothpaste (mint flavored for best results), and a fire extinguisher are among the requirements for a hardware check-out of the intelligent toothbrush you can build with just this free guide and a few necessary, inexpensive peripheral available for under $10,000 at your local computer store.

Start with the free (rejected) Zilog Z-80 microprocessor chip included with the guide, pick up the peripherals, and add a few thousand hours of your



spare time, and you'll soon be able to discard the stupid toothbrush you presently use and start each day brushing intelligently. There is a chapter on how to relate to a toothbrush that may be smarter than its builder.

A glossary of seven commonly used terms defines RS232, for example, as the "25 pin socket that lets you plug a $3,000 video terminal into a $10 microprocessor." The do-it-yourself plans are the result of a recent talk by the president of Dylakor Software Syslems, Inc. DYLAKOR SOFTWARE SYSTEMS, INC., 1655 Ventura Blvd., Encino, Calif. 91436.

Computer Audit Advice

The 42-page guidebook *Management, Control, and Audit of Advanced Edp Systems* suggests how auditors, their clients, and suppliers of edp systems should work toward cost-effective computer audits. The guide analyzes the auditing problems presented by an advanced dp system and suggests ways to avoid them. It also notes some of the objectives those systems are designed to achieve, including centralization of data and reduction of paper as a medium for recording business transactions. Price: $4.50. AICPA, Order Dept., 1211 Avenue of the Americas, New York, N.Y. 10036.

Printer Guides

More than 120 communications printers from over 30 vendors are identified and sorted by system environment and industry application in the 17-page booklet, *Communications Printers Selection Chart*. The booklet also includes a vendor directory. Price: $10, prepaid; $12 invoiced.

The *Printer Selection Chart* offers product information for more than 160 models from over 40 companies. The systems and industry environment are defined for each device, and interface, speed, and pricing information is given. The 29-page report includes the selection chart and a vendor directory. Price: $10, prepaid; $12, invoiced. Both reports are available from ALLTECH PUBLISHING CO., 212 Cooper Center, N. Park Dr. & Browning Rd., Pennsauken, N.J. 08109.

Personnel Management

The 40-page report *The People Side of Data Entry* is aimed at data entry supervisors who want to improve their personnel management techniques. Topics discussed in the report include: motivating employees to accept changes in equipment, measuring operator productivity, what to do when someone isn't working out, operator salaries, a positive approach to operator performance rating, and implementing flexible work hours. Price: $15, prepaid. MANAGEMENT INFORMATION CORP., 140 Barclay Center, Cherry Hill, N.J. 08034.

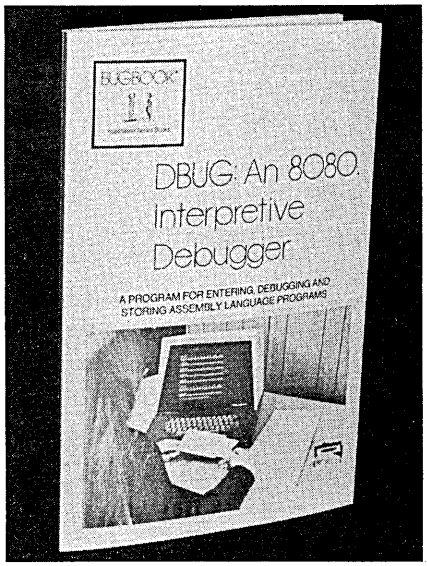
Application Case Studies

Applications of small business computers by a furniture manufacturer, nursing home, construction supplier, hardware wholesaler, meat processor, liquor distributor, automobile importer and distributor, and local municipality are described in this 20-page report. Each case study represents an interview with the dp administrator relating to selection, implementation, and operational problems and how he approaches it. Each application studied represents a business with annual sales over $1.5 million. *Casebook . . . Selected Small Business Computer User Application Case Studies* is available for $4 from MANAGEMENT INFORMATION CORP., 140 Barclay Center, Cherry Hill, N.J. 08034.

8080 Debugger

DBUG: *An 8080 Interpretive Debugger* is a program for entering, debugging, and storing assembly language programs, and is designed to permit the user to enter a program into an 8080 memory and single-step in through, instruction by instruction. The program with supporting documentation is said to be an aid for those who develop 8080 software—the user can enter and change data and program steps stored in random access memory. After the program is entered, it can be single stepped by using the break point to observe the effect of a particular instruction on each of the 8080's internal registers, the vendor claims.

DBUG was written for reading and punching paper tape with a teletypewriter, but the I/O routines can be changed to accommodate magnetic tape cassettes or crt terminals. Two complete listings of DBUG are given in the appendices—one in octal code and



one in hexadecimal code, each with appropriate I/O subroutines. User guidance information and examples of DBUG applications also are given. Price: $5. E & L INSTRUMENTS, 61 First St., Derby, Conn. 06418.

CICS/VS Handbook

The information contained in this reference digest is divided into ten sections, including: CICS/VS macro syntax and command syntax, debugging facility information, storage management summary, messages and codes, service transaction formats, and control area (DSECT) layouts. A hexadecimal and decimal conversion chart also is included. The standard CICS/VS trace table entries are described in tabular forms, and the EXECUTE interface trace entries also are described. The

(Continued on page 48)

Sly buy.

A CRT that costs more but actually costs less.

At $907,* our Perkin-Elmer Model 1100 CRT Terminal has been the price-performance leader in the CRT business for almost a year. Recently, some CRT makers cut their prices to a few dollars below ours.

Don't be fooled. The Model 1100 still costs less. Here's why.

Program debugging takes less time.

You'll save the few extra dollars you spend for our CRT the first time a programmer uses it for debugging a program. The secret? A feature called Transparent Mode, which displays everything coming down the line – including control characters – and helps solve the most complicated host computer and communication link problems in seconds.

Operators make fewer errors.

You'll save money day after day with the Model 1100. Thanks to a 9 x 12 character matrix, the Model 1100 has crisp, clear, strikingly sharp characters. So operators see their work better and make fewer mistakes.

The Model 1100 also has a hooded display to eliminate reflection and end eyestrain. The display is right at eye level, too, which means no bending, no neck problems, and less fatigue.

All our standard goodies.

A big 12-inch screen, 128-character ASCII set, upper and lower case, Typamatic repeat on all keys, and a 24-line display are standard. The same goes for our exclusive No Hassle toll-free 800 number. One call gets you service. Where you need it. When you need it. Worldwide.

The Perkin-Elmer Model 1100. Feature for feature, it still costs less.

*Quantity 75.

CIRCLE 35 ON READER CARD

PERKIN ELMER DATA SYSTEMS | TERMINALS DIVISION

Randolph Park West, Route 10 & Emery Avenue, Randolph, N.J. 07801
(201) 366-5550, TWX: 710-987-7913

(617) 890-1305 Boston, MA
(312) 437-3547 Chicago, IL
(214) 234-8880 Dallas, TX
(714) 544-9093 Los Angeles, CA
(201) 229-4040 Oceanport, NJ
(408) 249-5540 San Francisco, CA

source data

(Continued from page 46)

CICS/VS *Reference Handbook* is priced at $5 for the first five copies, and $4.50 in quantities of 6 to 30. One complimentary copy is offered to those writing for it on company stationery. ON-LINE SOFTWARE INTERNATIONAL, Software Plaza, Route 208, Hawthorne, N.J. 07506.

Micrographics

The 28-page illustrated booklet *All About Microfilm Cameras* is designed to provide basic facts to aid selection of that system component. Topics covered include: principles of photography and film, microfilm facts and terms, descriptions of various types of cameras, and a glossary. Price: $2.

The 1977 *Supplement to the Guide to Micrographic Equipment* covers over 100 new pieces of equipment introduced since 1976. Three general categories are covered: production, user, and computer output microfilm. Price: $14, NMA members; $17, nonmembers.

Basic Microfilm Standards is a collection of the five American National Standards specified for the microfilming of general books of account. It also includes the recommended practice for first generation silver halide microfilm, and a directory of all micrographic standards. Price: $8.50, members; $11, nonmembers.

The *British Standard Specification for Microform Readers* specifies the essential characteristics of reading apparatus for microfiche and microfilm in roll form, filmstrips, aperture cards and jackets, and applies only to rear projection readers, and does not apply to readers having a magnification of more than 50X. In addition to a printed text, a test fiche with 3360 resolution chart images at a 100X reduction is included in the package. Price: $18.50, standard and fiche; $12.50, fiche only. Prepaid orders should be sent to: NMA PUBLICATIONS SALES, 8728 Colesville Rd., Silver Spring, Md. 20910.

Medinfo

The proceedings of the Second World Conference on Medical Informatics, held in Toronto Aug. 8-12, 1977, are now available from this publisher. The objective of the conference was to evaluate cost-effectiveness criteria, provide a critical review of current failures and successes, identify important trends in technology and health care, determine the critical aspects leading to user acceptance, and to predict guidelines for the future. With a theme of "Information Technology for World Health," the conference featured 31 papers under the headings of: management, clinical medicine, public health, theoretical aspects, service and special care, education, and miscellaneous (including hardware and software technology, HIS, and evaluation of information systems in health care environments). Price: $95. NORTH-HOLLAND PUBLISHING CO., 335 Jan van Galenstraat, P.O. Box 211, 1000 AC Amsterdam, The Netherlands.

APT Language Standard

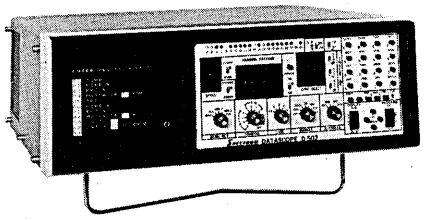
A revised standard for automatically programmed tool (APT) language is now available from ANSI. The American National Standard Programming Language APT, X3.37-1977, introduces new language in some instances to replace awkward or incomplete existing language. Intended for use as a reference rather than a teaching document, the standard is designed to promote interchangeability of processing programs on a variety of computers and includes a syntax of APT syntax interpretation rules and a format of tool position in the output data file. Single copies of the standard are $12.75. AMERICAN NATIONAL STANDARDS INSTITUTE, INC., 1430 Broadway, New York, N.Y. 10018.

Maintenance Study

The *Third Party Maintenance Marketplace* defines the maintenance mar-

(Continued on page 52)

RENT IT TODAY.



SPECTRON INTERACTIVE DATASCOPE MODEL D-502

Announcing the immediate availability of the Spectron DATASCOPE/Model D502—the new fully portable and programmable diagnostic tool for data communications systems that operates on-line to minimize downtime, pinpoint system failures, and debug software.

And you don't need to own one to use it!

Now you can rent the Model D502 whenever you need it—for only as long as you need it—with just one call to Leasametric.

Our diverse inventory includes the very latest state-of-the-art data communications test instruments from top manufacturers like Dranetz, Digitech, Atlantic Research, Digi-Log, and Halcyon to name just a few.

All instruments are calibrated to the manufacturer's specs. Come with complete documentation. And ready for immediate shipment from one of our 18 fully-stocked Inventory Centers across the U.S. and Canada.

Call for your FREE Telecommunications Test Equipment Rentals Brochure outlining our many services.

Leasametric

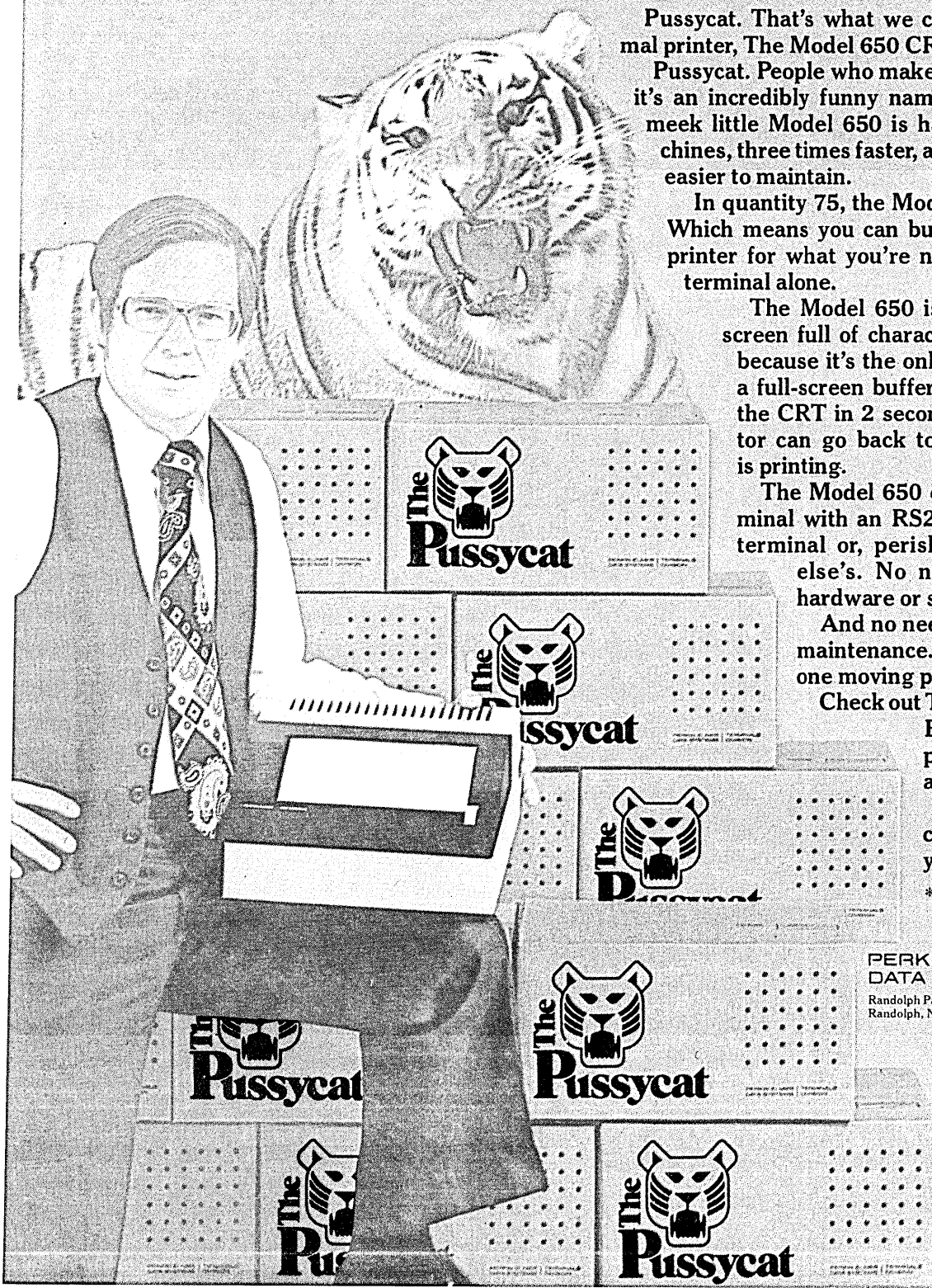
Division of Metric Resources Corporation
822 Airport Blvd., Burlingame, CA 94010

INVENTORY CENTERS: San Francisco, CA (415) 342-7111; Los Angeles, CA (213) 768-4200; Anaheim, CA (714) 634-9525; San Diego, CA (714) 565-7475; Houston, TX (713) 988-1000; Chicago, IL (312) 595-2700; Boston, MA (617) 244-9400; Midland Park, NJ (201) 444-0662; Long Island, NY (516) 293-5881; Washington, D.C. (301) 881-6700; Orlando, FL (305) 857-3500; Dayton, OH (513) 898-1707; Philadelphia, PA (215) 583-2000; Denver, CO (303) 429-7900; Minneapolis, MN (612) 854-3426; Dallas, TX (214) 661-9193; Atlanta, GA (404) 491-1155; Toronto, Ontario (416) 676-1897.
TOLL FREE NUMBERS: Outside California 800-227-0280; Outside New Jersey 800-631-7030; Outside Maryland 800-638-0838; Outside Illinois 800-323-2513.

CIRCLE 123 ON READER CARD

Smile, when you say pussycat!

Pussycat. Perkin-Elmer's $795,* 100 cps CRT Page Printer.



Pussycat. That's what we call our new 100 cps thermal printer, The Model 650 CRT Page Printer.

Pussycat. People who make 30 cps printers will think it's an incredibly funny name. Until they realize our meek little Model 650 is half the price of their machines, three times faster, and a whole lot quieter and easier to maintain.

In quantity 75, the Model 650 is only $795 each. Which means you can buy a CRT and a Pussycat printer for what you're now paying for a printing terminal alone.

The Model 650 is fast. It prints an entire screen full of characters in 20 seconds. And, because it's the only printer in its class with a full-screen buffer, the Model 650 can free the CRT in 2 seconds or less. So the operator can go back to work while the printer is printing.

The Model 650 connects to any CRT terminal with an RS232 port—a Perkin-Elmer terminal or, perish the thought, someone else's. No need to replace existing hardware or software.

And no need to worry about noise or maintenance. The Model 650 has only one moving part—the platen.

Check out The Pussycat from Perkin-Elmer. It's a great little printer at a very reasonable price.

And, if you're one of our competitors...Smile, when you say pussycat!

*Quantity 75.

PERKIN ELMER DATA SYSTEMS | TERMINALS DIVISION

Randolph Park West, Route 10 & Emery Avenue
Randolph, N.J. 07801 (201) 366-5550 TWX: 710-987-7913

Domestic, call:	
(617) 890-1305	Boston, MA
(312) 437-3547	Chicago, IL
(214) 234-8880	Dallas, TX
(714) 544-9093	Los Angeles, CA
(201) 229-4040	Oceanport, NJ
(408) 249-5540	San Francisco, CA
Overseas, call:	
887-1000	New South Wales, Australia
416-677-8990	Mississauga, Ontario, Canada
539-2260	Paris, France
753-34511	Slough, Berkshire, UK
089-753081	Germany
2200949	Singapore
031/450/160	Frolunda, Sweden

CIRCLE 39 ON READER CARD

Wrong competitive evaluation!

5-year penalty!

Buy a competitive network control system right now and you can set your company back 5 years. Wait for Intertel's new Network Control System, and you'll get a design created and built with more field experience than everyone else combined.

At Interface '78 in Las Vegas, Intertel will introduce a new Network Control System that will meet the on-line needs of *any* large system. Minute-to-minute needs. Designed to integrate *immediately* with your present network. And without any penalty when you upgrade.

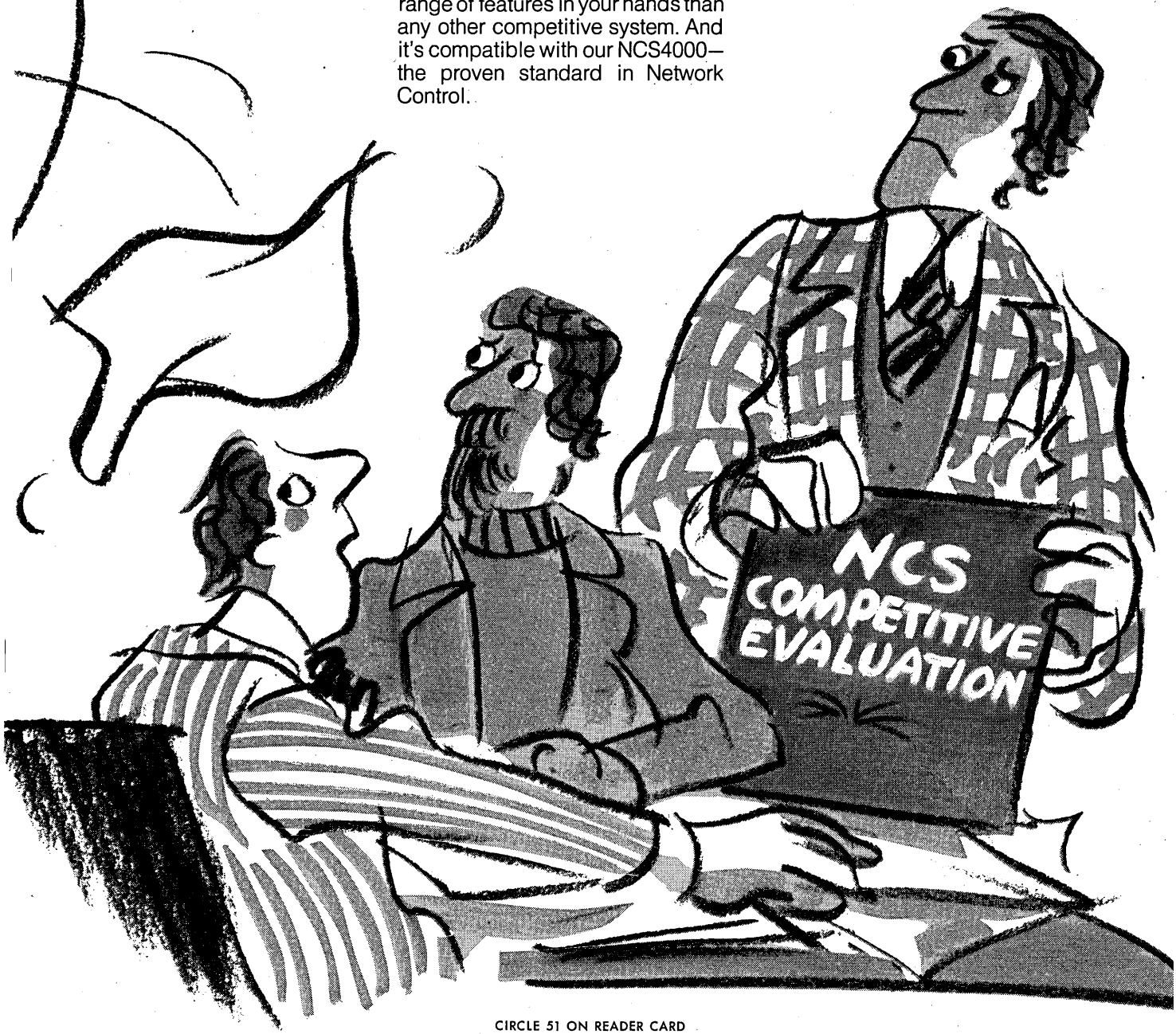
Be prepared for the network challenges of the 80's with the only third generation control system. It's the choice that puts a wider range of features in your hands than any other competitive system. And it's compatible with our NCS4000—the proven standard in Network Control.

The fact is, Intertel has already *installed* over 160 systems. A record that speaks more and more for itself. It should. After all, we're:

#1 in Network Control.

intertel

6 Vine Brook Park
Burlington, Massachusetts 01803
Tel. (617) 273-0950



CIRCLE 51 ON READER CARD

source data

(Continued from page 48)

ketplace from the end user point of view. Maintenance policies from computer manufacturers and third party vendors are examined, and included are special reports on future maintenance markets in the federal government and on the personal computing marketplace. Copies of the study proposal and the questionnaires used are available. For information on obtaining results and documentation contact: ALLTECH PUBLISHING CO., Attn: Emily Cline, 212 Cooper Center, N. Park Dr. & Browning Rd., Pennsauken, N.J. 08109.

courses

Microprocessor Seminar

A hardware-oriented seminar designed to ease understanding of what goes on inside state machines and microprocessors, "Understanding Algorithmic State Machines and Introducing Microprocessors," will have its emphasis on troubleshooting, with laboratory experiments and complementing lectures. Attendees will work with several types of logic state analyzers and will connect them to working products to verify proper operation. The course will be offered in Los Angeles, Jan. 3-6; Orange County, Calif., Jan. 9-12; Southfield, Mich., Jan. 23-26; Chicago, Jan. 30-Feb. 2; and Seattle, Feb. 27-March 2. Fee: $300. MOVONICS CO., Box 1223, 1922 Annette Lane, Los Altos, Calif. 94022.

Microprocessor Education

A series of three courses offered over a period of four days will cover microprocessor project management, microprocessors and microcomputers, and hands-on microcomputer programming.

The first course emphasizes high risk, high cost, and time critical problems applicable to microprocessors applications. Topics to be covered include: fundamental concepts; planning and specifying the project; how to select personnel; software development and how to verify the software works; and how to prepare for the future and avoid obsolescence.

The second course will emphasize factors affecting key design and development decisions including: processor selection, fundamental microcomputer concepts, software design and implementation, utilizing development and test equipment; and how to get started.

The third course is a hands-on microcomputer programming workshop for the beginner. Each student will receive a complete 8080 microcomputer system for is own use throughout the course.

The courses will be offered in Los Angeles, Jan. 16-20; Houston, Jan. 23-27; Detroit, Feb. 6-10; Denver, Feb. 13-17; Boston, March 6-10; San Diego, March 13-17, and Ottawa, April 3-7. Courses may be taken individually or in combinations. Tuition ranges from $195 for a one-day course to $695 for the series of three courses. INTEGRATED COMPUTER SYSTEMS, INC., 3304 Pico Blvd., Santa Monica, Calif. 90405.

Data Base Systems

The five-day course "Data Base Systems: Design, Implementation, Application, and Trends" will be offered Feb. 6-10 at the Univ. of California, Los Angeles. The program will examine the fundamental technology of data base tools and management systems. New technologies will be discussed, as will issues such as: information and file structures, higher level data organization and architecture, survey of commercial generalized file and data base management systems, System 2000 and inverted GDBMS, users' experience: System 2000, and future trends. Fee: $475. UCLA EXTENSION, Continuing Education in Engineering and Mathematics, 6266 Boelter Hall, Los Angeles, Calif. 90024.

Business Communications

This three-day conference will focus on the explosion of automated office and automated telecommunications applications. "Automating Business Communications" will be offered in New York City Jan. 23-25. The content will place emphasis on the economics of both applications and equipment, and will have sessions designed for management, planning, and operations personnel. Fee: $295; teams, $195. AIIE SEMINARS, Dept. DTM, P.O. Box 3727, Santa Monica, Calif 90403.

Technology Transfer

A series of courses will be offered over the next several months by this firm. The purpose of "Queuing Systems" is to present and develop methods from queuing theory so that participants are able to apply those methods to engineering systems problems. The seminar will begin with a refresher of transform and probability theory, and will proceed through the development of elementary, intermediate, and advanced queuing theory. It will be offered Feb. 22-24 in San Francisco.

"Satellite Data Communications" will describe the potential uses of satellites in data networks and explain the dimensions of flexibility for advanced teleprocessing systems they will provide. The course will also include discussions of economic considerations, packet broadcasting, small Earth terminals, and a look at Satellite Business Systems (SBS). It will be offered March 6-8 in San Francisco.

Designed to inform the network planner of the options available to him, "Experts on Networks" will discuss the questions to ask during the decision and planning process and how to evaluate network performance, and will describe the tools and techniques of network design. There will also be examinations of dedicated networks and public packet switching networks. The course will be offered in Washington, D.C., on March 13-15. Fee: $485, for each three-day seminar. Discounts are available for groups and multi-course participants. TECHNOLOGY TRANSFER INC., P.O. Box 49765, Los Angeles, Calif. 90049.

periodicals

Productivity Report

A quarterly, the *Edp Productivity Report* is available free of charge from this vendor. The second issue's Forum was the article "148 vs. 145 Case History." The Forum features an article dealing with data processing productivity improvement through performance evaluation. Contributors to that section hold senior management positions in organizations employing "leading edge" technology to meet long range computer objectives. Also included in the second issue were articles entitled "First JARS CICS/VS Interface Installed" and "Job Accounting for Dp Managers," and a column for the exchange of experience between users of the vendor's Job Accounting Report System. The publication is free. JOHNSON SYSTEMS, INC., Attn. Mark D. Berg, 8400 Westpark Dr., McLean, Va. 22101. ❋

A robot developed his skill
at reading phonetically, till
he could say any word,
but the people who heard
could tell comprehension was nil.

—Gloria Maxson

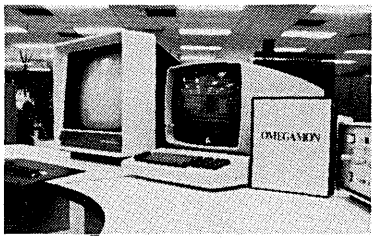
Design Flaw discovered in MVS!

IBM's new operating system is probably decreasing your throughput by 10-80% – even though your CPU is underutilized!

Flaw in Systems Resource Manager

Philosophically appealing, one of the goals of the SRM is to distribute machine resources with priority given to online systems (TSO) over batch. This prioritization becomes particularly important when the SRM detects a general system overload. The *flaw* is that when the system overload is *caused* by TSO, batch is always swapped out first, i.e. before SRM even begins to address the *problem,* batch is degraded! *OMEGAMON* has shown in installations across North America that often only 1 out of 5 jobs may be *active* at any one time while the CPU is only 60% busy!

What is OMEGAMON?



OMEGAMON is a state of the art software display monitor that functions exclusively on MVS via 3270 CRT's (dedicated or through TSO). It provides real-time information for both systems programmers and operators.

Exception Analysis

In addition to over 200 commands that enable comprehensive system exploration *OMEGAMON* also provides *automatic exception analysis* to warn of hardware/software problems, system availability, operational problems and performance bottlenecks.

Systems Approach to Performance

Rather than limiting itself to the *'magic'* of the SRM, ASM, RSM, *OMEGAMON* recognizes that the *operational bottleneck* must be a *major* component of any serious performance program! *OMEGAMON* can provide a common area for communication between operators and systems programmers.

Do You Have ANY of the Following Display Capabilities?

DASD DROPPED READY ANALYSIS

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ DANGER:                          DASD DROPPED READY AT 164+
+ CURRENT USER                                          JES2+
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

TASK WAIT ANALYSIS

```
JES2      WAIT   12  SEC  164 SPOOL, CONTROL UNIT
CICS      WAIT  1:18  MN            <<RESERVE>>
TSOUS12   SWAP  2:23  MN       <<SWAPPED BY SRM>>
PAYROLL   SWAP 10:11  MN  <<DATA SETS HELD BY: TSOUS12>>
SORTJOB   WAIT  3:19  MN  380      <<TAPE MOUNT>>
TESTJOB   SWAP  2:54  MN  <<WAITING ON SPOOL SPACE.>>
TSOUS1    SWAP  4:13  MN    <<WAIT ON DEVICE SWAP>>
SALES     SWAP  4:33  MN       <<SWAPPED BY SRM>>
TEST15    SWAP  2:32  MN  <<WAITING IN ALLOCATION>>
JOBAA5    SWAP    13  SEC          <<WAITING ON>>
          SMFBUF BUF01                 PAYROLL
```

CPU ANALYSIS (DISPLAY TASKS OVER 15% CPU)

```
SCPU15   %    CPU          0   10   20   30   40   50
         TCAM   15.09 - - - - - - - - >
         CICS   21.22 - - - - - - - - - - >
         TSOUSER 43.22 - - - - - - - - - - - - - - - - - - - - >
         TEST18  15.02 - - - - - - - >
```

POOR TSO RESPONSE TIME EXCEPTIONS

```
TSOUSER12 ELAP 3:18 MN   --2-->4   6   8   10 (MINUTES )
TSOUSER14 ELAP 9:45 MN   --2--4---6---8-->10 (MINUTES )
```

DEVICE TRACE (A NEW INNOVATION)

```
TRACE OF MVSRES: 161
DBSY      DDD    DDDD DDDDDDDDD
CBSY CCCCC
CHAN       HHH
IOQ  22222111111        111
I/O= 18          19   20  21
CPU  !!.........!!!.!....!!!..!!
USER SORT        TEST    SORT
CYL   23         600  601 400-
TIME              55   27  43
NRDY
RESV
```

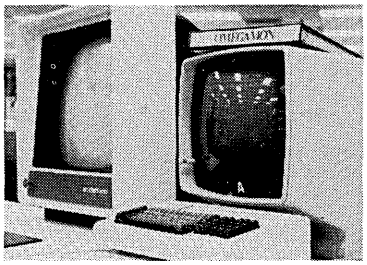
Competition between 2 jobs on same pack with some channel and control unit bottlenecks. Times are in ms.

DEVICE UTILIZATION (REQUIRES RMF-2)

```
STATP      DEVICE    CNTRL    Q-LEN    RESV    RESX
162 MVSRES  ---->     ---->    22211    ---->   ->
170 PAGE11   ->        ->      44311
389 (TAPE)                    --->
634 (COMM)  -->
```

Each plot symbol = 10%. MVSRES:50% device busy, 30% control unit busy, IOQ = 1 for 60% and 2 for 30%, reserves: 30% (this cpu), 20% (external). Separate exception thresholds (used to select devices) can be specified for each variable 'STAT' provides same information on tabular (numeric) basis.

MVS is a moving target . . . . OMEGAMON can improve your aim!



- Installed and operational in 15 minutes.
- No hooks, SVC's, or authorization!

BUT WHAT ABOUT RESULTS?

Results During Demonstrations!

In one shop the entire system became locked out (including master console) during a demo. Not only was *OMEGAMON* still running but the exception analysis showed within 12 seconds that JES2 was hung on a control unit (see example)! In another case a system hung while *OMEGAMON* reported that every one (else) was waiting on MVSRES. A third case was caused by a page data set problem. In all cases the console was locked out leaving *OMEGAMON* as the *only* form of visibility!

More Problems!

In 20 working days in September, 1977 – 22 problems were discovered in 8 installations. One demo revealed 5 problems in 3 hours. What problems: DASD dropped ready, page data sets, MSS, MVS under VM, VIO, tape control unit, CICS loop, CICS slow down, TSO problems, SMF buffers, enqueues, user catalogs, TCAM buffers, DDR, reserves, SQA , , ,

OMEGAMON Users? (Partial list)

United States
- TRW Space Systems
- TRW Credit Data
- Atlantic Richfield
- Southern California Edison
- A.O. Smith Corporation
- Celanese Corporation
- Florida Power Corporation
- Warner Brothers
- Western Bancorp

Canada
- Datacrown
- Canada Systems Group
- Canada Life
- City of Toronto
- University of Toronto
- University of Manitoba
- B.C. Hydro

Geneva
- Cern

! Candle Corporation

(Technical and marketing opportunities for top professionals: $40K)

Los Angeles:
CANDLE CORPORATION
4676 Admiralty Way, Suite 401
Marina Del Rey, Calif. 90291
1-213-821-2902

Canada:
CANDLE SERVICE CORPORATION
P.O. Box 280 Station "A"
Toronto, Ontario
Canada M5W 1B2
1-416-483-9041

Another first for ISS

THE INDUSTRY'S FIRST "SMART" FIXED MEDIA DRIVE

Announcing another in a long line of industry first's from ISS—the EFF 735—the first disk drive of its kind ever to employ an on-board microprocessor.

The advantages of microprocessor power in a disk drive are impressive. Complete internal drive diagnostics. Simplified circuitry because most analog circuits are eliminated. No field adjustments—ever. And a lot more, including microprocessor controlled routines that ease the load on the controller and the mainframe.

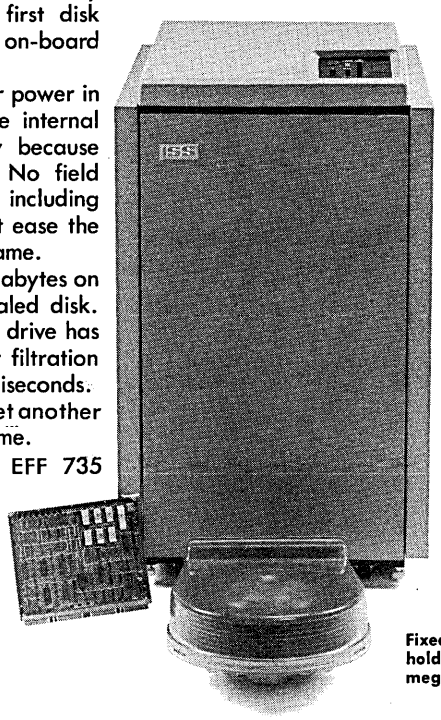
The EFF 735 gives you 353.8 megabytes on a single spindle using a fixed and sealed disk. There's one spindle per drive and each drive has its own internal power supply and air filtration system. Average access time is 23 milliseconds.

With our fixed head option, you get another 1.26 megabytes and zero access time.

Besides the microprocessor, the EFF 735 gives you a sweeping lineup of operating and maintenance features. A single phase motor. Dual port capability. A completely electronic tachometer. Total modularity of subassemblies. And truly outstanding serviceability, with no field adjustments and no requirement for special tools —one of the big reasons why your total cost of ownership is exceptionally low with the EFF.

EFF stands for Expandable File Family. The 735 is the first member of this new ISS family, later versions of which will have even greater capacities and capabilities. And all versions will be field upgradable so you can increase performance as your needs increase.

ISS is an operating unit of Sperry Univac bringing technological leadership for the generations ahead. For more details on the new EFF 735, write or call OEM Marketing, ISS, 10435 N. Tantau Avenue, Cupertino, California 95014, telephone (408) 257-6220.



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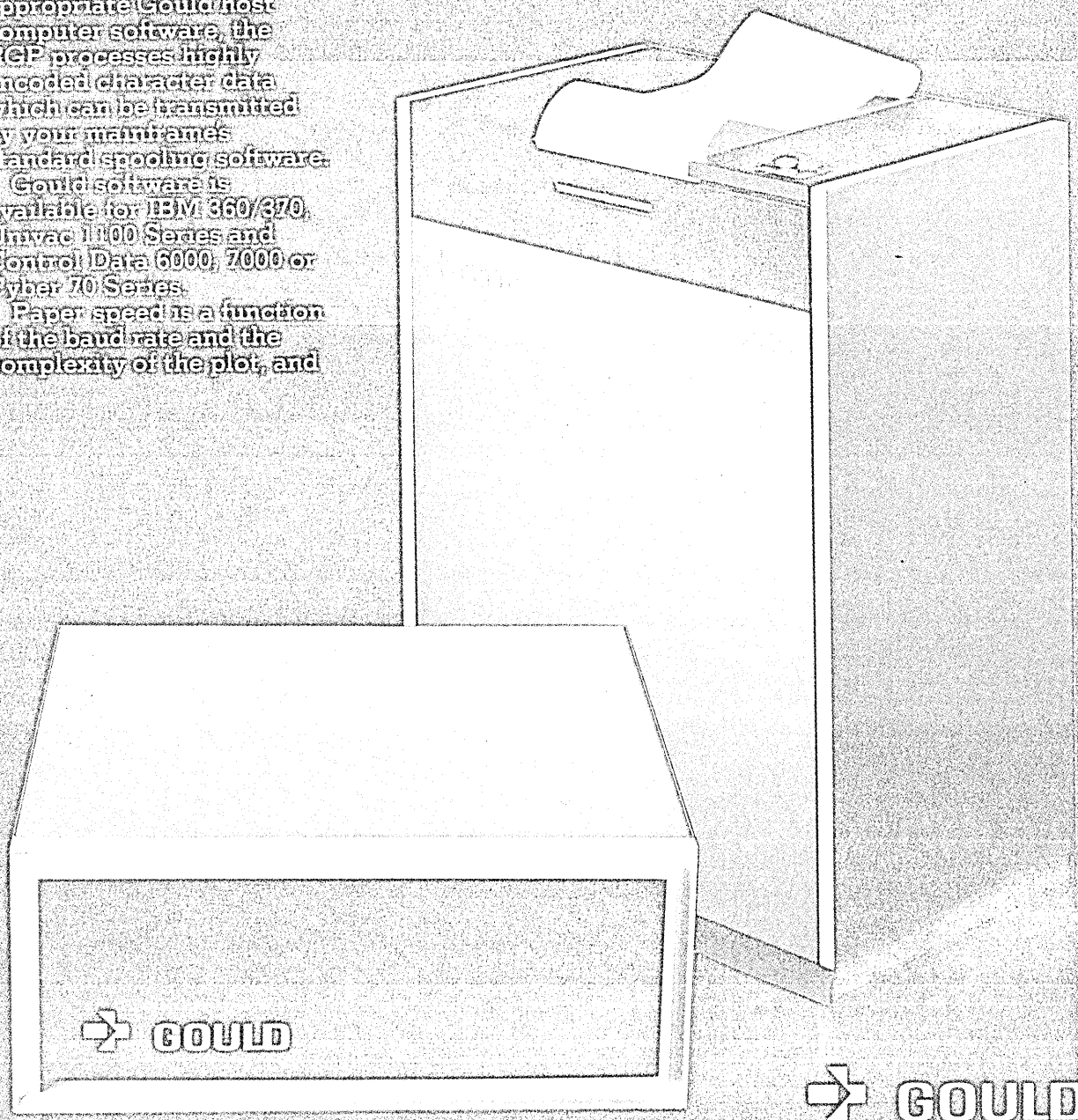

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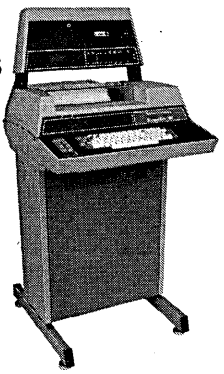

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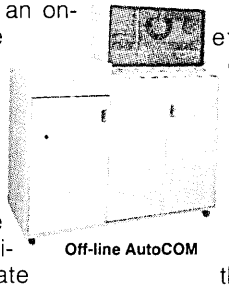

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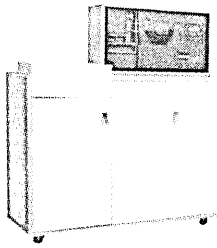

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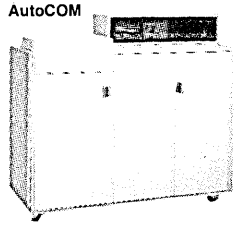

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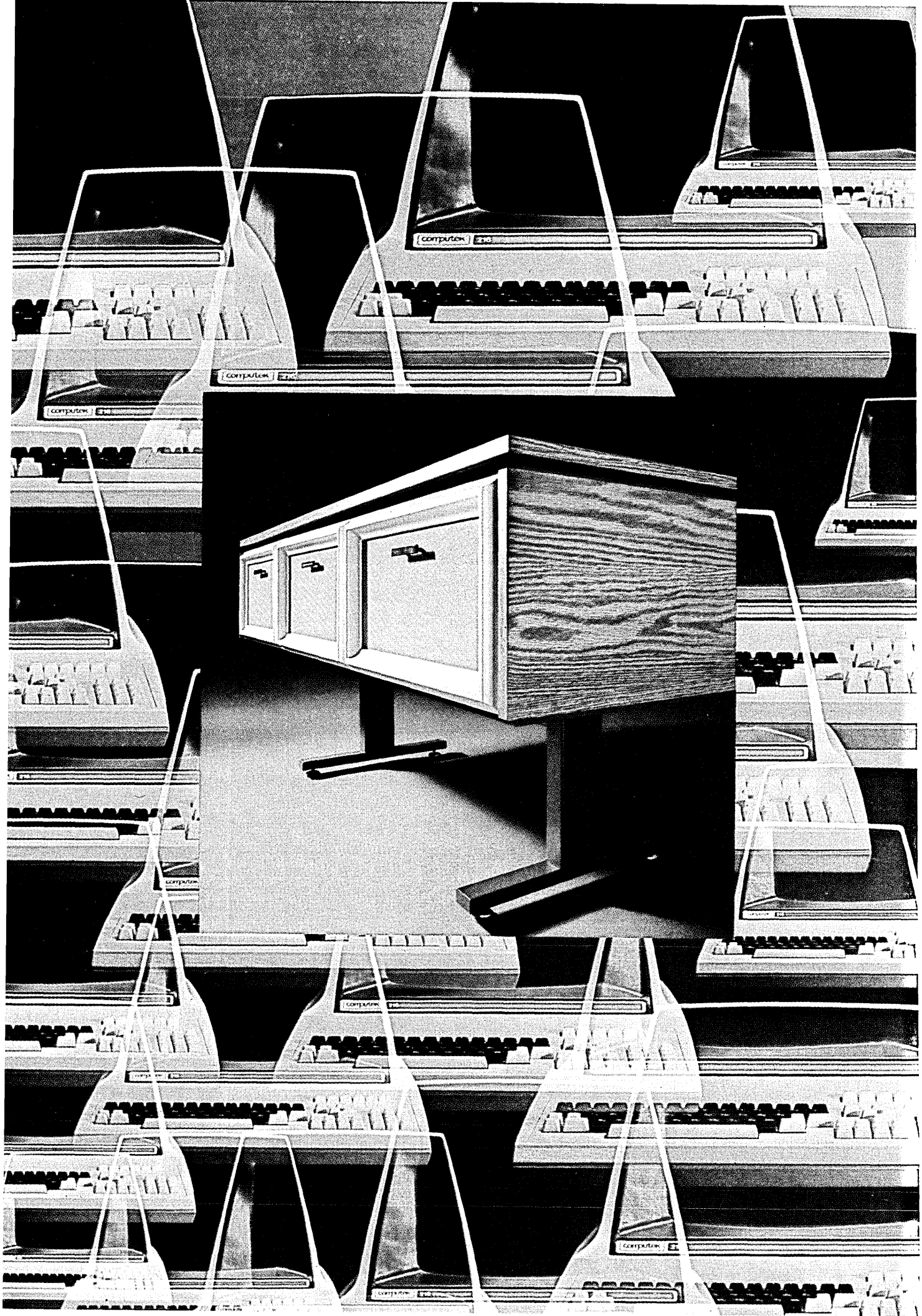

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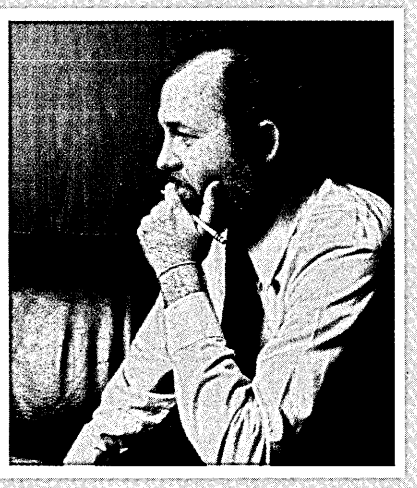

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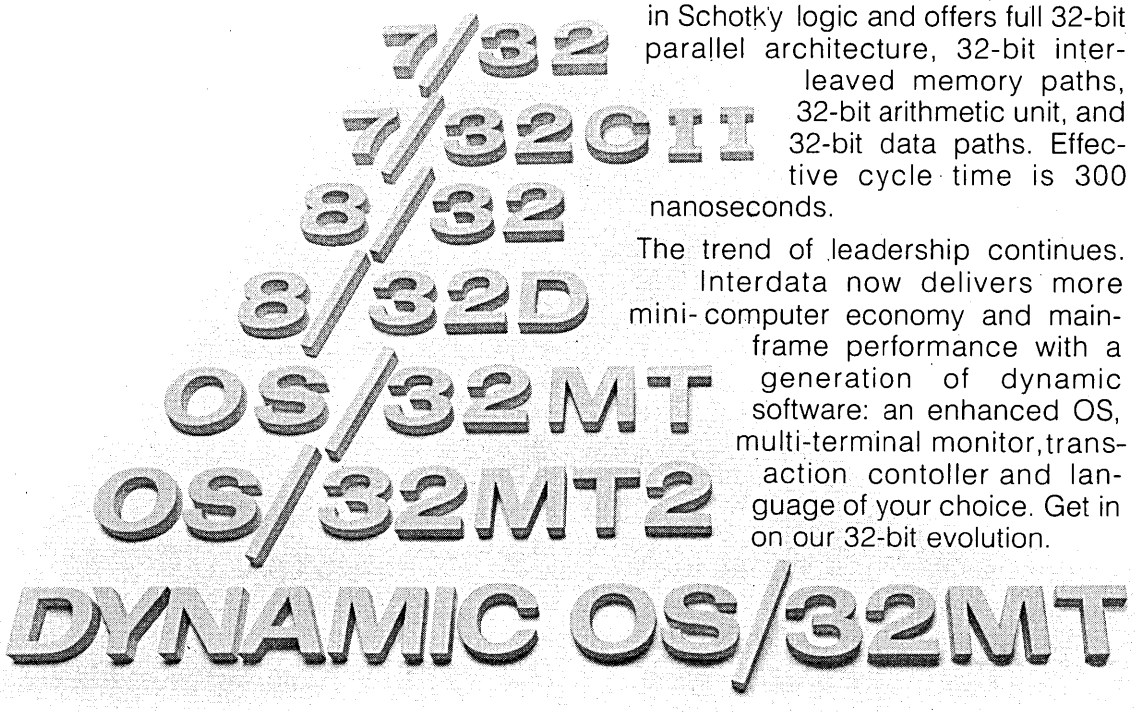

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Editor's Readout

John L. Kirkley, Editor

What Do We Want?

Turning and turning in the widening gyre
The falcon cannot hear the falconer;
Things fall apart; the centre cannot hold;
Mere anarchy is loosed upon the world,
The blood-dimmed tide is loosed, and
everywhere
The ceremony of innocence is drowned;
The best lack all conviction, while
the worst
Are full of passionate intensity.

—From *The Second Coming*
W. B. Yeats

Europeans view the IBM/Justice antitrust trial with amused disbelief—"Those crazy Americans are at it again." I can vividly recall being asked by a European industry association executive: "Why in the world does your country want to dismember one of its most powerful national resources?"

Why indeed? It's difficult to explain that the IBM trial is not only a puzzlement to international industry watchers; it has created a good deal of confusion here as well. A few years ago, in our series "IBM and the Structure of the Industry," few of those who commented agreed on the issues, the solutions, or anything else. Obviously the answers to this extraordinary situation are not obvious.

Nor are they imminent. Even though Justice is presently wrapping up its case, a consent decree or summary judgment at this point is highly unlikely. We may be into the 1980s before a final resolution is reached.

And Justice just might win. After a hesitant start the department seems to have established that:

- there is an identifiable and distinct general purpose computer market;
- IBM dominates that market;
- in the late 1960s and early 1970s it was almost impossible for a new company to enter this market—a characteristic of a monopoly-controlled environment; and finally,
- IBM used its economic strength to attack the plug-compatible manufacturers.

But Justice has now weakened its case by moving out of the late '60s-early '70s era (see October, p. 146) and, of course, IBM has yet to unleash the full talents of Cravath, Swaine, and Moore in its defense.

But still the entire procedure has a musty, dated smell. The attempts to bring the case up-to-date have only emphasized that the combatants are dealing with the ghosts of an industry that has long since changed its scope and direction. And it is also obvious that without some sort of interim relief to contain IBM's increasing dominance, the giant will continue to consolidate its stranglehold on the industry.

So again the question: how do you contain this national resource without crippling it? Particularly when it appears, fortunately for all of us, that the warfare of the next several decades will be economic rather than nuclear.

A good deal of the problem stems from a more fundamental confusion. We have no set of national objectives, no widely agreed upon goals that transcend individual and partisan interests. Naturally there is confusion when we push for a favorable balance of trade, but at the same time buy Japanese steel or contemplate the break-up of an IBM. Or when we as a nation pay lip service to energy conservation and yet refuse to spend the money needed to develop efficient and clean alternate sources. At this point in our history only the extremists of the left and right have concrete answers. Appealing in their simplicity, appalling in their essential bigotry and self-destructiveness, these radical pronouncements only serve to emphasize our dilemma.

Unhappily, a general unanimity of national purpose, or even a coherent national policy with regard to business, appears to be a long time down the road.

The best we can do in the interim is apply some old-fashioned Yankee pragmatism.

If Justice loses this case, it loses everything. If IBM loses, its basic strength will minimize the impact of whatever relief is sought, especially if the case drags into the 1980s; but it still will be hurt. Better for all concerned—IBM, the government, the computer industry, the users, and our standing in the world's marketplace—that the two parties get out of the courtroom and around the bargaining table. Pragmatically we need a consent decree.

We can then cut our losses and get on with the business of fashioning a viable and dynamic computer industry. ❋

MIS and the War Room

by C. W. Getz

Here's one tool from the management scientist's bag that plugs right into a dp environment to produce a prime example of synergy in action.

Most would agree that a Management Information System is critical to the operation of an organization. In fact, it is the essential element in management's *control* function. And yet, most MIS managers, although fully responsible for processing management data, have little responsibility for what happens to that data and information once it spews from the high-speed printer or appears on someone's crt.

Who then is responsible for the data and information that goes to top executives? Who bridges the gap between the computer and the top executive? Line and staff managers do, hopefully, but is there any one person responsible for the overall coordination of the data resources of the organization? There is usually a money resource manager, a people resource manager, a production manager, etc., but who is the data resource manager?

If either the director of MIS, the manager of computer operations, or the head of operations research aspires to become the manager of the organization's data resources, then he or she first must become interested in providing top executives, among others, with effective information tools to aid in the administrative and management processes.

We in the MIS profession are the toolmakers for management. These tools do not always involve computers, but, in fact, many of us have been managers of computers with little interest in what is being computed and why or in the quality of the product. I contend that the data resource manager of the organization should have a responsibility for the care and feeding of top executives, and one of the basic things executives must be fed is accurate, timely, and useful management information.

One of the effective tools of management control, and perhaps one of the least understood, is the Management Information Center, sometimes called a chart room, or situation room, or corporate war room.

There are basically two types of control rooms: operational and management. *Operational* control rooms are best used when operations are constantly changing, the system must be constantly monitored, and the data are often displayed in real or near-real-time. Military control rooms, airway traffic control centers, satellite control rooms, control rooms for monitoring operation of plants, or even the cockpit of an airliner, are all good examples of operational control rooms.

Management control rooms, on the other hand, are generally a horrible waste of time and money. The reason is that their use as a tool of management control is often misunderstood, and the rooms become expensive, fancy conference rooms and just so much eye wash. Conversely, a properly operated control room can be very effective in helping the organization to know where it is going, what it takes to get there, and where it is now.

To be effective, a management control room must be a part of a comprehensive management control system, and is best used in an organization whose major activities are operations or project-oriented, like constructing a building, building a weapon system, or developing a new product. This is not an absolute rule, and there are control rooms used in conjunction with routine operations.

It was said that a control room must be a part of a management control system to be effective; there are at least four reasons why a management control system is needed.

Interdepartmental Coordination. By their very nature, projects often involve people from different functional areas of an organization, and quite often, even from different organizations. Thus, some method is needed to assure *adequate coordination.*

Interdepartmental Teamwork. Some of the most delicate links in any organization are its lines of communication. Some mechanism is needed to assure top executives that their staffs and organizations are indeed working together as a team and not as a disjointed

group of individuals going their own way, doing their own thing, but who happen to have the same goal.

Management Discipline. Management discipline is that quality in an organization that compels action and compliance without specific orders. It is management discipline that transforms a group of people into a dynamic entity called an organization.

Common Plans, Records, and Reports. To achieve a coordinated and disciplined project team effort, the team should operate from the same plan and use the same records and reports. Confusion would be rampant if each team member had his own set of conflicting records.

Maybe you are convinced that you need a management control system, but that is just so many words. What is it? How does it work? The answers to those questions will differ from organization to organization, but more in degree and substance than in principle. The number and kind of elements or subsystems that comprise a management control system will also vary from writer to writer, organization to organization, executive to executive. To this writer's mind, there are seven major elements of a management control system built around the use of a control room. This system, or a close variation, has been used successfully in projects ranging from the world's largest research and development at the time, the nation's ballistic missiles and space program, to constructing a housing development, and even in the first conversion of a credit bureau to a computer environment. Variations of the system have been used in such diverse activities as history's largest construction effort, the Alaskan pipeline, and even in a small government day-to-day operation.

The seven basic elements

Although there is no rule about how many elements are needed for a successful management control system, the seven described below evolved over many years of trying. They were designed to work *inter*dependently; that is, the control room, the first element, is of questionable value if not used for the various purposes described in the other six elements. On the other hand, there is value to the other six elements if used without the control room, but all work best together.

Control room. The system is built around the use of a management control room, and a few general comments about control rooms are appropriate. A control room is a good mechanism to give vision to program and organization objectives. It provides a place for project teams and management to meet in an environment which creates an awareness of information and time. It provides a central location where the staff should be required to portray the objectives and status information concerning their own areas of responsibility. It can be used as a location for review and authentication of the data records of each individual line and staff organization.

It can be a central storage and clearing house for the data resources used in a program or project if the records are manual, or the location for retrieving and reviewing computer-produced project information. Most often, in the more sophisticated and larger organizations, it is a combination of both.

A control room is also an excellent location to use as a workroom for the development of PERT networks where this technique is used in project management. Principles of management control are hard for people to see, but a staff *can* see, feel, touch, and walk into a control room. The control room becomes the physical symbol of the organization's management control system.

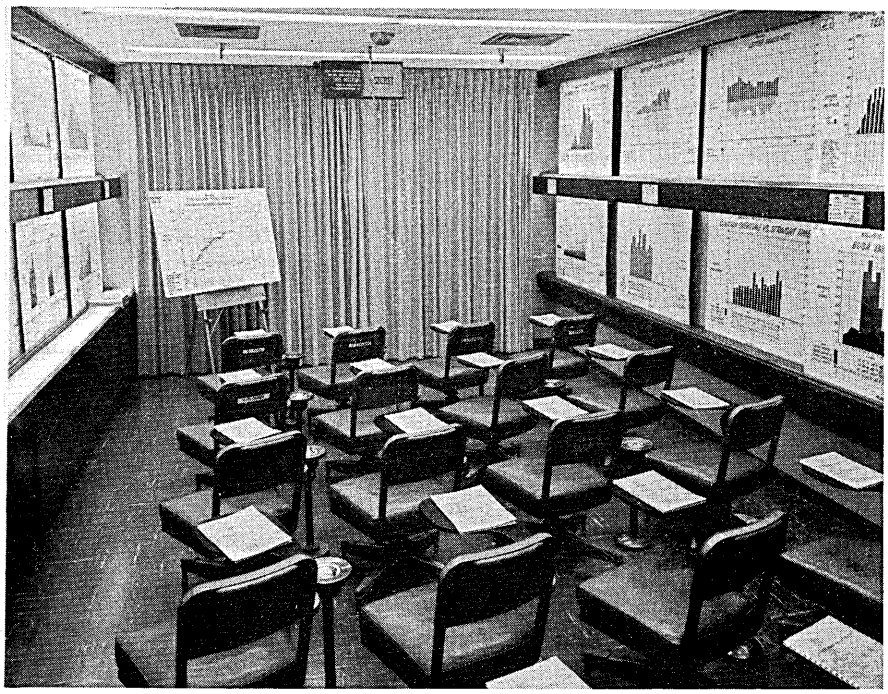
The photo below shows the first management control room used in this nation's ballistic missiles and space program. Earlier it was said that control rooms often become eye wash, but that harsh condemnation should be modified slightly by stating that control rooms can be very effective in assuring VIP's that the organization is on top of its programs. The room you see in the figure hosted a diversity of VIP's, including two Secretaries of Defense, Charles Lindberg, members of Congress, military and industry leaders, and many others.

This control room, together with program briefings held in the room, gave the visitors the visual assurance that the program managers were in full control. The room was later enlarged into a complex of several specialized control rooms.

Master program records. The second element of the management control system is master program records. You can apply any name such as data base, program records, project, or company files, etc. Regardless of name, information is the key to management and the essence of control, and a good management control system requires a set of data that is recognized by all as "official."

Mel Grosz, MIS pioneer, said, "*Management information is the connecting bond that permits separate organizational subdivisions to function in concert for pursuit of common corporate objectives.*" With a management control system based upon a control room, the master program records may take the form of either manual records such as milestone charts or automated records such as the same milestone charts in computer-produced version. Often the records take only the form of computer-produced graphics and tables.

An important point to remember is that the records should belong to the staff and line organization whose area



The U.S. ballistic missile and space program was begun from scratch and achieved its major objectives in a crash program, on schedule and within budget. Part of the reason for the success was a management control system which included the control room above.

Elements of the success of the room included a variety of display media and the presentation "programs" seen on each individual's chair. (USAF photo circa 1959.)

of responsibility is portrayed. The organization's managers must develop a proprietary interest in the charts and records, and not have the feeling they are merely supporting somebody else's job.

Program management representatives. A third major element of a management control system is called program management representatives. Another name might be program or project coordinators. They are persons appointed from each major element of the organization that composes the management or project team, such as engineering, production, or marketing. Their job is to represent their organization on management control system matters. They provide an informal mechanism, or informal organization if you prefer, through which it is possible to obtain the detailed participation of their line and staff organization. They establish their own organization's internal procedures for updating records, and for participating in all the activities of the management control system.

Participation is very important and must be mandatory.

Program management representatives can also provide a channel for rapid coordination of various management control material. Using representatives from each of the organizations also helps to create that proprietary interest mentioned earlier. Although called by different names, the concept of using special coordinators is one widely used today in large organizations. The activity is usually an additional duty for these persons.

Management policy committee. The next element of the management control system is a management policy committee. Since the management control system involves all parts of the organization, it is important that the policies and procedures represent a consensus. It is also one of the ways, but not the principal way, to get top executives involved in the management control system. If top executives participate, you do not have any problem with the lower echelons.

Staff review meetings. Staff review meetings, the next major element, should generally be of two types. The first type is a regularly scheduled review of program charts and records by the organization whose area is portrayed on the charts. For example, the engineering staff may meet to update their records. Or, in a large organization project, the XYZ project manager may conduct a meeting of all team members for the same purpose; and the team members may be from organizations different from the project manager's.

The formal published purposes of these meetings are: (1) to bring the management teams together in the control room on a scheduled, recurring cycle, usually monthly, for the purpose of updating charts or records and authenticating them with signatures of those responsible; and (2) to prepare the agenda for a second type of staff review, the one for the top executives.

There are numerous types of meetings and techniques applied by top executives. They are, for the most part, either tutorial or conversational. Some meetings are conducted by telephone on a one-to-one basis; some staff contacts by top executives are in small groups, informal and unstructured; and still others are conducted in larger groups and may be either structured or unstructured. The top executive review in this particular seven-point management control system is a quasi-formal, highly structured review that combines some of the advantages of all other types.

There are many styles and names for top management meetings—staff meetings, monthly management review, "Black Friday," program analysis and review meetings—but regardless of name, a top management review is essential to making the management control system function. Although billed as being the time to present top management with status and problems (with emphasis on problems), the real purpose of the meeting is to give top executives the assurance that the people responsible for day-to-day operations are on top of their programs and responsibilities.

Presentations are usually and preferably made by persons sometimes three or four levels below the top. A side benefit is that this creates good morale, since many of the lower staff level seldom have an opportunity to present their programs in person to top managers.

The meeting should be a scheduled review, conducted in what one top executive called "an atmosphere of formal informality," and with strict adherence to time limits, formats, and subjects. Although top executives are kept informed by this meeting, the meeting is not necessarily their primary means to do so. Experience has shown that control rooms cannot effectively be used as *the* principal source of information to keep executives informed, although experience has also shown that the top management reviews were the only occasions that top executives got a picture of their entire responsibilities at one sitting.

The monthly senior management review should not generally be a decision-making affair, although some decisions will inevitably be made.

Top executives must be trained to conduct this kind of meeting successfully—and this point deserves emphasis—but once they learn, it becomes a major part of their management style.

Publications. The sixth element of a good management control system is publications. There is no set standard as to what must be published, but experience shows that it is valuable to many levels of management to have some special hardcopy reports or sum-

Management control rooms can be just so much eye wash if not used as a part of a management control system incorporating a half-dozen other major elements. The room above, designed for the Alyeska consortium of companies responsible for building the Alaska oil pipeline, definitely does not fall into that category. Its facilities, which include several back-lighted displays plus overhead projectors, back-up projectors, etc., made it a good place to track the progress of pipeline construction.

maries for top executives, or even copies of control room charts, or computer-produced graphics and tables.

When company reports and data publications are based on the master program records of the management control system, they make an excellent coordination medium. The first page of a printout of the master program record, for example, could be a page of authenticating signatures. The signatures could be those of the program management representatives or even the senior executives of each of the major organizations.

Procedures. The seventh and final element of the management control system is procedures. Procedures are the road map of administration. They formalize responsibility so as to reduce misunderstanding between people. They are the administrative apparatus that permits the various elements of the management control system to work in harmony. They are formal authority for the system. Perhaps their greatest contribution is that they force the administrators of a management control system to reduce their thoughts to writing, and as the 19th Century journalist, Ambrose Bierce, said, "*Good writing is clear thinking made visible.*"

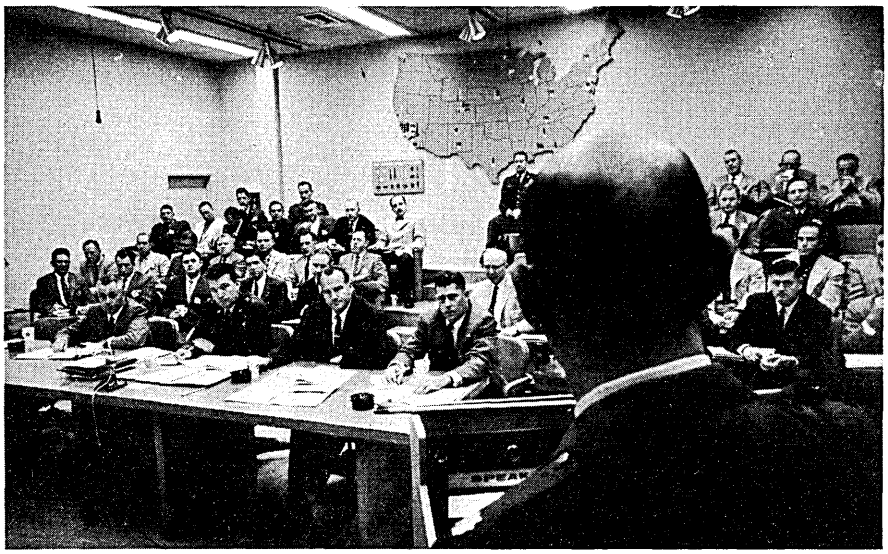
An important part of the procedural requirements of a management control system is a reporting system. A reporting system is the administrative vehicle for accumulating or distributing the data resources and data products of the organization. Management control systems require that data be disseminated by an effective reporting system, whether manual or automated, and that system should be formalized in procedures.

Does it work?

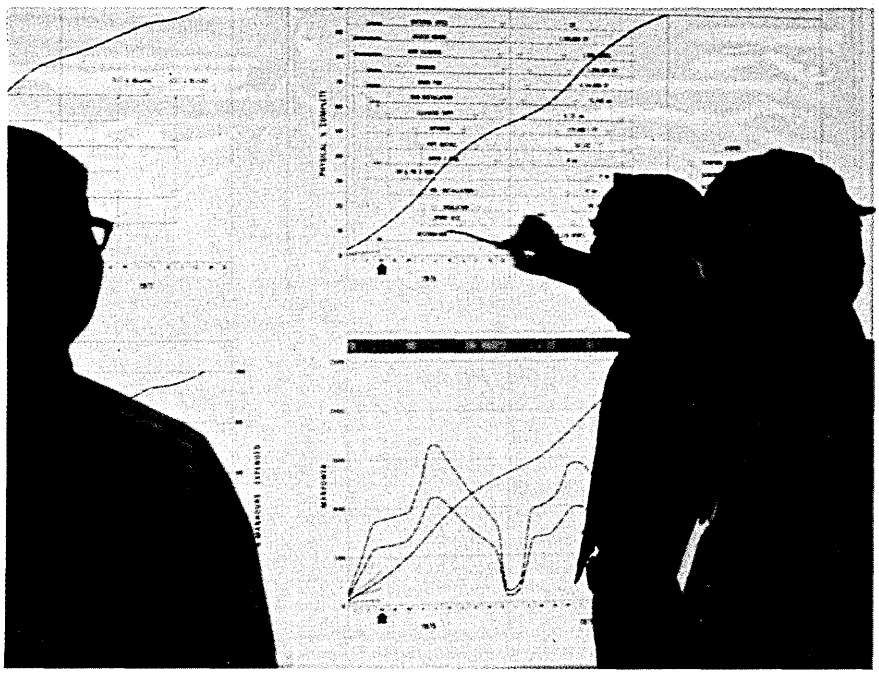
So there you have it in a nutshell: a management control system built around the use of a control room. Does it work? You bet it does, if the boss wants it to and the objectives are kept in proper focus. The entire ballistic missiles and space program of this nation was begun from scratch and achieved its major objectives in a crash program, on schedule, within budget; and the principal management control used was the system just described.

Construction of the Alaskan pipeline was managed by a consortium of oil companies called Alyeska, which used a management control system similar to that described, built around a very effective control room. The Alyeska control room and management control system was designed by one of the leading experts in this field, Jim Halcomb, of Halcomb Associates.

Although Avon Products Co. of New York has a beautiful and useful



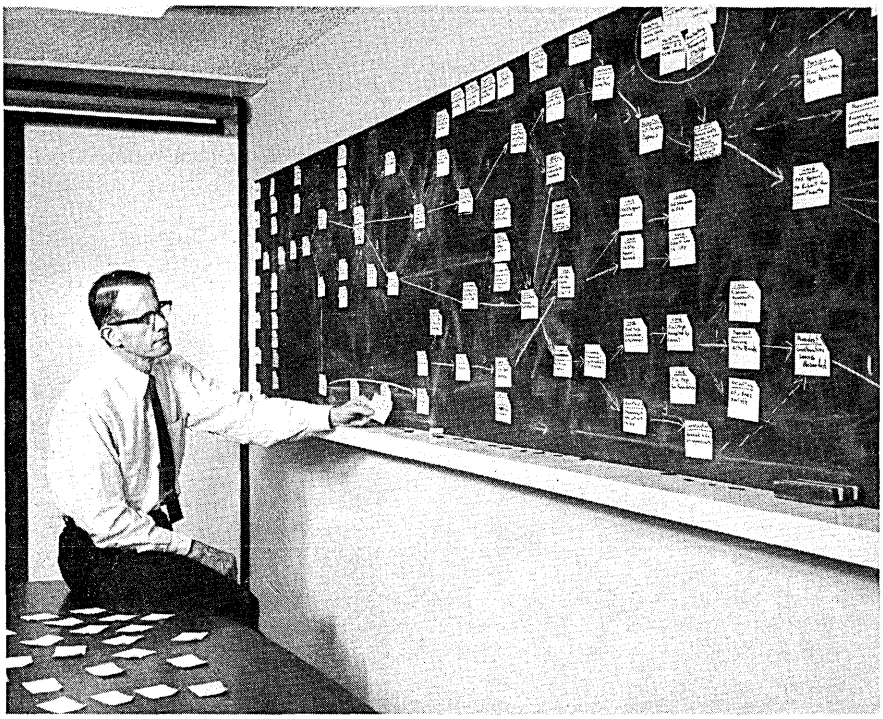
One of the management control room's functions is to give VIPs the visual assurance that programs are well under control. The above was taken at one of the ballistic missile program's "Black Saturday" meetings for top executives. Although part of a government program two decades ago, the meetings were not much different from those held by industry organizations today. The principles haven't changed.



As well as being a place where management is given on overview of progress, a carefully constructed war room can also be a place for project teams to work and a central clearing house for information. (This is a close-up of one of the back-lighted displays shown in the photo at left.)

main conference room, it is not a corporate war room. It is mentioned because of the management control system that is currently in use at Avon. Back in 1973, Avon became heavily involved in the use of the PERT technique in its Product and Packaging Div.'s planning and control functions.

The very nature of PERT forces a close working relationship between the various staffs of an organization such as Avon, and the firm has gone through a number of iterations in using it. Beginning with a staff of 27 people in a centralized environment, it has since wisely decentralized the PERT operation to the line and staff organization. Nevertheless, the company still has an international manager of PERT, a United States PERT manager, and PERT managers in their major organization elements. At least one of the managers conducts a monthly top executive review at the vice presidential level, and the whole operation has many of the trappings of the management control system elements described previously. They hold the monthly meetings in what an Avon



One element of the control room can be a PERT display with movable elements, such as this one improvised on a blackboard in Duc & Elliot, Inc.'s "Decision Pit."

representative labeled "miniwar rooms."

The Gould Corp. of Rolling Meadows, Ill., has an extremely efficient computer-based management control system and does use its control room for management meetings and for the display of computer-produced graphics. Gould also use crt's in the offices of key managers.

The "decision pit" is the name applied by builder Jules Duc to the small, inexpensive control room used by his company, Duc and Elliott, in the construction of housing projects, shopping centers, and other buildings. The room cost only $2,000 to build. Its sliding chart racks are actually closet doors from its tract houses. The company also depends heavily on the CPM/PERT technique in its planning and control, and uses the decision pit as a PERT workroom, complete with a magnetic chalkboard. (The photo on page 66 shows one view of the "Pit.")

An interesting aspect of the management control system used by Duc and Elliott is that the hardhat foremen from the field come to the decision pit at least weekly to update the CPM charts, as well as keeping the PERT chart on-site in the construction shack. It makes them feel a part of management and causes them to become highly schedule-conscious in an industry notorious for missing schedules.

"Black Friday," the top executives' monthly meeting in the Air Force's ballistic missile program two decades ago, was not any different from similar meetings held in various government and industry organizations today. The principles of management and management control have not changed since they were first expounded by the pioneers Taylor, Galbraith, Follett, and particularly by the great French administrator/engineer, Henri Fayol. Top executives still face many of the same problems that have faced managers for centuries, with some new ones added. The difference is that now they have better tools and better-educated people. The key is to use them. An unused tool or a skill is a waste.

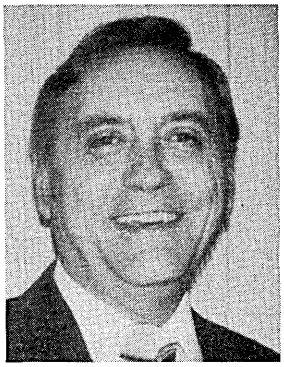
To compare the management control system just described against the definition of management control, Henri Fayol's 1923 definition is presented below. Keep in mind the seven elements of the management control system as you read the definition:

Control is an examination of results. To control is to make sure that all operations, at all times, are carried out in accordance with the plan you adopt, the principles laid down, and the orders given. Control compares, discusses, and criticizes. It tends to stimulate planning, simplify and strengthen organization, increase the efficiency of command, and facilitate coordination.

Management information systems have improved since the earliest MIS, the Babylonian mathematical tablet of 1600 B.C. Even so, top executives are more dependent upon data today than at any time in history. The computer is a great tool to aid us in gathering and assimilating the ever-growing amount of data, but it is not the only tool available. There is a whole realm of tools from the field of management and information sciences that can be effectively applied to analyzing management information, and helping bridge the gap between the computer and the top executive.

The management control system just outlined, in conjunction with the application of management science techniques, will go a long way in the care and feeding of top executives. In keeping with the reference to management pioneers, it is appropriate to quote an English author, Hannah More, who lived from 1745 to 1833. Her words are offered as a motto and guiding principle for all MIS executives. She said, *"It is not so important to know everything as to know the exact value of everything, to appreciate what we learn, and to arrange what we know."*

❋



Dr. Getz is the commissioner of the General Services Administration's Automated Data and Telecommunications Service for Federal Region 9, which includes California, Arizona, Nevada, and Hawaii, and extends all the way to Guam. Part of his business extends into Alaska, Idaho, Utah, and Montana.

He went to GSA in 1972 from his own consulting firm, which specialized in information systems. Prior to that he held positions as: vice president, National BankAmericard, Inc.; vice president and member of the board, Chilton Corp.; president, Chilton Computer Co.; president, Telecheck, Inc.; and chairman of the board, Cole Engineering.

In the twenty-odd years prior he was assistant controller for Information systems, U. S. Atomic Energy Commission; manager of Management Controls Planning, Lockheed Missiles & Space Co.; and held various executive positions with the U. S. Air Force in this field.

Among many other affiliations, he is a member of the Executive Council of the Society for Management Information Systems; and it was for SMIS' 9th Annual Conference, held in Los Angeles in September, he originally prepared this paper.

Computer-Aided Planning and Decision Making in the U.S.S.R.

by John E. Austin

The model-makers are running full-speed toward one of the biggest application problems ever attacked. And that's only their first task.

The Main Computer Center for the All-Union State Planning Committee of the Soviet Union or "Gosplan" is located in a modern 12 story building off Kirov Street in Moscow, about a mile from Red Square. The several hundred people who work here are responsible for developing and operating the computer systems which support the planning process for the entire nation.

Since 1972 these experts, in consultation with others from over 140 institutes, have been designing and implementing one of the most massive computer-based planning systems ever known. The work of this center is the key to the progress of the national economy of the Soviet Union because of the centralized nature of Soviet economic planning. Because of its importance, the center is able to command the finest in hardware and software resources as well as the pick of the trained systems personnel.

The work of Gosplan is basically that of planning the different balances in the national economy: value balances, manpower balances, and material balances. Value balances are drawn for the national product, national income, private cash incomes and expenses, plus state revenues and expenditures. These balances determine the relations between the main elements of the economy in cash terms. The value balances are used to fix the most general, social, and economic proportions such as those between consumption and accumulation in the national income. The manpower balance permits the determination of workers needed for production and describes the population left unused.

The theory of the balance method

The center commands the finest in hardware, software, and personnel resources.

makes it possible to analyze the relationships between different sections of the national economy and to coordinate their development. Because of this there is a very strong interest in developing mathematical modeling on a more scientific basis to achieve a proportional distribution of resources.

The planning process begins with the preparation of drafts by all enterprises within each of the 16 republics which are then submitted to the various Ministries of the republics. The Ministries forward them to Gosplan in Moscow. Gosplan develops the final plan in accordance with programs of the Communist Party and the directions of the Central Committee of the Communist Party to the Council of Ministers. Finally, Gosplan decisions are obligatory for the State Planning Committees of the republics.

In the new system of managing the national economy, the role of Gosplan has increased. One of the tasks is to improve the methodology of planning, the optimization of plans, and the working out of versions of plan calculations with computers. It is hoped that this will improve the quality and stability of the plans, and provide for the most efficient solutions.

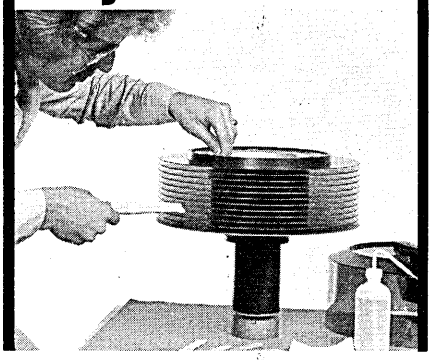
Under the direction of N. P. Lebedinsky, deputy chairman of Gosplan and director of the Main Computer Center, specialists have been drafting the Automated System of Planning Estimation or ASPER. This is an elaboration of the subsystems connecting Gosplan with the various agencies of the all-union and republic governments involved in preparing the national economic plan.

ASPER is based on three principles: (1) the evolutionary development based on 60 years of socialist efforts to bring about centralized economic planning in the Soviet Union; (2) a program of development which tries to enrich the existing methods with computers; and (3) the use of the systems approach to development and planning based on econometric modeling.

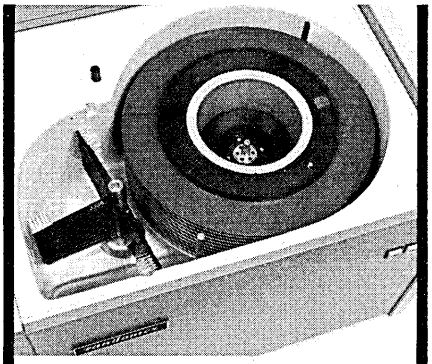
ASPER consists of 61 functional systems plus supporting systems. The subsystems describe the various balances, human resources planning, profits, and cash flow. That is, they deal with monies, materials, and people. It has taken five years to lay the groundwork

Some professional advice for those who now know that disk pack and cartridge cleaning is mandatory

Don't swab your data



Protect it with an automatic Randomex cleaner instead



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for ASPER and describe the technical specifications and interconnections between the all-union agencies and the republican agencies. A consensus now has been reached and the first documentation has been offered to Gosplan for approval.

During this first phase of development, certain models have been worked out; 3,300 tasks have been defined to be solved throughout the nation in a uniform way. At present 10% to 15% of these are implemented on a computer and as much as 50% of the preparation of the overall plan for the national economy that goes to the Council of Ministers is computerized. There is still a lively discussion going on as to the relationship between models and the more mundane data processing tasks involved in actually implementing and evaluating the plan for the national economy.

A visit to the Main Computer Center in Moscow in the summer of 1977 revealed a very impressive organization with some extraordinary resources. Half of the eighth floor is devoted to a machine room which contains two ICL 470 computers and one Eliot 503—both manufactured in the United Kingdom. Each of the ICL's has a 512K memory and 12 discs, as well as nine tape drives, plus card readers and printers, but all of the peripherals are shared. In addition, there are ICL crt displays in the mezzanine area for the use of systems programmers as well as 20 or 30 more scattered through the main Gosplan on Karl Marx Prospect in the middle of Moscow.

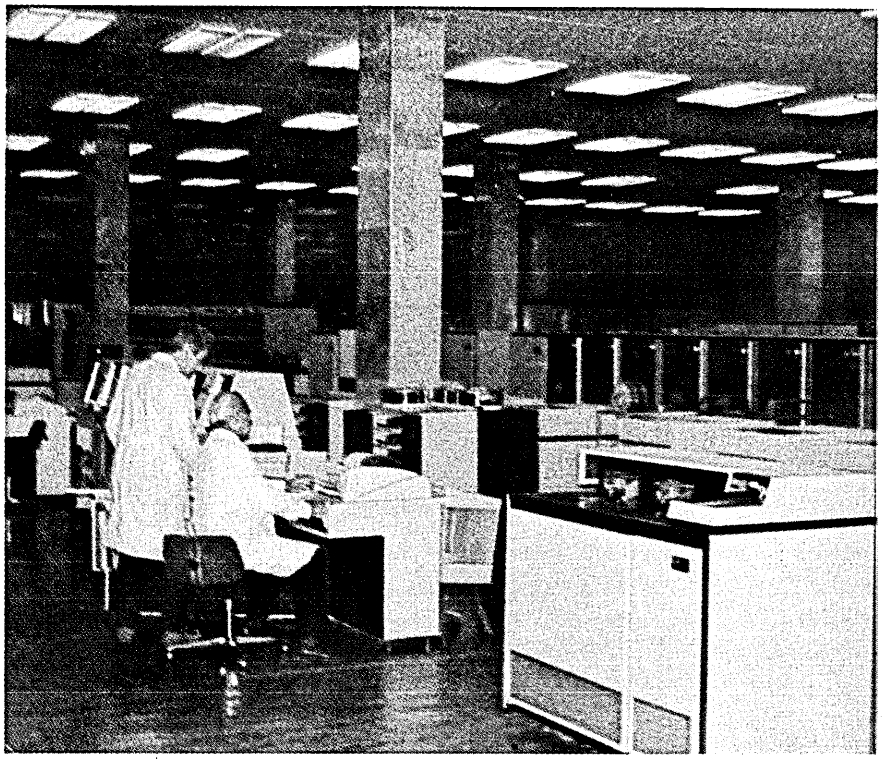
The components of ASPER are being programmed 40% in FORTRAN and 40% in COBOL. Approximately 140 programmers are working on these systems (including both applications and operating systems).

On the seventh floor there is another machine room of equal size which contains three ES-1030 machines. One of them has 512K of memory, the other two have 256K. The three operate on a standalone basis now but will be coupled through peripherals in the future. All applications programming on them is done in PL/1.

Specialists in the center feel that all of their computers are reaching saturation. The basic work for ASPER has been done in the ICL and Eliot machines, but all future work will be on the ES computers because the specialists feel it is more realistic to be on their own hardware. Unfortunately, the applications on the two different sets of systems are not compatible and so they will have to continue to use them separately until some sort of conversion is worked out.

Specialists in the center feel that all of their computers are reaching saturation.

These resources provide the heart of the computer base for the national eco-



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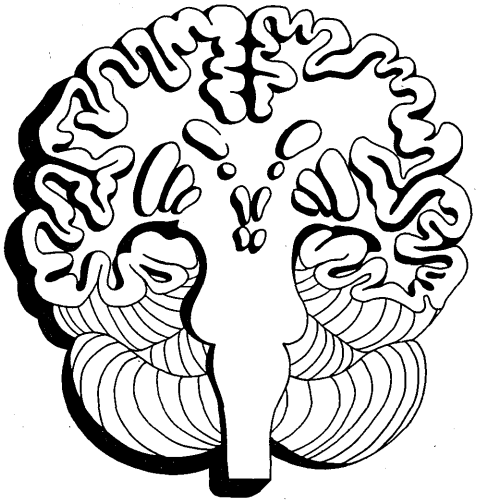

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It's where computer software has been headed, but will never get to.

The brain is usually the most fool-proof way to turn data into information.

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However, the brain does have drawbacks. It can't handle enough data and it's too slow.

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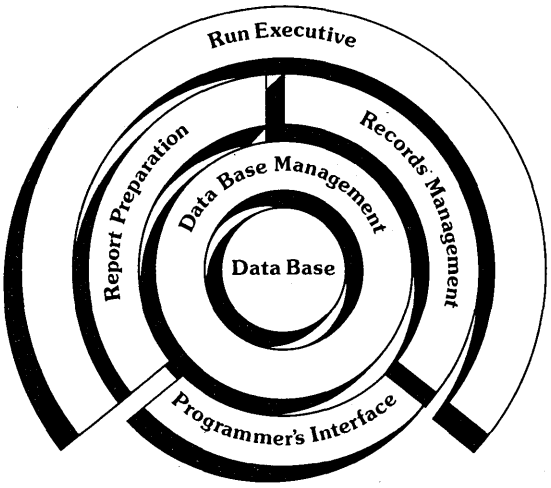

RAMIS II is a software system that offers many of the brain's capabilities without its limitations.

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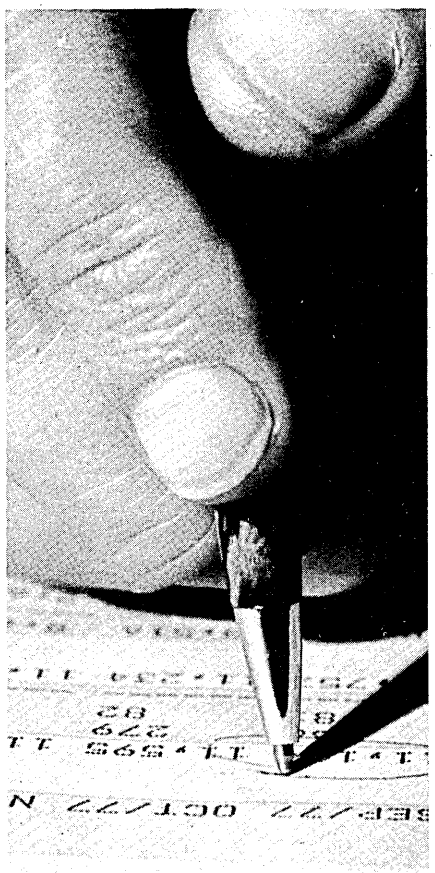

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nomic plan for the entire Soviet Union, although a number of standalone minicomputers are used within the various Gosplan offices for direct planning tasks and for the preparation of reports using RPG.

Gosplan leaders feel that they are making considerable progress and admit that since the task is a very ambitious one they still have a long way to go. Although they feel they can get the hardware resources, they continue to have difficulty obtaining sufficient trained manpower at the level of the republican ministries and of the enterprises. Since the future of computer-aided decision-making in the Soviet Union depends on a close coupling of the planning process in Moscow with the planning agencies in the various republican capitals, it will be essential for specialists to become acquainted with ASPER in the center and then move out, gradually carrying the basic methodologies and skills throughout the country.

One of the tasks on which Soviet specialists are consulting with specialists from the U.S. is that of educating managers in understanding and using economic modeling and data bases to carry out their tasks. One aspect of this consultation is being carried out through the bilateral U.S.-USSR Science and Technology exchange program which was begun through agreements signed in 1972 and renewed by the chairman of the U.S.-USSR State Committee of Science and Technology and the President's Science Advisor this past July. Under this program, specialists from each country move back and forth to share experience, to conduct seminars, to give lectures, and to help facilitate a greater flow of information regarding the uses of computers in management between the two countries.

> . . . lessons to teach the U.S. energy planning, transportation, and allocating agricultural resources . . .

The countries view this as a positive step in their relations because each has something to offer the other in the way of skills and experience. Each has had its share of difficulties in implementing new systems and technologies in areas which have proceeded by "seat-of-the-pants" methods. Soviet specialists are clearly eager to learn about methods of implementing systems in American business, economic forecasting, and planning. At the same time, U.S. specialists have been interested in reviewing and analyzing the plans for the automated system of planning estimates prepared by the Main Computer Center of Gosplan, because of the sheer scale and ambition of the plan. As the United States moves into more centralized planning in areas such as the energy use, national transportation, and the allocation of agricultural resources, there are lessons to be learned from the Soviet experience in these areas.

Soviet experience with computer-aided decision-making is still stronger in theory than it is in practice, but they are catching up. With appropriate attention paid to the human and organizational aspects of development, they could swiftly move toward their goal of truly integrated national economic planning. ❋

Mr. Austin lectures on business administration at Harvard Univ.'s graduate school. He is also currently the director of the EDUCOM consulting group. Previous positions at Harvard include: director of the laboratories, Div. of Engr. and Applied Physics; associate director, Center for Research in Computing Technology; associate director, Office for Information Technology; and associate director, Div. of Computer Services.

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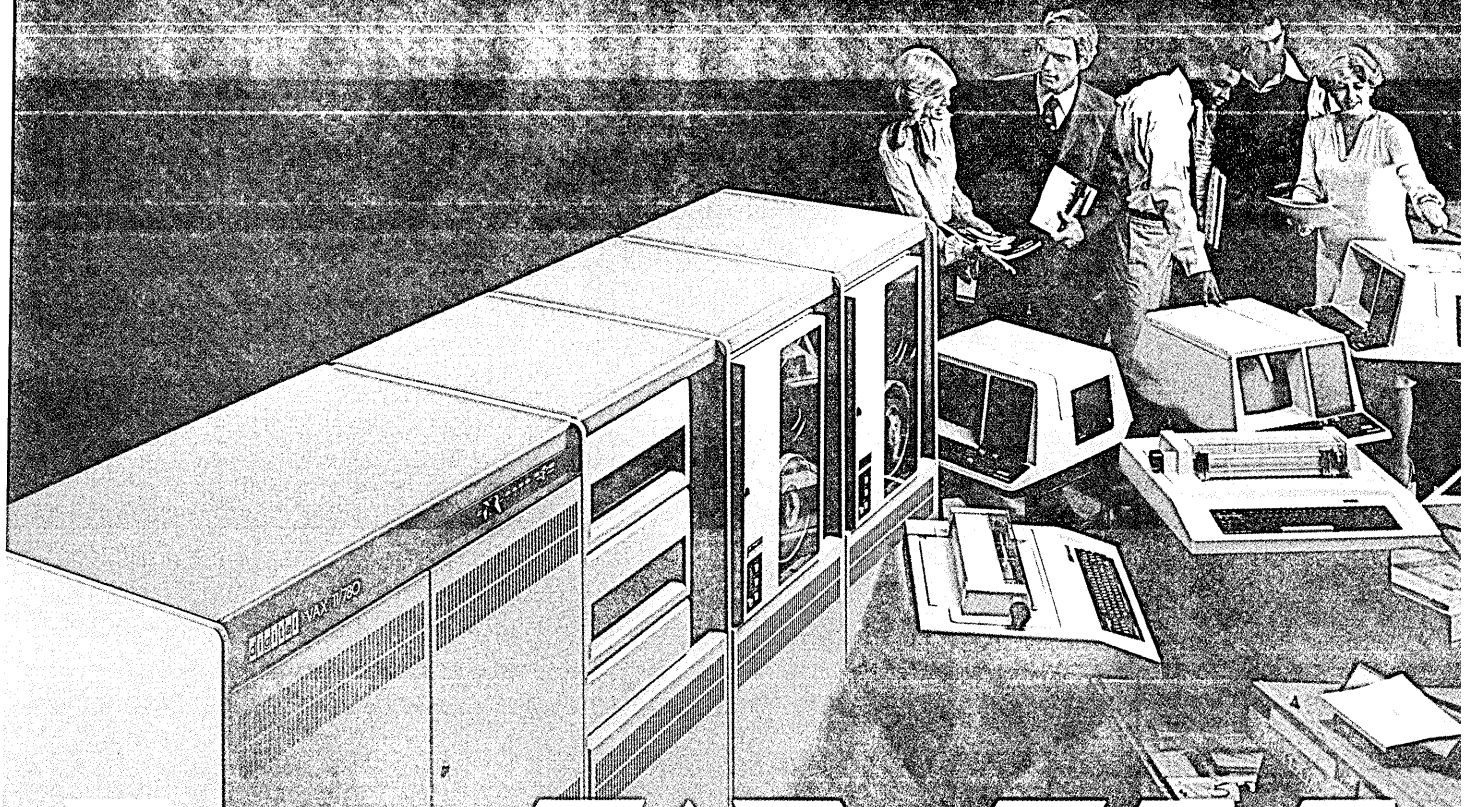

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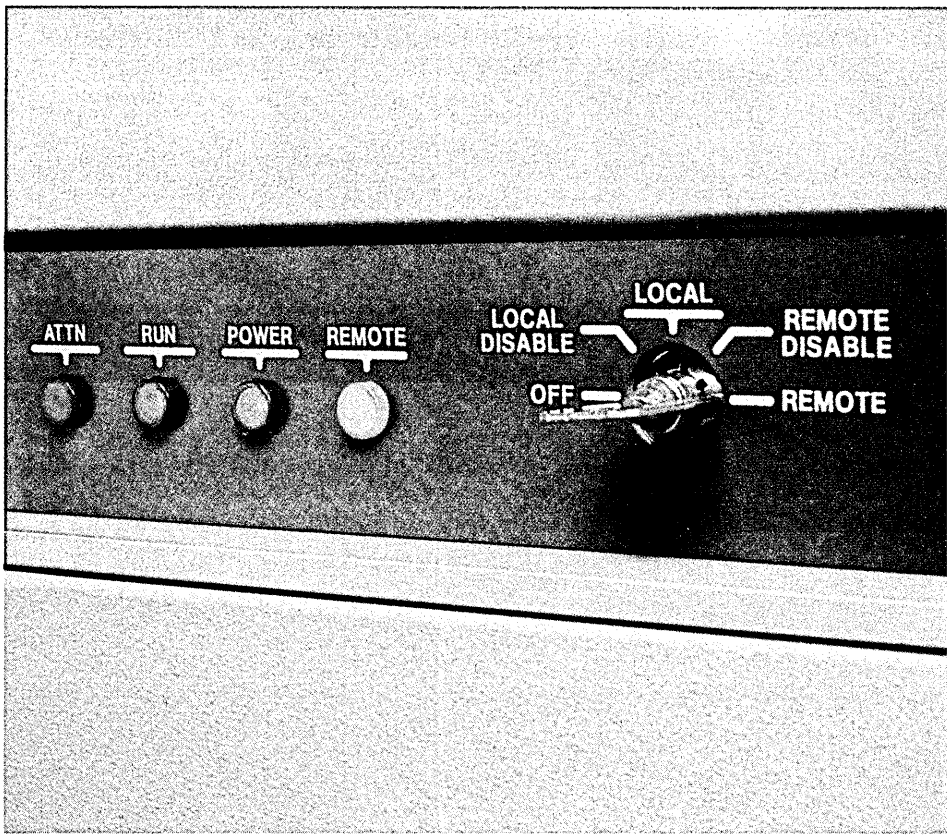

Four hierarchical access modes protect the system information. A diagnostic console contains an LSI-11 microcomputer. Automatic consistency and error checking detect abnormal instruction uses or illegal arithmetic conditions. Integral fault detection and maintenance features detect errors on memory, on disks, keep a history of recent bus activity, detect hung machine conditions, and allow automatic restart recovery.

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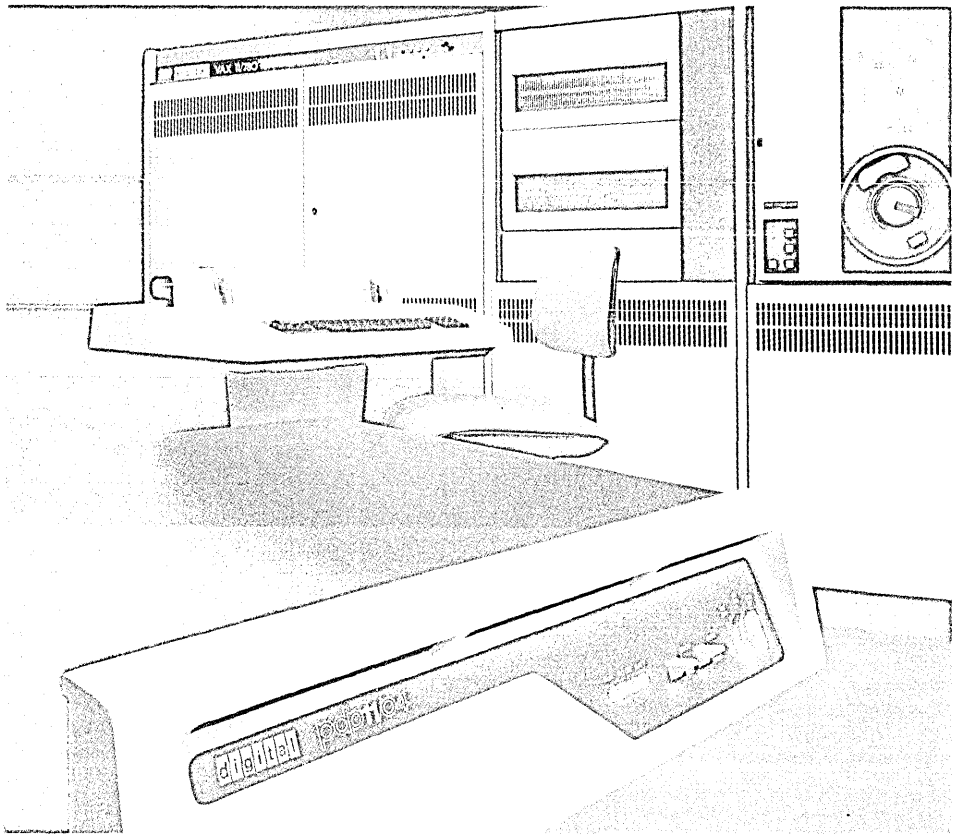

The VAX-11/780 is an all new 32-bit, virtual memory computer system with 243 basic instructions and a single, all-purpose operating system.

Yet...

DCL is the command language used on the PDP-11 with IAS and RT-11 operating systems. MCR is the command language used with RSX-11M and RSX-11D. Both DCL and MCR command languages are implemented on the VAX-11/780. The on-disk structure is the same one used by RSX-11M and IAS. The file access methods are the same as for RSTS/E, IAS, and RSX-11M.

Both VAX-11/780 and the PDP-11 implement the same FORTRAN IV-PLUS, BASIC-PLUS-2, and COBOL languages, with the FORTRAN generating native 32-bit code on the VAX-11/780. Users who have programmed in any of these languages have no additional learning.

In addition to its 32-bit native mode instruction set, the VAX-11/780 can concurrently execute the complete PDP-11 instruction set (with the exception of privileged and floating point instructions) in its "compatibility" mode. Both modes are built into the firmware and logic of the processor.

An Applications Migration Executive allows non-privileged programs written for the RSX-11M system to execute on the VAX-11/780 with little or no modification.

VAX-11/780 can be used as a host development system for RSX-11M and RSX-11S operating systems running on PDP-11s. All but the final debugging can be developed on the more powerful VAX-11/780.

VAX-11/780 and the PDP-11 both use a UNIBUS for connecting to peripherals. VAX-11/780 and the PDP-11/70 both have integrated MASSBUS adapters for interfacing high speed peripherals.

For those hundreds of thousands of persons who have worked with, and who know, the PDP-11 family, the new VAX-11/780 will be the simplest new system to learn. For those who need more throughput than a PDP-11 can offer, the VAX-11/780 offers easy migration, and great compatibility.

digital
VAX11
780

Major Features of the VAX-11/780 system

CPU 32-bit word length • Can directly address 4 billion bytes of virtual memory • User program can be up to 32 million bytes • Powerful instruction set includes integral floating point and context switching instructions • Instruction set supports 9 fundamental addressing modes with single instructions simulating entire high level language constructs • 8K byte write-through memory cache results in effective 290 nsec memory access time • Supports state-of-the-art paging memory management with 4 hierarchical protection modes each with read-write access control • 16 32-bit general-purpose registers • 32 interrupt priority levels, 16 for hardware and 16 for software • 2 standard clocks, programmable real-time and time-of-year with battery backup for automatic system restart operations • 12K bytes of writable diagnostic control store.

The Console Subsystem Intelligent microcomputer LSI-11 with 16K bytes of read-write memory and 8K bytes of ROM, floppy disk, and terminal • Optional port for remote diagnostics • Fast diagnosis, both remote and local, simplified bootstrapping, improved distribution of software updates.

Main Memory Subsystem ECC MOS memory built using 4K MOS RAM chips • Memory controller includes request buffer, increasing system throughput, eliminating most need for interleaving • Minimum memory configuration 128K bytes—maximum up to 1 million bytes per controller, two controllers allowed per system, for total of 2 million bytes physical memory.

Input/Output Subsystems Synchronous Backplane Interconnect (SBI) is main control and data transfer path. SBI capable of aggregate throughput rate of 13.3 million bytes per second • Error and parity checking every cycle for data integrity • SBI protocol uses 30 bits for address, allows both 32-bit plus parity and 64-bit plus parity data transfers • UNIBUS connected to SBI permits interfacing of general-purpose peripherals and user devices • Buffered UNIBUS adapter pathway between UNIBUS and SBI has throughput of 1.5 million bytes per second • MASSBUS connects to SBI via buffered adapter, permits interfacing high performance mass storage peripherals with parity checking • MASSBUS adapter throughput rate is 2 million bytes per second • Four MASSBUS adapters permitted per system.

Software System Designed for many applications including scientific, time-critical, computational, data processing, batch, general-purpose timesharing • Process-oriented paging for execution of programs larger than physical memory, transparently to the programmer • Memory management facilities controlled by user—can lock pages into working set, never to be paged out, or lock into physical memory, never to be swapped out • Sharing and protection at page level (512 bytes) • Four hierarchical access modes • Interprocess communication through files, shared address space, or mailboxes • System management facilities • DIGITAL command language and MCR command language provided • File and record management facility includes sequential and relative file organization, sequential and random record access • Supports Files-11 on disk structure level 2 • Program development capability includes an editor, language processors, symbolic debugger • Support provided for FORTRAN IV-PLUS/VAX and MACRO/VAX in native 32-bit mode, COBOL-11 (V3) and BASIC-PLUS-2 (V1) in compatibility mode • Scheduler is priority-ordered, round-robin/time-slicing, event driven • 32 levels of software process priority for fast scheduling • Networking capabilities are supported through DECnet for process-to-process, file access and transfer, and down-line loading • Batch facilities include job control, multi-stream, spooled input and output, operator control, conditional command branching and accounting • Command procedures are supported by command languages.

PDP-11 Compatibility Provides system-wide compatibility supporting execution of the PDP-11 instruction set (with exception of privileged and floating point instructions) in compatibility mode • Applications Migration Executive allows RSX-11M/S non-privileged tasks to run with minimal or no modification • Host Development Package allows creation and testing of RSX-11M tasks • Same data format • Same source-level programs • High level languages • Files-11 on disk structure, level 1 • RMS file access methods including ISAM • DIGITAL Command Language and the RSX-11 MCR command language.

Reliability, Availability, Maintainability Remote diagnostics by means of integrated diagnostic console permits diagnostics, examination of memory locations from remote terminal • Automatic on-line error logging • Automatic restart capabilities after power failure or fatal software error • Users continue to use system with failed hardware components • Consistency and error checking detects abnormal instruction uses or illegal arithmetic conditions • Improved packaging and cabinetry increase hardware reliability and ease of maintenance • On-line diagnostics available and run under operating system.

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A Popularity Contest for Languages

by Andreas S. Philippakis

Five years ago, Cobol was the top commercial programming language—to no one's surprise—with Assembler a close second. Since then, "structured" languages have been widely promoted; has their popularity increased?

The theory and practice of computer programming have received wide attention over the last few years. Although the proliferation of new languages in the '60s was followed by a short pause in the early '70s, since then the popularization of structured programming concepts and the concern over software reliability have again heightened the level of activity.

But has the new thinking on structured programming and language design affected language usage? Are new, "structure-oriented" languages replacing "old" ones?

In an attempt to answer at least part of that question, a survey was recently conducted among systems analysts and programmers in commercial data processing installations. A total of 132 respondents replied to questions concerning the percentage of their programming time spent using various languages. (The questionnaire listed seven popular languages and an "other" category.)

Before discussing the results, it should be emphasized that the basic question being investigated is on which language do professional programmers spend their time. No attempt is made here to rank languages in terms of efficiency or suitability.

A summary of current language use is presented in Table 1. The table also compares results from the current survey to those of a similar one conducted by the author in 1972 (Oct. 1973, p. 109). A *usage index* is included to make that comparison easier; it is computed as follows:

$$\text{index} = \frac{\text{number of users}}{\text{total respondents}} \times \text{average \% use}$$

where "average % use" is actually "average % use *where used*." This index weighs use by the total universe of respondents and to some degree adjusts for the differences in sample size between the 1977 and 1972 data. (Note, however, that this index has the disadvantage that size and type of installation are not being considered in the computation.)

What were the results?

Several observations are worth making regarding the data in Table 1:

1. The most widely and extensively used language for administrative data processing is still COBOL.
2. Assembly languages remain in wide and extensive use, being second only to COBOL.
3. All other languages are used to a far lesser extent.
4. FORTRAN is used by approximate-

PROGRAMMING LANGUAGE USE

	1977			1972			1972-1977
LANGUAGE	NUMBER OF SITES	AVERAGE % USE WHERE USED	USAGE INDEX	NUMBER OF SITES	AVERAGE % USE WHERE USED	USAGE INDEX	USAGE INDEX CHANGE
Assembler	97	22%	16	124	27%	20	−4
APL	4	14%	0.4	1	1%	0.0	+0.4
BASIC	11	15%	1	14	13%	1	0
COBOL	119	70%	63	138	70%	59	+4
FORTRAN	45	9%	3	79	11%	5	−2
PL/1	26	32%	6	26	28%	4	+2
RPG	23	25%	4	49	20%	6	−2
Other	42	16%	5	33	17%	3	+2

Table 1. COBOL is still the most commonly used commercial programming language, if not always the most well liked. It is used for some 70% of all programming at those sites where it is installed, on the average. Its usage index indicates it has slipped very little since 1972. (The usage index reflects "overall" usage of the language, and is intended to compensate for changes in the sample sizes for 1972 and 1977.)

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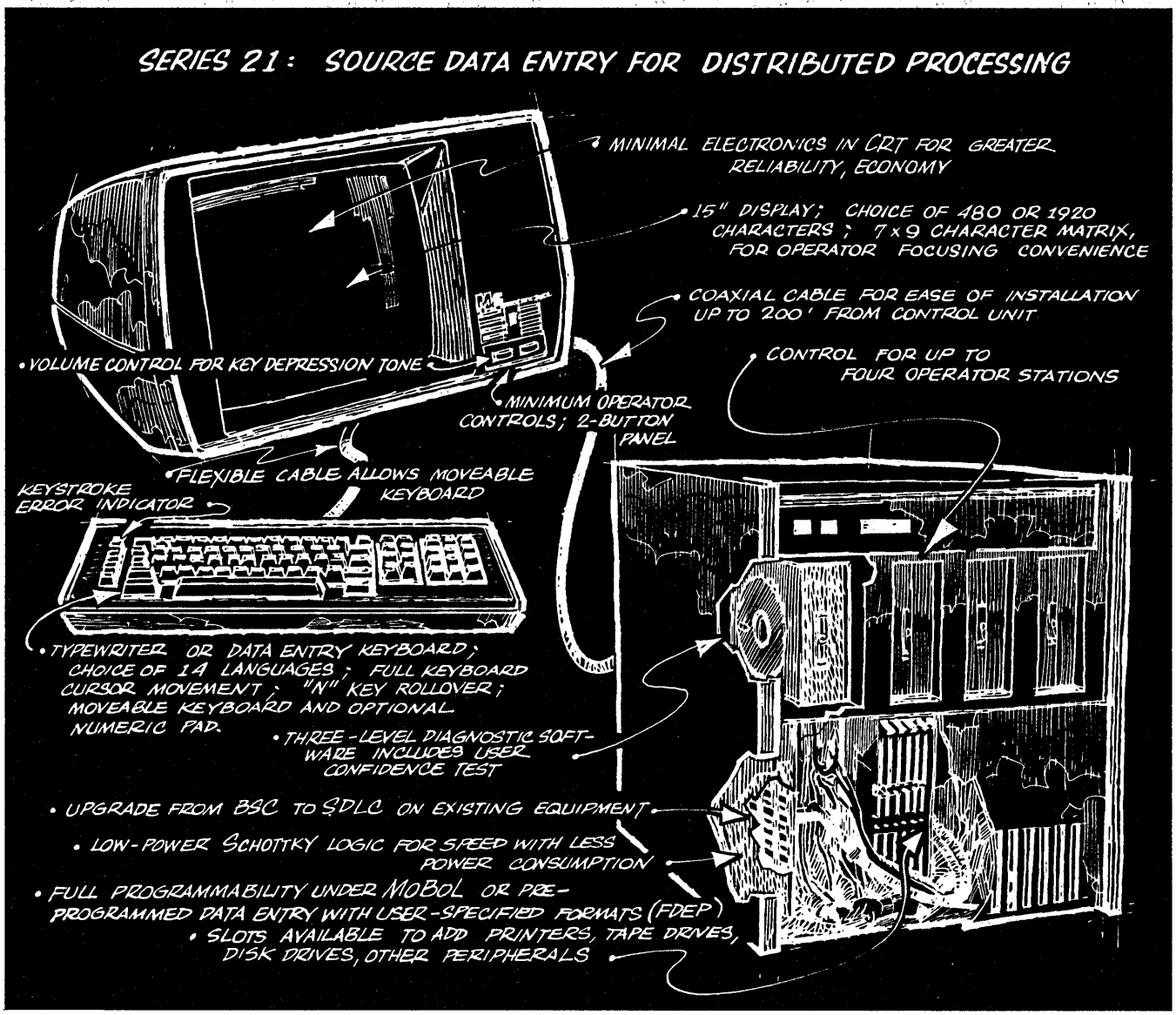

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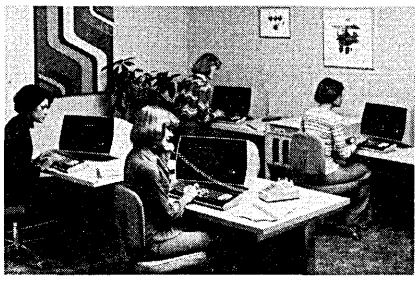

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LANGUAGE USE BY INDUSTRY

	Banking & Savings (20 sites/ 1280 users)		Government Related (27 sites/ 351 users)		Health Care (6 sites/ 168 users)		Insurance (5 sites/ 135 users)		Manufacturing (21 sites/ 735 users)		Public Utilities (14 sites/ 714 users)		Retail & Distribution (15 sites/ 195 users)		Other (24 sites/ 456 users)	
Language	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used	Number of sites	Average % use where used
Assembler	14	30%	16	28%	6	18%	4	7%	16	9%	12	19%	13	39%	16	14%
APL	0		0		0		0		1	10%	1	3%	0		2	21%
BASIC	3	34%	3	17%	0		1	1%	0		3	1%	0		1	10%
COBOL	18	75%	26	67%	6	80%	5	76%	19	81%	13	56%	11	64%	21	68%
FORTRAN	3	1%	13	12%	0		0		8	8%	11	8%	0		10	11%
PL/1	1	2%	7	10%	2	5%	0		4	42%	5	55%	0		7	42%
RPG	1	1%	4	34%	1	5%	0		6	26%	0		3	35%	8	21%
Other	4	28%	10	10%	0		4	24%	2	8%	6	9%	5	35%	11	12%

Table 2. Some industries seem to have less need for a variety of languages. Note, for example, that none of the sites responding for the Retail and Distribution industries claimed to be using any of the analytical languages.

ly one-third of the sample with an average use of 9% of the hourly programming effort.

5. PL/1 is used only by one-fifth of the sample, but those who use it do so extensively, with an average usage of 32%.

6. RPG-type languages compare in use to PL/1, being used by just under one-fifth of the sites responding, with 25% average use.

7. BASIC is used by 8% of the sample. However, the wide use of BASIC with many popular business minicomputers is not reflected in this sample. The sample was biased in favor of larger organizations which have formal data processing departments.)

8. APL is very limited both in number of sites and level of use. (Languages such as APL, FORTRAN, and to some extent BASIC and PL/1, can be categorized as analysis-oriented. One would expect that these terse languages are often used by persons who do their own limited programming for analysis of data and do not submit jobs through a regular dp department. Again, such usage would not be included in the responses to this questionnaire.)

9. The "other" category shows that other languages are used, often extensively, by about one-third of the sample. This category included several low level languages (such as NEAT/3), some very high level languages (such as MARK IV), and two ALGOL sites, each with a 5% usage level.

10. Comparing the 1977 survey results to those of 1972, little change appears. APL, COBOL, PL/1, and the "other" category show increases, while Assembler, FORTRAN, and RPG show small decreases. Taking into account that the responses were only estimates, plus the small size of the changes and the inherent inaccuracies in sampling, it is safe to say that language use has remained practically the same between 1972 and 1977.

Overall, no great variations exist across industry groups either (see Table 2a and 2b), but notice the absence of the more analytic languages, APL and FORTRAN, from the Health Care, Insurance, and Retail & Distribution groups.

Table 3 compares languages by usage level within an organization. It is interesting to see that the majority (51) of sites using Assembler use it for less than 10% of their programming, while on the other hand, 18 others use it for over 90%, and three of the latter use it exclusively. As expected, most COBOL sites polled use it for a large

LANGUAGE USE BY SITES

	AVERAGE % USE				
Language	≤10%	11%-50%	51%-90%	>90%	100%
Assembler	51	23	8	15	3
APL	2	1	0	1	0
BASIC	8	1	0	2	1
COBOL	11	15	56	37	7
FORTRAN	32	10	0	3	0
PL/1	13	5	2	6	0
RPG	14	5	2	2	2
Other	22	11	1	8	1

Table 3. Few sites can get by on a single language, but 74 out of the 132 sampled use a single language for over 90% of their work.

WRITING NEW PROGRAMS OR MODIFYING OLD ONES?

	AVERAGE % USE	
LANGUAGE	WRITING NEW PROGRAMS	MODIFYING OLD PROGRAMS
Assembler	31%	69%
APL	70%	30%
BASIC	55%	45%
COBOL	47%	53%
FORTRAN	55%	45%
PL/1	50%	50%
RPG	40%	60%
Other	56%	44%

Table 4. The data on check-out versus maintenance must be used with the other tables to make sense. For example, the 40/60 split for RPG does not mean that report generators are becoming less popular, but that more work is done in maintenance than in writing new code. The 70/30 split for APL may mean both that the language is becoming more popular **and** that much APL code is thrown away.

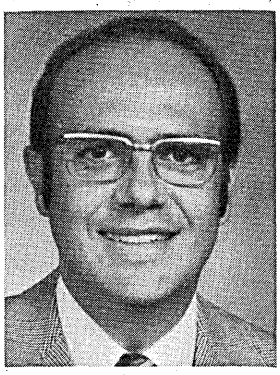
portion of their programming: seven used it exclusively. In general, single-language sites are few. One language rarely satisfies all programming needs.

Table 4 distinguishes between use of each language in writing new programs and in the modification of old ones. Note that assembler language, when used, is used primarily to modify old programs. One can infer that about 70% of assembler programming results from Assembler having been used previously to write programs. The APL usage split is just the reverse of Assembler, as would be expected of a new language often used in ad hoc analysis. In the remaining six language categories, the split between new programs and modification of old ones is about even, which goes along with the general observation that about one-half of the computer programming effort is devoted to program maintenance.

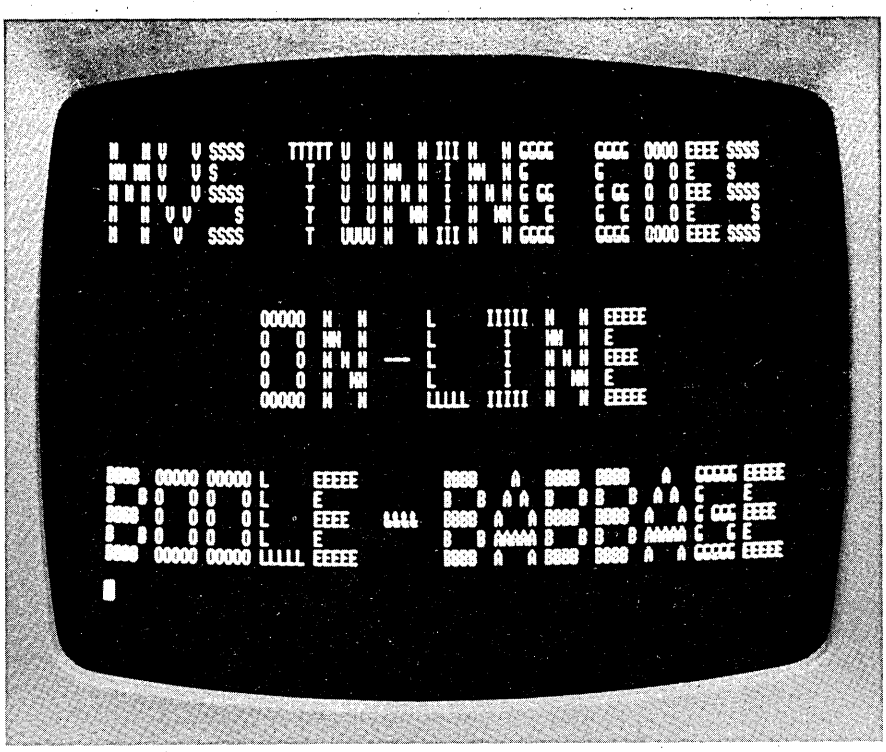
What does it prove?

Administrative data processing still is being programmed using just a few languages. COBOL, by far the most commonly used language, has remained so over the past five years. And despite all the literature in recent years about the merits of high-level language programming, assembler programming continues to be a close second. The well-known general purpose language PL/1 appears to be standing still (despite rumors that IBM has been encouraging its use), as do APL, BASIC, FORTRAN, and report generators.

It is safe to predict, based on this study, that the established momentum of currently popular languages will prove difficult to arrest. The merits of newly designed languages may remain academic subjects for some time to come, at least as far as administrative data processing users go. ❋



Dr. Philippakis is professor and chairman of the Dept. of Quantitative Systems in the College of Business Administration at Arizona State Univ. The coauthor of three books and several articles, he has been active in the computing field since 1962, and is a member of several professional societies.



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Minis have made a name for themselves, justifiably. But in the world of on-line, where needs keep growing, the one mini system just can't cut it. With the architectural limitations inherent to a single mini system, growth can build system overhead so fast you'll grind to a halt before you know it.

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The answer might seem to be to strap two processors together. One goes down, and the other takes over. Right? Wrong. It's not that simple. System software for a single processor system won't run on the strap-ups. And the fate of any transactions-in-process at the time of a failure is unknown. As is the state of any records being updated. And growth beyond the original system capacity is well nigh impossible.

What you really need is the one multiple processor system designed for multiple processor operation. Tandem's NonStop System.

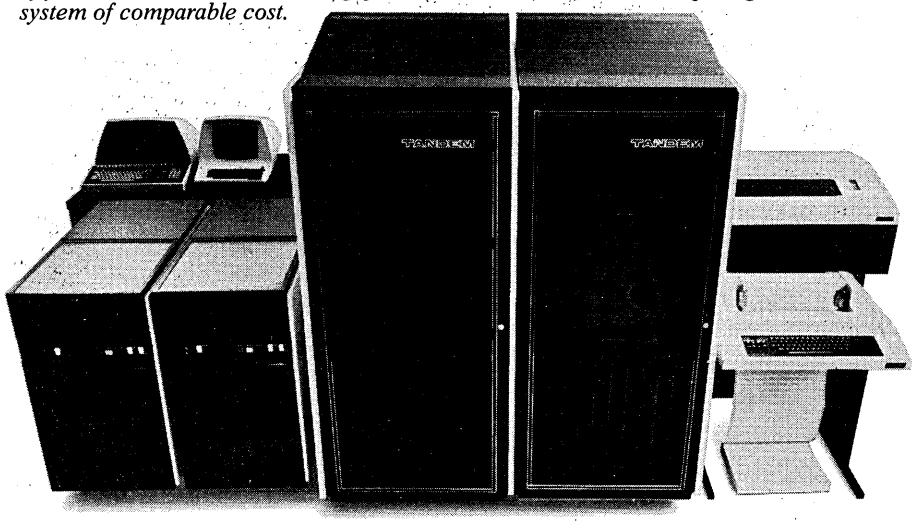
The four major "on-line" considerations.

When anyone is considering an on-line system, regardless of size, there are four primary points to consider. Throughput. Availability. Data Integrity. Transaction Protection. The system must be able to handle the job. It must be there when you need it. You must be sure of the integrity of your data base. And you must be sure you don't lose or duplicate a transaction. Even during a failure. No single processor system anywhere can provide that assurance. It takes a multiple processor system designed for the on-line environment, and Tandem is it.

For better throughput, spread the files.

We built the Tandem NonStop System with geographic independence of programs and files. They're handled automatically under Enscribe, our Data Base Record Manager. And instead of having one processor with one bottlenecking channel and a

The Tandem 16 NonStop System is composed of multiple, independent processors with dual redundant communications paths. The unique interaction between Tandem hardware and software assures not only continuous operation, and the integrity of your data base, but also throughput unmatched by any other computing system of comparable cost.



processor system anywhere an "on line" environment.

fixed priority system, Tandem's NonStop System distributes the work and the files across multiple processors, multiple discs, and multiple channels. Enscribe controls the pattern and the flow for maximum efficiency. Because of simultaneous disc accesses, there's a dramatic improvement in response time. It's one of the performance benefits about a multiple processor system which you can't get on a single processor system.

Ease of programming, by design.

Historically, multiple processor systems have been a bear to program. Not with Tandem. Guardian, Tandem's operating system, lets you write your programs as usual. You can add more processors, or memory, or terminals as you need them. No need to rewrite programs. Ever.

And we make it easy to write the programs in the first place, with COBOL or with TAL, a powerful language designed for fast, flexible programming. The software development tools of this mini-based system rival those of far more expensive systems, and include NonStop operation, data communications, mirror volume capability, full file protection, screen formatting programs, and a host of housekeeping utilities.

When you're thinking "on-line," think in Tandem.

Which means think in multiples. Few, if any, "on-line" systems can be installed and forgotten. The number of transactions, the number of terminals on-line, or the number of applications programs to be run on the system keep growing. Most likely, all three will multiply.

Which is traumatic unless you've started with the one system on the market which can grow with you—even if the growth occurs during the initial configuration phase—without having to start all over again.

NonStop growth and NonStop protection, too.

Because the Tandem System was designed for NonStop operation in both hardware and software, it offers an extraordinary measure of protection against a failure in any processor, I/O channel, disc drive, or in the software. No other system offers this measure of assurance.

When a failure does occur in any segment of the system, its back-up counterpart completes the task, without a hitch. Since all programs are geographically independent, and the operating system both distributes and monitors all work-in-process, recovery from a failure is instantaneous. There is no restart; no backing up to a hopefully safe point.

The system monitors its own operations, performing all tasks in a distributed fashion across the multiple processors. Even when a CPU goes down, another CPU is immediately aware of the failure and picks up the task in process and completes it. No data and no transaction need ever be lost or duplicated. The integrity of the data base can be fully protected. It is truly unusual, but it's one reason why we say no single processor system anywhere can touch us in the "on-line" environment.

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Guardian: Operating System.

NonStop operation.

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Virtual memory system.

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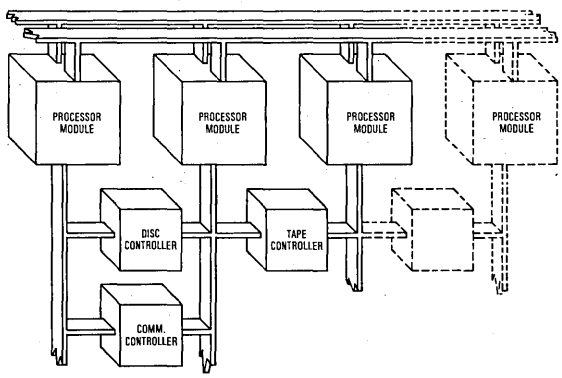
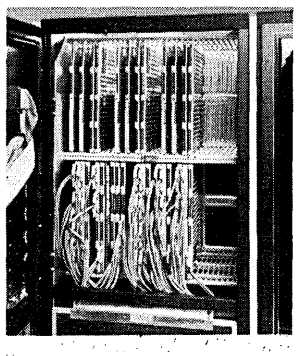
Photo and schematic show three processor modules with space for fourth module, interconnected to disc controllers, tape controllers and communications controllers.





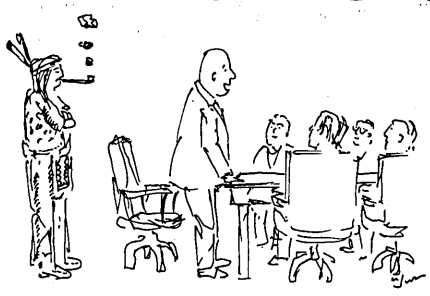
Is The World Building Data Barriers?

"While the grass is growing, the cow will die." Jan Freese, who has spearheaded the development and implementation of Swedish privacy law, quoted this old Swedish proverb in calling for international agreement on the kinds of data which can be transmitted across national borders and the methods of transmitting it—for personal and non-personal data alike.

"Governments must define their national interest, consultations and negotiations should begin, and finally new legal regimes must be created. If governments withdraw from productive discussion of the issues and delay decisions, a crisis atmosphere could develop."

Freese issued this warning at the first major international meeting on "Transborder Data Flows and Protection of Privacy," held last September in Vienna, Austria. He was talking about the proliferation of national privacy and data protection laws around the world, and the potential problem they create for any organization—government or private—that seeks to transmit information across borders. And he was talking about the problems that unfettered data flow create for the economy, society, and defense of a nation. Without agreement, all these interests clash head-on and nations clash head-on.

The users of international data transmission and data processing will in any case find their methods of doing business affected, if not their ability to do it.



Gentlemen, we've found a way to transmit the data.

More than 200 delegates from 20 countries—computer users, vendors, consultants, lawyers, educators, and government officials—streamed into the magnificent conference center of the Vienna Redoutensaal to find out where the problems lie, and in many cases, to test the political stance of other countries.

> Users of international data transmission and dp will find their methods of doing business affected.

The meeting sponsor, the Organization for Economic Cooperation and Development, tried valiantly to assemble a program that would introduce all the issues. Like Freese, its directors feel that privacy is just "one piece of the puzzle," which also involves national sovereignty, the needs of organizations, the power of communication authorities over transmission, and the protection of data and software. It would prove to be heady and often confusing fare, long on rhetoric and short on facts on the specific laws.

Gerhard Stadler, chairman of the OECD Data Bank Panel and an opening speaker, quickly made clear the various interests already clashing under current privacy and data protection laws. Countries such as Sweden, Germany, France, Spain, and Austria, already have provisions on transborder data flow that seek to prevent exporting data to evade national laws, he said. "Such measures remind one of the protectionism in the early stages of international trade . . . they not only could create difficulties with the data flows between states having data protection laws, but also between states that have them and states that don't."

Some of these countries are making their laws apply to "legal entities" (or organizations) as well as individuals, which broadens the scope of concern for anyone operating internationally. One such country, France, was represented by Louis Joinet of the Ministry of Justice, who underscored the economic and political dimension of the issue by noting simply that *"information is power."* (Joinet had been de-

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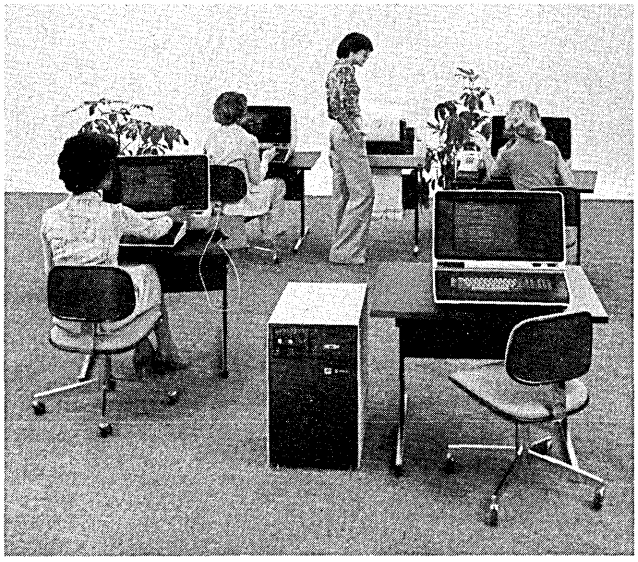

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layed in coming to the meeting by the passage of the highly protectionistic French data bill through the Chamber of Deputies.) He was clearly in favor of international agreements that take in all economic, legal, and social aspects—to protect national sovereignty as well as the individual.

But Freese, Stadler, and Joinet were way ahead of many delegates and nations in their thinking. In fact, Freese may well have been pointing at the U.S. and U.K. when he warned against delays. These two nations, among others, have been busy developing their privacy stances domestically, and most of their speakers at this symposium narrowed their transborder data flow concerns to the topic of privacy.

The undercurrent of grumblings about the size of the U.S. delegation

Such measures are like the protectionism in the early stages of international trade.

certainly underscored the behind-the-scenes politics and urgency of the meeting. The 30-plus delegates were thought to be some well-oiled machine aimed at delaying international efforts toward agreements. As a delegate, this reporter can state that most were untutored and represented their own independent professional interests. But, for good or ill, the U.S. government itself has taken no position yet and could not support the proposals Freese and others made. U.S. government representatives even opposed the release of a summary statement meant to indicate symposium consensus on the *need* for an international agreement of the broad issues of transborder data flow (something non-government delegates had to learn from outside sources).

In fact, the only consensus most attendees could see was on the principles of privacy protection, and then not even on the form of agreement to assure that protection. The U.S. government, via the statement of John Richardson of the Office of Telecommunications of the Commerce Dept., did come out in favor of some kind of accord on privacy, but committed only to study the broader issues. Richardson also called for a formal liaison between the OECD and the Council of Europe, the 19-member European body that has been working on a privacy convention.

That move was appropriate because Frits Bondius, a prime figure in the

(Text continues on p. 103, related stories on p. 98.)

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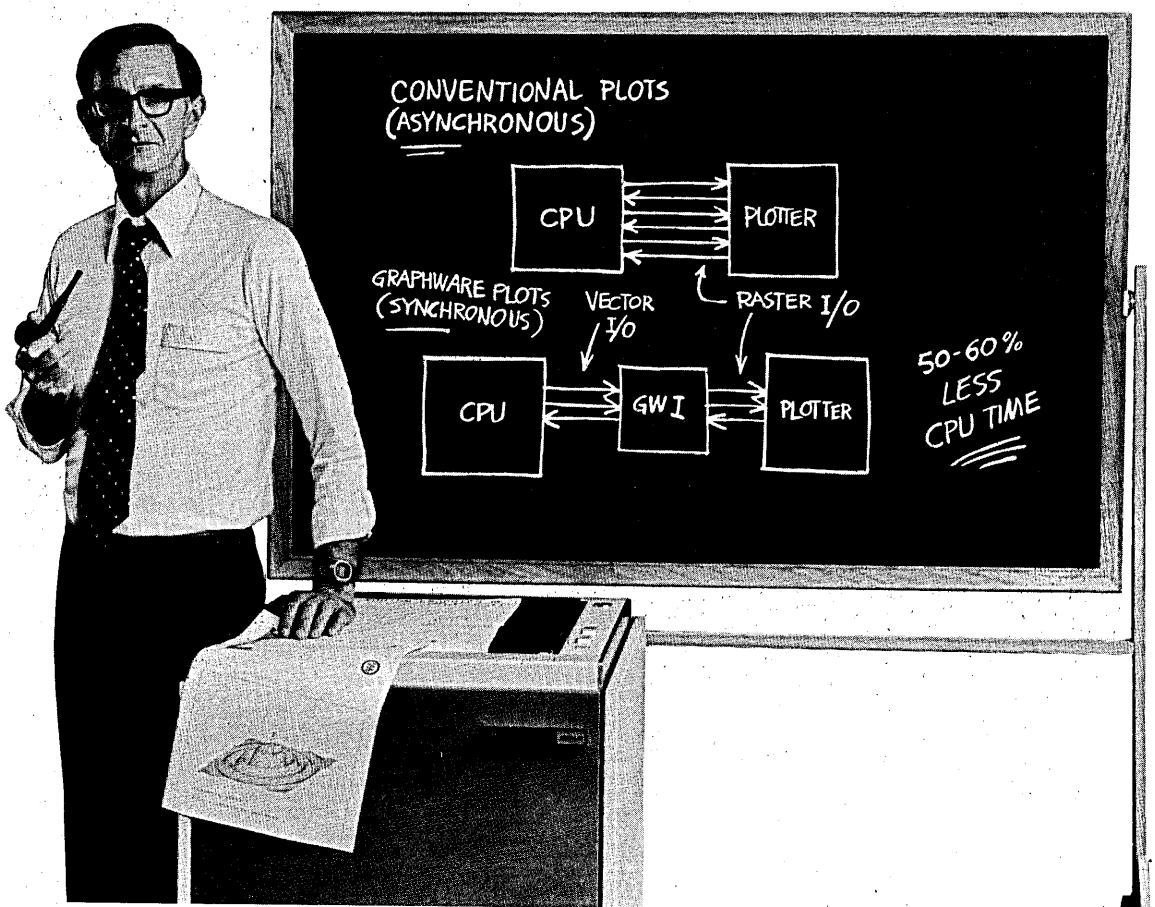

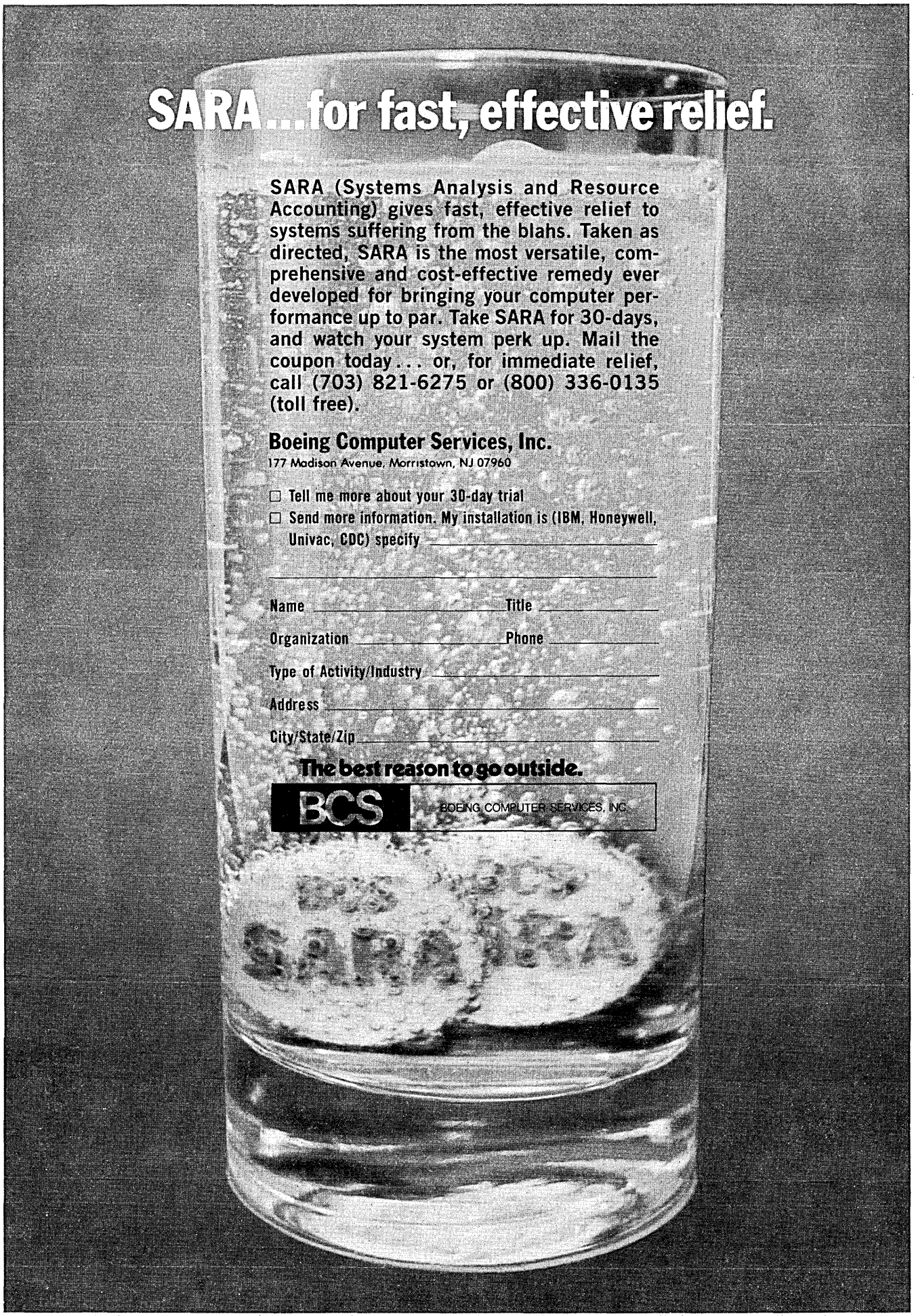
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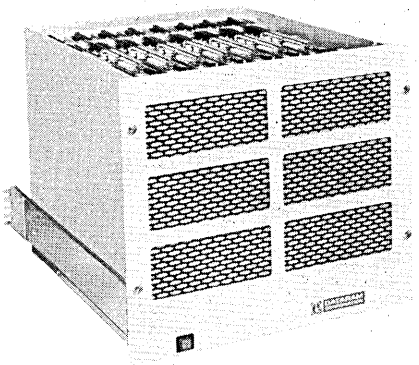

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WHAT, ME WORRY?

A growing number of American multinationals are waking up to the fact that the privacy laws being enacted around the world may have an impact on their global networks and corporate organization charts. The most knowledgeable among them are beginning to see that there is a broad body of laws, regulations, and tariffs which will *dictate* the kinds of data that can be recorded and how much of it can be transmitted across national borders.

Yet, in a recent DATAMATION survey of 40 American multinational firms, we found that more than half are unaware of what is going on in this field, partly because the laws and bills are in such early stages. Some believe that the laws being implemented will have no effect on them—even if they don't know what they are.

But more and more companies are beginning to study the issue, and some of the information systems executives shared their views and concerns with us. The range of attitude was indicated by two respondents. One, a manager in a transportation company, felt that the laws would be limited to privacy and would ultimately shake down in most countries into reasonable requirements that his company could live with. An information systems executive in a consumer products company saw a broader picture. "We are seeing the beginning of a worldwide effort to define what information can be gathered and transmitted, and in what manner. It begs for an international treaty."

Those most concerned were firms transmitting information on the individual:

A banker: "Present laws on banking and some of the pending data laws would prevent us from transmitting customer files across certain boundaries. If we want to lend Deutschmarks to a Japanese firm in Germany, the headquarters office in Japan wouldn't be able to find out through our systems. Sure, we can make telephone calls, but we transfer billions in currency worldwide daily. It is critical to know what our risk is globally."

An executive in the insurance industry: "All our insurance files on Canadian citizens are processed in the U.S. If Canada requires us to do our processing there, we'll be suffering a great financial hardship. We'll wait and see, but you can bet there will be a great outcry from insurance companies if such measures go into effect."

Pharmaceuticals: "As a pharmaceutical company, we depend a great deal on clinical trial data from outside the U.S. for filing applications for new drugs with the Federal Drug Administration. We're concerned that some of the laws will limit our ability to transmit data. In Germany, we understand that the service bureau we use—which collects data on doctors in the country—will not be able to keep these records in the same detail they have. We don't know how this will affect our marketing, which of course is to doctors and druggists."

Medicine: "Our only worldwide system is a health monitoring system of people who come into contact with toxic substances. Although it's definitely for their own good, I don't know if we'll be able to continue to use it, given the shape the privacy laws are taking."

If those firms dealing with individuals are deeply concerned, so are those with highly centralized organizations. One firm with 20 overseas plants has all top executives running those foreign operations located in the U.S. Information mailed and transmitted to the headquarters—on pricing, raw materials sources, production, and finances—is critical. Its interruption for any reason could mean both a corporate reorganization and—in countries where data restrictions are intolerable—withdrawal.

Those who are concerned about the issues stress that the concern has not yet reached the boardrooms of their corporations—just as it has not yet reached the Cabinet of the President. "I am afraid to tell them," said one executive planning an expansion of his firm's international network. "They are busy with more pressing matters and can't understand the technology or the concept of information as an economic and political tool. They'll only understand it if they can't get marketing information, like customer files, out of certain countries."

Clearly the issues have only reached a minority of corporate dp departments and legal departments. Whether there is cause to worry about unreasonable barriers to data traffic (except for tariffs) has yet to be proved. But forewarned is forearmed. ❋

The Service Bureaus' Stance

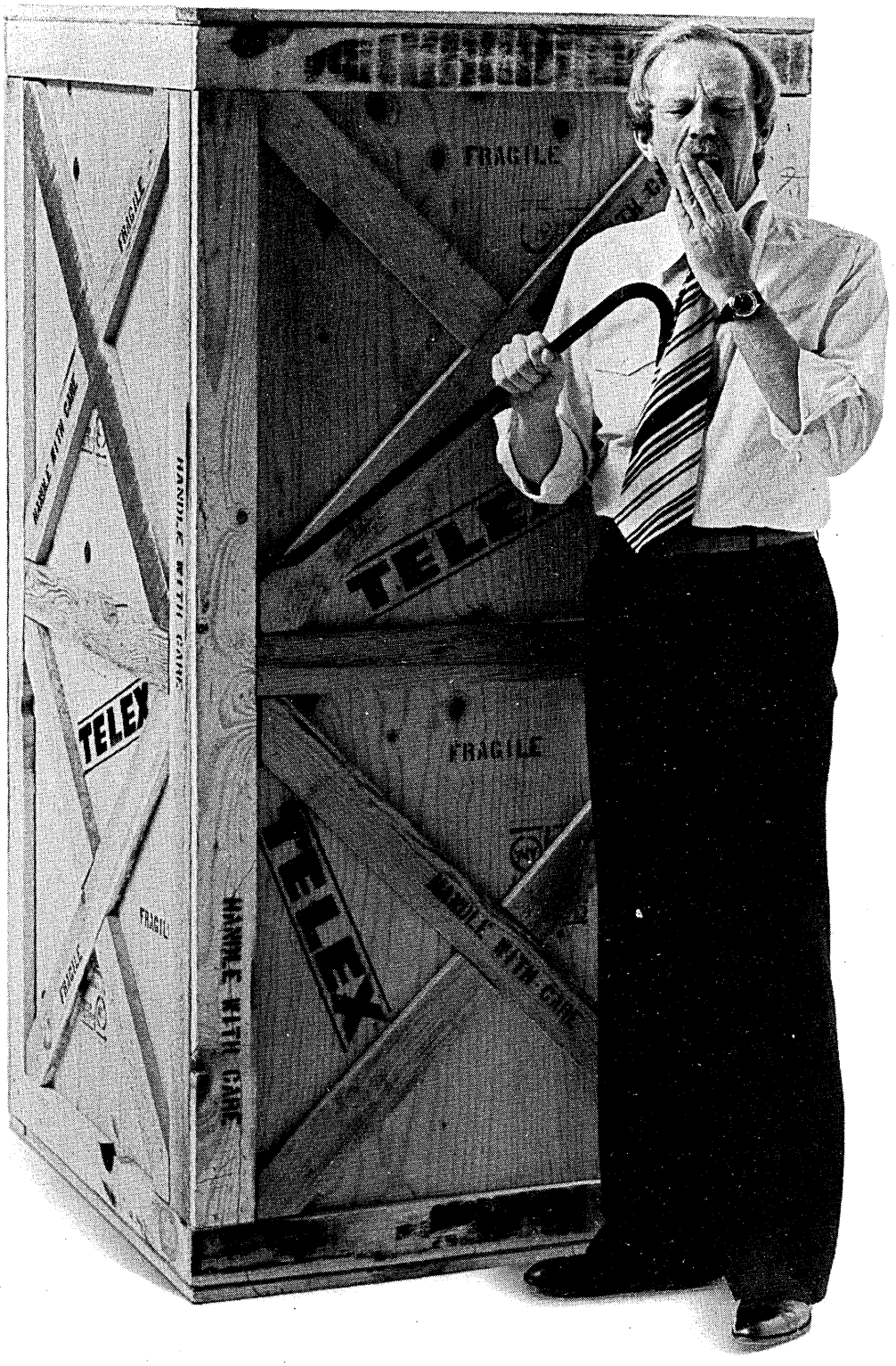
The symposium heard some strong recommendations from the service bureau community. Phillip Onstad of Service Bureau Corp., representing ADAPSO in the U.S., emphasized that the responsibility for data transmitted or stored in any system must lie with the customer, since the service operation is not always privy to what the customer is doing.

"We are seriously concerned," said Onstad, that "ill-conceived laws by a nation or group of nations will inhibit information flow in such a way that these nations may themselves suffer serious consequences. But we should have agreement—whether a computer is used, a filing cabinet, a messenger, or the phone system."

Alan Benjamin, president of the U.K.'s Computer Services Assn., specified what international regulations ought to do—again pointing to the customer, not the service organization. The one who benefits from the data processing should be the one obliged to obtain a license from any data protection authority and to specify where the processing will be done, Benjamin suggested; he should be the one who is subject to any law or requirement imposed either by the country where the processing is done or the one where the data originates.

George Fierheller, of Systems Dimensions Ltd. in Canada, asked that efforts be concentrated on abuses rather than on making general prohibitions to the movement of data. He called for treaties allowing for the free flow of data, but he also admitted that data which is vital to national interests perhaps should be kept from crossing the borders.

Onstad, Benjamin, and Fierheller each made it clear that the commercial service operation wants the least prohibitions on its ability to do business across borders and the least responsibility for the business done. But they did not go unchallenged. Jan Freese twitted them on their self-interest. "Several service bureau speakers have told us their data banks are just like safe deposit boxes in a bank. I fully agree. This important financial and social trust we put in the hands of dp services is the reason they should come under legal regulation just as their sister banks taking care of our money do." ❋



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It offers minicomputer users nearly four times the tape capacity of the previous 1600 bpi drives. Yet it takes up only one-fourth the space and costs only about half as much as the worldwide accepted, big box 6250 bpi units Telex has supplied to IBM users for years.

The four-to-one size reduction wasn't easy.

It took three years and a whole new standard of design to pack all that technology in a 19-inch frame. Parts innovations. Creative placement of needed elements. New materials. All have led to a remarkable achievement in simplicity and reliability.

The machine meets all the stringent requirements of true high density, 0.3-inch inter-record gap recording in both read and write operations.

In addition, the drive:

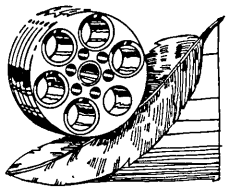
- Handles all three standard data formats—NRZI, PE and the new GCR.

- Runs reliably at speeds to 125 inches per second (models are also available at 45, 75 and 100 ips).
- Transfers data at the high speed of 781 kB per second (so off-loading can be done at nearly disk speeds).

- Rewinds a full 2400-foot tape reel in less than a minute. (That's 500 inches per second!)
- Reduces the complexity and cost of field maintenance (all work is done from the front).

Remarkable new capstan weighs only 1.9 grams.

To feel this Supr-Lite™ capstan is to believe its engineering achievement.



Not only does its lack of weight reduce inertia, it lets us use a smaller motor. Heat is reduced. Cooling blowers and hoses are eliminated.

Capstan walls are only 1/1000-inch thick, yet its unique manufacturing process* assures strength, absolute roundness (and users a more consistent data rate).

Telex tape path gets you up to speed in a hurry.

Perhaps the most dramatic example of how Telex miniaturized the 6250 is its tape path*. The path is very compact, yet it retains four vacuum columns (just like big brother).

It brings new efficiencies in tape dynamics and reduces the length of tape required between head and primary vacuum columns.

Combined with our new capstan, friction and mass are cut down so much that the unit runs tape full speed forward to full speed reverse in a mere 0.13 inches (a new record).

Special vacuum buffers and fixed air bearings gently handle tape at the high program rates possible with short inter-record gap operation. They eliminate long spans of unsupported tape, thus avoiding harmful tape oscillations that can restrict programming.

And we're so confident of tape servo reliability that we covered up the tape path with the operator's panel (further reducing space requirements).

New controller/formatter handles up to eight drives.

It includes the same proven logic design as our big controller, only miniaturized to fit a 10½-inch-high, rack-mounted box. And it's flexible enough to intermix all four tape speeds and all three densities—800, 1600 and 6250 bpi—in the same subsystem.

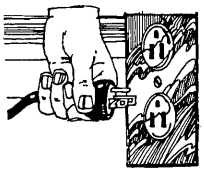
A built-in microprocessor handles extensive diagnostic routines.

When maintenance is required—on either controller or drive—the machine helps the technician quickly isolate faults down to board level for simple replacement. Given on-hand parts, a disabled machine should take less than an hour to fix. And all maintenance is done from the front.

Plug it in and go, it's that simple.

A common wall socket is all that's needed. And no special air conditioning. You can even operate it from a truck.

Design innovations with a goal of simplicity have enabled Telex to bring OEMs this remarkable new tape transport and controller. Large minicomputer users need this 6250 bpi mass storage capacity. Models are available now in dual density 800/1600 bpi. Full 1600/6250 bpi units will ship in the first quarter of 1978. Be the first to offer it.



Write or call Mr. Dan O'Neill, Telex Computer Products, Inc., 6422 E. 41st Street, Tulsa, Oklahoma 74135. Telephone: (918) 627-1111.

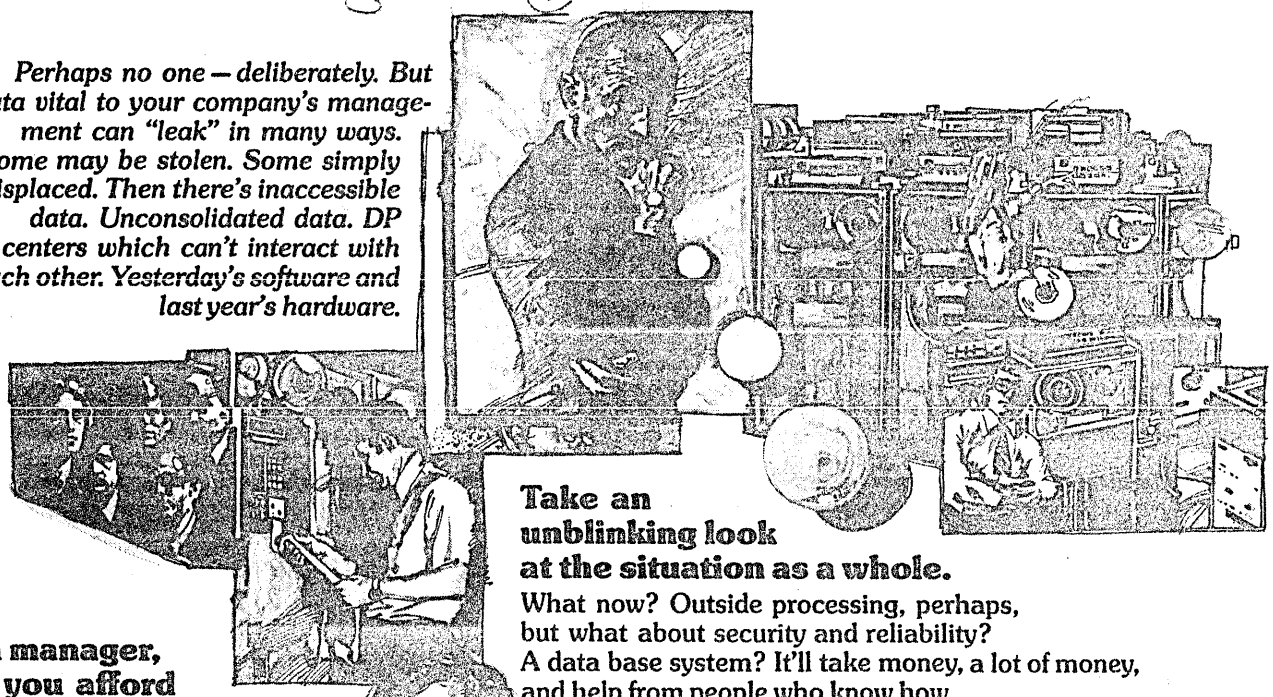
* patent pending

TELEX®

Miniaturization...in a big way.

Who's leaking company secrets?

Perhaps no one — deliberately. But data vital to your company's management can "leak" in many ways. Some may be stolen. Some simply misplaced. Then there's inaccessible data. Unconsolidated data. DP centers which can't interact with each other. Yesterday's software and last year's hardware.



Take an unblinking look at the situation as a whole.

What now? Outside processing, perhaps, but what about security and reliability? A data base system? It'll take money, a lot of money, and help from people who know how.

As a manager, can you afford not to check us out?

We've already proven ourselves to others. With sensible upgrading of management systems. Innovative DP conversions. Workable consolidation plans. And a 99% uptime record at our Dallas Center. Send us your request for a proposal. Or ask for a Sun Seminar...a working session on subjects you choose. In your conference room. For the time you allot.

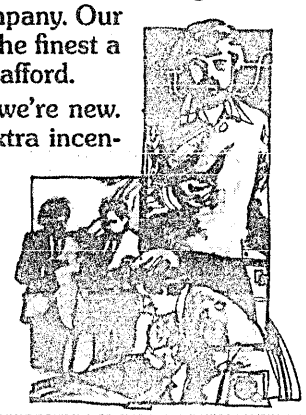
But your options are limited.

Computer problems are multi-dimensional and interrelated. You need a big single source, not a series of specialists. But in all the world, only a half-dozen companies have the depth, size and experience to accept the really big assignments. Now there's one more.

Sun Information Services. Suddenly you've got another option.

For twenty years we developed and ran the computer services for America's 27th largest industrial — The Sun Company. Our capabilities, frankly, are the finest a large oil company could afford.

But to the marketplace, we're new. Which means we have extra incentive to prove we deserve your business. You'll find us more flexible. And far more inclined to develop new answers than apply old systems.



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DATA BARRIERS?

development of the council's accord, would leave Vienna after his talk to attend a Council of Europe meeting in Strasbourg. There he would produce a mandate to the legal directorate from the Council of Ministers to have a final draft convention ready by the end of 1978. (Such a convention would affect how much information on an individual could be transmitted across national boundaries.)

This is important to the U.S. for two reasons. One is that the U.S. will have an opportunity at least to agree to the convention (if not to indirectly input to it). The second is that things are happening sooner than the U.S. expected. Ratification of this agreement

> They aren't likely to wait too long for the U.S. to make up its mind.

by member countries should take place in 1979 or 1980. The U.S. will have to speed up the development of its stance (since the meeting, we understand that Carole Parson, executive director of the U.S. privacy protection study commission, has been hired by the State Dept. as a consultant, purportedly to do a U.S. international policy study).

In the meantime, laws that transcend the privacy issue are being passed. Many nations are beginning to develop a total information policy that will engulf communications facilities. Sweden already has its Data Inspectorate working with its communications authority to bar certain transmissions, data base developments, the location and form of data processing organizations, and of course the kind of data recorded and transmitted. The symposium showed that some nations are anxious for international agreement not only to protect themselves, but also to protect free trade from restrictive nationalistic measures.

Since this meeting, the U.S. government has shown signs of understanding the boggling transborder data flow issues. While previously the State Dept. and its ad hoc task force were alone in their study, now the House and Senate have taken note, holding hearings on the problem. Congressional resolutions are in the works. And recent rumblings had it that a White House committee would focus on privacy and transborder data flows. One can be sure that many nations will be watching the moves of this country very carefully. But they aren't likely to wait too long for the U.S. to make up its mind. The cow must not die. ❋

—Angeline Pantages
International Editor

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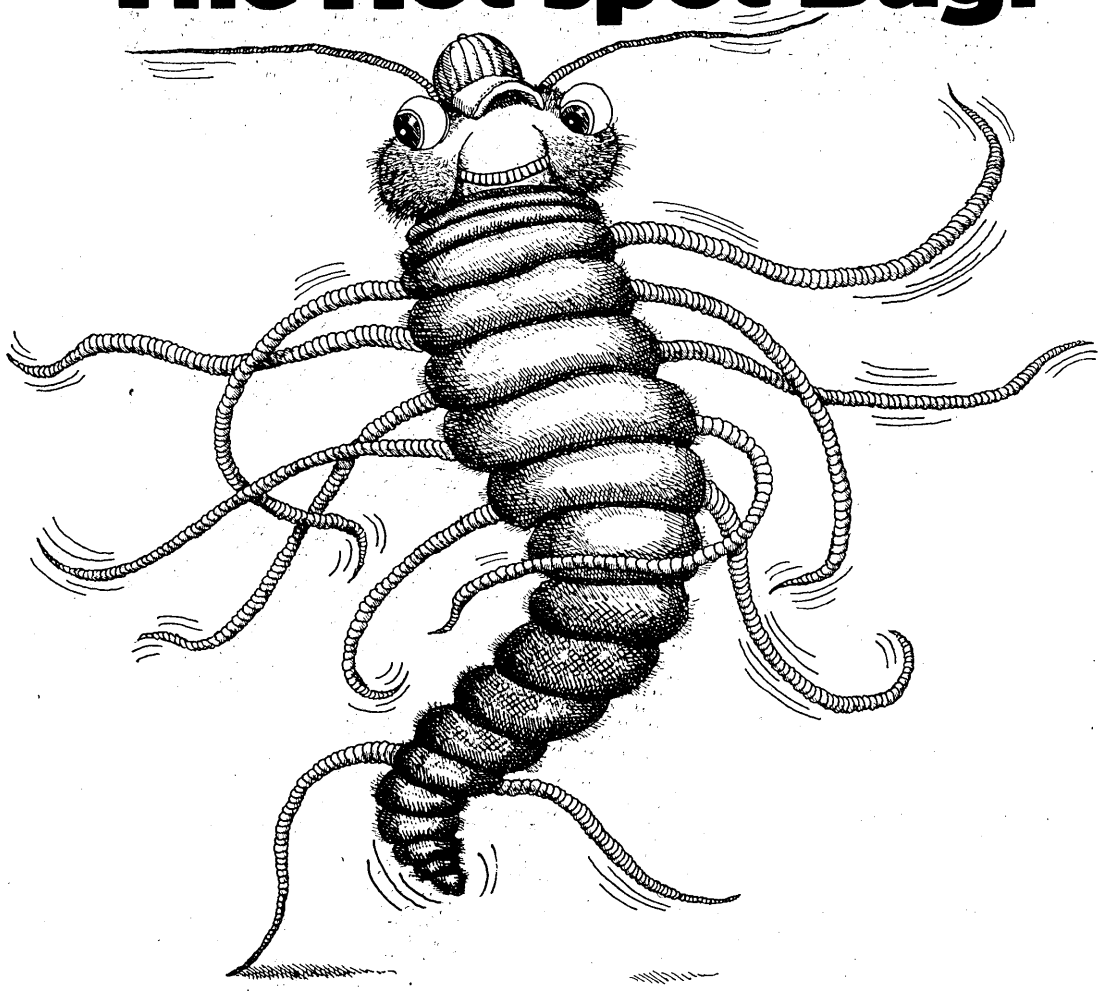
Type of computer now used:_____
Use/plan to use DBMS? Yes ☐ No ☐
If "yes", which one?_____

CIRCLE 124 ON READER CARD

The Hot Spot Bug.



You can't afford to have this pest in your computer room.

If your present environmental system is not maintaining even temperatures throughout your computer room, chances are you've been plagued by the Hot Spot Bug. It's a very expensive little pest that reduces equipment life and can cause down time. And, it attacks minicomputers as well as large scale systems.

EDPAC Process Cooling Systems are specially designed to prevent such problems in computer rooms. They provide the proper modular control for the entire room. So you can rely on EDPAC to protect your computer as no regular air conditioning system can.

Before the Hot Spot Bug costs you a small fortune, contact EDPAC today!

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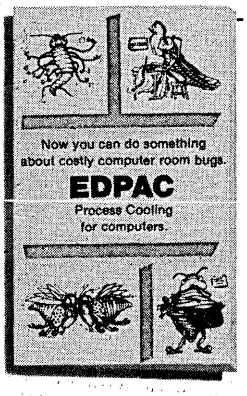

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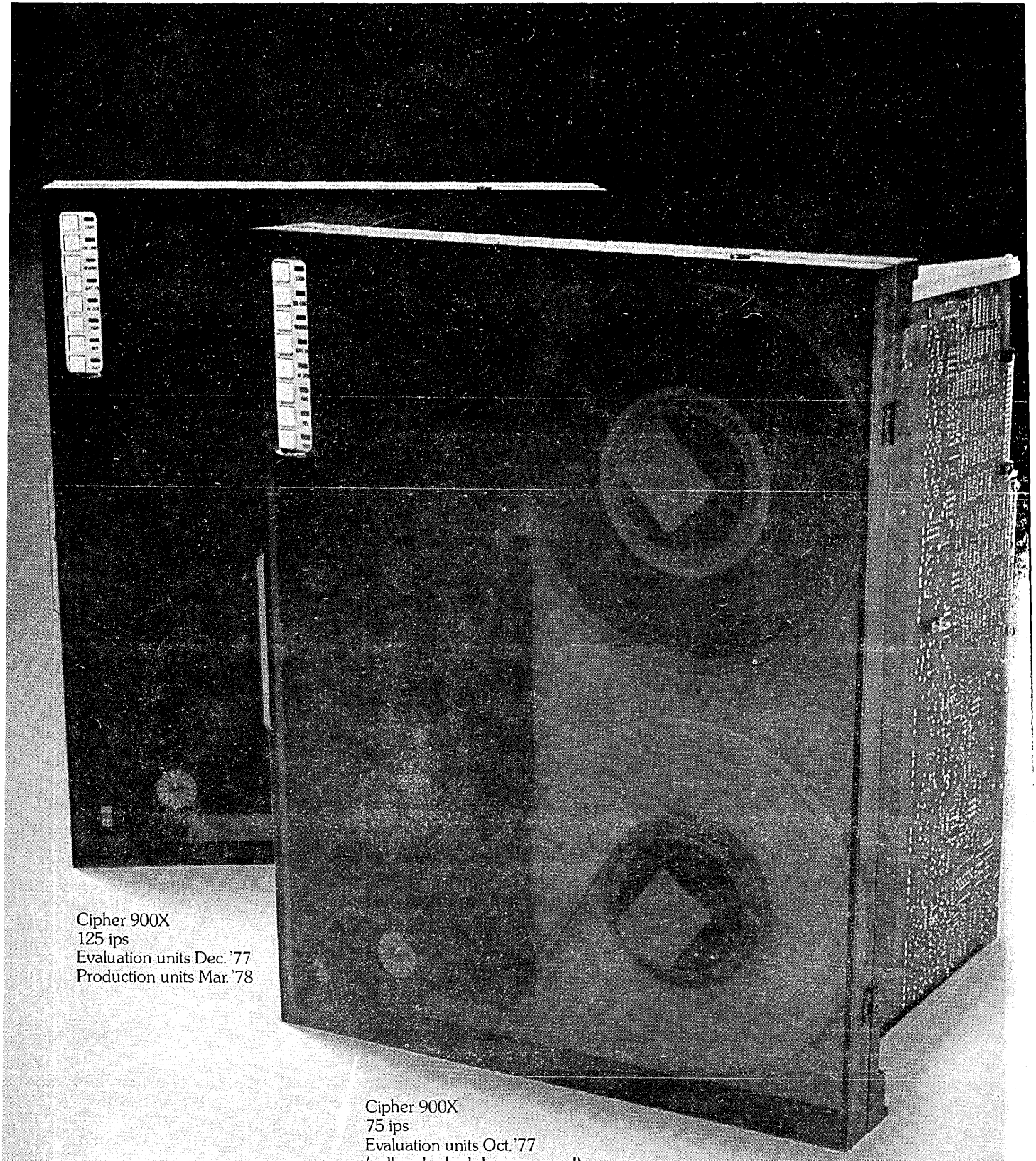


Cipher 900X
125 ips
Evaluation units Dec. '77
Production units Mar. '78

Cipher 900X
75 ips
Evaluation units Oct. '77
(call and schedule yours now!)
Production units Jan. '78

Cipher delivers a quiet blow to the competition.

Quiet as a whisper, the 75 and 125 ips Cipher vacuum tape transports simply obsolete every other vacuum drive on the market today.

By design and construction, the Cipher 900X vacuum tape drives are simply the best, most reliable tape transports on the market today. Bar none.

It starts with complete microprocessor control of all of the transport's functions, including complete self-test/diagnostics and a full measure of protection for the tape and an extraordinary reduction of maintenance problems.

In conjunction with our switched linear servo electronics, the microprocessor maintains total servo control during critical load and unload or power fail sequences. It's the smoothest tape handling you've ever seen; there is no possibility of tape damage even if a power failure should occur during high speed rewind.

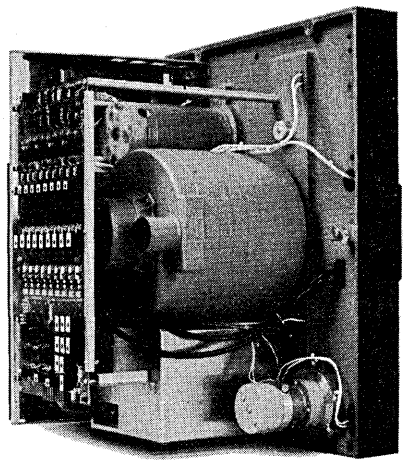
Power wise. The Cipher 900X series is the lowest power user of all vacuum tape transports. Averaging 300 to 350 Watts with a worst case 450 Watts Continuous Power Dissipation, the 900X series uses roughly half the 650 to over 1,000 Watts used by other vacuum tape transports.

You won't believe the quiet. Thanks to the Cipher 900X's multistage low speed vacuum pump, we use a much smaller motor. At 3400 rpms, our motor is substantially quieter than the competition's 10,000 rpm motors. A whisper instead of a high-pitched whine. And we've reduced more than noise. We've also knocked out 50% of the maintenance requirements found in traditional vacuum tape drives by eliminating belt drives.

No relays. Because the Cipher 900X incorporates opto-isolators to drive the blower motor and switch the high voltage AC components at the zero crossing line, transient generated line RFI is minimized. Power usage is drastically reduced. So is maintenance.

No incandescents. Light Emitting Diodes are used in place of incandescents in the 900X. With the field-proven reliability of solid state electronics, the unpredictable behavior of incandescents is eliminated.

Improved tape path. Only the long life sapphire cleaner and the chrome head (guaranteed for 5,000 working hours) come in contact with the tape. Air entering the tape path is filtered and the tape path itself is under a low positive pressure to prevent accidental ingestion of particular contaminants. No guesswork loading, since servos and transducers under control of the microprocessor automatically feed the column during load and unload. Servo controlled shutdown power fails protect the tape since, in the event of a brown out or failure, energy stored in the servos is utilized to effect a controlled power down.



Easiest to maintain and repair. Our exclusive Optical Sensing File Protect replaces troublesome switches, solenoids and trouble-prone mechanisms. And because the Cipher 900X has internally generated sequences of diagnostic and alignment tests, the MTTR is cut a good 30% by immediately locating the problem area. All mechanical and electronic assemblies in the 900X are modular. No special tools or fixtures are required; all critical tolerances are machined in.

The only thing missing are the problems: No belts, no hoses, no relays, no solenoids, no incandescents, no cooling fans, no power surges, no contaminants, no noise problems, no maintenance problems, no special tools or fixtures, no false EOT/BOT detection, no tape problems—no load snap, no whip, no shredding, no special precautions, no guesswork, and best of all—no price premium. None.

With design simplicity and the use of advanced solid state electronic components, the Cipher 900X series provides unparalleled performance, reliability and serviceability. At low cost. And quietly, too.

For further information and specifications, contact Cipher Data Products, 5630 Kearny Mesa Road, San Diego, California 92111. Headquarters: (714) 279-6550. TWX: 910-335-1251. Eastern Region: (617) 449-3182. Central Region: (312) 296-7250. Or contact your Cipher representative.

Cipher Data Products

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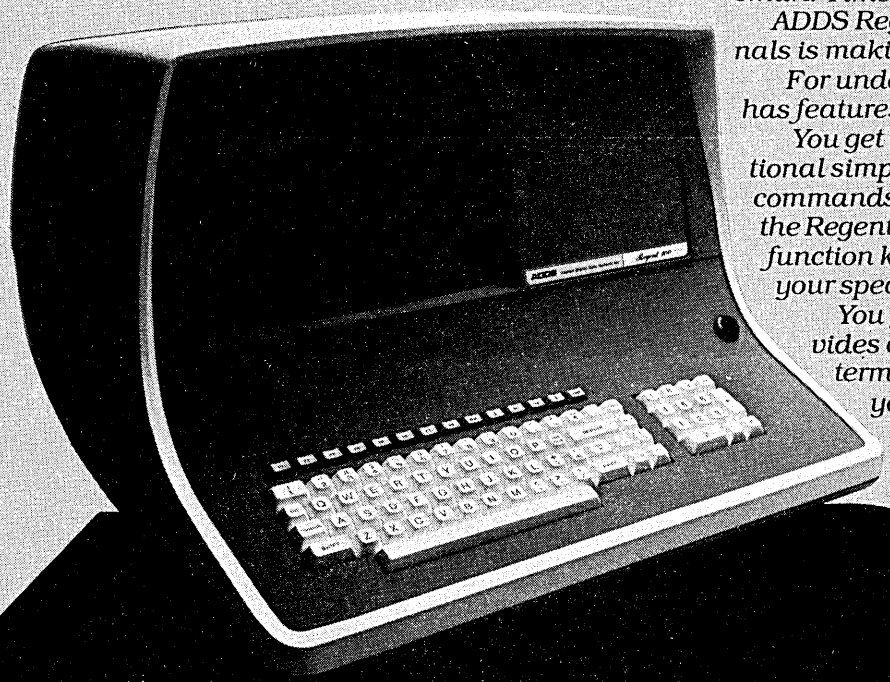
ADDS *Regent* · Smart for the price of Dumb.



Time was, if a man bought a Dumb terminal, he was considered pretty smart. Times change.

ADDS Regent family of Smart terminals is making Dumb look dumb.

For under $1000 our Regent 100 has features no smart man can resist.*

You get cursor controls for operational simplicity and extensive remote commands that make it easy to control the Regent from the computer. Optional function keys customize Regent to your specific application.

You get a Status Line that provides current information on the terminal's operating status. And you get visual highlights such as blinking, zero intensity, half intensity, underline and reverse video.

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In other words, you get Smart. Or Smarter: Our Regent 200 has everything our 100 has plus buffered transmission, auxiliary port and editing options.

You can't get a whole lot more.

Get Smart. Get ADDS.

Quality, Reliability and Integrity. It all adds up to ADDS.

*In moderate OEM quantity.

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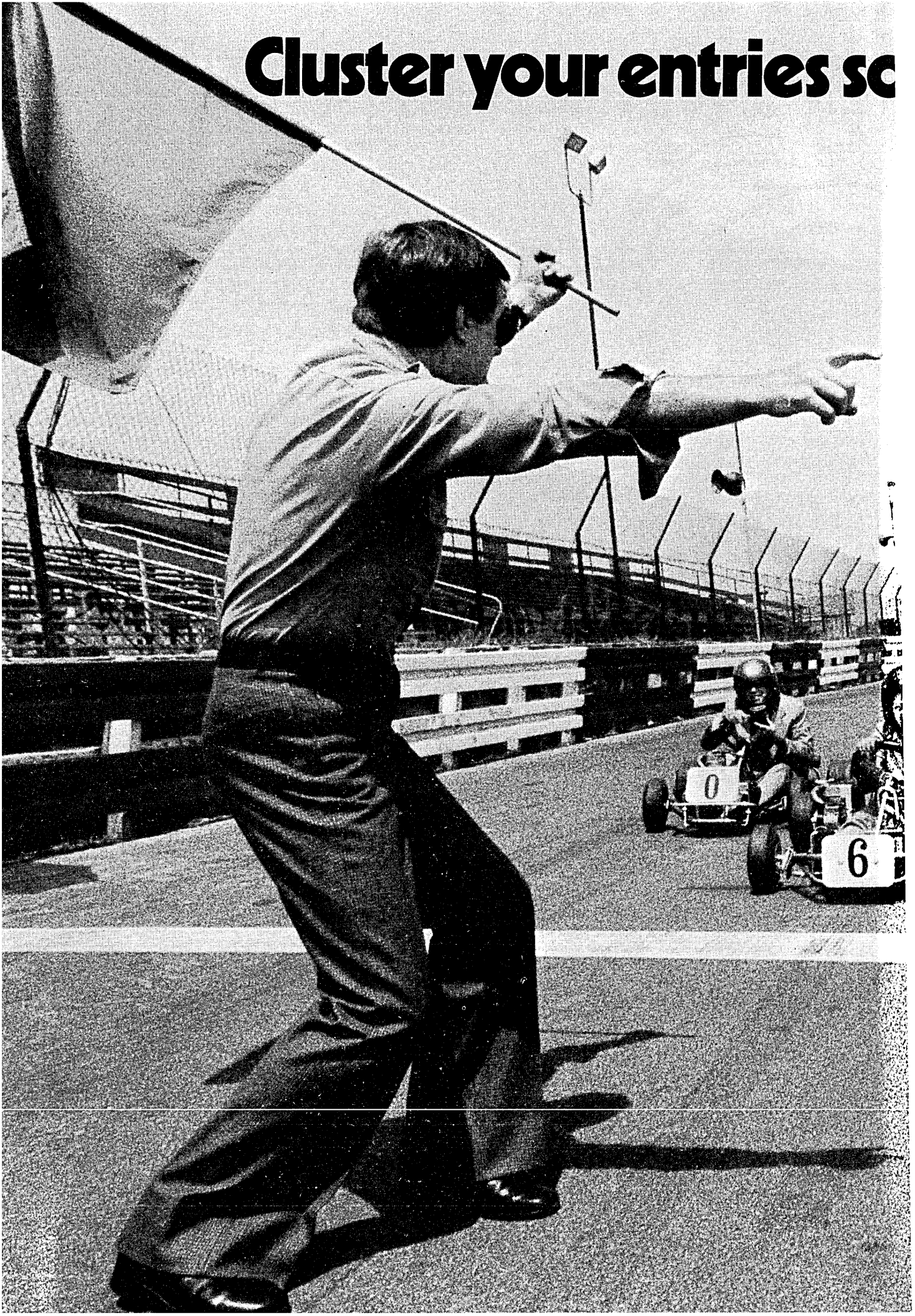

everybody wins. Mainly you.

You run a wholesale business. Two locations, 3000 customers and growing. But rather than hire more order clerks, you put a computer in your main office. Trouble is, feeding it orders keeps your clerks queued up, your direct line tied up, and your computer idling while your slowest operator taps out 30 words a minute.

We have a solution: A system that features our newest Dataspeed® 40 terminals clustered on a common controller in each of your two locations. Information is entered on a simple keyboard, with your own display forms to guide the operator, then held until all corrections are made and your computer is ready to receive it. Saves time. Avoids billing and shipping errors. Helps reduce inventory. Improves your cash flow.

Solving problems in data communications is an all-out commitment of the Bell System. If you haven't talked systems with your local Bell Account Representative lately, you're missing something.

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PAGE 229

The W1625 microprocessor terminal by Westinghouse can be customized to your specifications. And it can be reprogrammed at any time to meet your changing needs. Easily and economically.

So, you supply the specifications. We'll supply the terminals.

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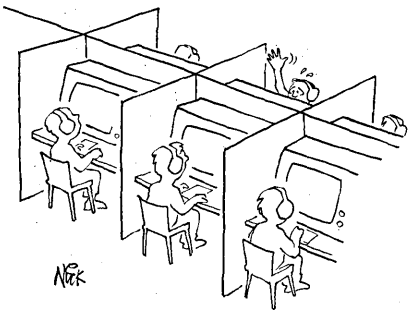
Second Compilations 3:1-12



AND it came to pass in the time of the mid-'50s that there arose out of the land of Harvard a behaviorist, Skinner. And Skinner was a believer in reinforcement, and he begat Programmed Instruction of the type called linear—that is, without branching.

THERE were those in the land who dealt idly with machines which taught. They seized Programmed Instruction and put it to work for their own purposes.

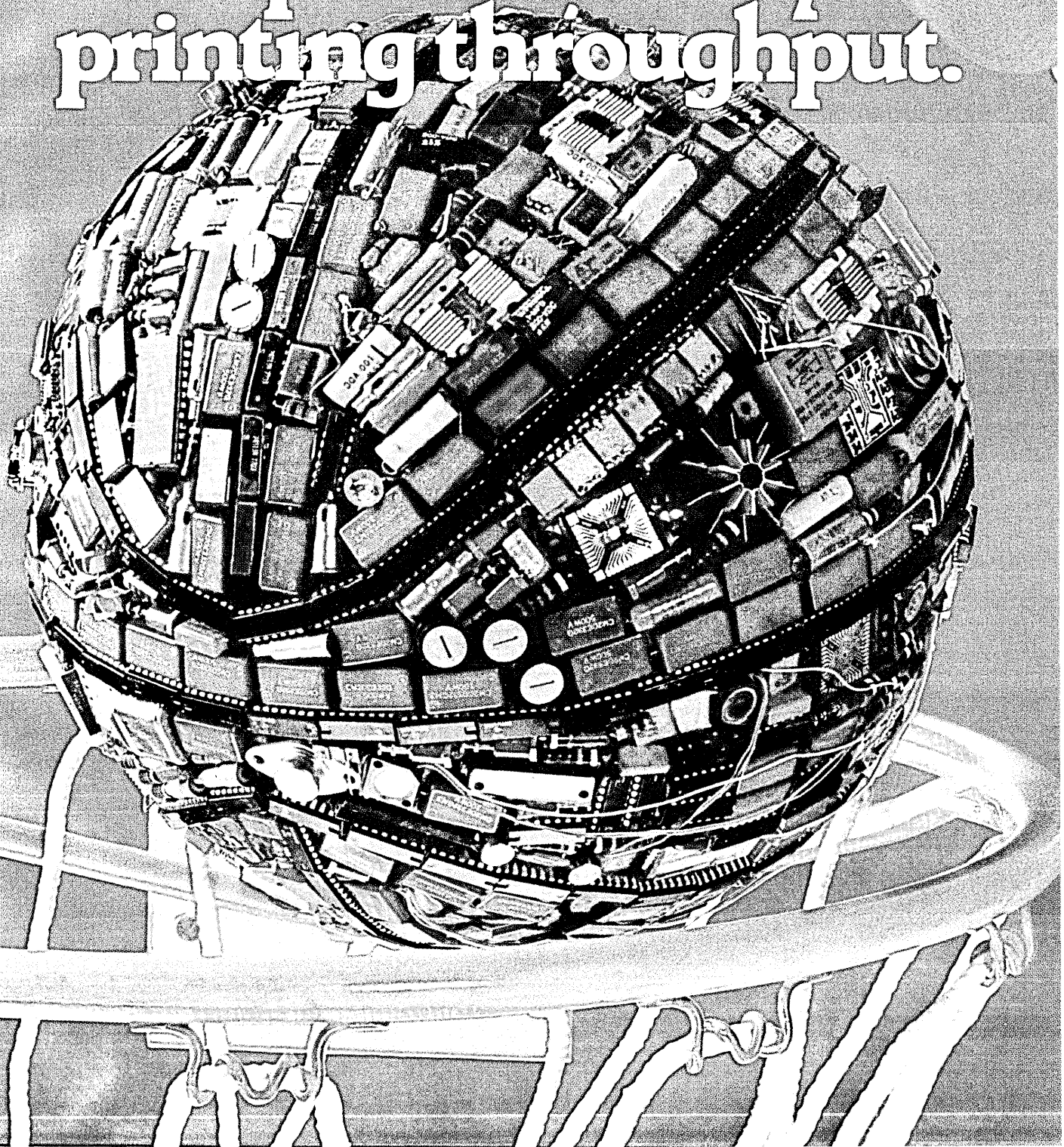
THERE also arose the followers of Crowder, who looked with favor upon Programmed Instruction of the impure type, that type given unto branching within itself.

AND the Skinnerians and the Crowderians were in constant battle one unto the other. Then came the Computerists who took the teachings of Crowder and embellished them with counters, buffers, and registers; with crt's, audio response units, and pens of light; and they called it CAI.

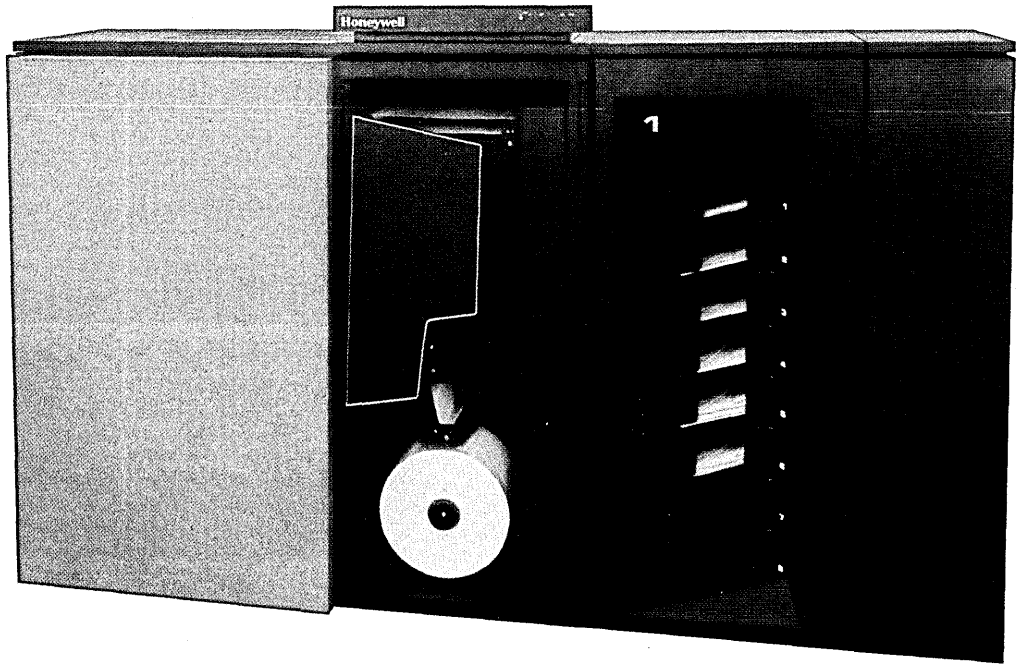
AND the teachers rose up and cried, "Save us, lest our children be depersonalized, and we be banished to the land of the unemployed." But IBM looked upon CAI and saw that it was good and just, and IBM blessed it so that it would prosper always and be unbelievably expensive.

—Michael H. Roe

How Honeywell can help you score a few points with your printing throughput.



The Honeywell Page Printing System.



It can break open your computer printing bottleneck.

It can save money, increase throughput, improve quality, and deliver a better finished product to your end users.

If you're now straining the capacity of two or more impact printers, you have two options: You can add another impact printer, and maybe another. Or you can replace your impact printers with a Honeywell Page Printing System and gain the advantages of total performance:

Economy. At throughput rates as low as 400,000 pages a month, the Honeywell Page Printing System can be very cost-effective. It's already cutting hardware, personnel, and forms inventory costs for a wide range of computer users.

Throughput. While printing variable data at a speed of up to 600 pages per minute, the Page Printing System is also printing the forms and punching, perforating, collating, and stacking the pages. A single PPS system is producing as many as 4,000,000 pages a month for one of our users.

Reliability. Continuous high-speed performance is possible because the Page Printing System uses unique electrostatic technology. More electronic operations. Fewer mechanical ones.

Flexibility. Honeywell's Page Printing System offers an amazing variety of options. There are variable form sizes, a wide range of type fonts (with upper and lower case), hole punching, a choice of colors, selective blanking or suppression, and individual addressing or routing.

Quality. Each printed character is crisp, clean, and sharp. Every line is true and even. Multiple copies, regardless of how many, are all originals. No carbons, no smudging, no degradation.

Efficiency. The Page Printing System is designed to operate off-line at a constant speed. CPU loads are reduced and print speed is not subject to degradation due to higher CPU priorities.

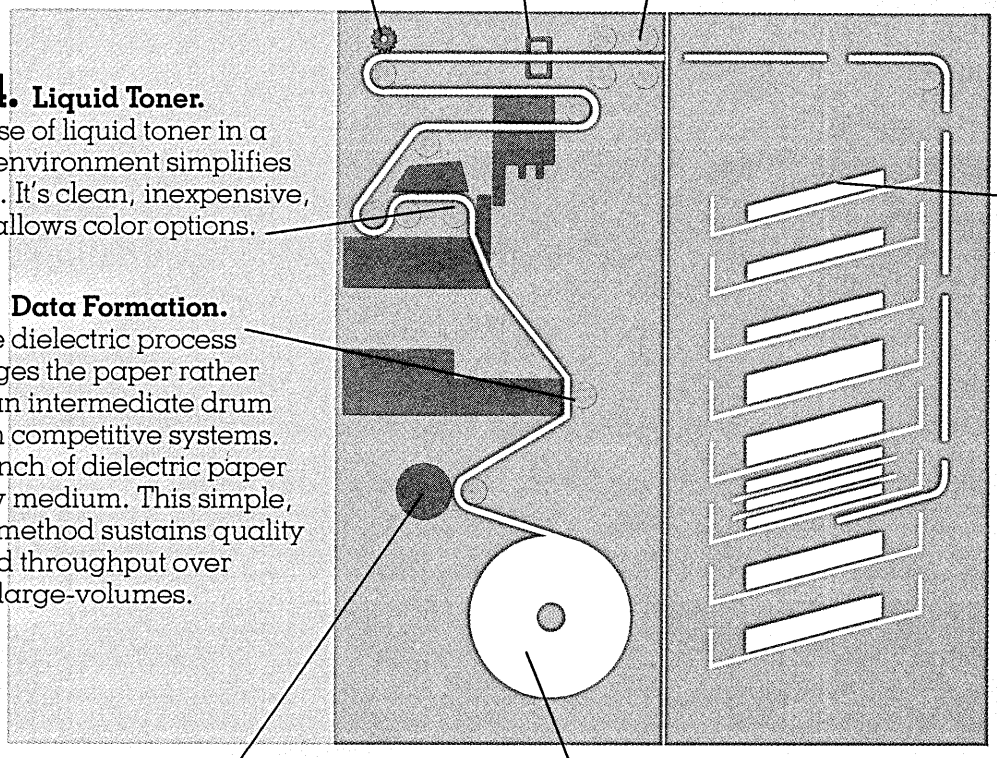
The inside story.

The use of roll-fed dielectric paper leads to a unique combination of features and benefits that insure game-winning performance.

6. Hole Punching.
Two or three holes, top or side.

7. Form Cutting.
Page widths are 8½" or 11" and can be cut to any length from 3" to 14".

5. Perforation.
Single vertical perforation optional. Operator adjustable.



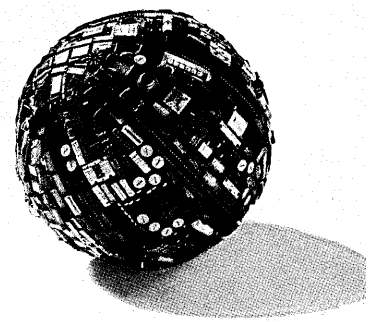
4. Liquid Toner.
The use of liquid toner in a sealed environment simplifies handling. It's clean, inexpensive, and allows color options.

3. Data Formation.
The dielectric process charges the paper rather than an intermediate drum as with competitive systems. Every inch of dielectric paper is a new medium. This simple, reliable method sustains quality and throughput over large-volumes.

8. Stacking/Collating.
Eight to 32 output pockets allow wide flexibility for automatic assemblies of completed outputs ready for delivery – and eliminate need for supplemental bursters and decollaters, and manual intervention.

2. Form Cylinder.
Fixed-data form copy is applied directly to the paper from a metal cylinder, eliminating the need for stock-piling pre-printed forms, insuring accurate registration, and maintaining consistently high print quality.

1. Roll-fed input.
The use of roll-fed paper simplifies the transport mechanism and allows reliable, high-speed printing-press-type operation.



A few of the ways Honeywell Page Printing System users are piling up points for their computer output operations.

A large motel and restaurant chain shortened a monthly report by 3,000 pages – simply by printing at 10 instead of eight lines per inch.

A major tire manufacturer produces their P & L closing reports for 3,000 locations eight days earlier.

A telephone company reduced their accounts receivable cycle by one day with improved operations and handling.

A major electrical manufacturer was able to deliver reports two to three days earlier – simply by eliminating after-print operations such as bursting, collating, and trimming.

A Midwest broker now responds regularly to an SEC deadline for daily logs – and avoids late-delivery fines.

A pharmaceutical company generates chemical structure diagrams to accompany FDA New Drug Applications, eliminating a time-consuming step.

Honeywell

Honeywell Information Systems, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

CIRCLE 75 ON READER CARD

User Ratings of Software Packages

by Herbert L. Gepner

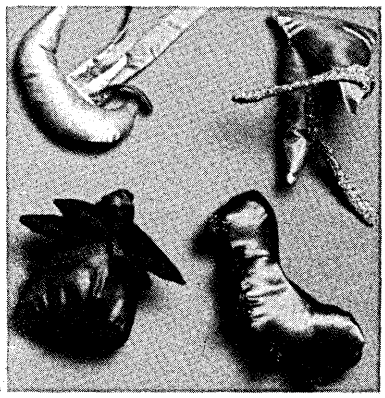
Here's how the users grade 199 popular software products.

Each year the number of software packages appearing on the market increases dramatically, as do expenditures for the acquisition of packaged software. Users will spend well over $300 million on the purchase of packaged software in 1977, exclusive of expenditures for outside custom programming, turnkey systems, or consulting, and it is estimated that this figure will exceed $1 billion by 1981.

There is an incredible variety of software packages competing for those dollars. Systems software addresses every facet of support from utilities to replacement operating systems. Applications software spans the spectrum of industrial, scientific, and academic endeavors. While some of them can be acquired for less than $100, at the other end of the spectrum there are complex and sophisticated data base/data communications systems that will cost hundreds of thousands of dollars by the time they are fully implemented.

Minicomputer software is generating more interest than ever. This class of software does not necessarily reflect lower purchase prices because of the smaller hardware on which it runs. In many cases the software for a minicomputer or microcomputer system costs the user more than the hardware itself. In the minicomputer market, the current emphasis is on applications software, and particularly on accounting application products designed to operate effectively in limited-storage environments.

Clearly, an ever-increasing number of data processing executives are acknowledging the potential savings and price/performance benefits that can be



achieved through the acquisition of "already tested and debugged" software. They are also looking for, and finding, system support software that will improve the performance of their existing computer installations.

In a joint effort to aid software buyers in identifying the products that are meeting the critical test of user satisfaction, DATAMATION and Datapro Research Corp. have just completed their third annual joint survey of software package users.

A questionnaire was mailed to nearly 30,000 computer installations last July. The form asked several general questions about the installation's software usage and budget, and then requested the user identify and rate any proprietary software packages which were in use in his shop or which had been thoroughly tested by him during the last 12 months. A total of 5,813 usable responses were received.

Detailed results of the survey described in this article are contained in "User Ratings of Proprietary Software," a DATAPRO 70 report available for $12 from Datapro Research Corp., 1805 Underwood Boulevard, Delran, New Jersey 08075; (609) 764-0100.

First, we asked the respondents whether they were using any proprietary software supplied by independent vendors and/or by their mainframe manufacturers. Among those who answered the questions, approximately 41% were using proprietary software from independent vendors and 58% were using separately priced software from their mainframe vendors.

About half of the responses contained budgetary information on the monies spent (or earmarked) for software packages in 1976, 1977, and 1978. The average amount spent by these 3,000-plus installations on packaged software in 1976 was $13,928. The projected spending averaged $16,224 in 1977 and $19,780 in 1978. Thus, the average expenditure grew by 16.5% from 1976 to 1977 and is expected to go up another 21.9% next year. These figures make it clear that the proprietary software industry is a healthy one whose products are finding steadily increasing user acceptance.

This year, for the first time, we asked the survey respondents what proportion of their programming was being done in each of the commonly used programming languages. The results are not likely to be surprising to anyone closely involved with the computer industry. They showed that 38% of all the programming in these installations was being done in COBOL, 20%

The Top-Rated Packages

Despite the higher number of responses needed to qualify for Honor Roll or Honorable Mention status this year, 32 packages were "elected" to the 1977 Software Honor Roll and 13 packages were named to the Honorable Mention list. Those figures represent modest reductions from last year's totals of 38 Honor Roll and 16 Honorable Mention packages, but the larger sample sizes required this year mean that prospective buyers can be even more confident that the honors packages are truly passing the critical test of widespread user satisfaction.

Special recognition should go to an even dozen software packages that satisfied the Honor Roll criteria for the third consecutive year: ALLTAX, ASAP, Disk Utility System, EPAT, Fast/Dump/Restore, 1130/FORTRAN, GRASP, LIBRARIAN, PANVALET, SYNCSORT, WESTI, and UCC 1 (TMS).

Nine more earned a place on the Honor Roll for the second consecutive year: CA-SORT, DYL-260, EASYTRIEVE, IDMS, LOOK, SAS, SLICK, Software 1040, and SPSS.

The top software vendors this year are Applied Data Research and IBM's General Systems Div., each with three packages on the Honor Roll. ADR scored with The LIBRARIAN, LOOK, and ROSCOE, while the IBM winners are three System/3 packages, CCP On-Line Screen Display, RPG II, and Sort. Four other software vendors each placed two packages on the 1977 Honor Roll: Pansophic Systems, SDI, University Computing Co., and Westinghouse. The 32 packages on this year's Honor Roll came from a total of 24 different vendors.

The 1977 Software Honor Roll includes five applications packages, two data base management systems, and two telecommunications monitors. The remainder are primarily straightforward packages of the system support or system function replacement type. Several of the perenially popular systems packages received impressively large user responses, too. PANVALET was rated by 139 users, The LIBRARIAN by 103, and GRASP, SYNCSORT, UCC 1, and WESTI by 60 or more users each.

The increasing impact of separately priced software for minicomputers and small business computers is illustrated by the fact that five of the Honor Roll packages and four of the Honorable Mention packages fall into this category. The three IBM software products for the System/3 are joined on the Honor Roll by 1130/FORTRAN from DNA Systems and Software 1040 from SAB, Inc. The latter is a tax calculation package that is designed primarily for the System/3 but can be used on larger IBM computers as well.

The minicomputer-oriented Honorable Mention packages are CYTOS and 1130/SORT from DNA Systems, the leading independent supplier of software for the IBM 1130, MCBA's Accounts Payable package for the DEC Datasystem 300 and 500 Series; and Informatics' XREF, a cross-reference listing extension to IBM's System/3 RPG II.

THE 1977 HONOR ROLL

Package	Vendor
ADABAS	Software AG of North America
ALLTAX**	Management Science America
ASAP**	Universal Software Inc.
CA-SORT*	Computer Associates, Inc.
CCP On-Line Screen Display (S/3)	IBM Corp. GSD
Comput-A-Charge	Value Computing Inc.
Disk Utility System**	Westinghouse Electric Co.
DYL-260*	Dylakor Software Systems, Inc.
EASYTRIEVE*	Pansophic Systems, Inc.
EDOS	The Computer Software Co.
EPAT**	SDI
Fast/Dump/Restore**	Innovation Data Processing, Inc.
FCS	University Computing Co.
F-LE-E/FLIM*	Goal Systems
1130/FORTRAN**	DNA Systems, Inc.
GRASP**	SDI
IDMS*	Cullinane Corp.
JASPER	Datachron Corp.
LIBRARIAN**	Applied Data Research Inc.
LOOK*	Applied Data Research Inc.
PANVALET**	Pansophic Systems, Inc.
QUIKJOB	Systems Support Software, Inc.
ROSCOE	Applied Data Research Inc.
RPG II (S/3)	IBM Corp. GSD
SAS*	SAS Institute, Inc.
SLICK*	NCI, Inc.
Software 1040*	SAB, Inc.
Sort (S/3)	IBM Corp. GSD
SPSS*	SPSS, Inc.
SYNCSORT**	Whitlow Computer Systems, Inc.
WESTI**	Westinghouse Electric Co.
UCC 1 (TMS)**	University Computing Co.

THE 1977 HONORABLE MENTION LIST

Package	Vendor
Accounts Payable	Mini-Computer Business Applications (MCBA)
CYTOS**	DNA Systems, Inc.
DOSSIER*	Computer Concepts, Inc.
FLEET/FMAINT**	SDI
MetaCOBOL	Applied Data Research, Inc.
Minicomm*	Informatics, Inc.
PAN*DA	Pansophic Systems, Inc.
Payroll System	Florida Software Services, Inc.
1130/Sort**	DNA Systems, Inc.
SPF (Structured Programming Facility)	IBM Corp. DPD
SPRINT	Jason Data Systems
Text/Editor	Burroughs Corp.
XREF	Informatics, Inc.

*Honor Roll package for the second consecutive year.
**Honor Roll package for the third consecutive year.

in RPG (including RPG II), 12% in FORTRAN, 12% in assembly languages, 7% in BASIC, 2% in PL/1, 1% in APL, and 8% in "other" languages.

The mechanics

The users were asked to identify and rate each software product that they had used or thoroughly tested within the past year. The form asked them to assign "excellent," "good," "fair," or "poor" ratings in each of seven categories: Overall Satisfaction, Throughput/Efficiency, Ease of Installation, Ease of Use, Documentation, Vendor's Technical Support, and Training (if applicable). Ratings of one or more software packages were supplied by more than 2,700 of the responding installations.

The collective user ratings for each package were then converted into a weighted average rating for each category. Each user rating of "excellent" was weighted as 4, "good" as 3, "fair" as 2, and "poor" as 1—just as in figuring college grade point averages. Then the weighted average was computed by dividing the sum of the products by the total number of user responses in each rating category.

When all the ratings had been tabulated, we found that 199 packages had been rated by five or more users each. The weighted average user ratings of these are tabulated on the following pages. With them, prospective software buyers can determine, with a considerable degree of confidence, the principal strengths and weaknesses of 199 popular software packages as judged by their users.

In addition to the 199 packages rated by five or more users and listed in this article, there were 1,024 more packages rated by fewer users. Thus, in all, more than 1,200 software packages were identified and rated in this year's survey.

As in previous years, the packages that received outstandingly high ratings from their users were accorded special recognition. To earn a place on the "1977 Software Honor Roll," a package had to be *rated by at least 10 users* and satisfy the following somewhat arbitrary but useful criteria: (1) a weighted average rating of at least 3.5 in Overall Satisfaction; and (2) a weighted average rating of at least 2.8 in every other rating category except Training (which was excluded because formal user training is neither offered nor required for many of the simpler packages).

"Honorable Mention" status was awarded to packages that met the Honor Roll rating criteria but were *rated by only five to nine users*, since the smaller sample sizes meant that we could not be quite as confident about the superiority of these products.

This represents a small but significant change in the criteria for admission to the Software Honor Roll and the Honorable Mention list. The required weighted average rating levels are unchanged, but the minimum number of user ratings required to make a package eligible for these kudos has been raised from six to ten for the Honor Roll and from three to five for Honorable Mention. In reviewing the growth rate of the industry and the number of user responses to these surveys, we decided that it would be appropriate to increase the required sample sizes and accordingly raise the level of confidence that the packages that satisfy the honors criteria truly represent the cream of the crop.

The results

As in 1976, we made an effort to determine whether user satisfaction with proprietary software in general is increasing or decreasing by comparing the overall weighted average user ratings earned by all the packages in this year's survey with the same figures from the previous surveys. The results appear in the item marked "Editor's Note."

As you can see, there has been *remarkably* little change in the consensus of user opinion during the three-year history of our annual software survey. As in previous years, users exhibit a fairly high level of Overall Satisfaction with the software products they are using but tend to be somewhat critical of the associated Documentation,

Editor's Note

A survey of the kind conducted by Datapro and DATAMATION is more like an opinion poll than like a statistically projectible research project. The results are often informative, usually valuable if correctly applied, and sometimes "wrong."

Perhaps the most amusing incident to illustrate the wrongness occurred at the time of the 1948 U.S. Presidential elections, when a poll showed that Thomas E. Dewey would win at the ballot box. Confident of the accuracy of the poll, a prominent newspaper printed its morning-after edition with a headline proclaiming the Dewey win. Harry S. Truman, who remained in office, had great fun with his copy of that paper.

In the case of the software survey, the chances of compiling misleading ratings come from two sources, the sample size and the subjective nature of the questions. During the years we've run the survey, we've been concerned about these problems and each year we have attempted to evaluate the validity of the results. What we have found has been encouraging.

First, although the questions we ask are subjective, there are indications that respondents use similar scales in answering them. One indication is that the cumulative average of all ratings for all software listed does not much change from year to year. Here is how the average ratings for this year compare:

	1975	1976	1977
Overall satisfaction	3.3	3.3	3.3
Throughput/efficiency	3.1	3.1	3.1
Ease of installation	3.1	3.1	3.1
Ease of use	3.2	3.2	3.2
Documentation	3.0	2.9	2.9
Vendor technical support	2.9	2.9	2.9
Training	2.8	2.8	2.8

As you can see, there has been remarkably little change in the consensus of user opinion—a change of 0.1 in *one* category over three years! And this consistency remains though different people at different installations may be supplying ratings each year.

The consistency of the results reported for individual packages tells us something too. For example, we've checked the ratings for "Overall Satisfaction" for each package appearing on the Honor Roll against the satisfaction ratings given for each of them last year where we had the data (all but one case). Fully two-thirds of the ratings either did not change, or changed by only one-tenth of a point.

On the other hand, the rating for one Honor Roll package changed a full 0.7; and that brings up the problem of sample sizes because that disparity occurred in a case where last year's response for that program reflected only four user opinions.

Similarly, the ratings for packages on the Honorable Mention list do not show the same high degree of consistency as those for Honor Roll products. By definition, the Honorable Mention list represents packages rated by fewer persons. (And strangely, the greatest disparity there is also a difference of 0.7 in the "Overall Satisfaction" ratings for 1976 and 1977.)

Yes, without a doubt, when more persons rate a single package, the ratings are more likely to reflect what the next purchaser will find the package to be like. But within certain broad limits, all the data—even that compiled from relatively few opinions—is useful as a starting point in screening and evaluating proprietary software packages. And that's what the whole project is about. ❁

USER RATINGS

Technical Support, and Training.

An important factor to consider when shopping for a software package is whether the product must be modified to satisfy your specific requirements. We asked the software users to indicate whether each package they rated required modifications by the vendor and/or by them. The following table shows the results for all 199 packages, for the 113 of those that we classified as systems software, and for the 86 packages classified as applications software. As in previous years, applications packages were far more likely to require modifications than systems packages.

	All 199	Systems	Applications
No Modifications required	59%	74%	26%
Modifications made by vendor	20%	18%	23%
Modifications made by user	24%	10%	51%

Note: Totals may exceed 100% because some packages were modified by both vendor and user.

The survey respondents were asked: "What packages or types of packages do you plan to evaluate during the next 12 months?" The answers naturally spanned the full spectrum of proprietary software, but it was clear that four classes of software are uppermost in the minds of prospective users these days: data base management systems, telecommunications monitors, file (or data) management systems, and standard accounting/payroll/personnel applications packages.

Some specifics

To assist you in shopping for the first three of these four types of packages, we've compiled tables that compare the weighted average user ratings of all the data base management products, telecommunications monitors, and file management systems rated. The number and diversity of the accounting-type packages represented in the survey precluded this type of comparison for them; but if you're shopping for a particular class of software package, you can easily group the user ratings of all the relevant packages into a similar table that will facilitate direct comparisons.

Table 1 summarizes the survey results for the data base management systems. IDMS from Cullinane Corp. has achieved Honor Roll status for the second consecutive year, and has been joined by another popular one, ADABAS from Software AG of North America. The IBM offerings, IMS, DOS/VS DL/1, and DBOMP, were again the recipients of some of the lowest ratings received by any of the products on the list. TOTAL from Cincom Systems, a 1976 Honor Roll member, received the largest number of user ratings (91) but missed the 1977 Honor Roll by a mere two-tenths of a point in Overall Satisfaction.

IMAGE from Hewlett-Packard was another 1976 Honor Roll DBMS that missed out in 1977—oddly by the same two-tenths of a point in Overall Satisfaction. Datacom DB also came close, but that product's Documentation rating fell short of the required 2.8 mark, and its Overall Satisfaction rating was also the two-tenths of a point shy of the required 3.5 level. Documentation was a sore point for most of the DBMS products shown in the table;

How Users Rated the Popular Data Base Management Systems

Package & Vendor	Number of users reporting	Weighted Average User Ratings: Overall satisfaction	Throughput/ efficiency	Ease of installation	Ease of use	Documentation	Vendor technical support	Training
ADABAS, Software AG of North America	12	3.5	3.5	3.6	3.7	2.9	3.5	3.1
DATACOM/DB, Insyte Datacom Corp.	11	3.3	3.2	3.0	3.4	2.4	3.2	3.2
DBOMP, IBM Corp. DPD	33	3.1	2.9	2.4	2.8	2.4	2.6	2.3
DMS-II, Burroughs Corp.	21	3.1	3.3	3.3	3.6	2.4	2.5	2.7
DOS/VS DL/1, IBM Corp. DPD	23	2.7	2.4	2.5	2.6	2.5	2.9	2.6
IDMS, Cullinane Corp.	16	3.5	3.2	3.5	3.1	3.0	3.8	3.5
IMAGE, Hewlett-Packard Co.	24	3.3	3.2	3.6	3.5	3.1	3.1	3.1
IMS, IBM Corp. DPD	28	2.8	2.4	2.5	2.6	2.7	3.1	2.9
SYSTEM 2000, MRI Systems, Inc.	20	3.2	2.5	3.0	3.1	2.4	2.8	2.8
TOTAL, Cincom Systems, Inc.	91	3.3	3.0	3.2	3.2	2.8	2.9	2.9

Table 1.

How Users Rate the Popular Telecommunications Monitors

Package & Vendor	Number of users reporting	Weighted Average User Ratings: Overall satisfaction	Throughput/ efficiency	Ease of installation	Ease of use	Documentation	Vendor technical support	Training
CICS, IBM Corp. DPD	117	3.0	2.8	2.4	2.6	2.7	2.8	2.7
DATACOM/DC, Insyte Datacom Corp.	13	3.3	3.5	2.8	3.4	2.4	3.2	2.9
ENVIRON/1, Cincom Systems, Inc.	14	3.1	3.2	2.7	3.0	2.8	2.9	3.1
INTERCOMM, Informatics Inc.	6	3.0	2.8	2.2	2.5	2.3	2.3	2.3
MINICOMM, Informatics, Inc.	7	4.0	3.9	3.7	4.0	2.9	3.1	3.4
MTCS, IBM Corp. DPD	11	3.1	3.0	2.8	3.0	1.9	2.5	2.1
ROSCOE, Applied Data Research, Inc.	17	3.5	3.4	3.4	3.6	2.9	3.0	2.8
TASK/MASTER, Turnkey Systems, Inc.	16	2.9	2.8	2.5	2.9	2.4	2.9	2.5
WESTI, Westinghouse Electric Co.	26	3.8	3.4	3.5	3.7	3.3	3.1	2.9

Table 2.

How Users Rate the Popular File Management Systems

Package & Vendor	Number of users reporting	Weighted Average User Ratings: Overall satisfaction	Throughput/ efficiency	Ease of installation	Ease of use	Documentation	Vendor technical support	Training
ASI-ST, Applications Software, Inc.	8	3.0	3.1	3.1	3.3	2.8	2.6	2.7
CULPRIT, Cullinane Corp.	13	3.3	3.0	3.5	3.2	2.9	3.2	3.1
The Data Analyzer, Program Products, Inc.	7	3.1	2.7	2.7	2.7	2.8	2.8	2.8
DYL-260, Dylakor Software Systems, Inc.	59	3.7	3.3	3.7	3.5	3.0	3.0	3.0
EASYTRIEVE, Pansophic Systems, Inc.	62	3.7	3.4	3.7	3.5	3.2	3.1	2.8
EXTRACTO, Aquila-BST (1974) Ltd.	5	3.2	3.0	3.6	3.8	2.4	2.6	3.0
FORTE-II, Burroughs Corp.	21	2.8	2.6	2.8	2.5	2.7	2.3	2.4
MARK IV, Informatics, Inc.	47	3.3	2.7	3.4	3.3	2.9	2.9	2.9
QUIKJOB II/III, System Support Software	29	3.6	3.5	3.7	3.6	3.2	3.2	3.0
RAMIS, Mathematica Products Group, Inc.	9	3.0	2.8	3.1	3.3	3.0	3.1	2.8
SCORE, Informatics, Inc.	5	2.6	2.8	3.0	3.0	2.4	2.2	2.6

Table 3.

only two of the 10 systems received a rating of 3.0 or better in this category.

Turning your attention to Table 2 on telecommunications, you'll notice a perennial winner, WESTI from Westinghouse, enjoying its third consecutive year on the Software Honor Roll. This year it is joined by another old-timer (but new to the Honor Roll), ROSCOE from Applied Data Research. Both of these products have been around for a long time, each serving a different user base and obviously doing a good job of it.

Minicomm, a 1976 Honor Roll product from Informatics, missed this year's Honor Roll because fewer than 10 respondents submitted ratings on the product, but those who did certainly rated it highly. Minicom received a perfect 4.0 weighted average in both Overall Satisfaction and Ease of Use, and earned higher weighted averages than any of the other telecommunications monitors in every rating category except Documentation and Vendor Support. Minicomm richly deserves its place on this year's list of Honorable Mention packages.

IBM's CICS again received the largest number of responses of any telecommunications monitor in the survey—117. The closest competitor was WESTI with 26. CICS fell far short of meeting the requirements for the Honor Roll and suffered most in the areas of Ease of Installation and Ease of Use. On the other hand, the ratings received by CICS either equaled or bettered the ones it achieved in 1976 in all categories. Datacom/DC, like its sister package Datacom/DB, satisfied most of the Honor Roll criteria but fell short in Overall Satisfaction and Documentation. None of the other monitors came close to meeting the honors criteria.

Table 3 lists the 11 file (or data) management packages that were rated. Three of these achieved Honor Roll status. Of the three, EASYTRIEVE from Pansophic received the largest number of responses with 62, followed by DYL-260 from Dylakor with 59, and QUIKJOB II/III from System Support Software with 29. Here again there is a product that fell short by just two-tenths of a point in Overall Satisfaction status—CULPRIT from Cullinane.

We really don't know why that two-tenths keeps showing up. But noticing that these "near misses" seemed to be more prevalent than usual in this year's survey, we looked to see how many of the 199 listed software packages came within that scant amount in a single category of attaining either Honor Roll or Honorable Mention status. The number was 22, which represents 11% of the total list. This is further evidence that software buyers have a large number of demonstrably high-quality packages to choose from.

On the following pages, you'll find the weighted average user ratings and brief descriptions of the 199 packages that were rated by five or more users. We believe you'll find it helpful to know how these users assessed the strengths and weaknesses of each package, but of course the critical question is how well a package can satisfy your own particular requirements.

This article contains three types of information to assist you in answering that question. First, the ratings should aid you in pinpointing packages that are widely used and highly regarded by their users. Second, the Reader Service number listed for each package will bring you more information from its vendor. Third, the Vendor Index that follows the package listings will make it easy for you to go directly to the source and get the facts you need. We hope this information will aid you in getting maximum value for your software dollars. ❋

Mr. Gepner is software editor of DATAPRO 70 and managing editor of Datapro Directory of Software at Datapro Research Corp., Delran, New Jersey. He was previously manager of real-memory software support for the Marketing Div. of RCA Computer Systems, and he worked in the IBM Software Product Testing Lab in Poughkeepsie, New York.

Users' Ratings of Software Packages

The list that follows summarizes the survey results on 199 proprietary software packages rated by three or more users. The rating in each category is expressed in terms of the Weighted Average calculated on a scale of 4 for "excellent," 3 for "good," 2 for "fair," and 1 for "poor."

Honor Roll and Honorable Mention packages are highlighted in color.

Accounting IV
Informatics, Inc.
Multicompany accounts payable system for use on IBM *360/370, Honeywell, Univac, and Burroughs computers.*

Users reporting	11
Overall satisfaction	3.1
Throughput/efficiency	2.6
Ease of installation	2.3
Ease of use	2.6
Documentation	2.8
Vendor technical support	2.5
Training	2.6

Price: $26,500 (General Ledger)—$32,500 (with data base interface).
CIRCLE 300 ON READER CARD

Accounts Payable
Honeywell Information Systems, Inc.
Accounts payable system for Honeywell Series 60, 600, and Level 66 computers.

Users reporting	7
Overall satisfaction	2.7
Throughput/efficiency	2.7
Ease of installation	2.5
Ease of use	2.5
Documentation	2.3
Vendor technical support	3.0
Training	2.0

Price: $2,599.
CIRCLE 301 ON READER CARD

Accounts Payable (S/3)
IBM Corp. GSD
Standard accounts payable system for IBM *System/3.*

Users reporting	29
Overall satisfaction	2.8
Throughput/efficiency	2.9
Ease of installation	2.7
Ease of use	3.1
Documentation	3.0
Vendor technical support	2.8
Training	2.9

Price: $93—$153/month for 12 months.
CIRCLE 302 ON READER CARD

Accounts Payable
Infonational
Multidivision, multicompany accounts payable system; for use on IBM *360/370 and most other comparable computers.*

Users reporting	8
Overall satisfaction	3.1
Throughput/efficiency	2.8
Ease of installation	3.3
Ease of use	3.5
Documentation	3.1
Vendor technical support	2.6
Training	2.9

Price: $15,000 license fee, plus $1,400/year maintenance.
CIRCLE 303 ON READER CARD

Accounts Payable
McCormack & Dodge Corp.
For use in most business-oriented establishments; runs on IBM *360/370, Honeywell, and Burroughs systems.*

Users reporting	9
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.7
Ease of use	2.9
Documentation	3.0
Vendor technical support	2.6
Training	2.6

Price: $18,000. One year free maintenance; thereafter, $750/year.
CIRCLE 304 ON READER CARD

Accounts Payable
Mini-Computer Business Applications, Inc. (MCBA)
For DEC *minicomputer series.*

PRONTO. The biggest booster

Nice system, your 3270's and 370.

But PRONTO, the Sperry Univac distributed data processing system, boosts its cost efficiency by taking care of all your remote computer needs. And freeing your 370 host to do the work it does best.

PRONTO is a software package that runs on a V77 minicomputer, equipped with peripherals such as line printers, video terminals, and disks.

PRONTO boosts the computer power at your remote branches by migrating computer services to meet their individual needs. Without changing host hardware and software.

When you add PRONTO to your current 3270 network, you suddenly find yourself able to concurrently perform local tasks you never could before.

Local and remote on-line processing. Local and remote batch processing. You can create new remote data bases. Not just for

your 3270 network ever had.

simplistic tasks, but for complex data base management services.

PRONTO speaks your mainframe's language. Whether it be COBOL or FORTRAN. And the system can even accommodate RPG-II.

1000 host computers already use TOTAL,® our data base management system.

With PRONTO, you won't use as much costly mainframe time or as many dedicated communications lines.

You get all this. Plus all the service and support of Sperry Univac around the world.

And it's those things that will turn a lot of 3270/370 users into Sperry Univac boosters.

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

SPERRY UNIVAC

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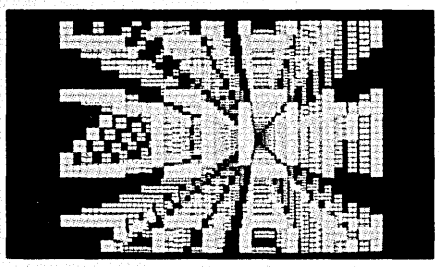
CIRCLE 33 ON READER CARD

Most graphics terminals are too dumb for words.

Even expensive models get tongue-tied when it comes to alphanumerics. But now there's a bright new graphics terminal that has a lot to say for itself.

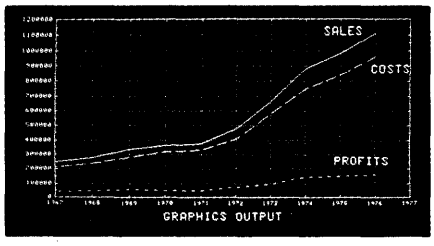
Alpha-graphics: the perfect combination.

It's the Hewlett-Packard 2648A alpha-graphics terminal. For just $5500* it will dazzle you with a



virtuoso display. You'll see zoom and pan, area shading, pattern definition, rubber band line, scientific plotting and graphics text composition. Having independent memories for graphics and alphanumerics, you can do auto-plots with or without words and figures on the screen.

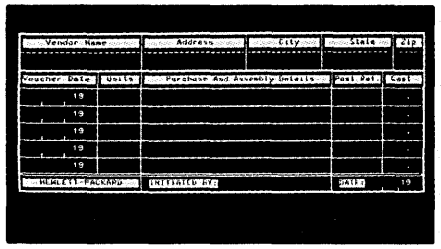
And when you need a smart alphanumeric terminal for on or off-line work, stay right where you are.



How smart is smart?

Ever seen a graphics terminal scroll 200 lines of interactive dialogue? And store up to 220K bytes of data (words and pictures) on twin cartridges? And cut out repetitive routines by storing up to 80 characters on each of eight "soft keys"?

The HP 2648A can also edit with the best of them. Communicate with a computer at rates up to 9600 baud. And accept a plug-in forms drawing mode to generate just about any form your company uses.

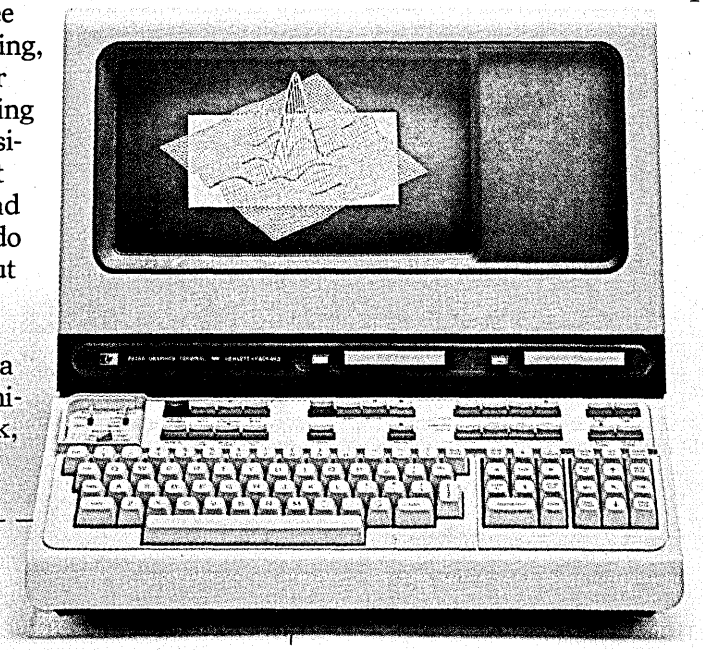


Strong as well as intelligent.

Like all our terminals, the HP 2648A has a clean, tough, modular design. Open it up like a suitcase, and you'll see the neat row of plug-in PC boards.

That makes it easy to add options or take care of maintenance. Not that downtime is a problem. Our terminals have such a good track record that we've lowered our maintenance price three times in the past two years. When you do need service, more than 1000 Systems and Customer Engineers worldwide are ready to take care of you.

So why settle for any dumb graphics terminal when ours can figure in your picture? See for yourself by calling the Hewlett-Packard office listed in the White Pages. Or send us the coupon and give our 2648A alpha-graphics terminal a screen test.



Yes, give me the good words (and pictures) on the HP 2648A terminal.

☐ I'd like a demonstration. ☐ Send me information.

Name Title

Company

Address

City/State/Zip

Phone

Mail to: Ed Hayes, Marketing Manager, Hewlett-Packard Data Terminals Division, 19400 Homestead Road, Dept. 414, Cupertino CA 95014.

*U.S. domestic price

HEWLETT hp PACKARD

42801HPT5

CIRCLE 82 ON READER CARD

Users reporting	5
Overall satisfaction	4.0
Throughput/efficiency	3.6
Ease of installation	3.6
Ease of use	3.2
Documentation	3.2
Vendor technical support	3.3
Training	4.0

Price: $2,000-$4,000, depending on language. Includes maintenance.
CIRCLE 305 ON READER CARD

Accounts Payable
NCR Corp.
Generalized A/P *package for Century and Criterion systems.*

Users reporting	16
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	2.5
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.4
Training	2.4

Price: $250 initial license fee plus $10/month.
CIRCLE 306 ON READER CARD

Accounts Payable
Software International Corp.
Data base-oriented systems for any IBM *360/370 with 64K and two discs.*

Users reporting	8
Overall satisfaction	2.4
Throughput/efficiency	2.1
Ease of installation	2.6
Ease of use	2.6
Documentation	2.3
Vendor technical support	2.8
Training	2.3

*Price: $12,500 (*DOS*)—$15,000 (*OS*). Maintenance is 10% of sales price after first year.*
CIRCLE 307 ON READER CARD

Accounts Receivable (S/3)
IBM Corp. GSD
Generalized system for use on System/3.

Users reporting	13
Overall satisfaction	2.5
Throughput/efficiency	2.8
Ease of installation	2.2
Ease of use	2.7
Documentation	2.7
Vendor technical support	2.9
Training	2.7

Price: $98/month for 12 months.
CIRCLE 308 ON READER CARD

Accounts Receivable
Management Science America (MSA)
In ANSI COBOL *for use on various mainframes.*

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.8
Ease of use	2.8
Documentation	1.6
Vendor technical support	2.6
Training	2.8

Price: $35,000-$50,000. Includes first year maintenance.
CIRCLE 309 ON READER CARD

Accounts Receivable
NCR Corp.
Generalized system for Century and Criterion series.

Users reporting	11
Overall satisfaction	2.9
Throughput/efficiency	2.6
Ease of installation	2.5
Ease of use	2.8
Documentation	2.3
Vendor technical support	1.8
Training	2.0

Price: $250 initial license fee plus $10/month.
CIRCLE 310 ON READER CARD

Accounts Receivable
Software International Corp.
In ANSI COBOL *for* IBM *360/370.*

Users reporting	8
Overall satisfaction	2.5
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	2.6
Documentation	2.5
Vendor technical support	2.9
Training	2.6

*Price: $23,500 (*DOS*)—$25,500 (*OS*). First year maintenance included; thereafter, 10% of license fee.*
CIRCLE 311 ON READER CARD

Account Reconciliation (ARP)
Disc, Inc.
A check reconciliation system for banks, insurance companies, and large corporate finance departments; runs on IBM *360/370 and Burroughs B 3500 and up.*

Users reporting	5
Overall satisfaction	2.8
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	3.4
Documentation	3.0
Vendor technical support	2.8
Training	2.7

Price: approximately $8,500-$14,000, plus mods if necessary. Six months maintenance included; thereafter, approximately $1,200/year.
CIRCLE 312 ON READER CARD

ADABAS
Software A. G. of North America
Data base management system for IBM *360/370 (any operating system), Univac 9000 (*DOS*), and Siemens.*

Users reporting	12
Overall satisfaction	3.5
Throughput/efficiency	3.5
Ease of installation	3.6
Ease of use	3.7
Documentation	2.9
Vendor technical support	3.5
Training	3.1

Price: $132,000. First year maintenance included; thereafter, $6,600/year. DOS *version: $88,000.*
CIRCLE 313 ON READER CARD

ADAS
Universal Software, Inc.
Disc space allocation system for IBM *360/370* DOS *and* DOS/VS *systems.*

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	3.2
Ease of installation	3.4
Ease of use	3.2
Documentation	2.6
Vendor technical support	3.4
Training	2.0

Price: $4,550 perpetual license. Includes first year maintenance; $280/year thereafter.
CIRCLE 314 ON READER CARD

ADPAC-II
Adpac Corp.
Business-oriented higher-level language and compiler with a report program generator feature.

Users reporting	7
Overall satisfaction	3.0
Throughput/efficiency	3.4
Ease of installation	3.3
Ease of use	3.4
Documentation	2.9
Vendor technical support	2.7
Training	2.6

Price: $20,000-$31,000 three year license, fourth year renewal: $3,250-$4,500 (no purchase). Includes training and maintenance.
CIRCLE 315 ON READER CARD

ALLTAX
Management Science America (MSA)
COBOL *subroutine for performing tax calculations.*

Users reporting	28
Overall satisfaction	3.7
Throughput/efficiency	3.5
Ease of installation	3.4
Ease of use	3.5
Documentation	3.6
Vendor technical support	3.4
Training	3.5

Price: $975-$2,850, plus $225-$650/year maintenance.
CIRCLE 316 ON READER CARD

ASAP
Universal Software, Inc.
Spooling supplement for IBM *360/370* DOS *or* DOS/VS.

Users reporting	20
Overall satisfaction	3.5
Throughput/efficiency	3.7
Ease of installation	3.6
Ease of use	3.8
Documentation	2.8
Vendor technical support	3.0
Training	3.2

Price: $3,600 and up. Includes first year maintenance; $250/year thereafter.
CIRCLE 317 ON READER CARD

ASI-ST
Applications Software, Inc.
High-level user language for updating, retrieval, and report generation; interfaces with IMS *or* TOTAL DBMS.

Users reporting	8
Overall satisfaction	3.0
Throughput/efficiency	3.1
Ease of installation	3.1
Ease of use	3.3
Documentation	2.8
Vendor technical support	2.6
Training	2.7

Price: $14,000-$34,000, depending on options.
CIRCLE 318 ON READER CARD

AUTOFLOW-II
Applied Data Research, Inc.
A system and program development tool for documenting whole systems and individual source programs.

Users reporting	14
Overall satisfaction	3.1
Throughput/efficiency	2.9
Ease of installation	3.3
Ease of use	3.2
Documentation	2.9
Vendor technical support	2.8
Training	2.8

Price: depends on language. In COBOL, *$6,750 (*DOS*)—$7,150 (*OS*).*
CIRCLE 319 ON READER CARD

BASIC
Digital Equipment Corp. (DEC)
Various versions to complement DEC *operating systems.*

Users reporting	8
Overall satisfaction	2.8
Throughput/efficiency	2.0
Ease of installation	3.0
Ease of use	3.0
Documentation	2.1
Vendor Technical support	2.0
Training	3.0

Price: $440, including maintenance.
CIRCLE 320 ON READER CARD

BASIC (360/370)
IBM Corp. DPD
For time-sharing use under ITF *or* TSO.

Users reporting	7
Overall satisfaction	3.1
Throughput/efficiency	2.7
Ease of installation	3.3
Ease of use	3.6
Documentation	3.3
Vendor technical support	2.7
Training	3.5

*Price: $385/month (*VS*).*
CIRCLE 321 ON READER CARD

BHAS II
Burroughs Corp.
Burroughs' hospital accounting system.

Users reporting	11
Overall satisfaction	2.5
Throughput/efficiency	2.3
Ease of installation	2.0
Ease of use	2.5
Documentation	1.6
Vendor technical support	2.5
Training	1.7

Price: $4,400-$15,400, plus $220-$970/year maintenance.
CIRCLE 322 ON READER CARD

BioMed (or BMD)
Univ. of Calif. at Los Angeles (UCLA)
Statistical computing for medi-

cal and other applications.

Users reporting	9
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	2.6
Ease of use	3.0
Documentation	3.4
Vendor technical support	2.4
Training	2.0

Newest release including several new features tentatively priced at $500/year for degree-granting institutions, $1,000/year for government agencies, $1,500/year for others.

CIRCLE 323 ON READER CARD

BIT-FACS
American Valuation Consultants, Inc.

Total fixed assets management system with report generation capabilities; operates in OS, DOS, *or* VS *environments.*

Users reporting	11
Overall satisfaction	3.0
Throughput/efficiency	2.9
Ease of installation	2.6
Ease of use	2.5
Documentation	2.5
Vendor technical support	2.9
Training	2.4

*Price: $15,000 (*DOS*)—$18,000 (*OS*), plus $1,500/year maintenance.*

CIRCLE 324 ON READER CARD

BOMP
IBM Corp. GSD

Bill of material processing system for System/3.

Users reporting	49
Overall satisfaction	3.1
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	2.9
Documentation	2.6
Vendor technical support	2.6
Training	2.4

Price: $59—$71/ month (card).

CIRCLE 325 ON READER CARD

Business Control Programs
Systems Management Inc.

A series of modular financial control programs — inventory, order entry, billing, etc. designed to run on the Microdata Reality minicomputers.

Users reporting	9
Overall satisfaction	3.3
Throughput/efficiency	2.7
Ease of installation	3.3
Ease of use	3.3
Documentation	2.4
Vendor technical support	2.9
Training	2.5

Price: $1,500 per module for object code.

CIRCLE 326 ON READER CARD

CARS-3
Computer Audit Systems

Data extraction program generator; generates COBOL *source programs and runs on any system with full* ANSI COBOL *compiler.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	2.8
Ease of installation	3.2
Ease of use	3.2
Documentation	3.2
Vendor technical support	3.4
Training	3.2

Price: $12,000-$15,000 one year license fee. Annual renewal: $2,000. Maintenance and new releases: $2,000/year.

CIRCLE 327 ON READER CARD

CCP On-Line Screen Design Facility
IBM Corp. GSD

CCP *3270 screen development and documentation aid for use on* IBM *System/3 computers.*

Users reporting	15
Overall satisfaction	3.7
Throughput/efficiency	3.6
Ease of installation	3.5
Ease of use	3.7
Documentation	3.5
Vendor technical support	3.6
Training	3.6

Price: $350 one-time charge.

CIRCLE 328 ON READER CARD

CA-SORT
Computer Associates, Inc.

Replacement sort/merge utility for IBM *360/370.*

Users reporting	38
Overall satisfaction	3.8
Throughput/efficiency	3.8
Ease of installation	3.7
Ease of use	3.8
Documentation	3.6
Vendor technical support	3.2
Training	3.4

*Price: $5,050 (*OS*), plus $2,700 for* SRAM *option; $5,500 (*DOS*). First year maintenance included; 12% of license fee, yearly, thereafter.*

CIRCLE 329 ON READER CARD

Certificate of Deposit III
Florida Software Services, Inc.

Multiclass certificate system; runs on IBM *360/370 and various Burroughs computers.*

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	1.8
Ease of installation	2.3
Ease of use	2.7
Documentation	2.5
Vendor technical support	2.0
Training	2.3

Price: $15,300-$20,660, plus $1,500/year maintenance.

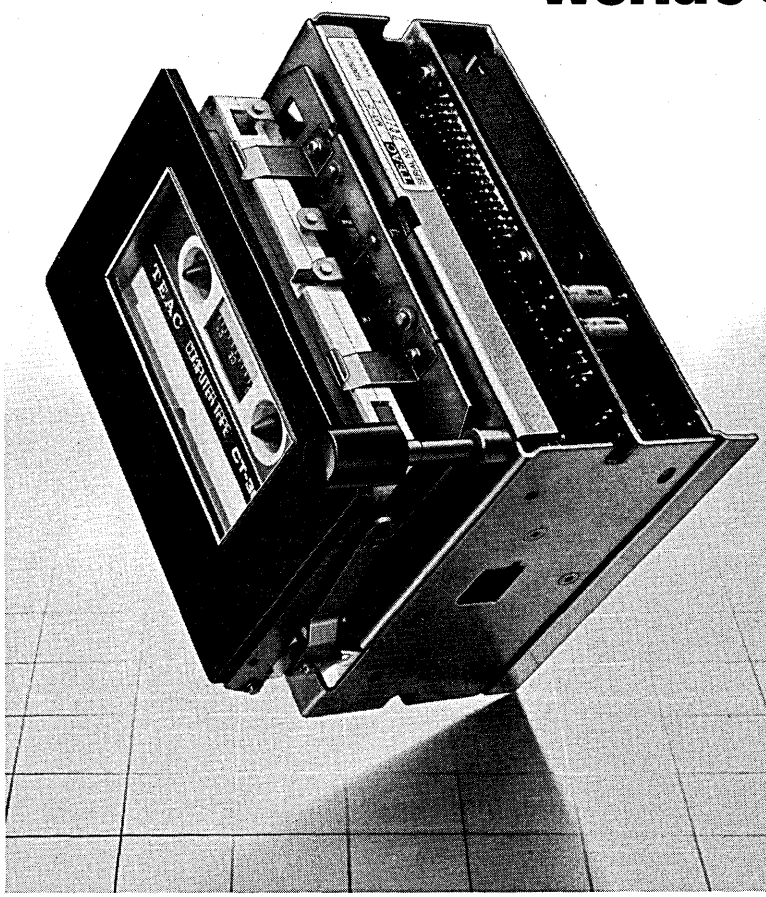
CIRCLE 330 ON READER CARD

CICS
IBM Corp. DPD

Data communications monitor; versions exist for IBM *360/370* DOS, DOS/VS, OS, *and* OS/VS *systems.*

Users reporting	117
Overall satisfaction	3.0
Throughput/efficiency	2.8

World's Smallest Datapack.



With the MT-2, TEAC introduces the world's most compact cassette datapack.

LSI-Controller makes it possible.

Recording density is 800 bpi (32 bits/mm, nominal) and nominal data transfer rate is 12 kbits/sec., but total size is only 105mm (H)× 120mm (W)×91mm (D). Weight has been held to less than 1kg.

What's more, flexibility is nearly unlimited.

The MT-2 has two circuit boards; one controls mechanical and memory functions, while the other handles interfacing with a wide variety of equipment. That means no extra cost for separate interface units, more versatile, compact connections and easier maintenance.

The MT-2 is one example of how TEAC experience in the data recorder field is paying off.

It can really pay off for you—besides its small size, we've given the MT-2 a small price tag.

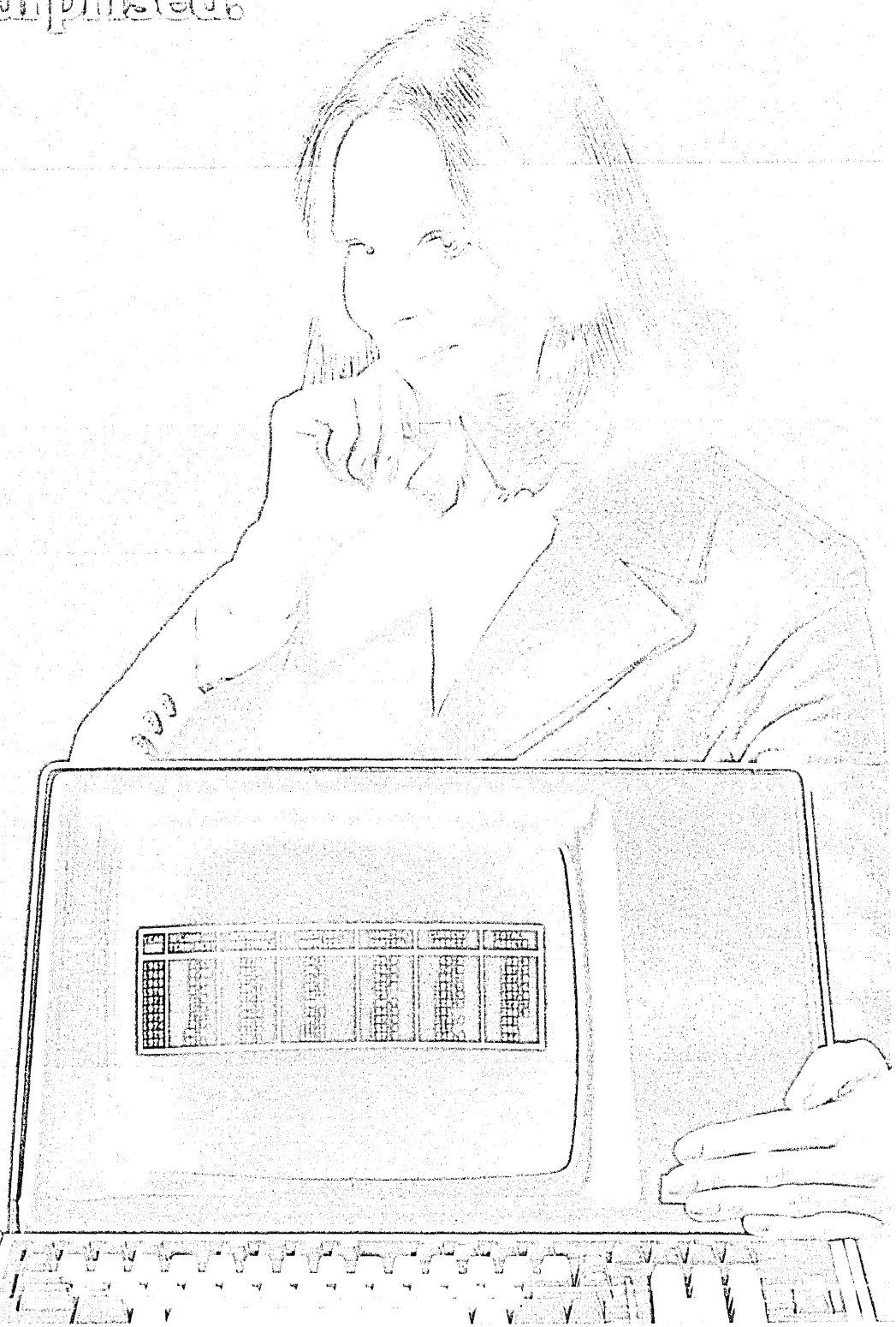
TEAC

TEAC CORPORATION: 3-7-3, Naka-cho, Musashino, Tokyo, Japan. **U.S.A.:** B.J. Wolfe Enterprises Inc., 10760 Burbank Blvd., North Hollywood, Calif. 91610 **England:** International Instruments Ltd., Cross Lances Rd., Hounslow, Middx. **W. Germany:** nbn Elektronik Starnberg, 813 Starnberg, Max-Emanuel-Str. 8 **France:** Tekelec Airtronic S.A., Cite des Bruyeres, Rue Carle-Vernet 92 Sevres **Holland:** SIMAC Electronics, Veenstraat 20, Veldhoven **Italy:** A.E.S.S.E. S.R.L., Corso Lodi, 47 20139 Milano **Norway:** Rodland & Relismo A.S., Gladengveien 3A, Oslo 6 **Sweden:** Teleinstrument ab, Mattesholmsvagen 138, Vallingby **Denmark:** Danbit, Plantagevej 23, 2680 Scolrod Strand **Switzerland:** Wenger Datentechnik, Bruderholzstrasse 45, 4053 Basel **Australia:** Jacoby, Mitchell Ltd., P.O. Box 70, Kingsgrove, N.S.W. 2208

CIRCLE 137 ON READER CARD

We've just introduced the best idea ever in alphanumerics.

But when we tell you who we are, you just might be surprised.



Tektronix 4020 Series

How can the first name in graphics come up with the last word in alphanumerics?

By turning both to your advantage.

From Alphanumerics to Graphics... now your terminals can keep pace with your needs. Our new 4020 Series terminals let you plan for the day when alphanumerics isn't enough. Without trading in terminals or buying more capability than you need right now.

Our 4025, for example, is a smart, refresh device that starts with alphanumerics and grows. First into forms ruling. Then into graphics. All without one capability compromising the other. As a complement, the 4024 offers data entry and forms capabilities. So you can prepare for the future with maximum economy and Tektronix quality.

Begin with the basics: alphanumerics at its best. Both configurations include expandable memory. Complete editing. Fields. Scrolling. Familiar, user-definable keyboard. Easy-on-the-eyes screen.

Plug in the forms ruling option and either terminal can recreate just about any source document. With one keystroke entry. Easy information call-up. Ideally proportioned 34-line deep screen.

And when you're ready to add data analysis and report generation, just add our low-cost graphics option to the 4025. Almost anyone can sit down and create bar charts, pie charts and histograms, and command 8½"x11" facsimiles off our optional copier. Our PLOT 10 Easy Graphing host software is designed for the nonprogrammer. For minimal core consumption.

Best of all, the 4020 Series comes with Tektronix reliability and support. All the more reason why they're a great long-term growth investment. Ask your local Tektronix Sales Engineer for a demonstration. Or write:

Tektronix, Inc.
Information Display Group
P.O. Box 500
Beaverton, OR 97077
(503) 638-3411
Tektronix Datatek NV
P.O. Box 159,
Badhoevedorp
The Netherlands

OEM information available

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CIRCLE 86 ON READER CARD

Tektronix 4025
Tektronix
Tektronix
COMMITTED TO EXCELLENCE

RATINGS

Ease of installation	2.4
Ease of use	2.6
Documentation	2.7
Vendor technical support	2.8
Training	2.7

Price: $1,000/month (OS/VS).
CIRCLE 331 ON READER CARD

CIF
NCR Corp.
Central information file system for banks. Runs on Century series and Criterion series.

Users reporting	9
Overall satisfaction	3.4
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	3.1
Documentation	2.9
Vendor technical support	2.9
Training	2.8

Price: for the total package, an initial license fee of $3,250 plus $135/month. Modules, individually, range from $250 + $10/month (General Ledger) to $1,200 + $50 month (DDA).
CIRCLE 332 ON READER CARD

COBOL
Burroughs Corp.
Standard Burroughs COBOL *compiler.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	2.8
Ease of installation	3.6
Ease of use	3.4
Documentation	2.2
Vendor technical support	2.4
Training	2.0

Price: $50/month.
CIRCLE 333 ON READER CARD

COBOL
Data General Corp.
For Nova and Eclipse minicomputers.

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.0
Ease of use	3.2
Documentation	1.8
Vendor technical support	2.6
Training	2.5

Price: $7,000 first year license fee; $5,000/year thereafter.
CIRCLE 334 ON READER CARD

COBOL
Digital Equipment Corp. (DEC)
Several versions to complement DEC *operating systems.*

Users reporting	6
Overall satisfaction	2.8
Throughput/efficiency	2.7
Ease of installation	2.8
Ease of use	3.0
Documentation	2.5
Vendor technical support	2.2
Training	2.0

Price: $3,785, including maintenance.
CIRCLE 335 ON READER CARD

COBOL (S/3)
IBM Corp. GSD
An ANSI *subset without Sort or Report Writer.*

Users reporting	5
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	2.8
Documentation	2.8
Vendor technical support	2.8
Training	2.3

Price: $89/month.
CIRCLE 336 ON READER CARD

COBOL (360/370)
IBM Corp. DPD
Includes DOS, OS, *and counterpart* VS *versions.*

Users reporting	71
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.1
Ease of use	3.4
Documentation	3.3
Vendor technical support	3.0
Training	3.3

Price: $78/month for library only—$236/month for compiler and library (OS/VS).
CIRCLE 337 ON READER CARD

COBOL (1130)
IBM Corp. GSD
Subset version for IBM *1130.*

Users reporting	20
Overall satisfaction	2.8
Throughput/efficiency	3.0
Ease of installation	2.7
Ease of use	2.9
Documentation	2.4
Vendor technical support	2.0
Training	1.8

Price: $86/month.
CIRCLE 338 ON READER CARD

Commercial Loan
Florida Software Services, Inc.
Multibank commercial loan system; runs on IBM *360/370 and most Burroughs computers.*

Users reporting	10
Overall satisfaction	2.8
Throughput/efficiency	2.4
Ease of installation	2.5
Ease of use	2.4
Documentation	3.1
Vendor technical support	2.6
Training	3.0

Price: $16,300-$23,300. Includes six months maintenance; $1,650/year thereafter.
CIRCLE 339 ON READER CARD

Comput-A-Charge
Value Computing Inc.
Job accounting and billing, written in ANSI COBOL; *runs on most mainframes.*

Users reporting	11
Overall satisfaction	3.5
Throughput/efficiency	3.0
Ease of installation	2.8
Ease of use	3.0
Documentation	2.9
Vendor technical support	3.1
Training	2.8

Price: $6,500 (DOS *and* DOS/VS) *—$9,500* (OS). *Includes one year maintenance and enhancements.*
CIRCLE 340 ON READER CARD

CUE
Boole & Babbage, Inc.
System hardware resource utilization analyzer and report generation system.

Users reporting	9
Overall satisfaction	3.1
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	2.7
Documentation	2.3
Vendor technical support	2.7
Training	2.7

Price: $11,500. Includes first year maintenance.
CIRCLE 341 ON READER CARD

CULPRIT
Cullinane Corp.
Output processor and report creation system for IBM *360/370 and Univac Series 70 computers.*

Users reporting	13
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	3.5
Ease of use	3.2
Documentation	2.9
Vendor technical support	3.2
Training	3.1

Price: $20,000 license fee, $2,000/year renewal.
CIRCLE 342 ON READER CARD

CYTOS
DNA Systems Inc.
Conversational operating system for IBM *1130 and compatible systems.*

Users reporting	7
Overall satisfaction	3.7
Throughput/efficiency	3.6
Ease of installation	3.6
Ease of use	3.6
Documentation	3.0
Vendor technical support	3.7
Training	3.5

Price: integral with TSO *at $8,000 (one-time lease).*
CIRCLE 343 ON READER CARD

Data Analyzer
Program Products, Inc.
Information retrieval and reporting on any IBM *360/370; has interfaces for* IMS, TOTAL, *and other* DBMS's.

Users reporting	7
Overall satisfaction	3.1
Throughput/efficiency	2.7
Ease of installation	2.7
Ease of use	2.7
Documentation	2.8
Vendor technical support	2.8
Training	2.8

Price: $16,000 (DOS)*—$18,000* (OS). *Approximately 5% annual maintenance after first year.*
CIRCLE 344 ON READER CARD

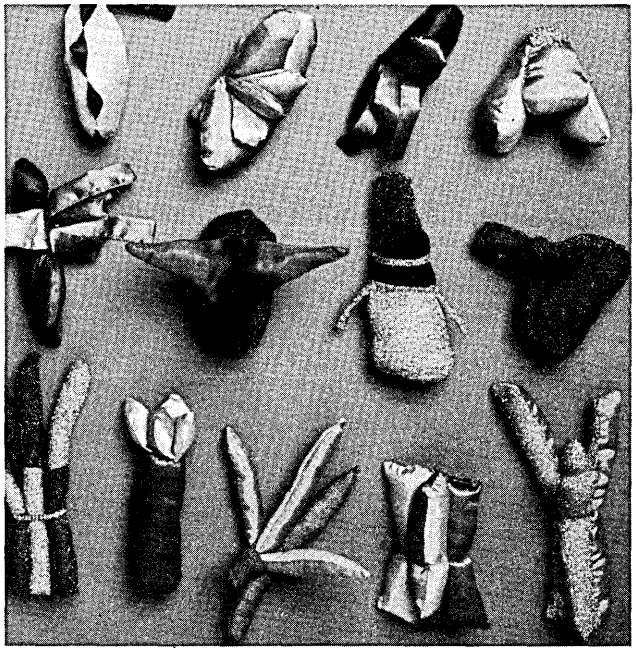
Datacom/DB
Insyte Datacom Corp.
Data base management system for the IBM *360/370 using inverted file structures.*

Users reporting	11
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.0
Ease of use	3.4
Documentation	2.4
Vendor technical support	3.2
Training	3.2

Price: $34,000 (DOS)*—$40,000* (OS). *Optional multiuser facility: $8,400* (DOS)*—$10,000* (OS).
CIRCLE 345 ON READER CARD

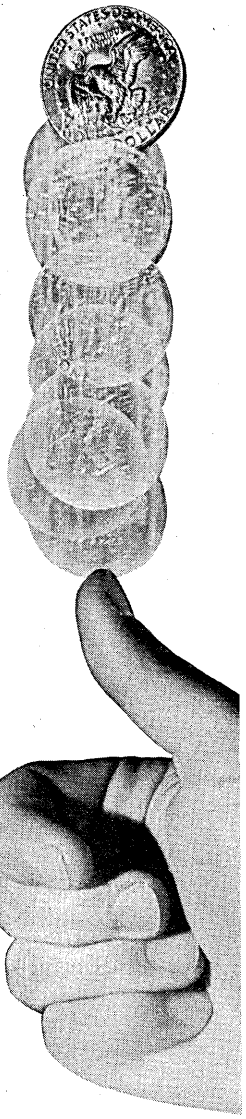
Datacom/DC
Insyte Datacom Corp.
A telecommunications processor for IBM *360/370; interfaces with Datacom/*DB *and other* DBMS's.

Users reporting	13
Overall satisfaction	3.3
Throughput/efficiency	3.5
Ease of installation	2.8
Ease of use	3.4

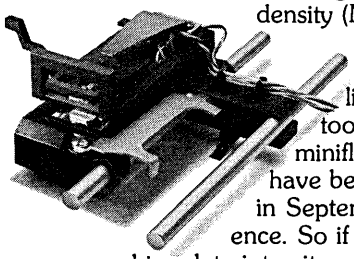


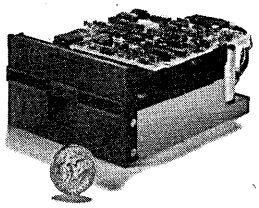
Introducing Shugart's SA450 double-sided minifloppy.

440 Kbytes on-line without a flip.



Why flip? Nobody delivers this much *on-line* data storage from a single minifloppy disk drive with total compatibility. Nobody but Shugart offers a complete family of minifloppy disk products. Now a single minidiskette™ can carry operating system software, application programs or about 220 pages of text. All avaliable on-line. Reach 440 Kbytes (unformatted) with random access speed. Without flipping media. **Two heads are better than one.** The proprietary Shugart head design allows you to read and write both sides of the minidiskette. So you can write and read larger data files without the delays and risks that come from additional diskette handling. **We promised. We delivered.** The SA450 delivers true upward expansion based upon the industry standard 35 track format. This proven *Format With a Future* allows you to use single or double-sided minidiskettes without sacrificing the margin that you've come to expect with the minifloppy. **Proven technology—single or double density.** The Shugart SA450 minifloppy disk drive has the same compact size and low weight as the original minifloppy—the Shugart SA400. And it's electrically, mechanically, and media compatible. Double density (MFM/M²FM) is standard, but you can also operate single density on one side or two. **There's more.** The unique direct-drive spiral cam actuator. Low heat dissipation, write protect, activity light, die cast base plate, and DC drive motor, too. But you get the idea. Nobody makes more minifloppy disk drives than Shugart. Over 25,000 have been installed since we introduced the little guy in September 1976. Nobody can claim more experience. So if you want 440 Kbytes of on-line storage, big drive data integrity, with proven reliability—and you're into word processing, intelligent terminals, small business systems or home computing—you'll love the SA450. Why flip? You can have the real double-sided minifloppy from the people who started the minifloppy revolution. Shugart.





Shugart Associates

415 Oakmead Parkway, Sunnyvale, California 94086
Telephone: (408) 733-0100
West Coast Sales/Service: Telephone: (408) 252-6860
East Coast Sales/Service: Telephone: (617) 890-0808
Europe Sales/Service: 3, Place Gustave Eiffel, Silic 311
94588 Rungis, France Telephone: (1) 686-00-85

The Leader In Low Cost Disk Storage.

™minidiskette trademark of Shugart Associates.

RATINGS

Documentation	2.4
Vendor technical support	3.2
Training	2.9

Price: $32,000 (DOS)—$37,000 (OS). Maintenance, after first year, 7%.
CIRCLE 346 ON READER CARD

DATAMACS
Management and Computer Svcs., Inc. (MACS)
Creates test files for COBOL programs on IBM 360/370.

Users reporting	5
Overall satisfaction	2.6
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.0
Documentation	2.2
Vendor technical support	2.2
Training	2.6

Price: $6,500 (DOS)—$8,500 (OS). Includes first year maintenance.
CIRCLE 347 ON READER CARD

DBOMP
IBM Corp. DPD
Data base organization and maintenance processor utility for IBM 360/370.

Users reporting	33
Overall satisfaction	3.1
Throughput/efficiency	2.9
Ease of installation	2.4
Ease of use	2.8
Documentation	2.4
Vendor technical support	2.6
Training	2.3

Price: $115/month.
CIRCLE 348 ON READER CARD

DDA Accounting
Burroughs Corp.
Various demand deposit accounting systems for banks.

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	3.6
Documentation	2.6
Vendor technical support	2.0
Training	3.0

Price: $2,500-$45,000, plus $150-$2,250/year maintenance.
CIRCLE 349 ON READER CARD

DFAST/VS
Oxford Software Corp.
Allows 360/370 DOS and DOS/VS users to automatically allocate and share disc space.

Users reporting	19
Overall satisfaction	3.1
Throughput/efficiency	3.4
Ease of installation	3.0
Ease of use	3.3
Documentation	2.4
Vendor technical support	2.2
Training	2.1

Price: $5,625-$8,750. Maintenance, after first year: 10% of purchase price.
CIRCLE 350 ON READER CARD

DIOPEN
IBM Corp. DPD
Disc file utility for IBM 360/370.

Users reporting	5
Overall satisfaction	3.6
Throughput/efficiency	3.8
Ease of installation	3.2
Ease of use	3.8
Documentation	2.5
Vendor technical support	2.2
Training	1.0

Price: $54 for 24 months.
CIRCLE 351 ON READER CARD

DISKPLAY
Boole & Babbage, Inc.
Volume table of contents (VTOC) analyzer that sorts and prints listings of data files and all pertinent disc-related information.

Users reporting	6
Overall satisfaction	3.2
Throughput/efficiency	3.3
Ease of installation	3.8
Ease of use	3.7
Documentation	3.8
Vendor technical support	3.5
Training	3.7

Price: $495. Includes six months maintenance.
CIRCLE 352 ON READER CARD

Disk Utility System
Westinghouse Electric Corp.
Disc-to-tape, etc., utility for use with IBM 360/370 DOS and DOS/VS.

Users reporting	79
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.8
Ease of use	3.7
Documentation	3.3
Vendor technical support	3.3
Training	3.1

Price: $2,500. Maintenance: $250/year.
CIRCLE 353 ON READER CARD

DITTO/OS
IBM Corp. DPD
File copy/file management utility.

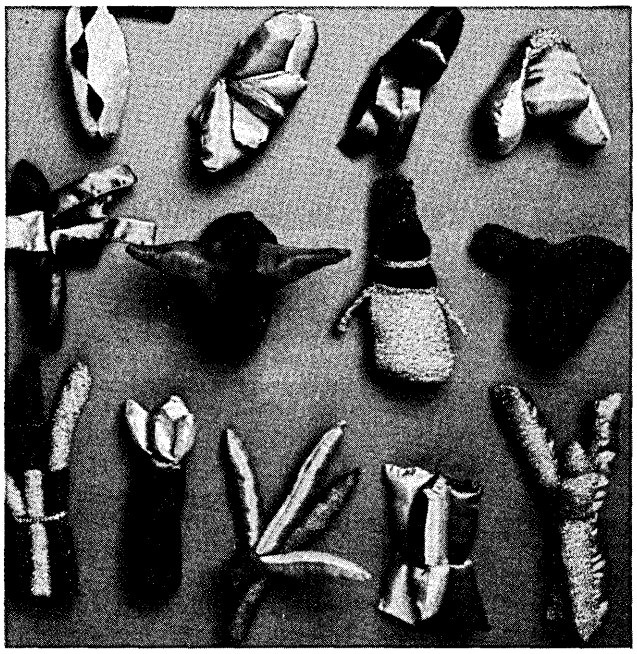
Users reporting	31
Overall satisfaction	3.4
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.6
Documentation	2.8
Vendor technical support	3.1
Training	3.0

Price: $71 for 12 months.
CIRCLE 354 ON READER CARD

DMS-II
Burroughs Corp.
Burroughs' data base management system; there are subsets for small, medium, and large computers.

Users reporting	21
Overall satisfaction	3.1
Throughput/efficiency	3.3
Ease of installation	3.3
Ease of use	3.6
Documentation	2.4
Vendor technical support	2.5
Training	2.7

Price: $12,000-$24,000.
CIRCLE 355 ON READER CARD



DOSSIER
Computer Concepts Corp.
IBM DOS or DOS/VS program library file descriptor system for core-image and/or relocatable libraries.

Users reporting	8
Overall satisfaction	3.6
Throughput/efficiency	3.8
Ease of installation	3.8
Ease of use	3.3
Documentation	3.4
Vendor technical support	3.3
Training	—

Price: $2,150 for a 99-year license plus $150/year maintenance fee after first year. One-year license: $85/month. Monthly license: $170/month.
CIRCLE 356 ON READER CARD

DL/1-DL1/E
IBM Corp. DPD
Data base management system for IBM 360/370 DOS/VS users; DL1/E is a subset for smaller systems.

Users reporting	23
Overall satisfaction	2.7
Throughput/efficiency	2.4
Ease of installation	2.5
Ease of use	2.6
Documentation	2.5
Vendor technical support	2.9
Training	2.6

Price: $315 (DL/1-E)—$346 (DL/1) monthly.
CIRCLE 357 ON READER CARD

DYL-250
Dylakor Software Systems, Inc.
File maintenance and label printing utility for IBM 360/370.

Users reporting	14
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.5
Ease of use	2.9
Documentation	3.0
Vendor technical support	3.1
Training	2.8

Price: $2,950.
CIRCLE 358 ON READER CARD

DYL-260
Dylakor Software Systems, Inc.
Data management and report writing system for IBM 360/370.

Users reporting	59
Overall satisfaction	3.7
Throughput/efficiency	3.3
Ease of installation	3.7
Ease of use	3.5
Documentation	3.0
Vendor technical support	3.0
Training	3.0

Price: $8,000-$13,450.
CIRCLE 359 ON READER CARD

EASYTRIEVE
Pansophic Systems, Inc.
Information retrieval and reporting system for IBM 360/370 and Univac Series 70.

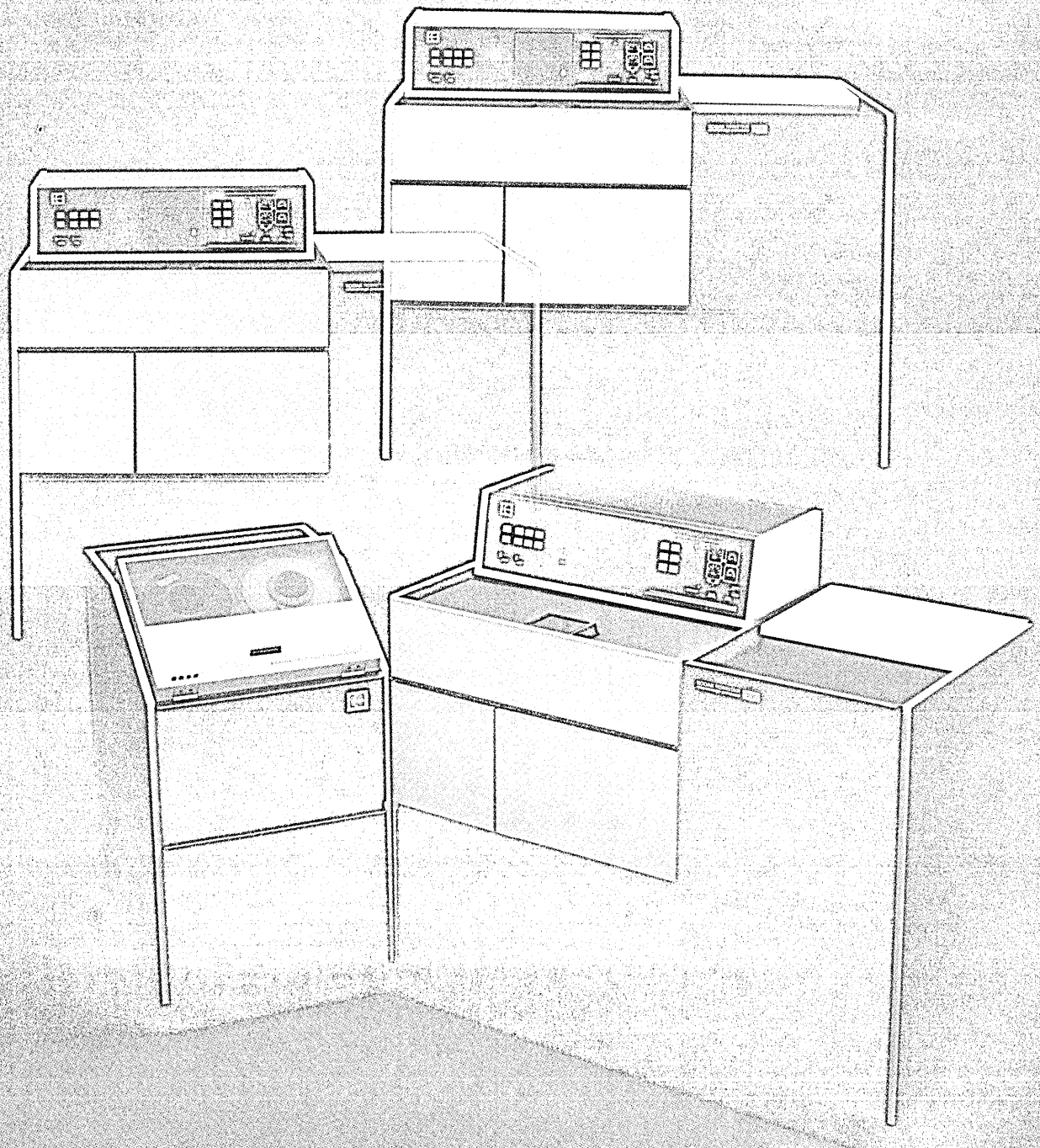
Users reporting	62
Overall satisfaction	3.7
Throughput/efficiency	3.4
Ease of installation	3.7
Ease of use	3.5
Documentation	3.2
Vendor technical support	3.1
Training	2.8

Price: $12,500 (DOS)—$15,000 (OS). Special "entry market" price (for 360/40 and smaller and 370/125 and smaller): $8,500 (DOS or OS).
CIRCLE 360 ON READER CARD

EDOS
The Computer Software Co.
A replacement operating system for IBM DOS users with many extended operating system features including DBMS support.

Users reporting	76
Overall satisfaction	3.7
Throughput/efficiency	3.6
Ease of installation	3.5
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.5

Take your choice: on-line or off-line.



3 dry, convenient, laser COMs, from Kodak.

For the detailed story, write Eastman Kodak Company, Business Systems Markets Div., Dept. DP7967, Rochester, NY 14650.

KODAK KOMSTAR Microimage Processors

RATINGS

Training 3.1
Price: $8,000 for the basic system. Includes installation and two years maintenance (thereafter, maintenance is 10% of purchase price). Options from $3,500-$7,250.
CIRCLE 361 ON READER CARD

ENVIRON/1
Cincom Systems, Inc.
General purpose data communications monitor for multiple online user terminals and applications; runs on IBM *360/370.*

Users reporting	14
Overall satisfaction	3.1
Throughput/efficiency	3.2
Ease of installation	2.7
Ease of use	3.0
Documentation	2.8
Vendor technical support	2.9
Training	3.1

Price: $22,500-$44,500. Includes on-site support (training, installation, testing) of 4 to 10 man-days. Maintenance: $1,250-$1,750/year.
CIRCLE 362 ON READER CARD

EPAT
SDI
Keep track of physical tape volumes on IBM *360/370 under* DOS *or* DOS/VS.

Users reporting	41
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.2
Ease of use	3.2
Documentation	3.1
Vendor technical support	3.1
Training	2.7

Vendor will not release price.
CIRCLE 363 ON READER CARD

EPIC-Budget/Finance
IBM Corp. GSD or DPD
One of a series of program products for schools that run on System/3 and 360/370 computers.

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	2.2
Ease of installation	2.6
Ease of use	2.6
Documentation	1.8
Vendor technical support	2.2
Training	2.2

Price: $121/month.
CIRCLE 364 ON READER CARD

EPIC-Socrates
IBM Corp. GSD or DPD
Another school-oriented program product (see above description).

Users reporting	11
Overall satisfaction	2.5
Throughput/efficiency	2.1
Ease of installation	2.1
Ease of use	2.7
Documentation	2.5
Vendor technical support	2.3
Training	1.7

Price: $192/month.
CIRCLE 365 ON READER CARD

ETOS
Educomp
Time-sharing operaitng system for use on the DEC PDP-8.

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	2.6
Ease of installation	3.2
Ease of use	3.4
Documentation	2.6
Vendor technical support	3.0
Training	2.7

Price: $5,950.
CIRCLE 366 ON READER CARD

ETSS
IBM Corp. DPD
Entry level time-sharing system that runs in one partition of a DOS/VS *system.*

Users reporting	10
Overall satisfaction	3.4
Throughput/efficiency	2.9
Ease of installation	2.6
Ease of use	3.2
Documentation	2.6
Vendor technical support	2.5
Training	1.8

Price: $250 for 24 months.
CIRCLE 367 ON READER CARD

EXTRACTO
Optipro, Inc.
Data management information retrieval and reporting system with multiple file-handling capabilities.

Users reporting	5
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.6
Ease of use	3.8
Documentation	2.4
Vendor technical support	2.6
Training	3.0

Price: $15,000-$25,000. Maintenance for one year included; thereafter, $500/year. Optional $7,500 data base interface.
CIRCLE 368 ON READER CARD

EZPERT
Systonetics, Inc.
Computerized, automated PERT *chart control system for use on* IBM *360/370, Univac, Honeywell, Burroughs, and* CDC *systems; written in* FORTRAN IV.

Users reporting	5
Overall satisfaction	3.2
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	2.8
Documentation	2.6
Vendor technical support	2.8
Training	2.8

Price: $42,000. One year free maintenance. Support service contract, including training, $2,000.
CIRCLE 369 ON READER CARD

FARGO-S/3
IBM Corp. GSD
Specialized hospital accounting

WITH DOCS USE YOUR 3277 AS A DOS·DOS/VS CONSOLE!

DOCS—Display Operator Console Support—provides the IBM S/360 & S/370 DOS and DOS/VS user with 3277 display unit SYSLOG support. DOCS is simply installed on any DOS or DOS/VS system with no changes required by the user. All 1052,3210 and 3215 typewriter functions are supported by DOCS with numerous enhancements over a non-DOCS environment. DOCS also enhances DOS/VS operation on S/370, 138, 148, and 158 beyond that provided by the IBM program product.

DOCS is quickly and simply installed on any system. All that the user need do is catalog the DOCS distribution tape to his Core Image library, define where the DOCS hard copy file is to be located and execute DOCS. Total installation time required is under 10 minutes.

DOCS functions concurrently with EDOS, GRASP, DOS/MVT, DOS/RS, POWER II, ASAP, POWER/VS, and ITEL's DOS/VS executing on a S/360 and will enhance the system operation by providing improved facilities for the use of these packages while DOCS is controlling SYSLOG.

DOCS is available from C F S, Inc. as a licensed program product and may be leased monthly, yearly or on a one-time lease arrangement for $175.00, $1,890.00 and $5,670.00 respectively. All three lease plans include free maintenance for as long as DOCS is installed.

SPEED

DOCS provides significant through-put improvement by the very nature of the speed of the 3277 display unit alone. Operators can even pre-answer messages on the console.

MULTIPLE CONSOLES

DOCS allows from 1 to 16 3277 display unit consoles to be used simultaneously as SYSLOG devices.

MULTIPLE OUTSTANDING REPLIES

DOCS permits messages followed by Reads to the typewriter to remain unanswered without tying up the system. All outstanding Reads are shown in high intensity on the display console(s).

REDUCED SUPERVISOR SIZE & OVERHEAD

DOCS does away with any need for the Console Buffering option in DOS or DOS/VS thus providing a savings in the core required by the users' supervisor as well as greatly reducing significant overhead to the entire system. Experience has shown that total through-put improvement with DOCS installed may approach 10% to 20%.

Send requests for DOCS to C F S. License agreements along with detailed information will be sent by return mail. Inquiries may be directed to:

ELIMINATES DEPENDENCY ON TYPEWRITER

DOCS will continue to operate, and allow the entire system to operate, if the 1052, 3210 and 3215 typewriter becomes inoperable. DOCS spools all typewriter data to a hard copy disk file for later printing thus obviating the need for the typewriter to be on-line at all times. Hard copy is asynchronously provided if the 1052, 3210 and 3215 is available. A hard copy listing is also available through a utility program which the user may execute in any problem program partition to list the hard copy file on SYSLST.

NO USER PARTITION REQUIREMENT

DOCS executes in its own pseudo-partition thus allowing the user unrestricted use of the problem program partitions.

MULTIPLE EXTERNAL INTERRUPT KEYS

DOCS provides a separate External Interrupt key for each partition (replacing the use of the MSG command). This is especially convenient for EDOS users. This function is also useful for GRASP users when communicating with a background partition problem program. A unique interrupt key is provided for each DOS/MVT region.

Mr. Richard Goran
C F S, Inc., P.O. Box 662, Brookline, MA 02147
(617) 731-3474 Telex 94-0285

CIRCLE 109 ON READER CARD

Sooner or later it was bound to get out.

Yes, the Dumb Terminal™ really does have two smarter brothers.

At first, they weren't quite as well known, because their Dumb Brother's smashing success was stealing the show. Although they had been selling quite well all along, even without getting constant headlines, like their Brother.

Now, however, Dumb Brother has pulled them into the limelight. And ADM-1 and -2 have decided, after all, that perhaps it's time you knew a little more about how smart they really are.

ADM-2 is the more intelligent of the two, providing you with flexibility of format, security, editing, interface, and transmission. You'll find, among a variety of other outstanding features, up to 8 screen status indicators and a numeric key pad. And a detachable keyboard with 16 function keys. Which give you the ability to access your special program, or form, or instruction.

The ADM-2 is also available in a model compatible with your Burroughs TD-800 Series. The ADM-2B. The ADM-2B adheres to the standard Burroughs poll and address line discipline.

On top of all that, we've made the ADM-2 micro-programmable. And taken all the mystery out of the procedure. Which makes user-micro-programmable simple, quick, and cost-effective. The ADM-2's versatility is limited only by your imagination.

You could call the other Smarter Brother, ADM-1, the "with-or-without" terminal. Starting with some pretty smart standard features, like a standard 24-line display, a field protection feature with dual-intensity and switch-selectable operating modes – block mode and conversation mode – you build up from there. With options like a hardcopy printer interface, and display editing capabilities (line insert, line delete, line erase, character insert, and character delete). Just add the options you need, and leave the rest of the "bells and whistles" for someone else. That way, it's more systems adaptable. And it's up to you just how smart you want it to be.

The Smarter Brothers have it all. Intelligence, appropriate functions, and sensible cost-per-performance.

So, you might as well get used to seeing more of the ADM-1 and -2 in the future. Because we suspect they're going to be in the spotlight from now on.

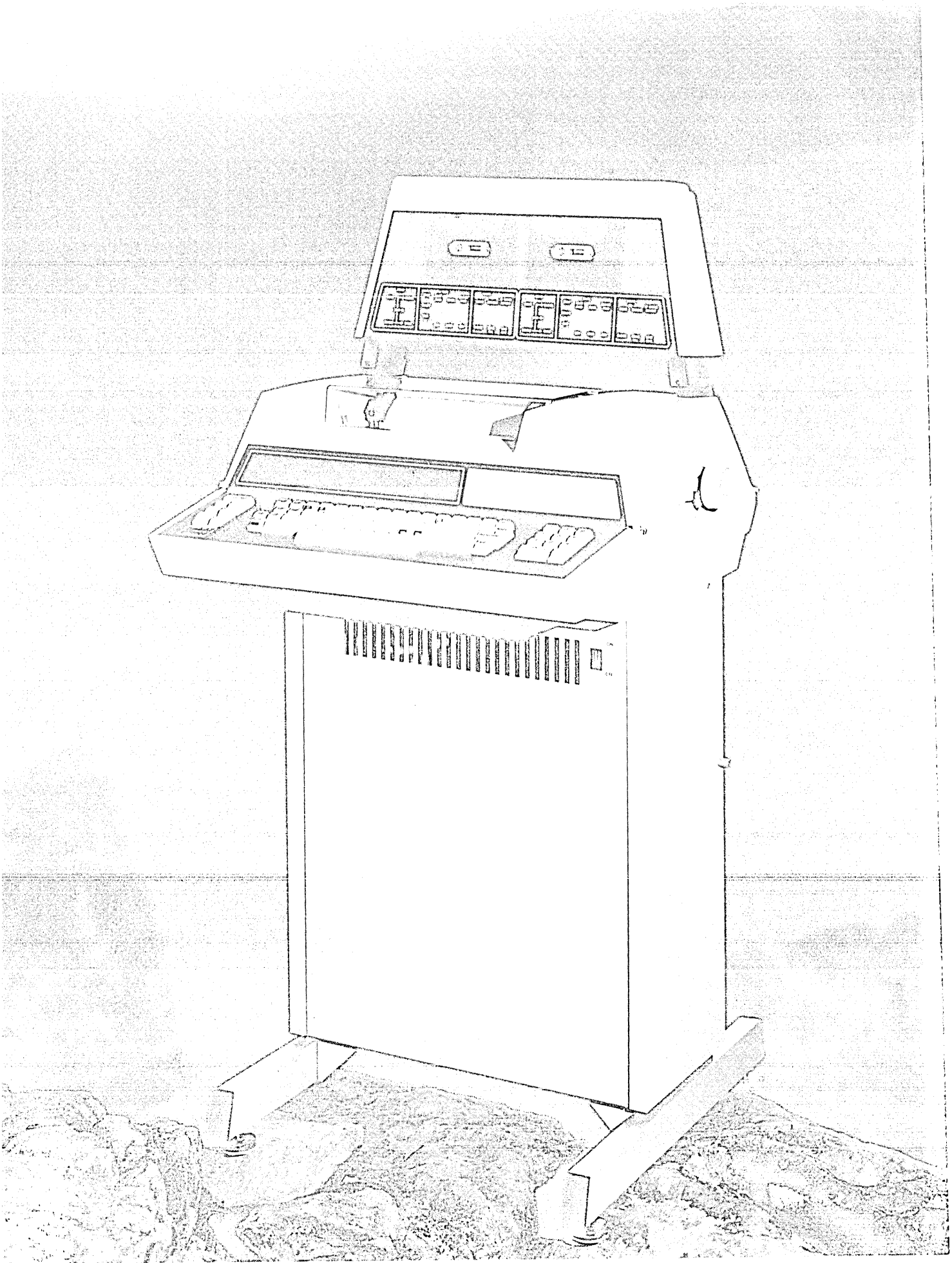
After all, there's really nothing wrong with exposing your Smarts.

LSi

The dumb terminal's smarter brothers.

Lear Siegler, Inc., E.I.D./Data Products, 714 N. Brookhurst St., Anaheim, CA 92803; (800) 854-3805. In California (714) 774-1010.

CIRCLE 92 ON READER CARD



Exceptional versatility makes the TermiNet® 30 printer King of the Mountain

General Electric's TermiNet® 30 printer has all the cost-saving flexibility you need in a true communications teleprinter.

Over 85 strappable functions, a wide range of options and your choice of interfaces make this 30 CPS teleprinter adaptable to almost any application.

In fact, there are dozens of things you'll like about TermiNet 30 printers. Like clear character legibility, internal and external modems, parity error detection, unattended operation, international configurations, numeric cluster and vertical formatting. And the list goes on.

What's more, it's loaded with human engineered features like the convenient and exceptionally long-lasting ribbon cartridge and the compact 132 column printout.

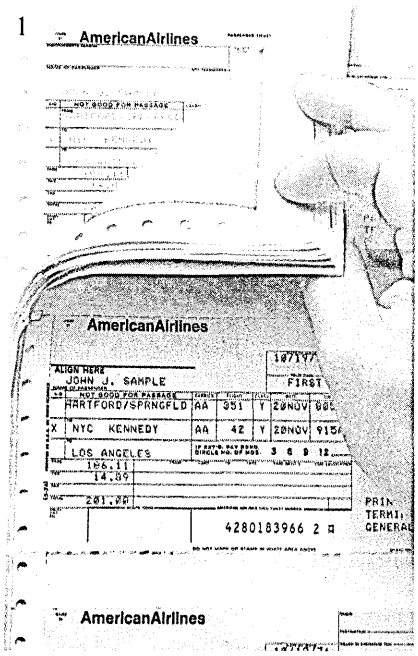
Options? Consider four of our newest, shown at the right: **1.** A Multi-Form Selector produces crisp, clean, readable copies even with thick 10-part forms (up to .028 inches), **2.** This single or dual cassette accessory adds more versatility, high speed data transfer and off-line processing, **3.** A Paper Tape Accessory for those applications where paper tape inputs and outputs are required, **4.** TWX/DDD Selectable—one machine for TWX plus dial-up, private line, timesharing and general purpose use.

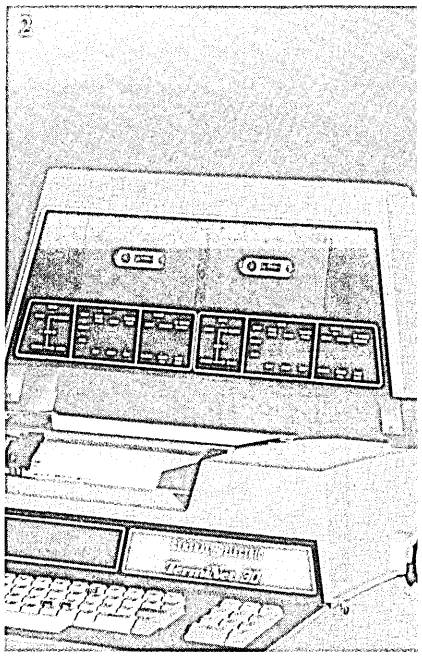
For more information about the incredibly versatile TermiNet 30 printer, write General Electric Company, Section 794-16B Data Communication Products Department, Waynesboro, VA 22980.

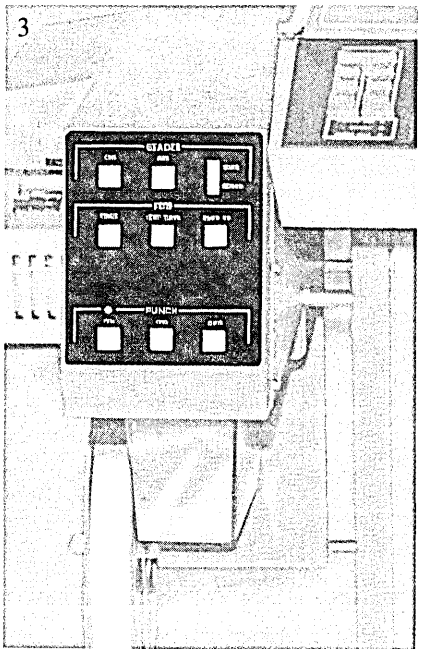
For your special kind of needs- a special kind of printer

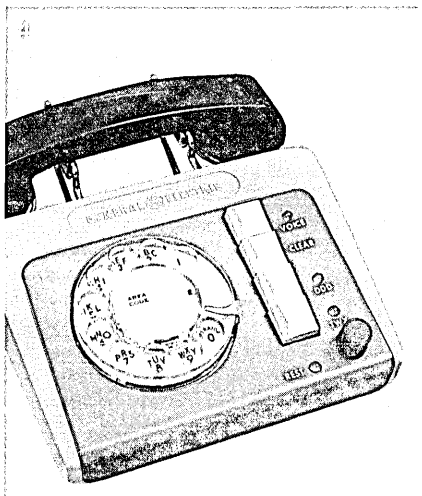
GENERAL ELECTRIC

CIRCLE 63 ON READER CARD









package for System/3 Model 6; developed as an IUP *(Installed User Program).*

Users reporting	5
Overall satisfaction	2.0
Throughput/efficiency	1.6
Ease of installation	1.6
Ease of use	2.2
Documentation	2.0
Vendor technical support	2.8
Training	1.5

Price: $165/month for 12 months.
CIRCLE 370 ON READER CARD

Fast/Dump/Restore (FDR)
Innovation Data Processing, Inc.
Disc-to-tape dump/restore utility for IBM *360/370* OS *or* OS/VS.

Users reporting	34
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.9
Ease of use	3.6
Documentation	3.0
Vendor technical support	3.4
Training	3.2

Price: $2,000—$4,000 (DSF). *Maintenance: $300—$500* (DSF).
CIRCLE 371 ON READER CARD

FCS
University Computing Co. (UCC)
Financial information storage and retrieval system for use on IBM *360/370 (all operating systems) and Burroughs computers.*

Users reporting	11
Overall satisfaction	3.6
Throughput/efficiency	3.0
Ease of installation	3.1
Ease of use	3.3
Documentation	3.4
Vendor technical support	3.1
Training	3.4

Price: $30,000 and up (commercial sales). Maintenance: $4,800/year.
CIRCLE 372 ON READER CARD

FICS
Management Science America (MSA)
Data base-oriented financial control and reporting system for banks; runs on IBM *360/370, Burroughs, and Honeywell* COBOL *systems.*

Users reporting	11
Overall satisfaction	3.0
Throughput/efficiency	2.0
Ease of installation	2.5
Ease of use	2.5
Documentation	2.8
Vendor technical support	1.7
Training	2.8

Price: $40,000-$80,000. Includes one year maintenance.
CIRCLE 373 ON READER CARD

Fixed Asset Accounting
Data Design Associates, Inc.
Specialized accounting system for IBM *360/370 and Burroughs B 1700 and up.*

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	2.8
Ease of installation	3.3
Ease of use	3.0
Documentation	3.0
Vendor technical support	3.5
Training	2.7

Price: $12,500-$19,500, plus 10% maintenance after first year.
CIRCLE 374 ON READER CARD

Fixed Assets (S/3)
IBM Corp. GSD
Generalized fixed assets accounting system for System/3.

Users reporting	6
Overall satisfaction	2.8
Throughput/efficiency	2.8
Ease of installation	3.2
Ease of use	2.8
Documentation	2.7
Vendor technical support	1.8
Training	1.3

Price: $138/month for 12 months.
CIRCLE 375 ON READER CARD

Fixed Assets Accounting
McCormack & Dodge Corp.
Specialized accounting system for use on IBM *360/370.*

Users reporting	18
Overall satisfaction	2.9
Throughput/efficiency	2.6
Ease of installation	2.7
Ease of use	2.8
Documentation	2.8
Vendor technical support	2.5
Training	2.5

Price: $21,000. Maintenance after first year approximately $1,500/year.
CIRCLE 376 ON READER CARD

F-LE-E/FLIM
Goal Systems
Replacement linkage editor and MAINT *utility for* IBM *370* DOS/VS *systems.*

Users reporting	19
Overall satisfaction	3.8
Throughput/efficiency	3.8
Ease of installation	3.7
Ease of use	3.7
Documentation	3.6
Vendor technical support	3.6
Training	3.3

Price: $65/month, including maintenance.
CIRCLE 377 ON READER CARD

FLEET/FMAINT
SDI
FLEET *incorporates* FMAINT *functions; replacement for* IBM*'s* MAINT *utility and library control program for* DOS *and* DOS/VS *users.*

Users reporting	7
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.0

Model 204

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The Data Base Management System You Won't Outgrow

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- Because Model 204 offers the most sophisticated access methods available today.
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Cambridge, Massachusetts 02139

CIRCLE 143 ON READER CARD

TI's 745 Portable Data Terminal can make the difference between closing doors and closing deals.

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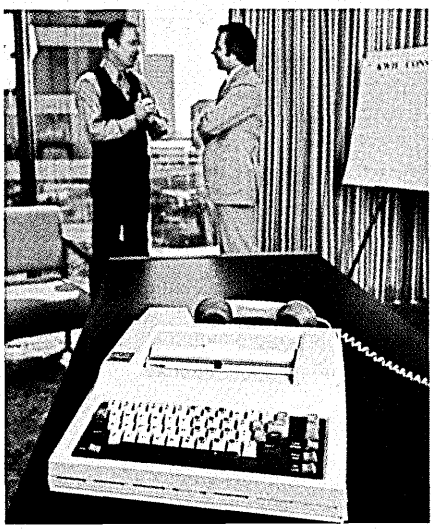

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Houston, Texas 77001

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†U.S. Domestic Price

TEXAS INSTRUMENTS.

RATINGS

Training 3.2
Vendor will not release price.
CIRCLE 378 ON READER CARD

FORESIGHT
Foresight Systems, Inc.
Statistical forecasting system written in FORTRAN.

Users reporting	9
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.5
Ease of use	3.1
Documentation	2.6
Vendor technical support	3.2
Training	3.0

Price: $30,000. Includes guaranteed installation, four days training, one year maintenance and warranty. Optional maintenance: $750-$2,500/year.
CIRCLE 379 ON READER CARD

FORTE-II
Burroughs Corp.
Disc file management system for most medium-to-large scale Burroughs computers; generates COBOL *source code as well.*

Users reporting	21
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	2.5
Documentation	2.7
Vendor technical support	2.3
Training	2.4

Price: $11,000, plus $1,100/year maintenance.
CIRCLE 380 ON READER CARD

FORTRAN
Digital Equipment Corp. (DEC)
Available in various versions to support DEC *computers.*

Users reporting	28
Overall satisfaction	3.1
Throughput/efficiency	3.1
Ease of installation	3.3
Ease of use	3.2
Documentation	2.9
Vendor technical support	2.6
Training	3.0

Price: $490, including maintenance.
CIRCLE 381 ON READER CARD

1130/FORTRAN
DNA Systems Inc.
For IBM *1130 and compatible systems.*

Users reporting	15
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.2
Ease of use	3.5
Documentation	3.0
Vendor technical support	3.2
Training	3.7

Price: $1,495.
CIRCLE 382 ON READER CARD

FORTRAN
Interdata Corp.
Available in various versions for 16- and 32-bit systems.

Users reporting	6
Overall satisfaction	2.3
Throughput/efficiency	2.2
Ease of installation	3.0
Ease of use	2.2
Documentation	2.2
Vendor technical support	1.2
Training	2.0

Price: 16-bit: FORTRAN IV, *$250-$550 (on disc);* FORTRAN V, *$650-$1,300. 32-bit:* FORTRAN V, *$650-$1,300.*
CIRCLE 383 ON READER CARD

FORTRAN IV (360/370)
IBM Corp. DPD
Includes DOS, OS, *and* VS *versions.*

Users reporting	9
Overall satisfaction	2.8
Throughput/efficiency	3.0
Ease of installation	2.9
Ease of use	3.0
Documentation	2.8
Vendor technical support	2.3
Training	2.0

Price: OS: *$102/month (library Mod II)—$300/month (compiler-H extended).*
CIRCLE 384 ON READER CARD

General Ledger
Honeywell Information Systems, Inc.
Standard general ledger system for HIS *Series 60, 600, 6000, and Level 66 computers.*

Users reporting	5
Overall satisfaction	2.6
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	2.4
Documentation	2.6
Vendor technical support	2.6
Training	2.3

Price: $2,599.
CIRCLE 385 ON READER CARD

General Ledger (S/3)
IBM Corp. GSD
Generalized package to run on IBM *System/3.*

Users reporting	14
Overall satisfaction	2.7
Throughput/efficiency	2.4
Ease of installation	2.4
Ease of use	2.8

This terminal is fast, bilingual, and can chart a course.

The AJ 860. Quite probably the most highly featured desktop teleprinter terminal you can buy. And now you can buy a lot more including 1200 baud, APL, and graphics.

High speed operation. Now you can have 110 to 600 baud operation in 103 mode as standard. You can upgrade to 1200 baud in either 103 or 202S mode whenever you wish.

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This is all in addition to the long list of standard features that have made the AJ 860 so popular: 128 character ASCII code set, dual gate forms tractor, easy-to-use sculptured keyboard, 17-key numeric pad, complete forms control, RS 232 line interface, mobility, and more.

Get full details on the AJ 860. Call your nearest AJ sales office. Or write Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, California 95131, (408) 263-8520.

In Europe: Anderson Jacobson S.A., 14 rue Leon Gambetta, 92120 Montrouge, France, telephone 654 10 10; Anderson Jacobson Ltd., Shepperton, Middlesex, U.K., TW178AP, telephone Walton-on-Thames 44439

The AJ 860. It's got it all.

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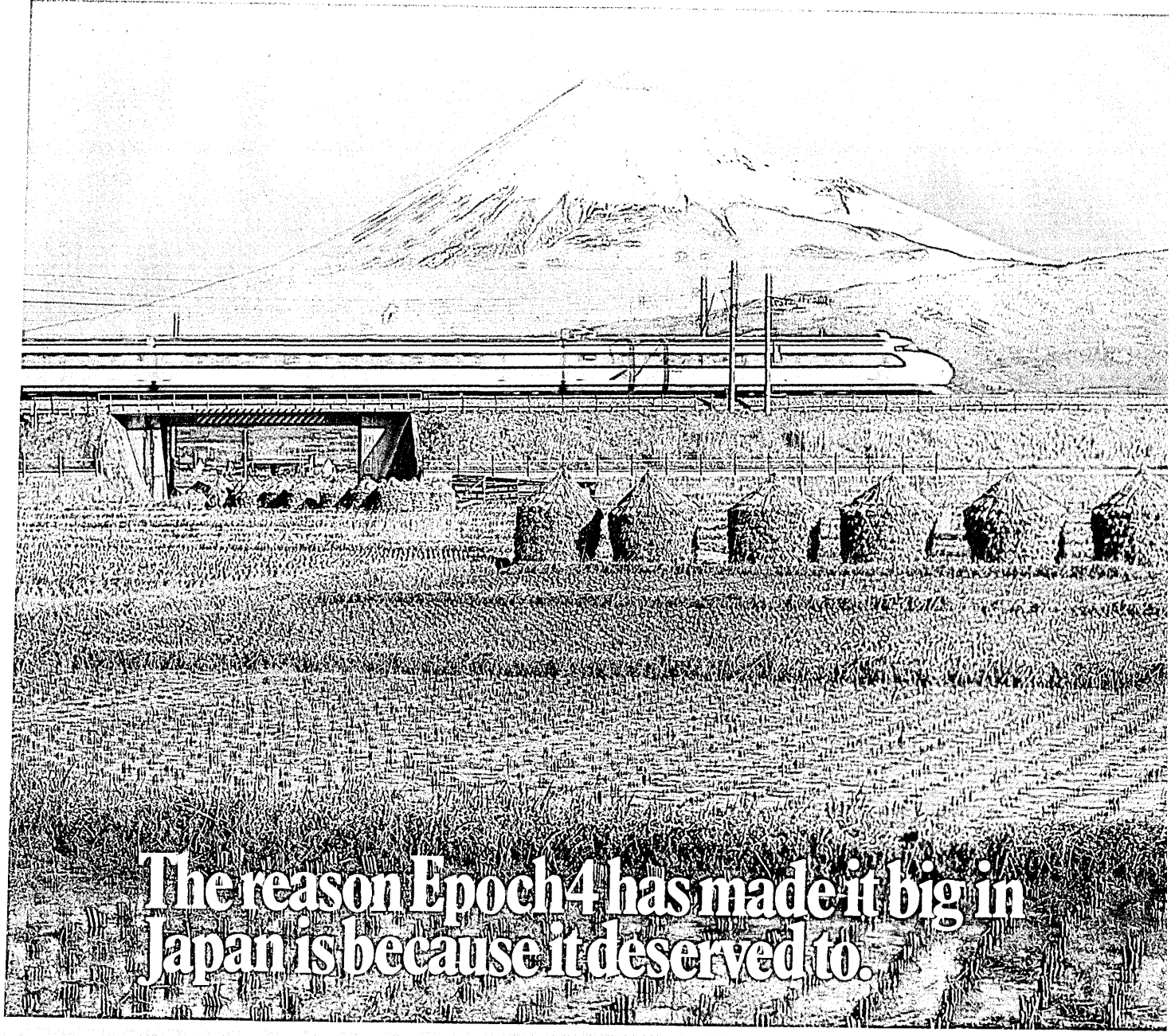
CIRCLE 102 ON READER CARD



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When we introduced Epoch 4 several years ago, we felt like we had a good thing. Now, after billions of error-free passes have been made with Epoch 4, operators know they have a good thing.

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Epoch 4 is known everywhere for its consistency and reliability. And it should be, because every reel is fully certified for use through 6250 CPI.

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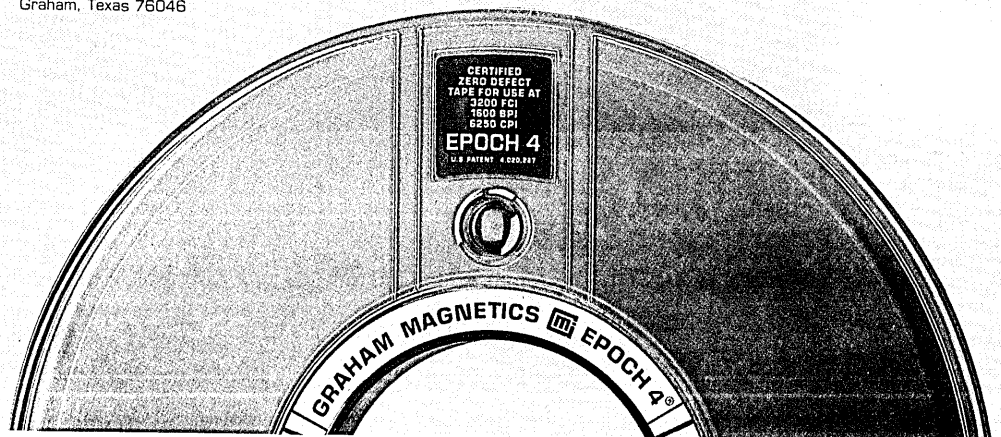
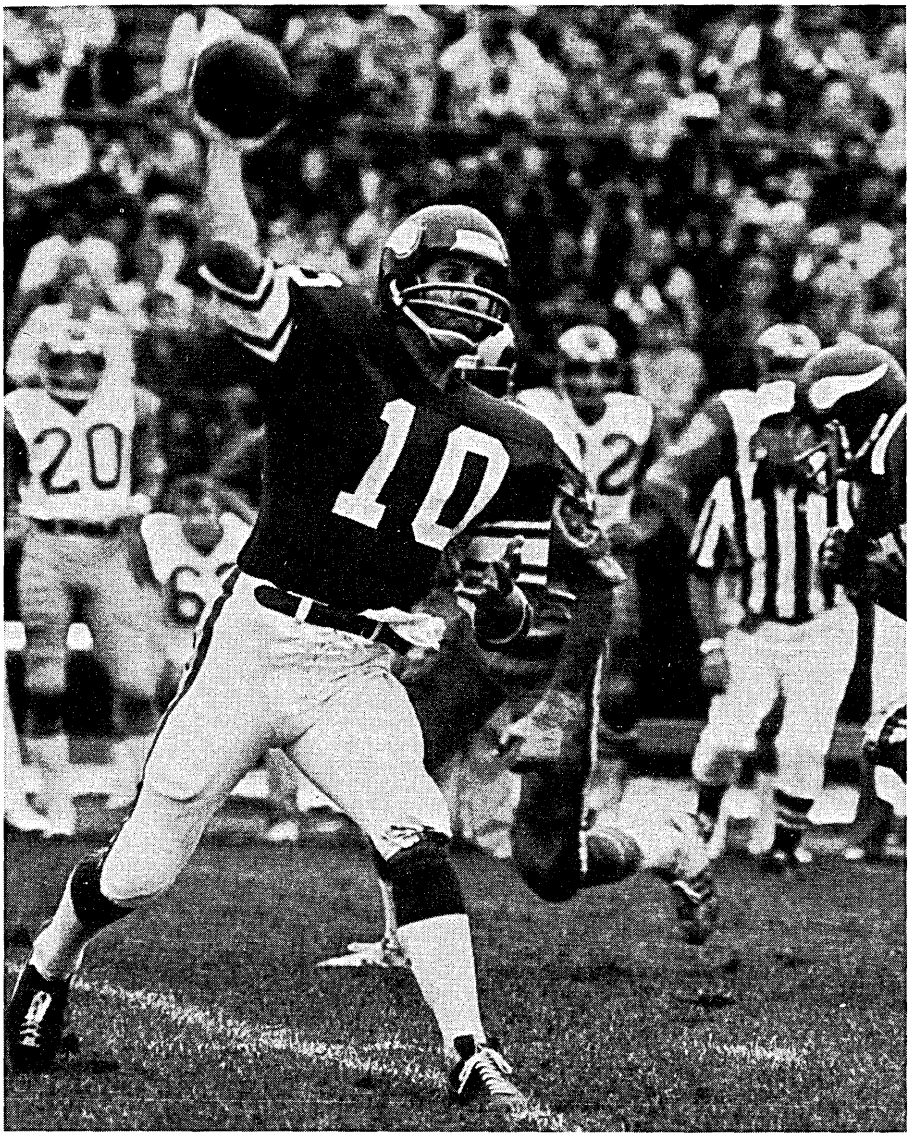


CIRCLE 64 ON READER CARD

"Avoiding payroll problems requires more than a quick release."



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No matter what size, or how your organization is structured, or how many payrolls you have to pay, MSA's Payroll Accounting System can handle it. Any type of employee can be paid through any one of a variety of pay periods and you can process different payroll units at different times. To keep track, you can produce specialized reports designed to your specifications without any extra programming. You have complete flexibility in deductions, tax withholdings and automatic deposits. The system also has standard provisions for handling Federal Unemployment, State Unemployment and Disability Insurance. And this system can be combined with MSA's Personnel Management and Reporting System to provide improved employer-employee relationships.

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RATINGS

Documentation	2.6
Vendor technical support	2.4
Training	1.6

Price: $59/month for 12 months.
CIRCLE 386 ON READER CARD

General Ledger
Infonational, Inc.
In ANSI COBOL *to run on most mainframes.*

Users reporting	7
Overall satisfaction	3.3
Throughput/efficiency	2.4
Ease of installation	2.9
Ease of use	3.1
Documentation	3.1
Vendor technical support	2.8
Training	3.0

Price: $30,000 plus $2,400/year maintenance.
CIRCLE 387 ON READER CARD

General Ledger
Management Science America (MSA)
In ANSI COBOL *to run on most mainframes.*

Users reporting	29
Overall satisfaction	2.9
Throughput/efficiency	2.1
Ease of installation	2.2
Ease of use	2.4
Documentation	2.8
Vendor technical support	2.5
Training	2.5

Price: $34,000-$55,000. Includes one year maintenance.
CIRCLE 388 ON READER CARD

General Ledger
NCR Corp.
Generalized system for use on Century and Criterion series.

Users reporting	22
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	3.1
Documentation	2.9
Vendor technical support	2.8
Training	2.7

Price: $250 initial license fee plus $5/month.
CIRCLE 389 ON READER CARD

General Ledger
Software International Corp.
In ANSI COBOL *to run on most mainframes.*

Users reporting	25
Overall satisfaction	3.2
Throughput/efficiency	2.6
Ease of installation	2.6
Ease of use	2.9
Documentation	2.5
Vendor technical support	2.9
Training	2.8

Price: $27,500 (DOS)*—$32,500* (OS)*. Maintenance: 10% of sales price, after first year.*
CIRCLE 390 ON READER CARD

GRASP
SDI
Spooling enhancement to IBM *360/370* DOS *and* DOS/VS*; two versions available.*

Users reporting	50
Overall satisfaction	3.5
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.4
Documentation	3.1
Vendor technical support	3.1
Training	3.0

Vendor will not release price.
CIRCLE 391 ON READER CARD

HCS
IBM Corp. DPD
Hospital patient accounting and billing system for IBM *370* DOS/VS *systems with* CICS/DOS.

Users reporting	12
Overall satisfaction	2.7
Throughput/efficiency	2.4
Ease of installation	1.8
Ease of use	2.6
Documentation	2.0
Vendor technical support	2.3
Training	2.1

Price: $800 for 12 months (OS/*Accounting).*
CIRCLE 392 ON READER CARD

HEMS (Hospital Finance Management System)
IBM Corp. GSD
A disc-based patient accounting and financial control system for System/3 and System/32 small hospital users.

Users reporting	7
Overall satisfaction	3.0
Throughput/efficiency	2.6
Ease of installation	3.0
Ease of use	3.0
Documentation	2.9
Vendor technical support	2.8
Training	2.5

Price: $148/month for 4-module package. $31-$51 month for each module.
CIRCLE 393 ON READER CARD

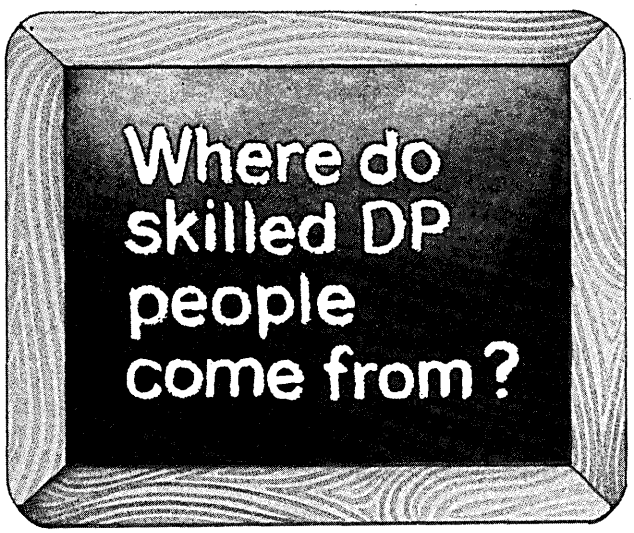
IDMS
Cullinane Corp.
Data base management system for IBM *360/370, Univac systems, and* DEC PDP-*11.*

Users reporting	16
Overall satisfaction	3.5
Throughput/efficiency	3.2
Ease of installation	3.5
Ease of use	3.1
Documentation	3.0
Vendor technical support	3.8
Training	3.5

Price: $42,000 plus $4,200/year renewal fee.
CIRCLE 394 ON READER CARD

IMAGE
Hewlett-Packard Co.
Data base management system; versions available for H-P *1000 and 3000 series computers.*

Users reporting	24
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.5
Documentation	3.1
Vendor technical support	3.1
Training	3.1



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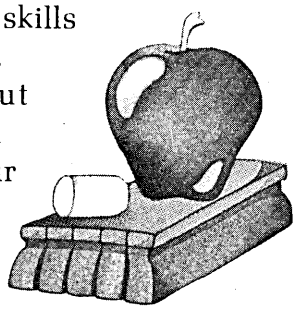

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CIRCLE 395 ON READER CARD

IMS (Inventory Management System)
Honeywell Information Systems, Inc.
An inventory management system that provides bill of material processing and related functions on HIS *Series 60, 2000, 6000, and Level 66 computers.*

Users reporting	9
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	2.6
Ease of use	2.7
Documentation	2.4
Vendor technical support	1.7
Training	2.6

Price: Series 2000, fully paid license fee: inventory reporting/bill of material processor, $4,568. Material requirement planning/resource inventory planning, $7,481. Standard cost control, $2,284.
CIRCLE 396 ON READER CARD

IMS
IBM Corp. DPD
Data base management system for IBM *360/370* OS *and* OS/VS; *several versions available.*

Users reporting	28
Overall satisfaction	2.8
Throughput/efficiency	2.4
Ease of installation	2.5
Ease of use	2.6
Documentation	2.7
Vendor technical support	3.1
Training	2.9

Price: $950/month (VS). *With data communication feature $981/month.*
CIRCLE 397 ON READER CARD

IMSL Subroutine Libraries
IMSL, Inc.
Math and statistical subroutines, available for most general purpose computing systems.

Users reporting	23
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.1
Ease of use	3.2
Documentation	3.4
Vendor technical support	3.3
Training	2.3

Price: commercial sales, $1,220, first year license, $2,370 for two years, $3,460 for three years. Universities: $980 (first year), $1,900 (two years), $2,775 (three years). Prices include maintenance.
CIRCLE 398 ON READER CARD

Installment Loan System
Florida Software Services, Inc.
Multiple-bank installment loan accounting for IBM *360/370, Burroughs,* NCR, *and Honeywell computers.*

Users reporting	7
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	2.9
Ease of use	3.0
Documentation	2.7
Vendor technical support	2.9
Training	3.5

Price: $15,700-$21,500. Includes six months maintenance; thereafter, $1,600/year.
CIRCLE 399 ON READER CARD

Intercomm
Informatics, Inc.
Data communications monitor for IBM *360/370* OS *and* OS/VS *systems.*

Users reporting	6
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.2
Ease of use	2.5
Documentation	2.3
Vendor technical support	2.3
Training	2.3

Price: $36,000 (basic package). Includes one year maintenance.
CIRCLE 400 ON READER CARD

INVEN/3
IBM Corp. GSD
Inventory management system for IBM *System/3.*

Users reporting	6
Overall satisfaction	3.5
Throughput/efficiency	2.0
Ease of installation	3.0
Ease of use	3.4
Documentation	2.5
Vendor technical support	2.5
Training	2.5

Price: $300/month for 12 months.
CIRCLE 401 ON READER CARD

Inventory Control
NCR Corp.
For use on NCR *Century series and Criterion series.*

Users reporting	5
Overall satisfaction	3.2
Throughput/efficiency	3.2
Ease of installation	2.8
Ease of use	3.4
Documentation	3.4
Vendor technical support	3.4
Training	3.2

Price: $480 initial license fee plus $20/month.
CIRCLE 402 ON READER CARD

IPICS
IBM Corp. GSD
Initial production inventory control system for System/3.

Users reporting	26
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.4
Ease of use	2.8
Documentation	2.2
Vendor technical support	2.5
Training	2.3

Price: $350/month (production control) for 12 months. Modules from $60/month.
CIRCLE 403 ON READER CARD

(Ratings continue on page 146)

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ISC
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$995

Unretouched photograph of screen

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RATINGS

IPR
NCR Corp.
An in-patient records control system.

Users reporting	8
Overall satisfaction	3.0
Throughput/efficiency	2.3
Ease of installation	2.9
Ease of use	2.9
Documentation	2.1
Vendor technical support	2.0
Training	2.6

Price: $250 initial license fee plus $10/month.
CIRCLE 404 ON READER CARD

IPS
Burroughs Corp.
Item Processing System designed for various banking environments; versions for several Burroughs configurations.

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	3.5
Ease of installation	3.0
Ease of use	3.2
Documentation	2.3
Vendor technical support	2.8
Training	2.5

Price: $9,000-$50,000, plus $450-$2,500 annual maintenance.
CIRCLE 405 ON READER CARD

IRP (S/3)
IBM Corp. GSD
Inventory and requirements planning for the System/3.

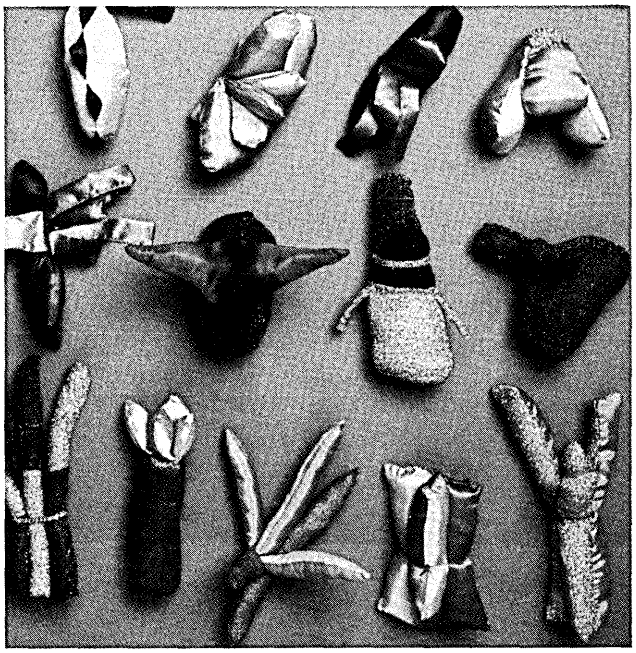
Users reporting	8
Overall satisfaction	2.8
Throughput/efficiency	2.9
Ease of installation	2.5
Ease of use	2.6
Documentation	2.1
Vendor technical support	2.8
Training	2.1

Price: $
CIRCLE 406 ON READER CARD

JAS/3
IBM Corp. GSD
Critical path method project planning and supervising for disc System/3.

Users reporting	6
Overall satisfaction	3.0
Throughput/efficiency	3.7
Ease of installation	2.7
Ease of use	2.7
Documentation	2.2
Vendor technical support	2.2
Training	3.0

Price: $82/month.
CIRCLE 407 ON READER CARD



JASPER
Datachron Corp.
Job accounting and performance analysis for IBM *360/370* OS, DOS, *and* VS, *or* EDOS *operating systems.*

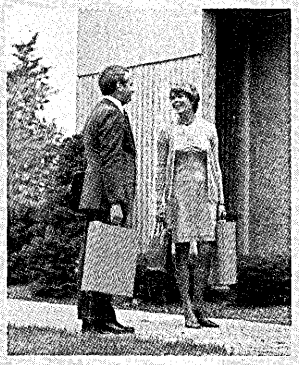
Users reporting	10
Overall satisfaction	3.7
Throughput/efficiency	3.1
Ease of installation	3.4
Ease of use	3.3
Documentation	2.8
Vendor technical support	3.0
Training	2.8

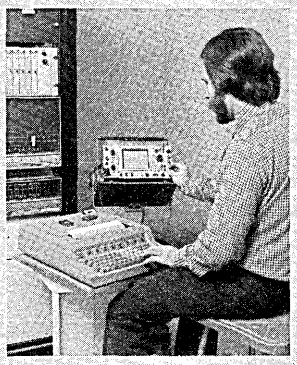
Price: $5,000-$6,000. Includes one year maintenance; 12% of sales price yearly thereafter.
CIRCLE 408 ON READER CARD

Job Accounting (DOS)
Johnson Systems, Inc.
Job accounting and resource measurement for IBM *360/370* DOS *or* DOS/VS.

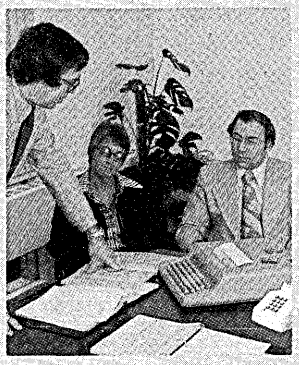
Users reporting	21
Overall satisfaction	3.3

Smartest Move Yet!


for newspaper reporters


for field diagnostics

for programmers


for sales representatives

CDI has conceived the smartest move yet for terminal users . . . the Miniterm 1205 *Portable* ASR!

Incredibly, in one compact package the 1205 offers a portable, micro-processor-based terminal with removable storage media and off-line editing capabilities that rival some of the most sophisticated word-processing systems.

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25 North Avenue
Burlington, MA 01803
(617)273-1550
Telex: 94-9398

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The Versatile Generation.

Infoton's new generation of low price terminals does it all. The incredibly versatile 200 and 400 give you a choice of options unmatched in the industry.

Model 200 is a beautiful example. It is a Teletype compatible terminal with roll or page mode of operation. A detachable keyboard of solid state construction guarantees 100 million operations...ten times the performance of most mechanical keyboards. And the keyboard comes in five different configurations plus export versions to suit users' unique requirements. Other outstanding features include 9 x 9 dot matrix, addressable cursor, EIA and current loop interfaces and non-destructive forward and back spacing.

The 400 has everything the 200 has...and more. Built around the Z-80 microprocessor, it allows software designers to expand programs as needed without additional hardware. Capabilities include complete formating and editing with block mode transmission. Also character mode for normal log-in procedures or straight character operation.

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Infoton

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(617) 272-6660

For full facts, just contact any of the Infoton offices below:
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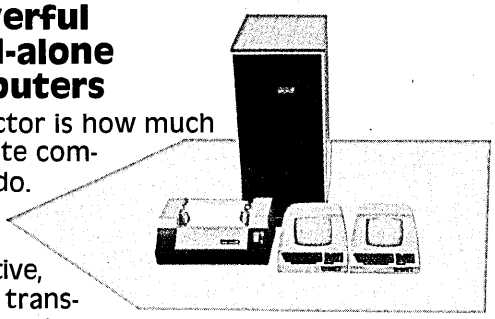
Introducing Basic/Four distributed data processing.

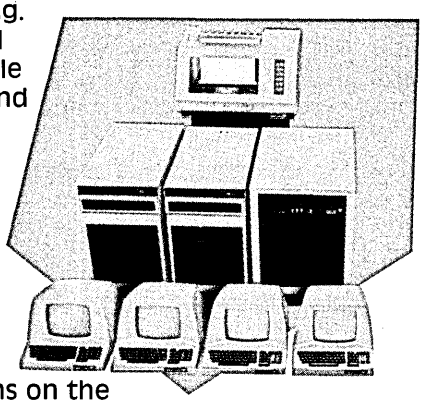
Right system, right price!

The right system should make each remote location an independent data processing center. That's what Basic/Four® computers do. And at the right price. Because there's a model to meet the exact needs of each location.

Powerful stand-alone computers



The key factor is how much each satellite computer can do. Basic/Four computers are interactive, for instant transaction processing. Each is powerful enough to handle all accounting and payroll for each location, plus its specialized function–manufacturing, distribution, warehousing, whatever.

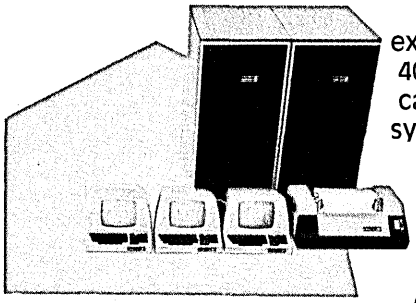


No more costly time-drains on the host computer. No more waiting for processing.

Easy to install, program, use

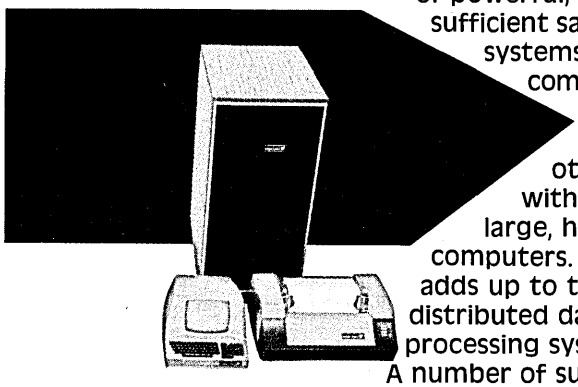
The data processing needs of your remote locations are like those of an independent business. And that's our specialty!

We offer proven software packages, with special application modules that are easily adapted to your particular needs. The language is BUSINESS BASIC, so programming is a snap. So is operation: we can teach a clerk to run a system in less than a day.



After 6 years experience, with some 4000 installations, we can put in Basic/Four systems fast.

We talk to IBM all the time



Our tie-in capability means your network of powerful, self-sufficient satellite systems can communicate with each other, and with most large, host computers. That adds up to the ideal distributed data processing system. A number of such Basic/Four systems are up and running in the U.S. and abroad.

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Basic/Four Systems are also marketed in more than 30 foreign countries.

Throughput/efficiency	3.0
Ease of installation	3.1
Ease of use	2.9
Documentation	3.0
Vendor technical support	2.8
Training	2.6

Price: $4,000. Options: $1,500 (POWER VS)—$3,000 (CICS interface).
CIRCLE 409 ON READER CARD

Job Accounting (OS)
Johnson Systems, Inc.
Same functions as product listed above, but for use with OS or OS/VS systems.

Users reporting	10
Overall satisfaction	3.5
Throughput/efficiency	2.7
Ease of installation	3.6
Ease of use	3.4
Documentation	2.9
Vendor technical support	2.7
Training	2.8

Price: $6,000. Options: $1,000 (summarization) — $4,000 (CICS interface).
CIRCLE 410 ON READER CARD

Job Accounting
Westinghouse Electric Corp.
Job accounting for IBM 360/370 DOS or DOS/VS.

Users reporting	11
Overall satisfaction	3.2
Throughput/efficiency	3.4
Ease of installation	3.1
Ease of use	3.4
Documentation	2.8
Vendor technical support	3.0
Training	—

Price: $1,500 plus $250/year maintenance.
CIRCLE 411 ON READER CARD

LIBRA
Datachron Corp.
Partition cpu usage monitor for DOS/VS users of IBM 370.

Users reporting	10
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.4
Ease of use	3.5
Documentation	3.6
Vendor technical support	3.4
Training	3.5

Price: $2,150. Includes first year maintenance, 12% of sales price thereafter.
CIRCLE 412 ON READER CARD

LIBRARIAN
Applied Data Research, Inc.
A source program management system with batch and on-line retrieval capabilities.

Users reporting	103
Overall satisfaction	3.7
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.5
Documentation	3.3
Vendor technical support	3.0
Training	3.1

Price: $2,550-$4,900 (DOS), $5,800 (OS).
CIRCLE 413 ON READER CARD

LIFE/70
TCC, Inc.
A life insurance company management information system for IBM 360/370 users.

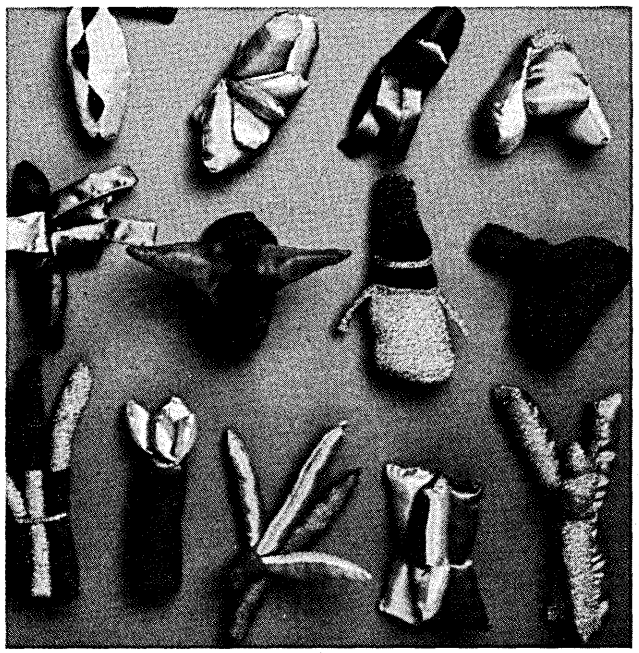
Users reporting	6
Overall satisfaction	2.7
Throughput/efficiency	2.4
Ease of installation	2.3
Ease of use	2.2
Documentation	2.5
Vendor technical support	2.5
Training	2.3

Vendor will not release price.
CIRCLE 414 ON READER CARD

LOOK
Applied Data Research Corp.
A system performance measurement tool for measuring cpu usage, I/O and paging activity, and core utilization.

Users reporting	10
Overall satisfaction	3.6
Throughput/efficiency	3.5
Ease of installation	3.9
Ease of use	3.9
Documentation	3.2
Vendor technical support	3.2
Training	2.8

Price: per cpu, $4,800 (MVT, SVS, BFI)—$6,000 (MVS).
CIRCLE 415 ON READER CARD



Manufacturing Management Package (S/32)
IBM Corp. GSD
Management control and accounting package for the System/32.

Users reporting	7
Overall satisfaction	3.4
Throughput/efficiency	2.4
Ease of installation	3.3
Ease of use	3.4
Documentation	3.4
Vendor technical support	3.4
Training	3.0

Price: $295 (total package). 18 modules $28-$55 each.
CIRCLE 416 ON READER CARD

MARK IV
Informatics, Inc.
Data management system for any IBM 360/370; optional interfaces to IMS, DL/1, and TOTAL.

Users reporting	47
Overall satisfaction	3.3
Throughput/efficiency	2.7
Ease of installation	3.4
Ease of use	3.3
Documentation	2.9
Vendor technical support	2.9
Training	2.9

Price: $12,000-$41,000 without options, U.S. and Canada. Includes installation, training, and first year maintenance.
CIRCLE 417 ON READER CARD

Material Requirements Planning (MRP)
IBM Corp. GSD
Designed for use on System/3.

Users reporting	7
Overall satisfaction	2.7
Throughput/efficiency	2.1
Ease of installation	2.6
Ease of use	2.7
Documentation	2.3
Vendor technical support	2.4
Training	2.3

Price: $185.
CIRCLE 418 ON READER CARD

MetaCOBOL
Applied Data Research Corp.
A COBOL metacompiler with a preprocessor and library of programmed procedures.

Users reporting	5
Overall satisfaction	3.6
Throughput/efficiency	3.2
Ease of installation	3.2
Ease of use	3.2
Documentation	3.2
Vendor technical support	3.2
Training	2.8

Price: $12,500-$25,500 (DOS); $15,000-$31,500 (OS).
CIRCLE 419 ON READER CARD

MIIS Operating System
Medical Information Technology, Inc. (MEDITECH)
Time-sharing executive and interpretive information system; runs on PDP-11, -15, Data General complete line, and IBM Series/1. Written in a dialect of MUMPS.

Users reporting	6
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.8
Ease of use	3.7
Documentation	2.5
Vendor technical support	3.4
Training	2.8

Price: $15,000 plus $150/month maintenance.
CIRCLE 420 ON READER CARD

Minicomm
Informatics, Inc.
Display monitor that competes with IBM's CICS/Entry.

Users reporting	7
Overall satisfaction	4.0
Throughput/efficiency	3.9
Ease of installation	3.7
Ease of use	4.0
Documentation	2.9
Vendor technical support	3.1
Training	3.4

Price: $8,500 (without options).
CIRCLE 421 ON READER CARD

MTCS
IBM Corp. DPD
Minimum Teleprocessing Communications System.

Users reporting	11
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	2.8
Ease of use	3.0
Documentation	1.9
Vendor technical support	2.5
Training	2.1

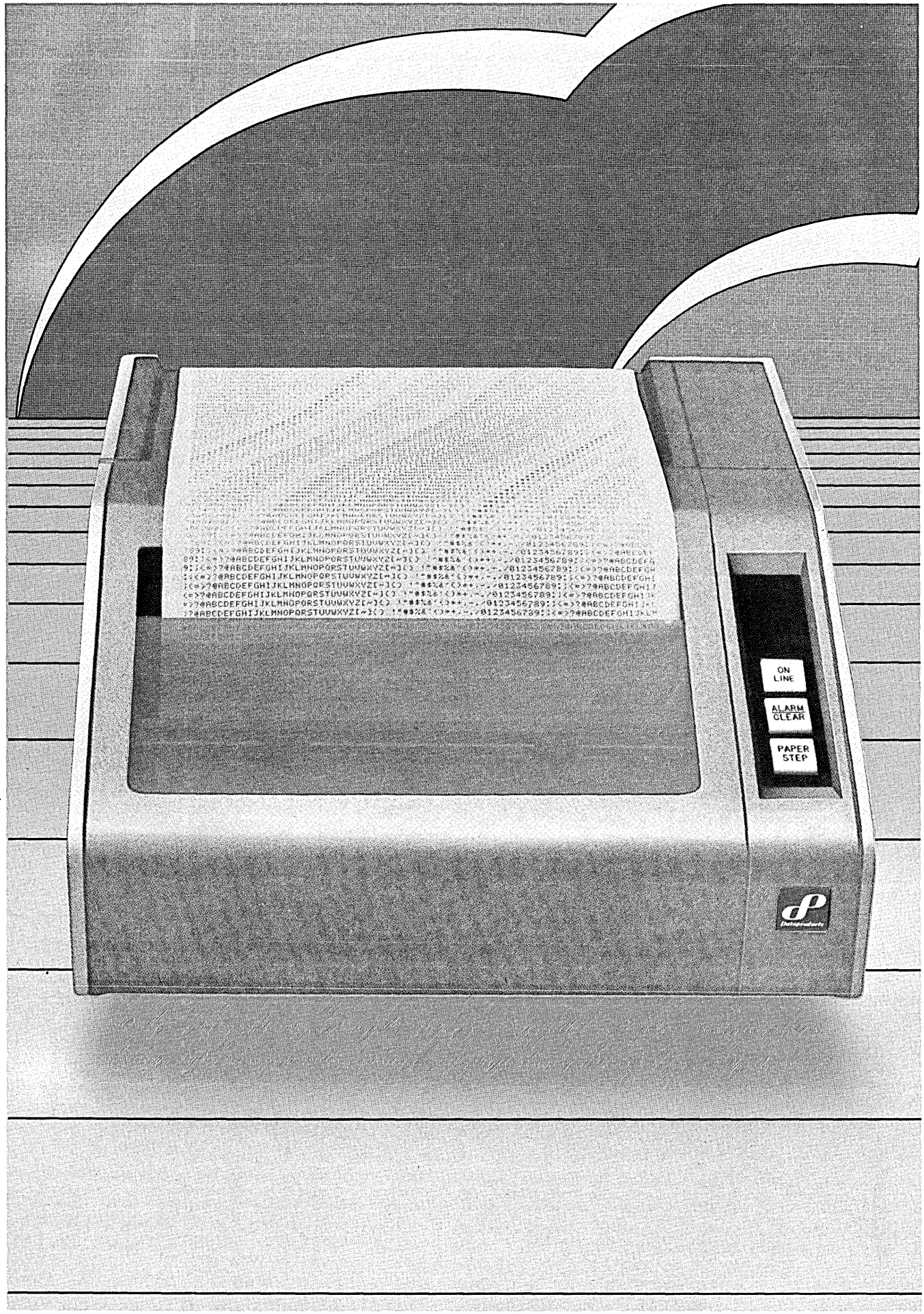
Price: $427 for 12 months (370 version).
CIRCLE 422 ON READER CARD

NDL
Burroughs Corp.
Network Definition Language that enables the definition and generation of customized controller programs for use on most B Series computers.

Users reporting	29
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.2
Ease of use	3.2
Documentation	2.5
Vendor technical support	2.3
Training	2.4

Price: $4,000, plus $400/year maintenance.
CIRCLE 423 ON READER CARD

Nichols Project Management System
Nichols & Co.
Project planning and control system for IBM 360/370, Honey-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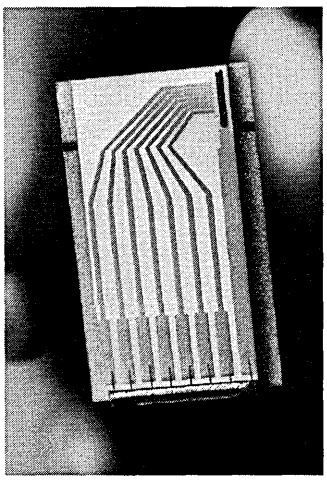
PAPER STEP

DATAPRODUCTS' NEW ERA T-80 THERMAL PRINTER:

80 CPS FOR THE PRICE OF 30.



Dataproducts' New Era T-80 thermal printer is nearly three times faster than other thermal printers.

Yet it costs about the same.

What's more, the T-80 offers you Dataproducts dependability, assured by a smartly conservative design, a unique solid-state print head, and a minimum of moving parts.

Noise, too, has been minimized.

The quiet T-80 hums at 80 cps, so it can be seen but barely heard.

And head changing is a snap.

Any operator can put in one of our incredibly small, self-cooling heads in a snappy 10 seconds.

Our New Era T-80 thermal printer, with its parallel or optional RS-232-C interface, is ready to tie into your CRT, your terminal, or your processor.

The T-80: fast, inexpensive, quiet, and reliable.

Altogether, an unbeatable combination.

Dataproducts

THE PRINTER COMPANY

NORTH AMERICAN SALES HQ: 6219 De Soto Avenue, Woodland Hills, CA 91365, (213) 887-8451; Telex 69-8492.
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well, Burroughs, and DEC*system 10 computers; also known as* PROCON.

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	2.3
Ease of installation	2.3
Ease of use	2.5
Documentation	2.4
Vendor technical support	2.5
Training	2.7

Price: $18,500. Includes installation, training, and first year maintenance and enhancements.
CIRCLE 424 ON READER CARD

OPTIMIZER II
Capex Corp.
Optimizes object code of IBM *360/370* ANSI COBOL *programs under* OS *and* OS/VS *systems.*

Users reporting	14
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.5
Ease of use	3.7
Documentation	3.0
Vendor technical support	3.2
Training	3.3

Price: $6,000-$21,000. Includes first year maintenance; thereafter, $720-$2,520/year.
CIRCLE 425 ON READER CARD

ORBIT
NCR Corp.
Wholesale and distribution management control system for Century Series and Criterion Series.

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	2.0
Ease of installation	2.2
Ease of use	2.8
Documentation	2.4
Vendor technical support	1.8
Training	1.8

Price: $750 initial license fee plus $10/month, retail. Wholesale: $480 plus $20/month.
CIRCLE 426 ON READER CARD

OS/8
Digital Equipment Corp. (DEC)
Tape or disc operating system for batch or interactive PDP-8 *systems (8K or larger).*

Users reporting	6
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.0
Documentation	2.7
Vendor technical support	2.5
Training	3.5

Price: $440 plus $175/year maintenance.
CIRCLE 427 ON READER CARD

OS32/MT
Interdata, Inc.
Real-time, multitask, multiprogramming operating system for 32-bit Interdata minicomputers.

Users reporting	7
Overall satisfaction	2.3
Throughput/efficiency	2.0
Ease of installation	2.6
Ease of use	2.0
Documentation	2.1
Vendor technical support	1.9
Training	2.0

Price: $5,000-$5,300.
CIRCLE 428 ON READER CARD

PAN*DA
Pansophic Systems, Inc.
Direct access space management and control system for most IBM *360/370-supported direct access devices.*

Users reporting	6
Overall satisfaction	3.5
Throughput/efficiency	3.2
Ease of installation	3.5
Ease of use	3.3
Documentation	2.8
Vendor technical support	2.8
Training	2.7

Price: $6,000.
CIRCLE 429 ON READER CARD

Panvalet
Pansophic Systems, Inc.
Program library maintenance system for any IBM *360/370; on-line version also available.*

Users reporting	139
Overall satisfaction	3.6
Throughput/efficiency	3.5
Ease of installation	3.4
Ease of use	3.5
Documentation	3.3
Vendor technical support	3.1
Training	2.9

Price: $4,980 (DOS)*—$5,980* (OS). *Special "entry market" price (for 360/40 and smaller, and 370/125 and smaller): $2,980* (OS *or* DOS).
CIRCLE 430 ON READER CARD

Payroll
Florida Software Services, Inc.
General purpose payroll system for IBM *360/370, Burroughs,* NCR, *and Honeywell computers.*

Users reporting	8
Overall satisfaction	3.5
Throughput/efficiency	2.9
Ease of installation	3.6
Ease of use	3.6
Documentation	3.6
Vendor technical support	3.4
Training	3.0

Price: $9,400-$14,800. Includes six months maintenance; thereafter, $450/year.
CIRCLE 431 ON READER CARD

Payroll
Honeywell Information Systems, Inc.
For Honeywell Series 60, Level 61 and Level 62 systems.

Users reporting	7
Overall satisfaction	2.7
Throughput/efficiency	2.4
Ease of installation	2.3
Ease of use	2.4
Documentation	2.0
Vendor technical support	2.3
Training	2.0

Price: $1,496 (Level 61)—$1,969 (Level 62).
CIRCLE 432 ON READER CARD

Payroll (S/3)
IBM Corp. GSD
Generalized payroll system for small-to-medium payrolls; runs on System/3.

Users reporting	38
Overall satisfaction	2.9
Throughput/efficiency	2.8
Ease of installation	2.8
Ease of use	2.8
Documentation	2.9
Vendor technical support	2.8
Training	2.5

Price: $80-$150/month for 12 months.
CIRCLE 433 ON READER CARD

Payroll
Management Science America (MSA)
For any IBM *360/370 or Burroughs B 3500 or larger system.*

Users reporting	59
Overall satisfaction	2.9
Throughput/efficiency	2.6
Ease of installation	2.4
Ease of use	2.6
Documentation	3.2
Vendor technical support	2.8
Training	2.7

Price: $30,000-$45,000. Includes first year maintenance.
CIRCLE 434 ON READER CARD

Payroll
NCR Corp.
Standard payroll system for use on Century and Criterion series.

Users reporting	48
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	3.1
Documentation	2.8
Vendor technical support	2.5
Training	2.5

Price: $250 initial license fee plus $5/month.
CIRCLE 435 ON READER CARD

Payroll
Wang Laboratories, Inc.
For IBM *360/370 and Honeywell Series 60 computers.*

Users reporting	10
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	2.6
Ease of use	3.0
Documentation	3.1
Vendor technical support	2.9
Training	3.2

Price: $2,200-$108,000, depending on modules. Maintenance: $3,000-$12,000.
CIRCLE 436 ON READER CARD

PC/70
Atlantic Software Inc.
An automated project planning and resource measurement system with cost forecasting facilities.

Users reporting	12
Overall satisfaction	2.8
Throughput/efficiency	2.7
Ease of installation	2.9
Ease of use	2.5
Documentation	2.8
Vendor technical support	2.8
Training	2.5

Price: $17,500.
CIRCLE 437 ON READER CARD

PCS
Burroughs Corp.
Production control system; runs on most Burroughs B Series computers.

Users reporting	7
Overall satisfaction	3.4
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.1
Documentation	3.0
Vendor technical support	2.6
Training	3.2

Price: $14,300-$48,336, plus $795-$2,430/year maintenance.
CIRCLE 438 ON READER CARD

PEP
Stockholder Systems, Inc.
Paperless Entry Processing for automatic payment through Automated Clearing House; for IBM *360/370 and Burroughs systems.*

Users reporting	15
Overall satisfaction	3.3
Throughput/efficiency	2.3
Ease of installation	2.6
Ease of use	2.7
Documentation	3.1
Vendor technical support	3.2
Training	2.5

Price: $14,500 (also available through modular pricing). Includes first year maintenance; thereafter, $1,000/year.
CIRCLE 439 ON READER CARD

PI-SORT II
Applied Data Research, Inc.
A standalone, self-relocating, fixed-length sorting program for IBM *360/370* DOS *and* DOS/VS *disc sort users.*

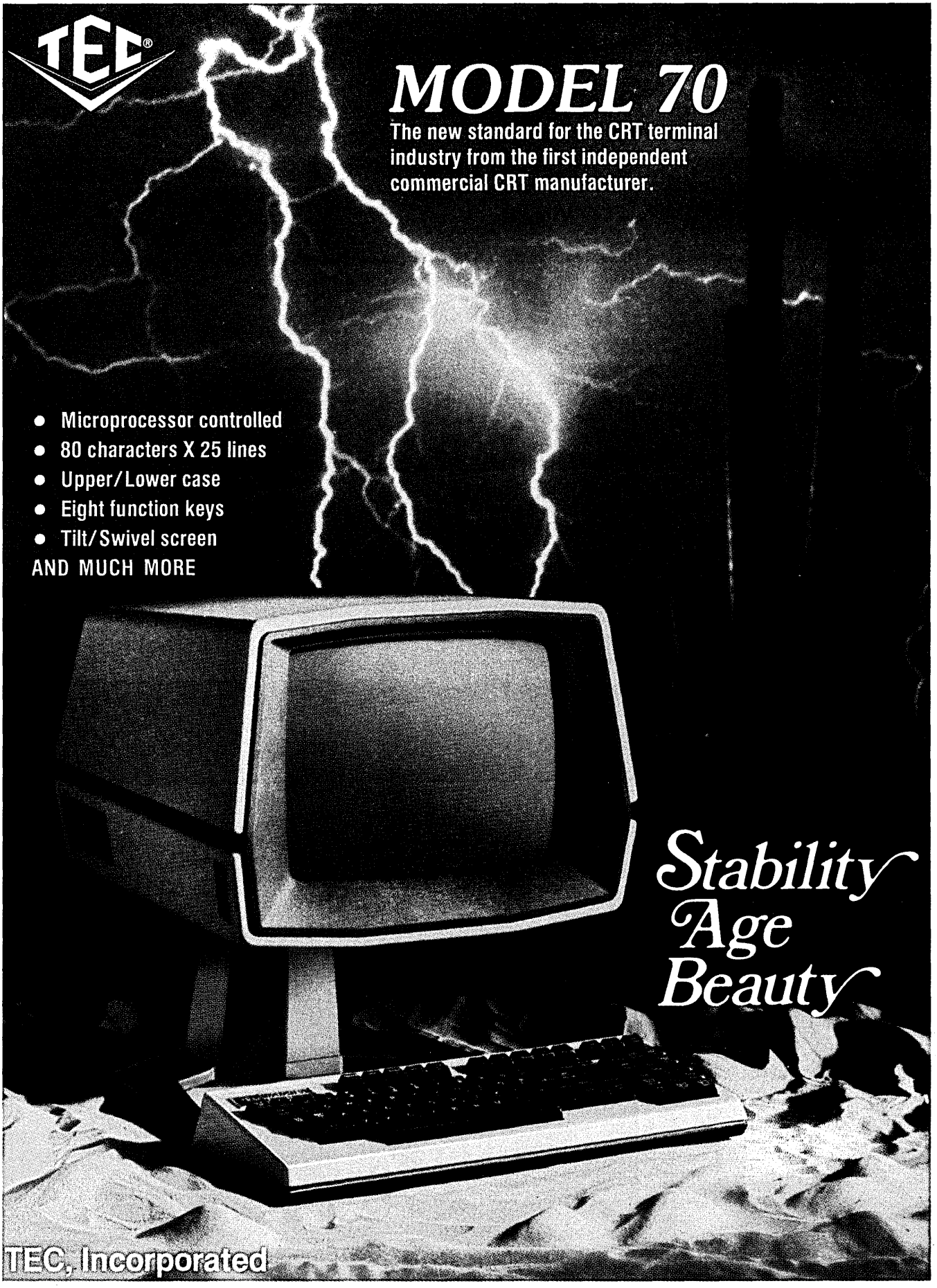
Users reporting	6
Overall satisfaction	3.1
Throughput/efficiency	3.3
Ease of installation	3.4
Ease of use	3.8
Documentation	3.1
Vendor technical support	2.6
Training	3.0

Price: $2,000. Includes one year maintenance.
CIRCLE 440 ON READER CARD

PL/1 Optimizer
IBM Corp. DPD
For IBM *360/370; has automatic optimization.*

Users reporting	14
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.0
Ease of use	3.2
Documentation	3.0
Vendor technical support	3.1
Training	3.0

Price: $210/month (OS)*, optimizing compiler. $45/month* (OS)*, resident library; $28/month* (OS)*, transient library.*
CIRCLE 441 ON READER CARD



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CIRCLE 146 ON READER CARD

RATINGS

PLAN-IV
Capex Corp.
Installation planning, performance evaluation, and management control system with forecasting capabilities for IBM *360/370* OS, OS/VS, *and* MVS *environments.*

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.0
Ease of use	3.0
Documentation	3.0
Vendor technical support	2.8
Training	2.8

Price: $6,500-$7,500, including one year maintenance; annual maintenance thereafter $780-$900. In MVS, *$12,000 plus $1,440/year maintenance after first year.*
CIRCLE 442 ON READER CARD

Plot-10 Advanced Graphics II
Tektronix Inc.
Versatile graphic support routines.

Users reporting	6
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	2.7
Ease of use	3.3
Documentation	2.7
Vendor technical support	2.5
Training	1.0

Price: $850. Requires Plot-10 Terminal Control System.
CIRCLE 443 ON READER CARD

Plot-10 Terminal Control System
Tektronix, Inc.
Graphics package for use with IBM *360/370,* CDC *6000, and* DEC PDP-*10 systems with Tektronix display terminals and plotters.*

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	2.6
Ease of use	3.3
Documentation	3.2
Vendor technical support	3.0
Training	3.0

Price: $750 (one-time license).
CIRCLE 444 ON READER CARD

POWER
IBM Corp. DPD
Spooling supplement to IBM *360/370* DOS; *a* POWER/VS *version is available for* DOS/VS.

Users reporting	6
Overall satisfaction	2.3
Throughput/efficiency	2.5
Ease of installation	2.7
Ease of use	2.5
Documentation	2.5
Vendor technical support	2.8
Training	2.4

Price: $80 for 12 months (VS).
CIRCLE 445 ON READER CARD

Q-PAC (Payroll)
Software International Corp.
Single and multiple payroll system for IBM *360/370* DOS, OS, *and* VS *users.*

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	2.6
Ease of installation	2.3
Ease of use	2.5
Documentation	1.5
Vendor technical support	2.8
Training	2.7

No longer marketed.
CIRCLE 446 ON READER CARD

QUIKJOB II/III
System Support Software, Inc.
File management and report writing system for any IBM *360/370; can handle one or more input files.*

Users reporting	29
Overall satisfaction	3.6
Throughput/efficiency	3.5
Ease of installation	3.7
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.2
Training	3.0

Price: QUIKJOB II, *$3,245;* QUIKJOB III, *$5,445.*
CIRCLE 447 ON READER CARD

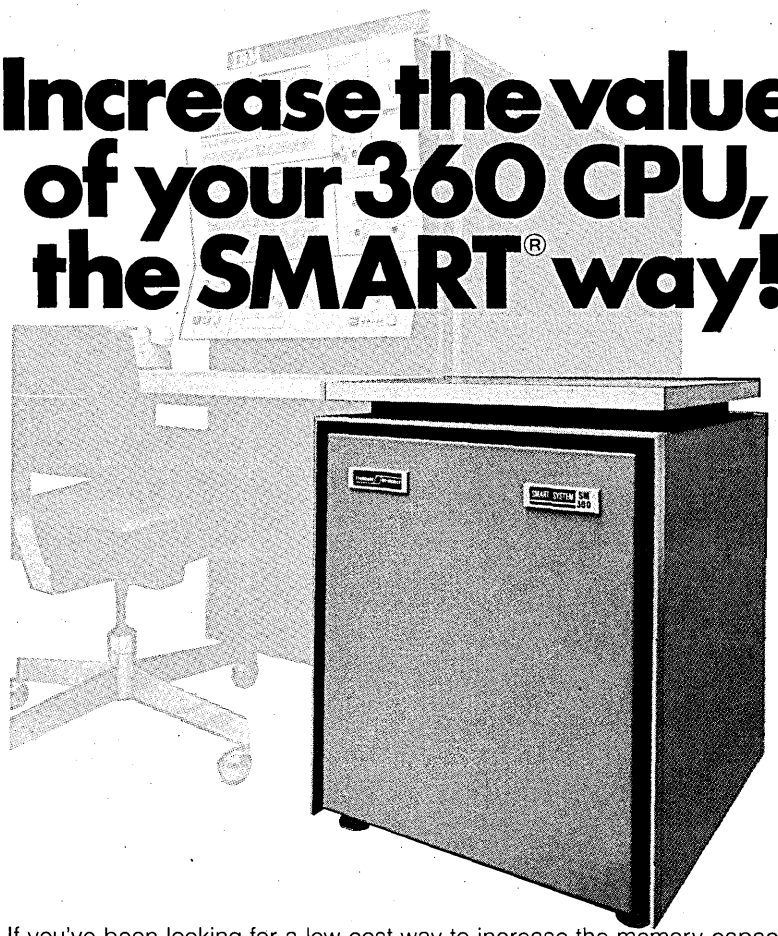
RAMIS II
Mathematica Products Group, Inc.
Data management information and retrieval system; interfaces with IMS; *runs on* IBM *360/370.*

Users reporting	9
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	3.1
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.1
Training	2.8

Price: $34,000 (batch use only), $46,000 (interactive), $84,500 (total package with options). 10% annual maintenance fee after first year.
CIRCLE 448 ON READER CARD

RDOS
Data General Corp.
Real-time disc operating system

Increase the value of your 360 CPU, the SMART® way!



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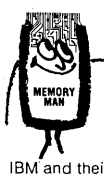

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CIRCLE 136 ON READER CARD

for Nova or Eclipse minicomputers.

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	2.8
Ease of installation	2.3
Ease of use	3.2
Documentation	2.5
Vendor technical support	2.3
Training	2.3

Price: free with purchase of minimum hardware configuration (memory, terminal, disc). Alone: $4,000.
CIRCLE 449 ON READER CARD

REPORTER
Burroughs Corp.
COBOL *source code report preparation system for most Burroughs computers.*

Users reporting	10
Overall satisfaction	3.1
Throughput/efficiency	3.1
Ease of installation	3.3
Ease of use	3.4
Documentation	2.6
Vendor technical support	2.4
Training	2.1

Price: $6,000-$13,000 permanent license, plus $600-$1,300/year maintenance.
CIRCLE 450 ON READER CARD

ROSCOE
Applied Data Research, Inc.
Remote job entry and conversational monitor system for OS *and* OS/VS *operating systems.*

Users reporting	17
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.6
Documentation	2.9
Vendor technical support	3.0
Training	2.8

Price: $28,000-$39,500.
CIRCLE 451 ON READER CARD

RPG
Burroughs Corp.
Standard Burroughs RPG *compiler.*

Users reporting	5
Overall satisfaction	2.8
Throughput/efficiency	3.0
Ease of installation	3.8
Ease of use	3.5
Documentation	1.8
Vendor technical support	2.5
Training	2.0

Price: $50/month.
CIRCLE 452 ON READER CARD

RPG II
IBM Corp. GSD
Standard RPG II *processor for System/3.*

Users reporting	51
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.5
Documentation	3.4
Vendor technical support	3.4
Training	3.3

Price: $37-$89/month.
CIRCLE 453 ON READER CARD

RPG II (S/32)
IBM Corp. GSD
Standard RPG II *processor for System/32.*

Users reporting	8
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.5
Ease of use	3.5
Documentation	3.3
Vendor technical support	2.9
Training	3.7

Price: $27/month.
CIRCLE 454 ON READER CARD

RPG (360/370)
IBM Corp. DPD
Includes DOS, OS, *and* VS *versions.*

Users reporting	51
Overall satisfaction	3.4
Throughput/efficiency	3.3
Ease of installation	3.6
Ease of use	3.4
Documentation	3.2
Vendor technical support	2.8
Training	3.1

Price: $109/month (DOS).
CIRCLE 455 ON READER CARD

RSTS/E
Digital Equipment Corp. (DEC)
Resource-sharing / time-sharing operating system for PDP-*11.*

Users reporting	25
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.0
Ease of use	3.3
Documentation	3.0
Vendor technical support	2.2
Training	2.4

Price: $4,840, plus $1,155/year maintenance.
CIRCLE 456 ON READER CARD

RSX-11M
Digital Equipment Corp. (DEC)
Advanced real-time operating system for PDP-*11.*

Users reporting	32
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	2.6
Ease of use	2.8
Documentation	2.4
Vendor technical support	2.0
Training	2.2

Price: $2,200, plus $1,260/year maintenance.
CIRCLE 457 ON READER CARD

RT-11
Digital Equipment Corp. (DEC)
Foreground/background real-time disc operating system for PDP-*11.*

Users reporting	23
Overall satisfaction	2.9
Throughput/efficiency	2.7
Ease of installation	3.1
Ease of use	3.2
Documentation	2.6
Vendor technical support	1.8
Training	2.2

Price: $1,105, plus $450/year maintenance.
CIRCLE 458 ON READER CARD

RTE III
Hewlett-Packard Co.
Real-time executive operating system for H-P *21*MX *and 2100 series.*

Users reporting	13
Overall satisfaction	3.2
Throughput/efficiency	2.7
Ease of installation	2.7
Ease of use	3.1
Documentation	2.7
Vendor technical support	2.9
Training	2.7

Price: $6,000 (without options).
CIRCLE 459 ON READER CARD

SAS
SAS Institute, Inc.
Statistical Analysis System for IBM *360/370* OS *and* OS/VS.

Users reporting	14
Overall satisfaction	3.6
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.6
Documentation	3.1
Vendor technical support	3.2
Training	2.7

Price: $3,500, first year license; $1,500 annual renewal. Includes maintenance and updates.
CIRCLE 460 ON READER CARD

SAS
Univ. of N. Carolina State
A statistical analysis system for use on the IBM *360/370.*

Users reporting	5
Overall satisfaction	3.2
Throughput/efficiency	2.8
Ease of installation	3.2
Ease of use	3.0
Documentation	2.8
Vendor technical support	3.3
Training	4.0

This version no longer offered by UNCS. *See* SAS *Institute above.*
CIRCLE 461 ON READER CARD

SAVE/RESTORE
Oxford Software Corp.
IBM *360/370* DOS *or* DOS/VS *disc utility, library condenser, etc.*

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	2.3
Ease of installation	3.5
Ease of use	3.5
Documentation	2.8
Vendor technical support	2.8
Training	1.0

Price: $2,000 (DOS)*—$3,000* (DOS/VS). *Includes first year maintenance (10% of purchase price per year thereafter).*
CIRCLE 462 ON READER CARD

SCHOLARS
NCR Corp.
School automated records system for Century Series.

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	2.8
Ease of installation	3.2
Ease of use	2.5
Documentation	3.2
Vendor technical support	2.0
Training	2.3

Price: $12,500.
CIRCLE 463 ON READER CARD

Scholastic Scheduler
Burroughs Corp.
One module of the total Scholastic Support system; for most Burroughs computers.

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	2.7
Ease of installation	2.7
Ease of use	2.7
Documentation	2.0
Vendor technical support	1.3
Training	1.8

Price: $5,000-$7,400, plus $250-$400 annual maintenance.
CIRCLE 464 ON READER CARD

Score
Informatics, Inc.
Multipurpose COBOL *program generator for most mainframes.*

Users reporting	5
Overall satisfaction	2.6
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.0
Documentation	2.4
Vendor technical support	2.2
Training	2.6

Price: $17,500.
CIRCLE 465 ON READER CARD

SLICK
NCI, Inc.
Source program librarian for IBM *360/370 (all operating systems); also maintains object code,* JCL, *data files, and text.*

Users reporting	36
Overall satisfaction	3.5
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.3
Documentation	2.9
Vendor technical support	3.1
Training	2.8

Price: $2,450-$2,950. Includes first year maintenance; optional maintenance thereafter, 12% of purchase price yearly.
CIRCLE 466 ON READER CARD

Software 1040
SAB, Inc.
For preparation of personal income tax form 1040; runs on a variety of minicomputers.

Users reporting	19
Overall satisfaction	3.5
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.6
Documentation	3.3
Vendor technical support	3.7
Training	2.9

Price: $1,600 for the first 400 returns (lease only, on a service basis).
CIRCLE 467 ON READER CARD

SPA System
Singer Business Machines
General accounting, order entry, and inventory control system for System Ten.

Users reporting	5
Overall satisfaction	2.8

Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	3.2
Documentation	2.2
Vendor technical support	1.2
Training	1.0

Price: $9,750 for new enlarged package, STARS II. *Maintenance: $100/month.*
CIRCLE 468 ON READER CARD

SPF (Structured Programming Facility)
IBM Corp. DPD
A programming development tool supporting a VS2 TSO *user with a 24-line 3270 display terminal on an* IBM *370.*

Users reporting	5
Overall satisfaction	4.0
Throughput/efficiency	3.2
Ease of installation	2.8
Ease of use	4.0
Documentation	3.0
Vendor technical support	3.6
Training	3.3

Price: $288/month.
CIRCLE 469 ON READER CARD

SPSS
Carleton College
University-modified version of Statistical Program for Social Sciences.

Users reporting	6
Overall satisfaction	3.2
Throughput/efficiency	3.2
Ease of installation	3.3
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.0
Training	—

Price: academic users, $600; non-profit, $900; commercial, $3,000. Maintenance renewal fee after first year: academic, $300; non-profit, $450; commercial, $1,000.
CIRCLE 470 ON READER CARD

SPSS
Northwestern Univ.
Specially modified CDC *version of* SPSS *from* SPSS, *Inc.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	3.0
Ease of installation	3.0
Ease of use	2.8
Documentation	3.2
Vendor technical support	2.8
Training	2.5

Price: academic, $750 plus $400/year maintenance (after first year); non-profit or government agencies, $1,250, $600 maintenance; commercial, $5,000, $2,000 maintenance.
CIRCLE 471 ON READER CARD

SPSS
SPSS, Inc.
For statistical work in the social sciences on IBM *360/370, Univac,* CDC, *and Xerox Sigma 9 systems.*

Users reporting	48
Overall satisfaction	3.5
Throughput/efficiency	2.9
Ease of installation	3.1
Ease of use	3.4
Documentation	3.4
Vendor technical support	2.9
Training	2.8

Price: commercially, $5,000, includes one year maintenance—optional maintenance renewal $2,000/year. Tax-exempt organizations, $1,500—optional maintenance after one year $800. Academic users (who fill out a user questionnaire), $1,000 plus optional maintenance after one year at $600/year.
CIRCLE 472 ON READER CARD

1130/SORT
DNA Systems Inc.
For IBM *1130 and compatible systems.*

Users reporting	6
Overall satisfaction	3.8
Throughput/efficiency	3.8
Ease of installation	3.8
Ease of use	3.7
Documentation	3.2
Vendor technical support	3.2
Training	4.0

Price: $730. Extended data bases: $200.
CIRCLE 473 ON READER CARD

Sort (S/3)
IBM Corp. GSD
Small sort (disc and/or card versions) for System/3.

Users reporting	44
Overall satisfaction	3.5
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.4
Documentation	3.3
Vendor technical support	3.2
Training	3.0

Price: $10-$45/month (disc); $76-$81 (tape); $15-$30 (CCP).
CIRCLE 474 ON READER CARD

Sort/Merge (360/370)
IBM Corp. DPD
Disc-based sort.

Users reporting	71
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	3.5
Documentation	3.3
Vendor technical support	3.4
Training	3.2

Price: $181/month (OS/VS).
CIRCLE 475 ON READER CARD

SPM (Source Program Maintenance)
IBM Corp. DPD
For IBM *360/370* COBOL *programs; on-line.*

Users reporting	22
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	2.6
Ease of use	3.4
Documentation	2.7
Vendor technical support	2.6
Training	2.6

Price: $150/month.
CIRCLE 476 ON READER CARD

SPRINT
Jason Data Services
Spooling supplement to IBM *360/370* DOS *and* DOS/VS.

Users reporting	7
Overall satisfaction	3.6
Throughput/efficiency	3.7
Ease of installation	3.7
Ease of use	3.4
Documentation	3.1
Vendor technical support	3.1
Training	2.5

Price: $3,300/month-$4,850/month (lease only), plus $150/year maintenance.
CIRCLE 477 ON READER CARD

Stocks & Bonds System
Insurance Systems of America, Inc.
Stocks and bonds portfolio system that runs on IBM *360/370, Univac 90/30, and Honeywell 2000 series; there is a generalized version and an insurance company version.*

Users reporting	7
Overall satisfaction	2.9
Throughput/efficiency	3.0
Ease of installation	2.4
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.7
Training	2.8

Price: $19,000-$34,500.
CIRCLE 478 ON READER CARD

SYNCSORT
Whitlow Computer Systems, Inc.
Efficient OS *or* OS/VS *disc and tape sorting on* IBM *360/370.*

Users reporting	53
Overall satisfaction	3.6
Throughput/efficiency	3.6
Ease of installation	3.3
Ease of use	3.5
Documentation	3.1
Vendor technical support	3.4
Training	3.0

Price: $200/month, $6,200/3 years (no purchase). Includes maintenance and new releases. Additional cpu's, 10% less.
CIRCLE 479 ON READER CARD

System 2000
MRI Systems, Inc.
Generalized data base management system for IBM *360/370, Univac, and* CDC *systems.*

Users reporting	20
Overall satisfaction	3.2
Throughput/efficiency	2.5
Ease of installation	3.0
Ease of use	3.1
Documentation	2.4
Vendor technical support	2.8
Training	2.8

Price: $35,000. Includes first year maintenance.
CIRCLE 480 ON READER CARD

TASK/MASTER
Turnkey Systems, Inc.
Data communications monitor for IBM *360/370.*

Users reporting	16
Overall satisfaction	2.9
Throughput/efficiency	2.8
Ease of installation	2.5
Ease of use	2.9
Documentation	2.4
Vendor technical support	2.9
Training	2.5

Price: $20,000 and up. Includes two years maintenance.
CIRCLE 481 ON READER CARD

TDS
Honeywell Information Systems, Inc.
High-volume Transaction Driven System for on-line processing with Series 60 and Level 66 computers.

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	3.3
Ease of installation	2.7
Ease of use	3.2
Documentation	2.2
Vendor technical support	2.3
Training	2.4

Price: $1,191/month.
CIRCLE 482 ON READER CARD

Text/Editor
Burroughs Corp.
Standard text editing system for most Burroughs computers.

Users reporting	6
Overall satisfaction	3.7
Throughput/efficiency	3.8
Ease of installation	3.8
Ease of use	3.5
Documentation	3.2
Vendor technical support	3.2
Training	3.0

Price: $1,500, plus $175 annual maintenance.
CIRCLE 483 ON READER CARD

TFAST/VS
Oxford Software Corp.
Provides tape management capabilities for IBM *360/370* DOS *or* DOS/VS *systems.*

Users reporting	12
Overall satisfaction	3.3
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	3.3
Documentation	2.5
Vendor technical support	2.8
Training	1.0

Price: $6,250. Maintenance after first year is 10% of purchase price.
CIRCLE 484 ON READER CARD

TOTAL
Cincom Systems, Inc.
Generalized data base management system for use on a variety of systems from minicomputers to large-scale computers.

Users reporting	91
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	3.2
Documentation	2.8
Vendor technical support	2.9
Training	2.9

Price: $13,500 (smaller systems) —$45,000 (OS/MVS). *Includes 4 to 6 man-days on-site support*

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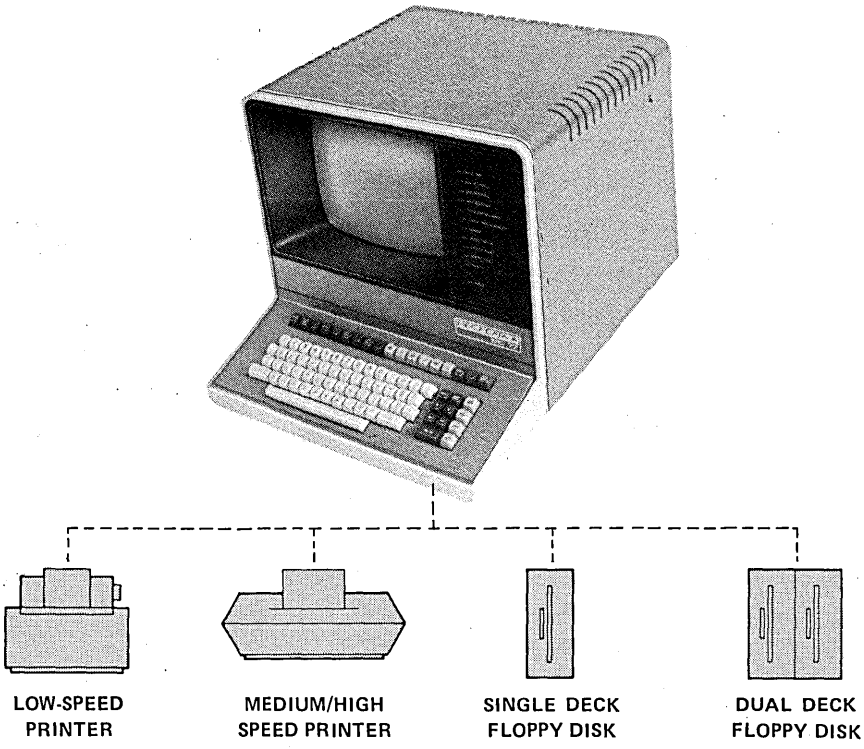

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Encino, California 91316
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CIRCLE 142 ON READER CARD

RATINGS

(training, installation, testing) and first year maintenance. Annual maintenance fee thereafter, $1,000-$2,250.
CIRCLE 485 ON READER CARD

TRI-LIBE
Triplex Systems
Source program library system for any IBM *360/370 with a minimum 32K partition; formerly marketed as* MAXI-LIBE.

Users reporting	6
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.3
Ease of use	3.3
Documentation	2.3
Vendor technical support	3.3
Training	3.0

Price: $2,500. Includes first year maintenance; thereafter, 10% of purchase price yearly.
CIRCLE 486 ON READER CARD

TSO
DNA Systems Inc.
Time-sharing operating system for IBM *1130 and compatible systems.*

Users reporting	6
Overall satisfaction	3.2
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	3.2
Documentation	2.2
Vendor technical support	3.5
Training	1.0

Price: integral with CYTOS *at $8,000 (one-time lease).*
CIRCLE 487 ON READER CARD

UCC 1 (or TMS)
University Computing Co. (UCC)
Tape management system for IBM *360/370* OS *or* OS/VS.

Users reporting	23
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.0
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.1
Training	2.6

Price: $12,500, plus $1,300/year maintenance.
CIRCLE 488 ON READER CARD

UCC 2 (or DUO)
University Computing Co. (UCC)
Aid for conversion from DOS *or* DOS/VS *to* OS *or* OS/VS *on* IBM *360/370.*

Users reporting	9
Overall satisfaction	3.4
Throughput/efficiency	3.3
Ease of installation	2.7
Ease of use	3.3
Documentation	2.8
Vendor technical support	3.0
Training	2.5

Price: $32,500, plus $2,200/year maintenance.
CIRCLE 489 ON READER CARD

UCC 10
University Computing Co. (UCC)
Data dictionary manager and control statement generator for IBM's IMS.

Users reporting	9
Overall satisfaction	3.0
Throughput/efficiency	2.9
Ease of installation	2.7
Ease of use	2.7
Documentation	2.3
Vendor technical support	3.1
Training	2.2

Price: $18,000, plus $2,000/year maintenance.
CIRCLE 490 ON READER CARD

Uniapt Graphics
United Computing Corp.
A minicomputer version of the APT *numeric control part programming language used for graphics control on various computer models.*

Users reporting	5
Overall satisfaction	3.4
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	3.4
Documentation	2.6
Vendor technical support	1.2
Training	1.3

Price: $25,000 and up.
CIRCLE 491 ON READER CARD

UNIX
Western Electric Co., Inc.
Multiuser time-sharing system for DEC PDP-*11/40 and up; supports several languages; can replace* DEC's RSTS.

Users reporting	10
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.3
Ease of use	3.8
Documentation	3.1
Vendor technical support	2.3
Training	2.8

Price: $20,000. No maintenance offered.
CIRCLE 492 ON READER CARD

Utilities (S/3)
IBM Corp. GSD
(Not further qualified by survey respondents).

Users reporting	17
Overall satisfaction	3.3
Throughput/efficiency	2.9
Ease of installation	3.5
Ease of use	3.3
Documentation	3.3
Vendor technical support	3.5
Training	3.4

*Price: $10 (card/*CSS*); $16 (card).*
CIRCLE 493 ON READER CARD

VORTEX
Varian
Real-time operating system for Varian (now Univac) V70 Series minicomputers.

Users reporting	6
Overall satisfaction	2.7
Throughput/efficiency	2.5
Ease of installation	2.3
Ease of use	3.0
Documentation	2.3
Vendor technical support	2.2
Training	2.5

Price: $1,000, plus $800/year maintenance (includes new releases).
CIRCLE 494 ON READER CARD

WATFIV
University of Waterloo
Fast, in-memory FORTRAN *compiler for* IBM *360/370.*

Users reporting	6
Overall satisfaction	3.7
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	3.7
Documentation	3.0
Vendor technical support	2.4
Training	1.0

Price: for educational uses, $600; commercial, $1,200; third party, $2,400. Includes maintenance.
CIRCLE 495 ON READER CARD

WESTI
Westinghouse Electric Corp.
Teleprocessing interface system for small-to-medium IBM *360/370* DOS *or* DOS/VS *installations.*

Users reporting	26
Overall satisfaction	3.8
Throughput/efficiency	3.4
Ease of installation	3.5
Ease of use	3.7
Documentation	3.3
Vendor technical support	3.1
Training	2.9

Price: $8,500, plus $750/year maintenance, for local only. $12,500, plus $1,000/year maintenance, for local and remote.
CIRCLE 496 ON READER CARD

WISE
Digital Equipment Corp. (DEC)
A data management tool primarily intended for college administration; runs on PDP-*11 under* RSTS/E.

Users reporting	7
Overall satisfaction	2.6
Throughput/efficiency	2.0
Ease of installation	2.6
Ease of use	2.6
Documentation	2.4
Vendor technical support	2.2
Training	1.8

Software is bundled.
CIRCLE 497 ON READER CARD

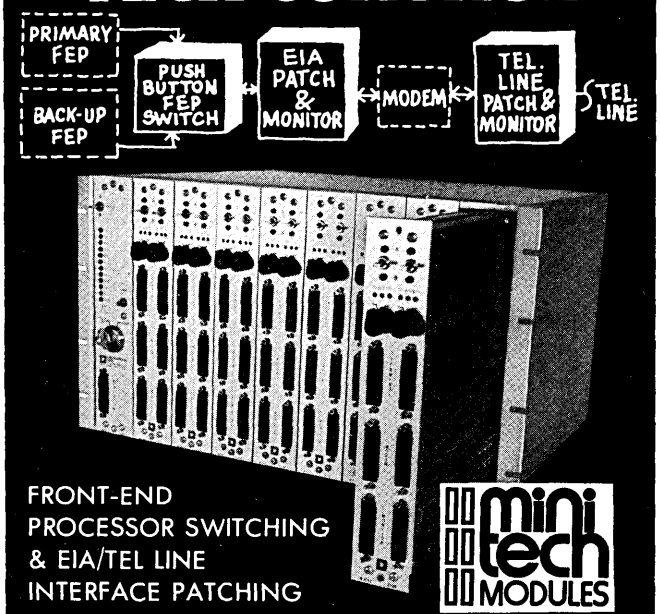
XREF
Informatics, Inc.
RPG-II *compiler extension that produces an alphabetic cross-reference listing automatically; designed for use on almost all models of the* IBM *System/3.*

Users reporting	5
Overall satisfaction	3.5
Throughput/efficiency	2.8
Ease of installation	3.6
Ease of use	3.6
Documentation	2.8
Vendor technical support	2.8
Training	2.0

Price: $199 (permanent lease). Includes maintenance.
CIRCLE 498 ON READER CARD ❋

(Vendor Index starts on page 160)

Mini-Tech Means TECH CONTROL



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CIRCLE 121 ON READER CARD

Vendor Index

For your convenience in obtaining additional information about the software packages rated in the preceding listings, the full names, addresses, and telephone numbers of the 82 companies that supply them are listed below.

American Valuation Consultants, Inc.
2200 East Devon Ave.
Suite 247
Des Plaines, IL 60018
(312) 297-6100

Applications Software, Inc.
21515 Hawthorne Blvd.
Torrance, CA 90503
(213) 542-4381

Applied Data Research, Inc.
Route 206 Center, CN-8
Princeton, NJ 08540
(609) 921-8550

Applied Data Systems (aka ADPAC Corp.)
120 Howard Street
San Francisco, CA 94105
(415) 981-2710

Optipro, Inc.
P.O. Box 615
Stock Exchange Tower
Montreal, Quebec
Canada H3C 2T8
(514) 866-5841

Atlantic Software Inc.
Lafayette Building
Fifth and Chestnut Streets
Philadelphia, PA 19106
(215) 922-7500

Boole & Babbage, Inc.
510 Oakmead Parkway
Sunnyvale, CA 94086
(408) 735-9550

Burroughs Corp.
Burroughs Place
Detroit, MI 48232
(313) 972-7000

Capex Corp.
2613 North Third Street
Phoenix, AZ 85004
(602) 264-7241

Carleton College
Computing Activities
Northfield, MN 55057
(507) 645-4431 ext. 443

Cincom Systems, Inc.
2300 Montana Ave.
Cincinnati, OH 45211
(513) 662-2300

Computer Associates, Inc.
655 Madison Ave.
New York, NY 10021
(212) 355-3333

Computer Audit Systems, Inc.
80 Main Street
West Orange, NJ 07052
(201) 736-9720

Computer Concepts, Inc.
6443 S. W. Beaverton Highway
Portland, OR 97221
(503) 297-4721

The Computer Software Co.
6517 Everglades Drive
Richmond, VA 23225
(804) 276-9200

Cullinane Corp.
20 William Street
Wellesley, MA 02181
(617) 237-6601

Datachron Corp.
174 Fifth Ave.
New York, NY 10010
(212) 675-5333

Data Design Associates, Inc.
1333 Lawrence Expressway
Suite 418
Santa Clara, CA 95150
(408) 985-2570

Data General Corp.
Route 9
Southboro, MA 01772
(617) 485-9100

Digital Equipment Corp. (DEC)
146 Main Street
Maynard, MA 01754
(617) 897-5111

Disc, Inc.
110 Painters Mill Road
Suite 29
Owings Mills, MD 21117
(301) 363-4100

DNA Systems, Inc.
P.O. Box 1424
Saginaw, MI 48605
(517) 793-0185

Dylakor Software Systems, Inc.
16255 Ventura Blvd.
Encino, CA 91436
(213) 995-0151

Educomp Corp.
196 Trumbull Street
Hartford, CT 06103
(203) 728-6777

Florida Software Services, Inc.
P.O. Box 2269
Orlando, FL 32802
(305) 831-3001

Foresight Systems. Inc.
1901 Avenue of the Stars
Suite 585, Century City
Los Angeles, CA 90067
(213) 277-2722

Goal Systems
P.O. Box 29481
Columbus, OH 43229
(614) 882-3867

Hewlett-Packard Co.
1501 Page Mill Road
Palo Alto, CA 94304
(415) 493-1501 ❋

For more information on the Datapoint 1500, contact the sales office nearest you . . .

Home Office:
9725 Datapoint Drive
San Antonio, Texas 78284
(512) 699-7151

Sales Offices:
Atlanta/(404) 325-2212
Boston/(617) 890-0440
Chicago/(312) 298-1240
Cincinnati/(513) 481-2600
Cleveland/(216) 351-1775
Columbus/(614) 457-1722
Dallas/(214) 661-5536
Denver/(303) 321-8286
Des Moines/(515) 225-9070
Detroit/(313) 855-2900
East Hartford/(203) 289-9364
Greensboro/(919) 299-8401
Honolulu/(808) 833-2110
Houston/(713) 680-2200
Indianapolis/(317) 299-4253
Kansas City/(913) 321-5802
Los Angeles/(213) 385-0395
Memphis/(901) 761-3080
Miami/(305) 621-4335
Milwaukee/(414) 453-1425
Minneapolis/(612) 854-4054
New Orleans/(504) 522-5457
Newport Beach/(714) 752-9073
New York/(212) 971-9270
Orlando/(305) 896-1940
Philadelphia/(215) 667-9477
Phoenix/(602) 265-3909
Pittsburgh/(412) 344-6800
Portland/(503) 223-2411
Richmond/(804) 353-3858
Rochester, N.Y./(716) 385-3450
San Antonio/(512) 734-8982
San Francisco/(415) 398-2888
Seattle/(206) 455-2044
Stamford/(203) 359-4175
St. Louis/(314) 878-6595
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At $20,000, the Datapoint 1500 would be just another outstanding computer system.

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A Real Computer

Don't let the price mislead you. The 1500 contains a powerful fully programmable business computer with 32,000 bytes (8 bits & parity) of memory. Add to that an integral keyboard, video display and dual diskette drives (over 500,000 characters on-line) and you have a complete system. And there's more. A standard, built-in communications interface requires that you add only a modem to start communicating.

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There's much more than just hardware, too. You get a comprehensive Diskette Operating System with a utility library including sort, index and index sequential access method (ISAM), a data entry language (DATAFORM®), a data processing language (DATABUS®). Like all Datapoint systems there's a common, dynamic file structure . No time consuming file format conversion necessary. You start writing application programs immediately.

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The 1500 will communicate in IBM 3780 discipline, or DATAPOLL® for Datapoint-to-Datapoint communications. Auto-answer is standard. You needn't halt an ongoing data entry operation to communicate — with the 1500 you can communicate while an operator continues to enter or process data. Or, you can elect to do concurrent printing on an optional Freedom Printer™.

More Features — And a Growth Path

You'll find the 1500 full of those features you've always wanted. Inverse video for display highlighting, user program defined function keys, simple installation, and easy operator training. Programs can be remotely loaded from a central site. A system that you can adapt to your needs, not the reverse.

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Each 1500 is backed by the nationwide Datapoint Field Service organization with over 90 service centers. And when you need systems or other technical advice, the Datapoint Account Managers and Systems Engineers are ready to help.

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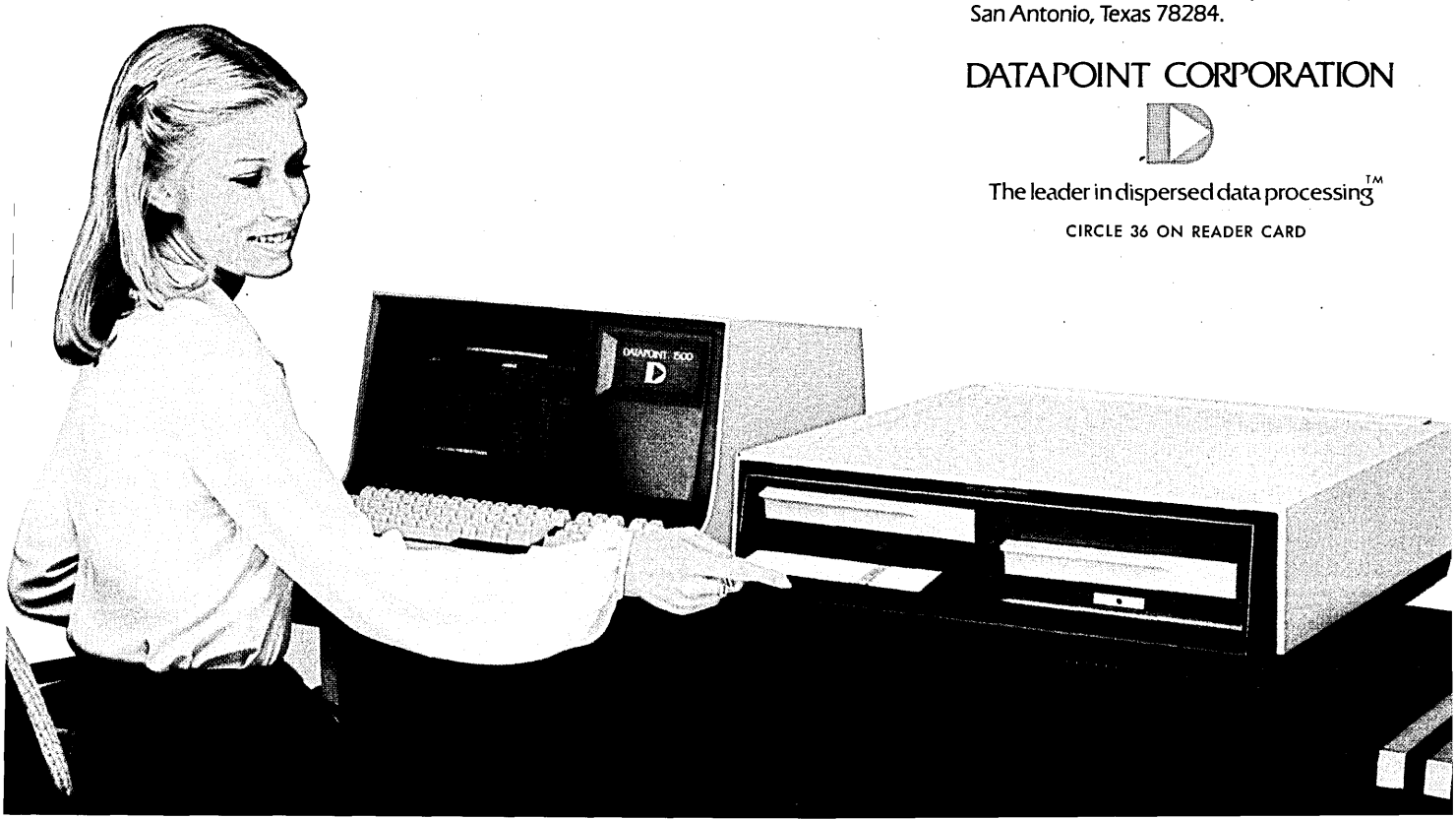
CIRCLE 36 ON READER CARD



VENDOR INDEX

Honeywell Information Systems, Inc.
200 Smith Street
Waltham, MA 02154
(617) 890-8400

IBM Corporation, General Systems Division
P.O. Box 2150
Atlanta, GA 30301
(404) 256-7000

IBM Corporation, Data Processing Division
1133 Westchester Ave.
White Plains, NY 10604
(914) 696-1900

IMSL (International Mathematical & Statistical Libraries) Inc.
7500 Bellaire Blvd.
Sixth Floor
Houston, TX 77036
(713) 772-1927

Infonational, Inc.
P.O. Box 82477
San Diego, CA 92138
(714) 560-7070

Informatics, Inc.
21050 Vanowen Street
Canoga Park, CA 91304
(213) 887-9121

Innovation Data Processing, Inc.
970 Clifton Ave.
Clifton, NJ 07013
(201) 777-1940

Insurance Svstems of America, Inc.
204 Collins Road, N.E.
Cedar Rapids, IA 52402
(319) 377-4816

Insyte Datacom Corp.
325 Oak Plaza Building
3707 Rawlins Street
Dallas, TX 75129
(214) 526-4280

Interdata, Inc.
2 Crescent Plaza
Oceanport, NJ 07757
(201) 229-4040

Jason Data Services
1871 Jonive Road
Sebastopol, CA 95472
(707) 823-2293

Johnson Systems Inc.
8400 Westpark Drive
McLean, VA 22101
(703) 893-8700

Management and Computer Services, Inc. (MACS)
790 Valley Forge Plaza
Valley Forge, PA 19482
(215) 265-2910

Management Science America (MSA)
3445 Peachtree Road, N.E.
Atlanta, GA 30326
(404) 262-2376

Mathematica Products Group, Inc.
P.O. Box 2392
Princeton, NJ 08540
(609) 799-2600

McCormack & Dodge Corp.
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Newton, MA 02164
(617) 964-6610

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Cambridge, MA 02141
(617) 354-3000

Mini-Computer Business Applications, Inc. (MCBA)
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Los Angeles, CA 90048
(213) 936-7131

MRI Systems Corp.
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NCI, Inc.
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(404) 252-9474

NCR Corporation
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Dayton, OH 45479
(513) 449-2000

Nichols & Co.
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Suite 2170
Los Angeles, CA 90067
(213) 556-2757

Northwestern University
Vogeback Computer Center
2129 Sheridan Road
Evanston, IL 60201
(312) 492-3741

Oxford Data Services
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(800) 631-1615

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(312) 986-6000

Program Products, Inc.
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SAB, Inc.
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New York, NY 10022
(212) 421-5380

SAS Institute, Inc.
P.O. Box 10066
Raleigh, NC 27605
(919) 834-4381

SDI
2855 Campus Drive
P.O. Box 5801
San Mateo, CA 94402
(415) 572-1200

Singer Business Machines
30 Rockefeller Plaza
New York, NY 10020
(212) 581-4800

Software A.G. of North America, Inc.
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(703) 860-5050

Software International Corp.
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(617) 475-5040

SPSS, Inc.
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Tektronix, Inc.
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San Raphael, CA 94901
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Turnkey Systems, Inc.
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Norwalk, CT 06851
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United Computing Corp.
22500 S. Avalon Blvd.
Carson, CA 90745
(213) 830-7720

Universal Software Inc.
Brookfield Office Park, Rt. 7
Brookfield, CT 06804
(203) 792-5100

Universal Computing Co.
8303 Elmbrook Drive
Dallas, TX 75247
(214) 688-7100

University of California at Los Angeles (UCLA) Department of Biomathematics
Room AV 111
Los Angeles, CA 90024
(213) 825-5800

University of North Carolina State
Computer Center
Raleigh, NC 27607
(919) 737-2859

University of Waterloo
Computer Center
Waterloo, Ontario
Canada N2L 3G1
(519) 885-1211

Value Computing Inc.
300 West Marlton Pike
Cherry Hill, NJ 08002
(609) 429-4200

Varian Graphics Division
611 Hansen Way
Palo Alto, CA 94303
(415) 493-4000

Wang Laboratories, Inc.
One Industrial Ave.
Lowell, MA 01851
(617) 851-4111

Western Electric Corp.
P.O. Box 25000
Greensboro, NC 27420
(919) 697-2000

Westinghouse Electric Corp.
2040 Ardmore Blvd.
Pittsburgh, PA 15221
(412) 256-7972

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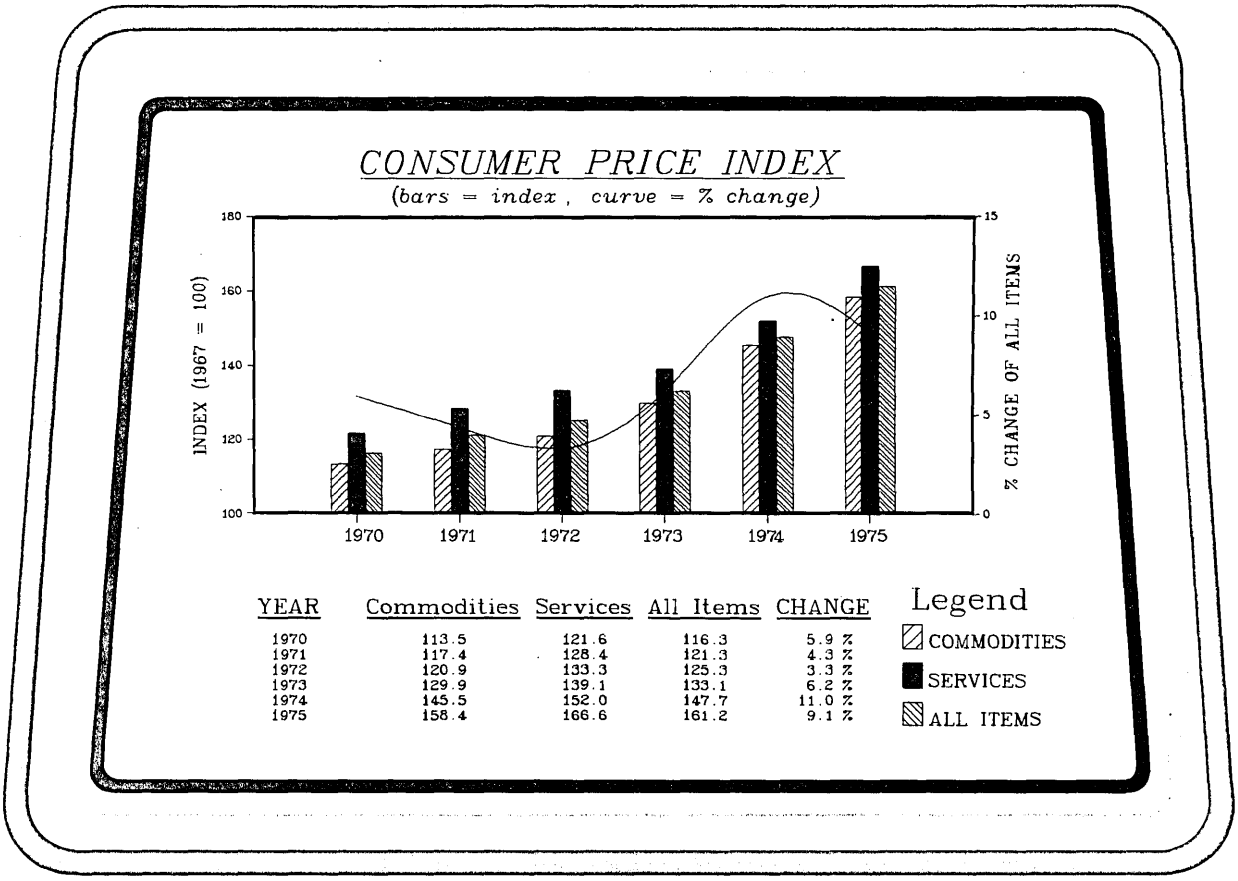

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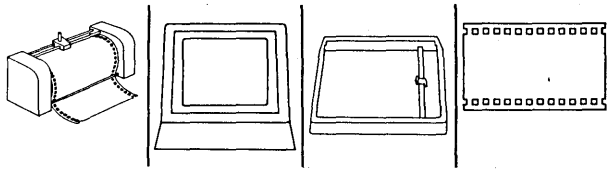

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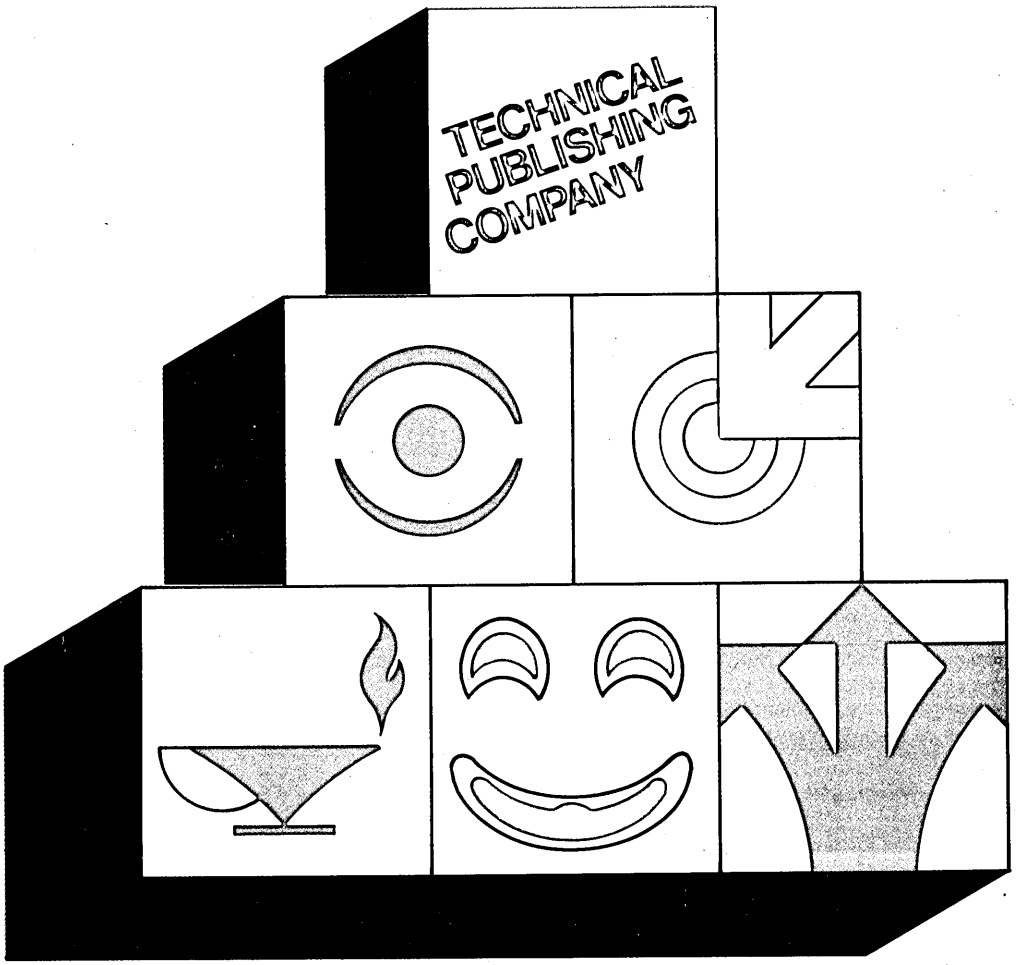

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Plan to spend your next workation with us at INTERFACE '78. You'll learn why thousands of previous INTERFACE attendees go back to their operations with productive solutions harnessing the power of computers and communications. At INTERFACE '77, in Atlanta last March, 6500 attendees and 135 exhibitors shared applications experience and product knowledge. Over 200 speakers addressed 70 sessions on all vital aspects of data communications. INTERFACE '78 promises to be even more significant to the data communications world.

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Our attendees and exhibitors expect a lot from us...and we are measured on how well we deliver. This year's theme, "Planning on Performance," guides our program emphasis so users can establish measures of performance in all areas of data communications. Thus, attendees can return to their operations and plan to achieve higher levels of performance cost-effectively.

The Performers will Meet in Las Vegas

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- A four-day conference dedicated to data communications, covering 70 sessions, with over 200 speakers.
- Over 175 companies will display the latest in data communications products, systems and services in a 150,000 square-foot exhibit hall - an area larger than three football fields.
- Thousands of users from similar applications areas share real-world experiences.
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Net Workshops - The top consultants in networking uncover the secret of network design and optimization for the datacomm professional.

Product Updates - Leading experts focus on the latest product technology from an application viewpoint to simplify decision-making for users.

Service Updates - Ever-oscillating transmission service opportunities receive a comprehensive update to take advantage of new tariff structures and alternative vendor approaches.

Application Workshops - Here the major application issues of EFT/POS, distributed computing, electronic mail, etc., are given a thorough airing.

Technology Workshops - Today's industry technology is tomorrow's user solution, so a look at what's coming provides added leverage in the decision-making process.

Management Workshops - Responsibility for a data communications operation demands a specialized knowledge and experience in key areas addressed, such as future planning, hiring and training personnel, contracts and negotiations.

Highlight Sessions - Progress and politics go hand in hand in the data communications world, so evolving issues both product and politic will be brought to light.

Data Communications INTERFACE® '78

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Magazine

Data Communications INTERFACE '78 Partial Exhibitor Listing

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ACTION COMMUNICATIONS SYSTEMS, INC.
AMERICAN SATELLITE
APPLIED COMPUTER SYSTEMS
ASTROCOM
ATLANTIC RESEARCH
AUERBACH PUBLISHERS, INC.
BEEHIVE INTERNATIONAL
BENWILL PUBLISHERS
BOEING COMPUTER SERVICES
BUNKER RAMO
BURROUGHS CORP.
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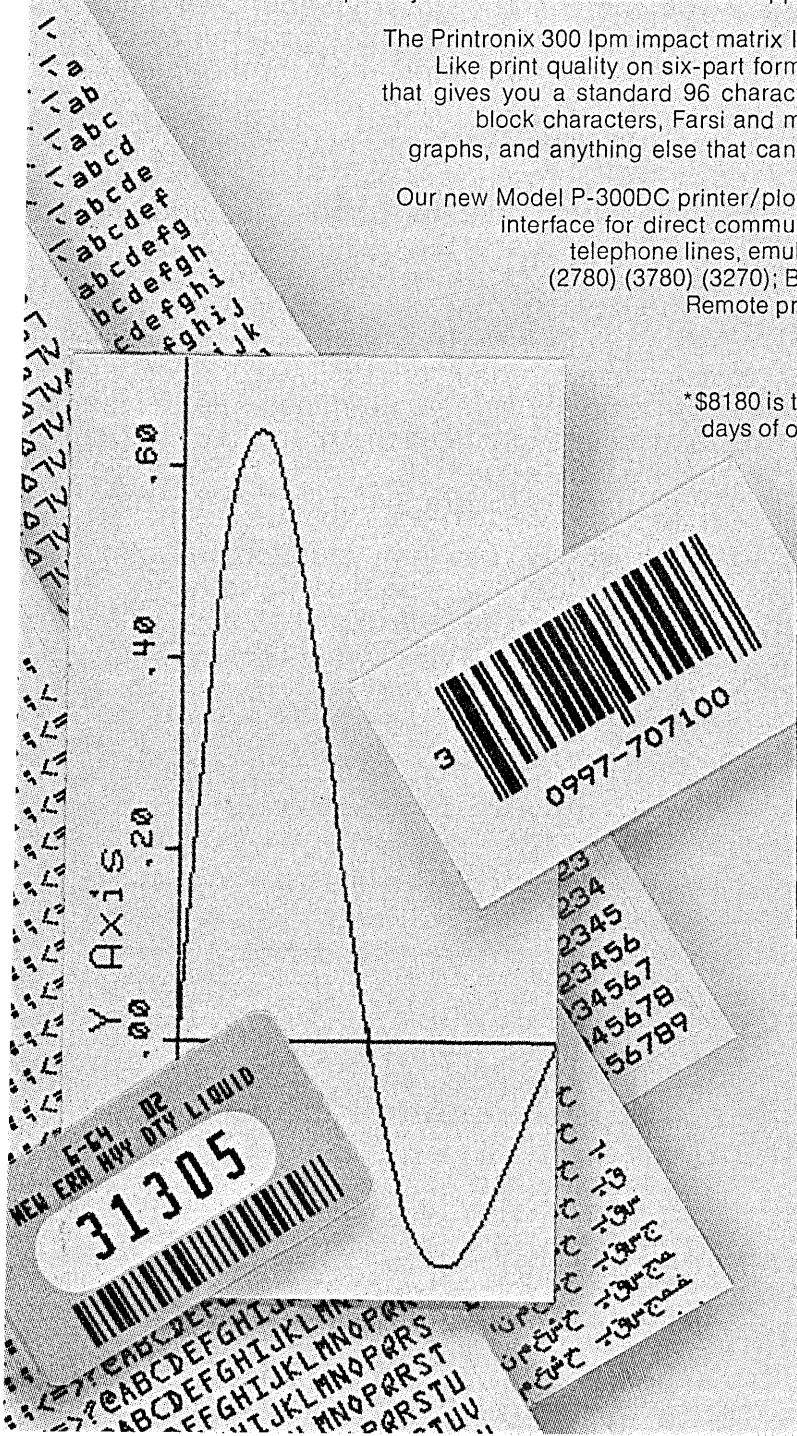

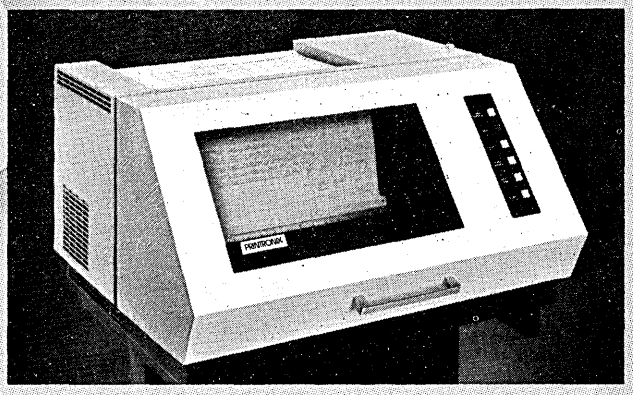

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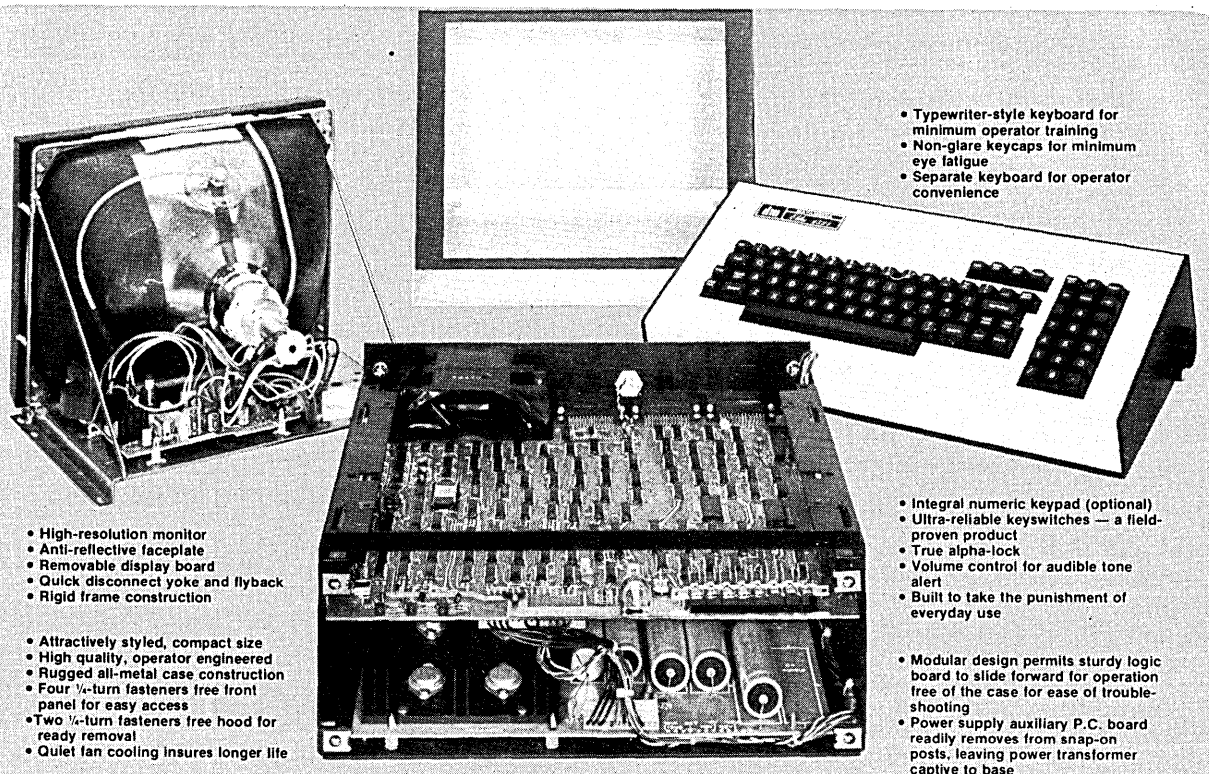

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Sixty Ingredients for Better Systems

by Robert L. Patrick

These are the ideas to apply to make systems more error-resistant.

Dynamic error checking and correcting is achieved only as a result of building a hierarchical set of checks and balances into the hardware, operating systems software, applications programs, and manual procedures that make up a computer system. Nowadays, this isn't easy to do.

Some time ago, the operations of the hardware were more thoroughly checked than they now are. Due to the unreliability of early vacuum tube circuitry and mechanical equipment, various kinds of parity checking were invented for main memory, tapes, discs, and drums. High quality readers read cards at two stations to check for errors. Electromechanical printers used extra circuits to check that the character impressed on the paper was the character sent to the device.

As late as the early '60s, at least one computer was designed to be thoroughly checked with parity established by redundant card reading, verified when the data reached the cpu, checked in parallel with all arithmetic operations, on all transfer operations; and it had an unbroken chain of checking from the cpu registers out through the channels to the tapes and discs and back again.

Current hardware has far fewer error checking features. Partly because the componentry is more reliable, and partly in pursuit of lower prices, computer manufacturers have convinced themselves that partial checking is now adequate.

And with the advent of on-line systems, minicomputers, and distributed processing, the trail of hardware checks has become far from continuous. A bare-bones terminal without any checking is the cheapest to build and sell. Similarly, users mix and match minicomputer components from several manufacturers to bring total system prices down to rock bottom. While the data and electronic control interfaces in these systems of necessity are compatible, the checking philosophy, the machine diagnostics, and the servicing of errors suffer from the lack of a continuous systems approach.

> There are many who have not yet run into their first catastrophic failure . . . but they will.

The state of the art in current software is worse. Many operating systems, compilers, and utility programs simply do not work as promoted. To be sure, their makers successfully test the main line features of each software package and correct all of the errors those tests disclose. But the state of the testing art is still relatively primitive, and the quality of the product depends on the quality of the tests, the amount of money allocated to testing, and the time remaining for testing as the development project comes to a close.

Most manufacturers do an excellent job on small software packages of low to medium complexity. No vendor does an outstanding job on highly complex software systems which must support a variety of hardware configurations and carry a broad spectrum of work.

The software vendors are pressured both by their customers and by their competition. As a result they con-

In the interests of space, the caveats and explanatory material were removed from the study report from which the material in this article was derived. Serious readers should obtain a copy of NBS Special Publication 500-24 entitled *Performance Assurance and Data Integrity Practices* (now in publication), from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

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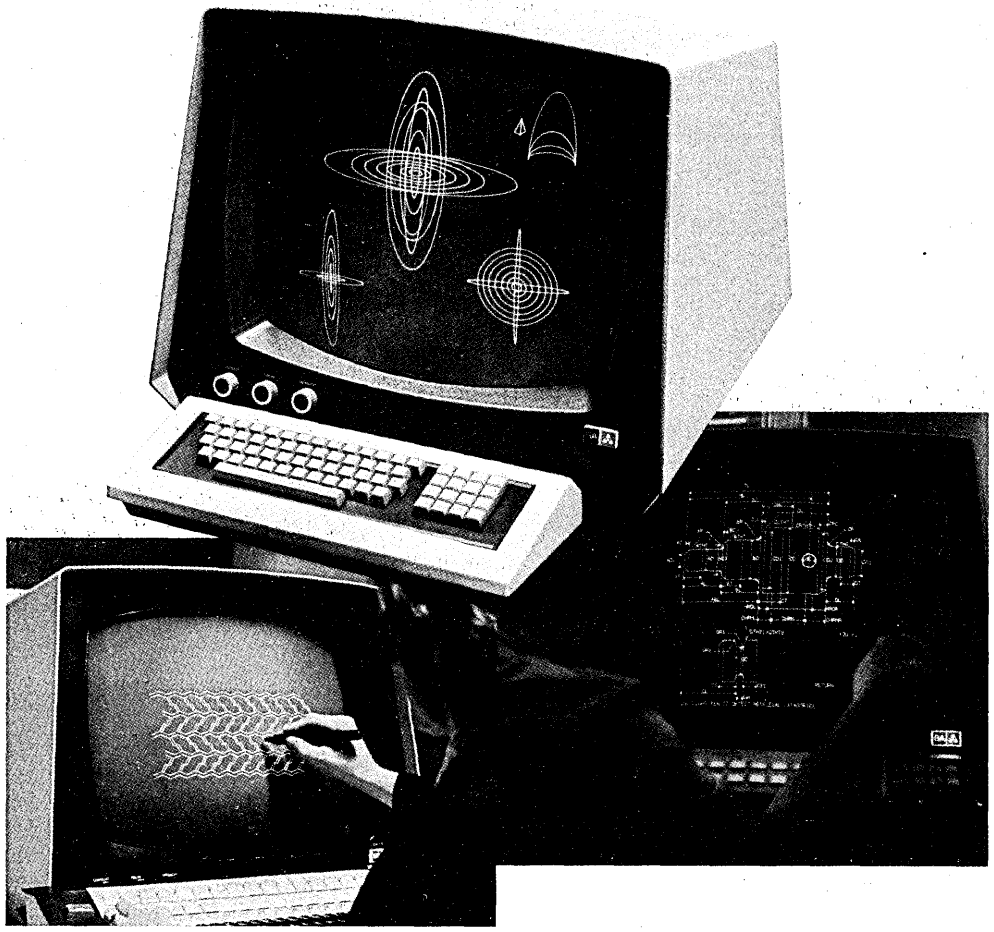

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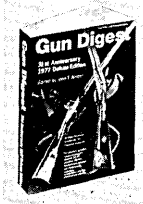

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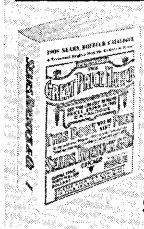

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tinuously seek to offer more function with less memory and faster execution speeds. To achieve needed code compression, it is not uncommon to strip out most of the software checking mechanisms that could provide increased reliability.

Color it bleak

Against this bleak background we attempt to run application systems in production. It is not surprising that we have undetected errors or that we have had to devise a set of application techniques to "plaster over" the cracks left by the hardware and software vendors.

In fact, however, some designers have become fairly adroit at getting satisfactory operation out of computer based systems which are driven right to the limit of their reliability. True, there are many other designers who have had small successes and have not yet run into their first catastrophic failure. But they will. It therefore is useful to describe the techniques which have been successfully applied and to make them available to a larger audience.

It appears that no single grand solution to the problem of error control exists. Instead, each successful organization has assembled a series of techniques for dealing with errors peculiar to its installation. These techniques have been creatively woven into system designs so that resulting applications become (relatively) insensitive to the errors they routinely encounter.

The following 60 ideas collectively represent the state of the art in this field. No claim is made that they are unique or new, or even that they might not be grouped into different categories than these presented here. However, the set does enjoy the following common properties: they are real. They have seen use in production systems. They work on stock, commercially available equipment using stock software. And they have been employed in systems which were implemented by average programmers and run by average operations personnel.

Some of the ideas have been around for some time and hence can be termed common practice. Others, while they may have been around for some years, have not been broadcast and still exist more or less uniquely in their original environments. No installation can benefit from all 60 ideas, but every installation can benefit from selecting those that apply to its needs and environment.

Consider the human element

1. Consider Human Factors in Keyboarding: The system designer must be

familiar with the data and its various formats, with the equipment to be used, and with the keyboarding environment including work stations, lighting, and sound conditioning.

Given professional personnel, use heavy abbreviations and short synonyms to cut the keystroking required. However, be wary of excessive abbreviations and any form of code compression at the input stations with part-time or occasional operators.

2. Manage Keyboarding Errors: In big shops having a high volume of similar keyboarding, keep error statistics by machine and by employee. By trying various employee-machine combinations, the error statistics will isolate employees with the best and worst records. Analyze the actions of both of these extremes to cause the techniques of the superior employee to be emulated, and determine how to help the less productive employee.

3. Provide Operator Feedback: For on-line systems, the computer should positively acknowledge each transaction by assigning sequential message numbers to the transactions emanating from each individual terminal. A new message is awarded the next consecutive number and a positive confirmation of receipt displays that same number to the terminal operator. This number provides transaction accountability and is the basis of a dialog between the computer and the terminal operator in the event of restart.

4. Inform Operator of Performance Anomalies: In some cases estimated run time can be predicted from a simple count of the input transactions. In other cases run time must be estimated by a more complex equation which depends on the number of transactions in each of several transaction classes. In yet other cases the transaction run time will vary unpredictably based on the parameters in the transaction and the constitution of the values contained in the files.

Inform operators whenever unpredictable transactions are being processed to define, by implication, that the remainder of the processes are predictable and hence performance should conform to historical expectations (within the usual limits).

5. Establish a Data Base Administrator Function: Split data base administration from development programming, maintenance programming, and production operation. This will pare the jobs down to reasonable size and concentrate a series of like functions in the hands of a neutral administrator.

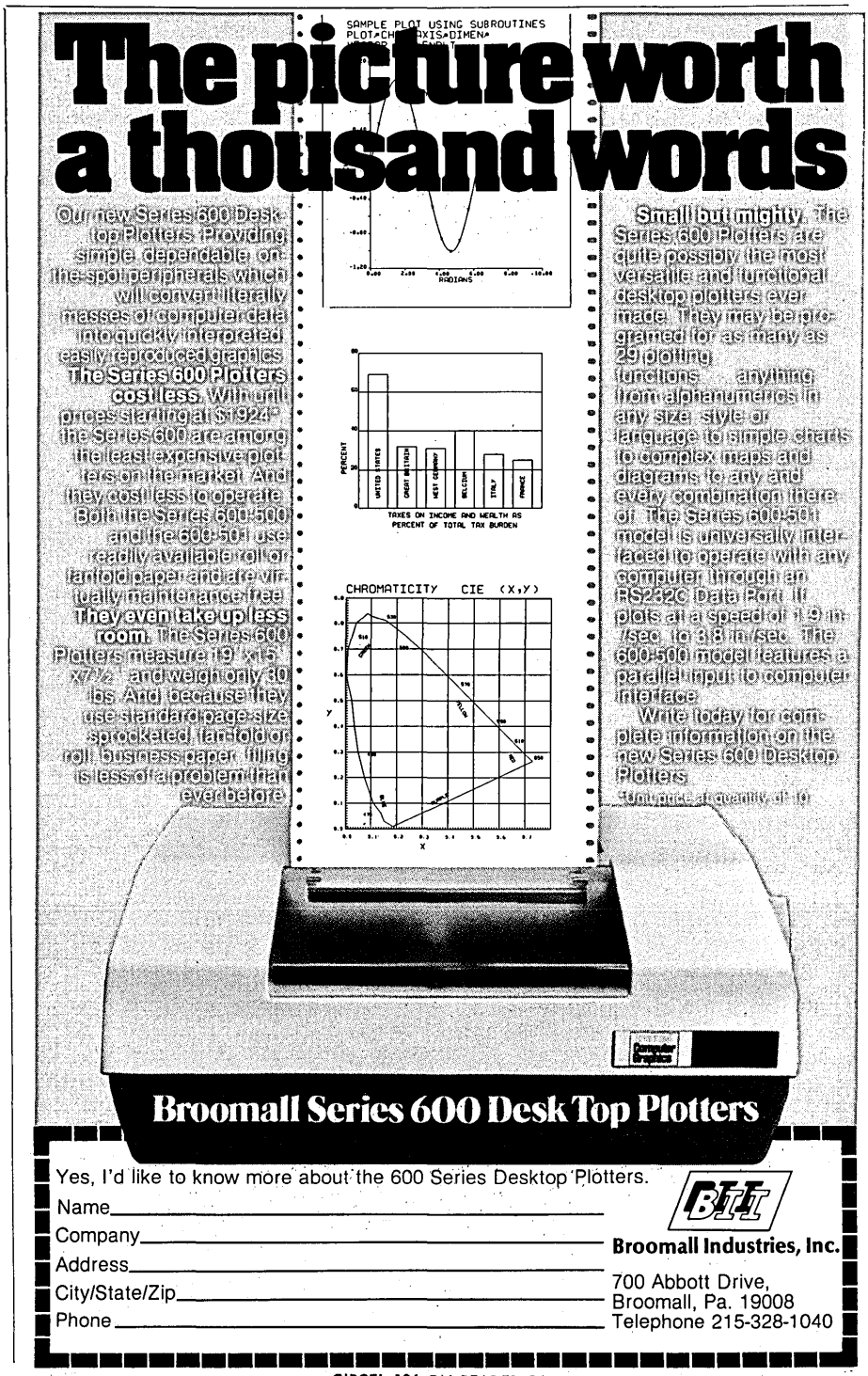
The data base administrator and his staff should address definitions, controls, procedures, backup, transitions, data elements, formats, records, files, and file sets.

In addition, the data base administrator should control and be solely responsible for the use of file utility programs to audit, verify, duplicate, reconstruct, initialize, and reorganize data.

6. Build Local Expertise: User-oriented programming packages are sold in a ready-to-use state, and little or no programming talent is required for their installation and use. If a programming package is used for mainline work where production must be completed on schedule, the prudent manager will build some level of local expertise as insurance that he has available the skills he needs when an emergency arises.

Develop error detection aids

7. Build in Verification Tests: When running many data cases through a complex calculation, routinely run a standard case before, during, and after the massive set of live data. This will verify that the program and the computer system were operating correctly (at least for the paths exercised by this



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standard case) throughout the production run.

8. Build in Diagnostics: In the event a remote terminal operator invokes the standard exercise package and receives unexpected results, a separate input diagnostic package can be invoked so the operator can follow a predetermined input script and let the input diagnostic package determine if the character strings received are exactly those expected.

Similarly, a file of predetermined (canned) output can be stored and an output diagnostic program invoked to display the canned outputs to the remote operator.

Given the results of the input diagnostic and the output diagnostic, the remote operator then will be able to intelligently call for assistance and indicate what the problem seems to be.

9. Build in Exercisers: In an interactive system, catalog a standard demonstration program and provide a script for each remote terminal operator which accesses standard data, exercises the system, and produces predictable results. The remote operator then can be assured of an operational terminal, communications network, central computer, operating system, and at least one operational path through the applications system and data base management system. With experience, the remote operator also will be able to determine if the system response time is within normal limits.

10. Build in Communications Exercisers: Communications lines which interconnect intelligent devices can be programmed to repeatedly exchange standard messages to calibrate the line.

11. Install On-line Testing Option: In any system which involves elaborate error checking, provision must be made to declare entry into a "test mode" for exercising the fault detection logic by introducing faults into the system. The purpose of the test mode is to inhibit the sounding of alarms, the printing of error messages, and the logging of test events as actual error occurrences thereby destroying the integrity of the error statistics.

12. Provide Operator Options for Checking: Computer operators learn the processing rhythm of a large job (even when multiprocessing). Some systems have been constructed with optional checking features which can be invoked whenever the operator wants assurance that a suspicious processing pattern is not destroying the integrity of the data base.

13. Provide for Exception Reporting: The computer can be made to reject obvious mistakes and to process suspicious transactions while listing their occurrence on an exceptions report for personal review. The quantity and type of items requiring review (only big ticket items, all California customers, etc.) is an excellent indicator of the general health of the system.

Simplify recovery

14. Log "Before" and "After" Images for Restart: A restart log should contain the "before image" of the data fields destined for change, and the "after images" of those same fields. Restart by loading the data set produced during the last checkpoint dump and simply replace all "before images" with their companion set of "after images" from the log.

In addition, if failure leaves the data base in an unusable state, it is possible to reverse the effect of recent processing and replace "after images" with "before images."

15. Keep Error Suspense Files: When input transactions are lengthy and when error experience shows corrections usually affect only a small portion of the original record, suspense files containing original records (complete with errors) can be maintained. The correction process then consists of re-

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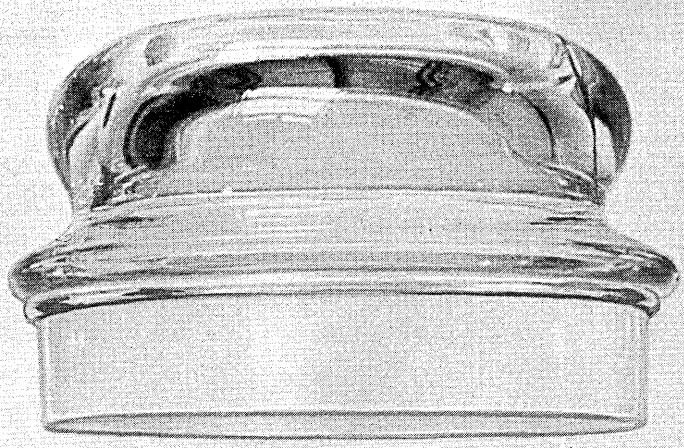

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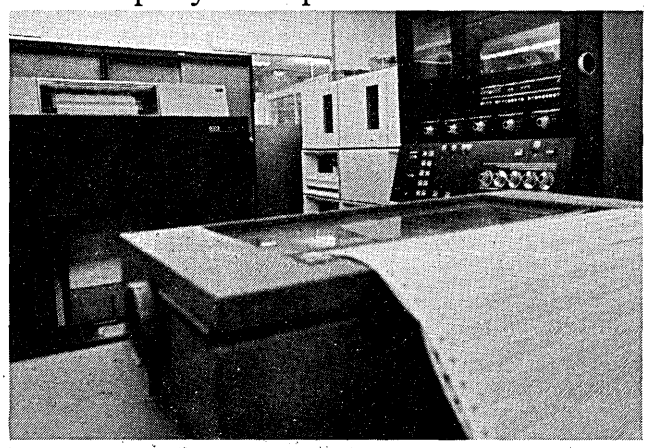
At 9:03 on a Wednesday night, an electrical malfunction caused overheating, and smoke began rising in the west end of this company's computer room.



At 9:06, while the fire was still in the smoldering stage, the Fenwal Fire Supression System automatically sensed this smoke and discharged its extinguishing agent (Halon 1301).

By 9:30 that same night, the smoke had cleared, employees had arrived and with the appropriate Fire Department clearance entered the computer room. Traces of Halon were present but there was no discomfort.

Close examination of the problem area revealed scorched and discolored internal wiring. Some relays would have to be replaced. But no other damage had occurred.

Even though the fire was inside the consoles, at the farthest point from the Fenwal discharge nozzles, the flames were snuffed out *dry* and major damage or personnel injury was completely averted.

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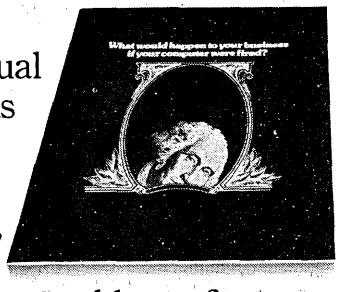

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entering identifying information plus only the fields in error.

16. Log Errors in Context: All errors should be logged. In addition to recording the error and storing a unique error code, an error log should contain enough information to identify the discrete data path from the originator to the computer (source, observer, keyboard operators, batch, dates, etc.). It must also contain the information needed to identify the input transaction in its own local processing sequence, the customer classification awarded by the input screening process, any classification associated with the master file, the type of error discovered, and aggregate statistics on error trends during that processing run, day, week, and month. The *entire* context must be logged to allow analysis of the error.

17. Provide Automatic Error Analysis: One leading manufacturer has recently enhanced its operating system software to provide increased availability. A series of optional programs called Checker/Fixers are provided. When called during the restart process, each checker verifies the format and contents of a control block and if the block is incorrect, optionally calls the fixer to rebuild the control block from other information stored in the system. Systems designers can adopt this technique to reduce the number of crashes requiring full restarts.

Build in redundancy

18. Design for Input Redundancy: Redundancy can be built into input messages (at the cost of increasing the input character count) to provide context information for edit programs, to allow meaningful correction (in some instances), and to allow meaningful operator dialogs in an on-line system.

19. Design for In-batch Redundancy: Hash totals and item counts assure that batches retain their integrity through multiple transformations (editing, sorting, updating, and printing). Item counts carried completely through the process also assure that every item was processed.

20. Design for File Redundancy: Some file systems carry checksums over into the data base to assure that data quality does not deteriorate over time.

21. Design for Redundancy on the Master File: A properly designed data base will contain enough redundancy so its integrity can be independently verified without reference to other files, indexes, or supplementary information. (The data base administrator should own the data base audit program and run it for the benefit of all users sharing data. If the program is expensive to run, it should be made possible to check subsets of the files on consecutive runs.)

Identify everything clearly

22. Design Integrity Into Names: Check-digits on procedure, job, and program names can be used to prevent setup mistakes or operator commands from calling for incorrect procedures or jobs. While such incorrect requests are most likely to abort, some may partially execute and destroy a portion of a data base before the catastrophe is recognized.

23. Store Variable Names To Enhance Edit Logic: One set of data management software stores the variable name adjacent to each occurrence of the variable. While the storage space is increased, the name/value pair provides valuable redundancy for editing and lays the foundation for two stages of table-driven edit: one as the data is received, and the second immediately prior to the update.

24. Establish Standard Data Elements and Codes: Establish procedures for the data file design and definition process, for standard file formats, record formats, data element formats, and for local standards for encoding some data element values.

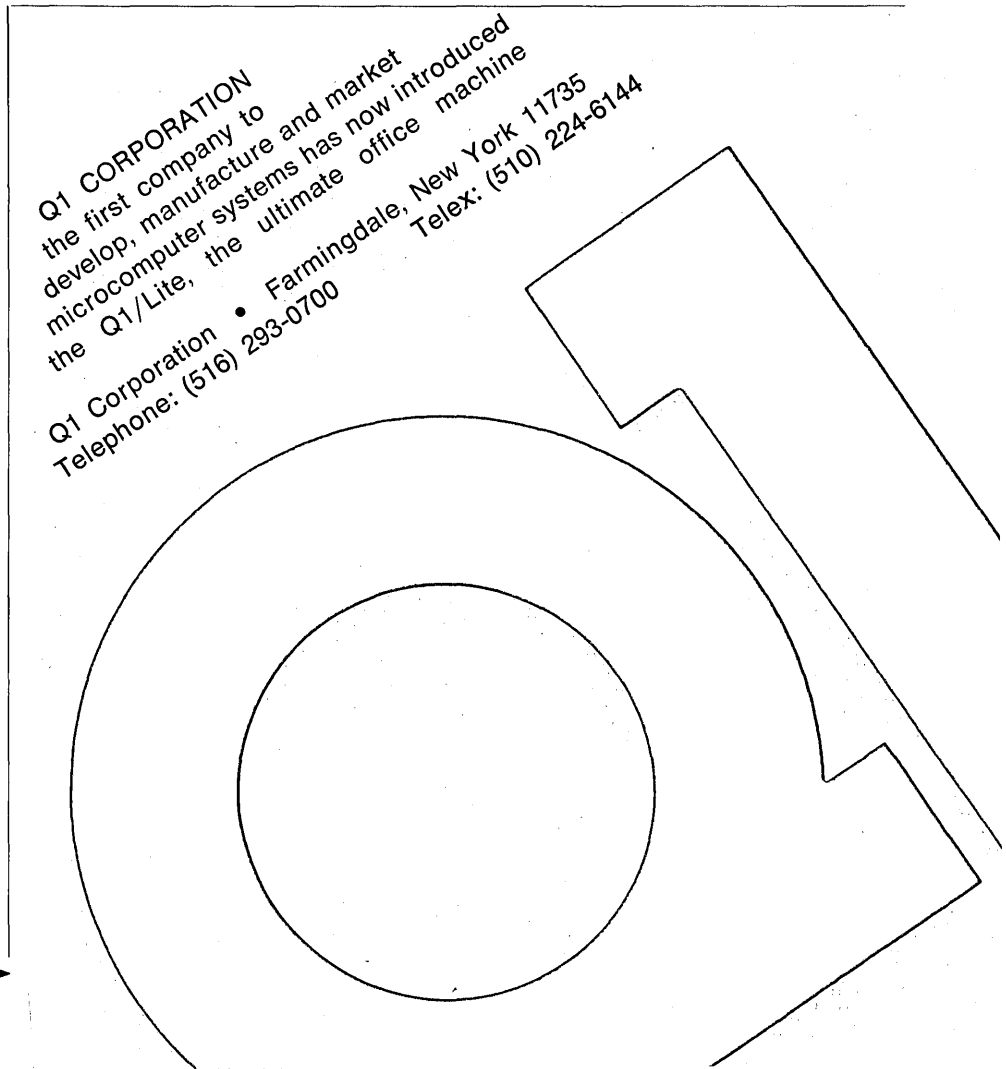
These local standard encodings eventually give rise to common tables of values shared among application systems, and a single common utility program (under the control of the data base administrator) to maintain these tables of standard values. (There is a century of history in the library community pertaining to the establishment and maintenance of such standard value tables; they are called "authority lists" by librarians.)

25. Use Quality Flags: Data quality flags can be added to files, records, groups of fields, or individual fields in a data base, and can be used to condition processing to avoid a mismatch between the quality of the data and its intended use.

The quality flag indicates to each processing program which format and content checks the record has successfully passed.

26. Use Activity Dates: If each input transaction carries a date-of-event, and each record in the file carries a date-of-last-transaction-processed, these will help ensure the data is processed in a proper sequence.

27. Use Self-Defining Files for Integrity: One technique for handling



CIRCLE 130 ON READER CARD →

very large files (in excess of a dozen full tape reels at 1600 bpi) involves a file design with a directory on the front of every individual record. The directory describes the structure of the record and contains pointers to every data element contained in the record. This record format gives files independence from their application programs (and hence insensitivity to change), and provides extensive redundancy which allows the integrity of the large files to be audited and maintained.

28. Add Redundancy for Audit: Within the data base, additional information can be carried in the record header to provide the basic parameters for certain types of integrity audits. Specifically, a record header should contain the identifier associated with the last program to update the record, the date of that last update, the time of that update, and the transaction sequence number causing the update.

Establish controls

29. Use Active Totals for Controls: While item counts and hash totals are good, the primary controls over a data base should be selected from fields that are totaled and presented on the system's major reports. That is, given an option, the totals should be numbers routinely used by the system's human monitors and hence should be meaningful numbers for workload, trend, financial, or value analysis.

30. Segment Controls for Efficiency: Although all data base programs should maintain control totals even though they process transactions in random sequence, most data bases have two or more processing "patterns" over a full processing cycle. Any such sequential processes should do a 100% verify over the parts of the file they process. (Needless to say, the file controls should be segmented so any sequential process handling part of the file can have access to control totals for just the part of the file routinely processed.)

31. Maintain Update Controls: About 10 years ago, with the advent of reliable disc files, the data base zealots advertised that an on-line data base system would allow remote transactions to be entered immediately (as the event occurred) and to be instantaneously reflected in the data base. However, they neglected to advertise that such on-line operation (with instantaneous update from remote terminals) bypassed all of the traditional checks and balances that had been set up first in manual systems, and later in batch systems.

Many systems are running today with on-line update from remote terminals because an adequate system of controls has been satisfactorily automated. However, in some very large and very complicated systems, on-line control at the transaction level proved difficult to achieve. For these systems it was necessary to batch on-line transactions, sort these transactions into some sequence, and apply a more traditional form of batch control before the transactions were allowed to update the file.

Review the math

In the early to mid-'50s, the preponderance of information processing was scientific computing. Persons performing this work had degrees in mathematics, engineering, physics, or one of the other hard sciences. However, even that schooling did not prepare these early programmers in numerical analysis. After considerable difficulty, programmers were trained to know the difference between accuracy and precision, to be cautious when scaling, and to be skeptical of all floating point calculations.

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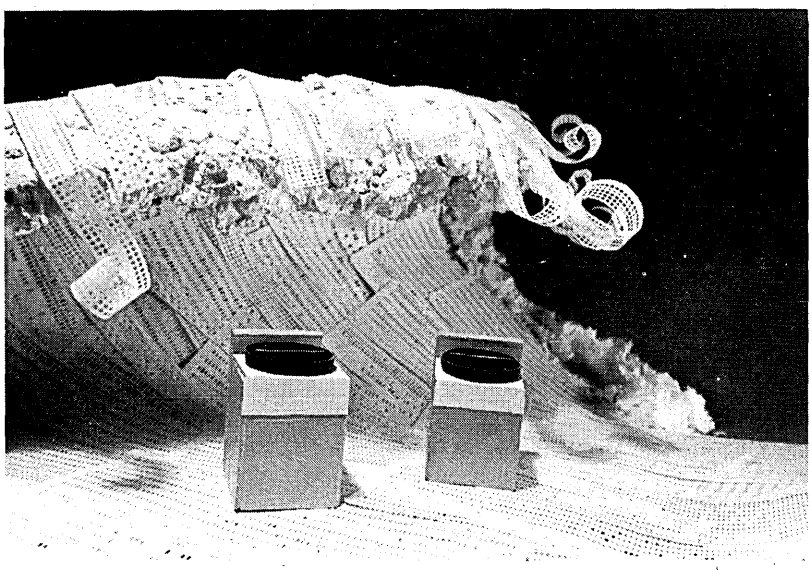

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population has exploded. To be sure, the colleges of today teach numerical hazards in their numerical analysis courses; however, a great number of the journeymen programming statistical, engineering, or mathematical computations are not aware of the classic problems in numerical approximations. A sample of these numerical hazards is provided below:

32. Review Arithmetic Representations: Every computer has its idiosyncrasies and these idiosyncrasies give rise to arithmetic singular points (such as a signed zero). Prior to performing extensive math on an unfamiliar computer, each programmer should discover the arithmetic singular points in the system to determine if these idiosyncrasies will affect the planned calculations.

33. Remember the Arithmetic is Finite: Whenever arithmetic is being performed which exploits the full range of a computer's arithmetic registers, round off, truncation, and the residue following arithmetic manipulations suddenly become important. To determine if double-precision operations are required, each math programmer should discover how the arithmetic behaves at the extremes of the numeric ranges.

34. Calibrate Numerical Approximations: Manufacturers offer subroutine libraries and in some cases built-in transcendental functions. Frequently these are treated as an extension of the instruction set. Each installation should calibrate the subroutine library to be used, and publish the accuracy achieved by the algorithms it contains. (Considerable effort will be required to validate a library of subroutine approximations.)

35. Perform Parallel Check Calculations: In many scientific calculations, there are two different sets of equations which produce the same result or, in some cases, an additional equation can be introduced which exploits some other physical/mathematical property and provides a check calculation. By introducing such redundant calculations, the correct operation of the computer system can be verified and, as a by-product, the accuracy of the computer solution can sometimes be estimated.

36. Detect Errors With Numerical Aggregates: In repetitive scientific calculations dealing with many observations of well behaved data, standard statistical techniques (mean, variance, skewness, kurtosis) will detect gross

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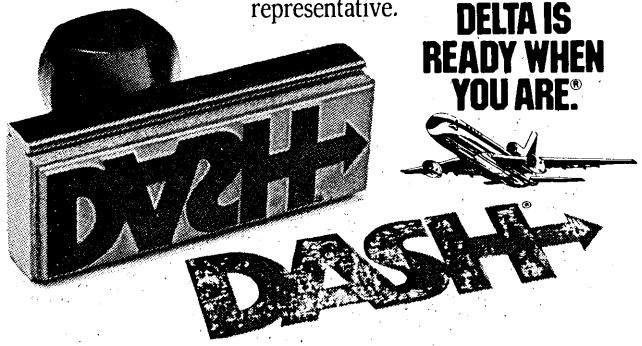

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errors in the observations or in subsequent processing.

Test it first

37. Use Separate Data for Testing: To provide a test environment without the risk of allowing an unchecked program access to real files, keep a set of test files whose structure is identical to that of the live data base. Insist on seeing satisfactory runs on the test file before a modified system is allowed to run in production mode.

38. Pilot Test Input System: Program the input system first and pilot test it under actual (or simulated) conditions while the rest of the system is being completed. Use the statistics from these pilot tests to verify the design, its documentation, the training planned, and to check the assumptions on which the input system design was based.

39. Run Pilot Production Batches: The control group can be given a running start and the probability of meeting deadlines can be increased if a small but representative sample of data is routinely run as pilot production. The control group can then check the output of this pilot run as the main run is processing.

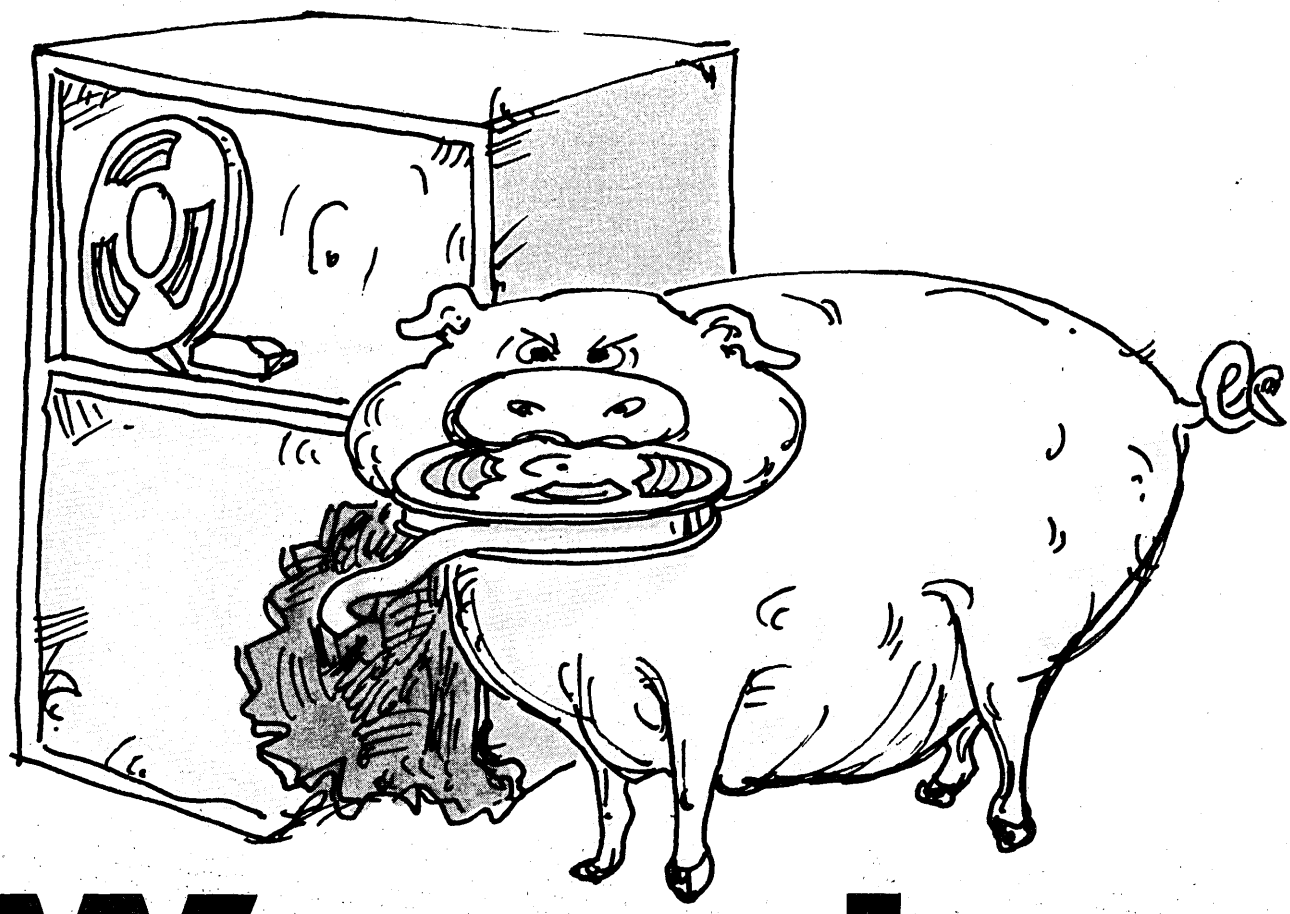
40. Process Dummy Transactions: Place dummy master records on the file and routinely process fictional transactions against them to produce predictable outputs. Then verify the results to assure that in these particular instances the detailed processing was correctly performed. (Remember, if this is a payables run, to destroy the check written to the dummy account.)

Edit everything

41. Establish Classes in Edit Specs: Many financial systems have established credit classifications and adjust a credit rating dynamically based on the customer's basic rating and the current status of his account. After the adjusted rating is established, the editing system invokes dollar limits appropriate to the customer's adjusted rating.

Similar classes of edits can be defined for other applications. For instance, a utility company might establish four classes of subscriber service: apartment, single family residence, large residence/light industry, and heavy industry.

42. Establish Classes of Limits: Many data base systems keep an order quantity limit on the master file along with the product description and status. If a quantity requested exceeds this limit, manual intervention is requested to confirm the order.



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43. Edit in Context: Edits on individual, isolated fields are less powerful than edits on combinations of fields since the latter may be performed using recent history from fields and records already processed in the current computer run. For complex edits dealing with a sequence of inputs, as in an on-line dialog, make specific tests dependent on what has gone before.

For example, the response to the question, "How many persons in your immediate family?" could be edited in isolation only as numeric and normally in the range 1 to 20. However, if another question in the same questionnaire read "Name the persons in your immediate family," the two responses could be processed in combination.

44. Use Table-Driven Edits: Whenever a group of input fields routinely appear together, the group can be given a single identifier. This ID can be used to enter the data base description so the data editing specification can be obtained for the group. Then verify:

- Does each data element meet its spec?
- Does the record match its spec?
- Are all the required data elements present?
- Are all present data elements permitted?

45. Use Normal Edit Limits: When many independent input transactions are related to members of a homogeneous group (of customers, individuals, parts, or accounts), taking an aggregate average across all members of the group will allow the computer system to determine if any individual member of the group deviates significantly from the average.

46. Use Trend Limits: In processing input transactions, the behavior of an individual can be compared to his own previous behavior. This requires a behavior history be maintained by the computer for each account.

47. Maintain the Limits: Several editing schemes require that history data be stored for establishing current editing limits. These systems require edit, update, and reporting modules to maintain the file of edit limits.

48. Stage the Edits: In distributed input processing, the staged edit concept calls for four discrete stages of edit:

(1) The first edit is a field edit. This is performed by whatever minicomputer or intelligent terminal supports the keyboards. Following each end-of-field delimiter, the field is checked against the field specification for length, character set, and value range.

(2) Following the last field in a record, the record is checked against the record specification to determine if the fields exist in legal combinations for the record type.

(3) After a group of records is completed by an individual operator, the batch is checked for consistency against a batch spec.

(4) Finally, upon receipt, the central computer edits the batch in the presence of the data base for format, content, and context, and then verifies all encoded variables against the appropriate authority list.

49. With Deferred Update, Use Immediate Edit: Some applications collect input transactions during the day, edit them, store them in a batch, and reflect the entire batch of transactions in the file during one massive overnight processing run. For such systems, edit each transaction thoroughly on-line before accepting it for the overnight queue. Thus, unless the transaction attempts to change a master record which does not exist, the overnight processing will be successful.

Use good processing practices

50. Concentrate Change Activity: When updating a record, locally structure the application code so it does not make any changes to the record until all tests have been passed and it is certain that the transaction can be posted. Then if an error prohibits up-

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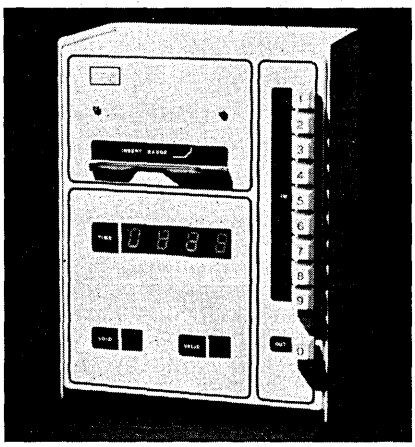

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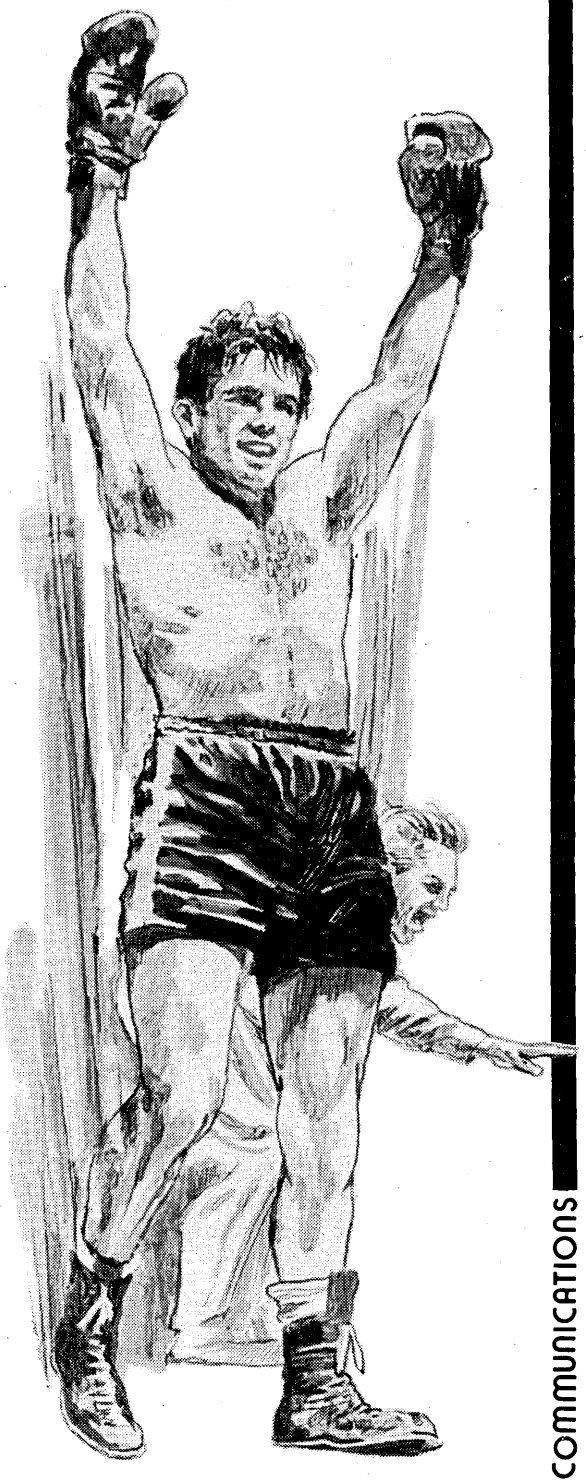

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date, the original record need not be reconstructed, and the probability that an abort will leave the data in a partially updated state is minimized. (This is particularly important if some data appears several times in a data base.)

51. Maintain Workspace Integrity: Fill the unused space in a data record and the unused space in memory with a known bit pattern. Then by checking the pattern it can be determined that the unused space is in fact unused and stays that way.

52. Erase Space: After each message/input transaction has been processed, obliterate the residual data to keep previous values from being accidently used in subsequent processing. To get full benefit from this technique, the pattern used to obliterate data should not be a legal combination of characters (blanks, zeros, nines, etc.) because a program which fails to initialize its workspace could still appear to run "properly" under some circumstances using those characters.

53. Program a Read-Only Mode: In dealing with master files of essentially static data, once the basic record has been certified to be correct, set a flag bit in the record header to inhibit further update without special privilege. Then an installation standard file access method will inhibit unauthorized update and maintain the integrity of the basic data.

54. Guarantee Program Integrity: Some program designers structure their object program modules into read-only (reentrant) areas and into read-write (serially reusable) areas. A simple checksum of the read-only areas can assure that the program (and its tables) remains untouched.

55. Interpret File Changes: Some programs unintentionally modify more data than they are entitled to. To avoid this, append a table-driven interface module to the record fetch routine supplied by the data base management system. Thus a program can get any data it desires, but can only put back data it is authorized to change.

56. Note Performance Changes: Performance changes are an indication of general system health, provided the programs have not been modified since the previous run.

57. Coordinate File Retention and Audit: When a computer center deals with a master file which is cyclically updated, it is traditional to establish a retention plan which defines how many consecutive obsolescent versions of the master file shall be retained. The audit cycles must be considered when preparing the retention plan as it may be desirable to retain additional generations of the obsolescent master files to accommodate the audit cycle.

58. Prevent Loss of Data Integrity Over Time: Data stored and untouched in a perfect world does not deteriorate. However, machines do make mistakes, operators executing unfamiliar procedures make mistakes, programming mistakes go uncaught, and the correction of mistakes sometimes breeds other mistakes. Thus in an imperfect world, data seems to decay over time even though no transactions which update specific individual records have been processed against the master file. Organizational responsibilities must be properly defined, the files must be properly designed, changes must be controlled, and files must be audited to maintain their integrity over long periods.

59. Control Quality: The quality assurance staff must check the control totals on input batches, reconcile totals on output reports with the most recent input and the current file statistics, and review histograms of the input transaction mix to catch deviations from the norm before errors are broadcast to the outside world.

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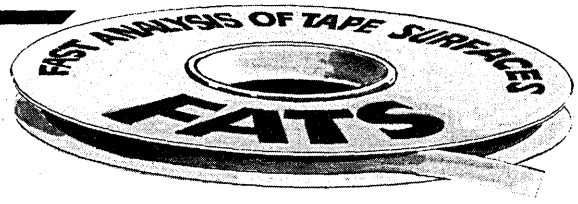

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60. Verify on Duplicating: A well-designed data base may have considerable redundancy. A separate audit program can be created to check that redundancy and verify the integrity of the file set. Imbed these same routines in a file copy program so the process of creating a backup file also checks that file for correctness.

Conclusions

The designers of application programs, especially large ones, must work hard to do a creditable job in today's environment. If the applications system is to be long running, restart must be considered. If the program runs frequently it must be tuned to efficiently exploit the operating environment. This article has shown that other tuning also is required.

Audit trails require careful design if they are to remain unbroken in all circumstances. Files must have controls designed in; it is hard to add them later. If the mathematics of processing exceeds simple arithmetic, it sometimes requires special attention too. More and more it is becoming apparent that a data processing system requires careful design attention be given both to the computer processing and to the manual processes (such as data capture, balancing, error correction, reports distribution) that surround the computer system.

If a data processing system taxes the hardware, involves careful consideration of individual privacy, or is geographically distributed, the challenge is greater, the hazards more pronounced, and the possibility of failure quite real.

The designer's best defense is team work. Suppress your ego and request a peer review of your design. Organize your experience into checklists so you avoid repeating past mistakes. Exchange checklists with your colleagues so you can profit from their knowledge. Above all, don't expect perfection. Plan for the unexpected and contain the errors as they occur.

A manager cursed with operating a troublesome, error-prone system has a different problem. An inadequate system design, a system carrying data volumes in excess of its design limits, or a system whose environment has changed drastically needs money and talent. No amount of exhortation or training will correct a system that is badly matched to its environment. Instead you need to measure the error frequencies and their impacts, review the basic design, and reaffirm the design goals. Given a preliminary review, an action plan (requiring still more money and talent) can be prepared, sold, and scheduled. If you have to rework an existing system, first collect ideas such as those presented in this report. Not all of them are expensive to implement. ❋

Mr. Patrick has been an independent data processing consultant since 1959. His assignments usually involve system design, computer center management, or audits of computer center operations. His clients have included aerospace companies, computer manufacturers, and technical publishers among others, both in the U.S. and internationally.

He is the author of the special National Bureau of Standards publication "Performance Assurance and Data Integrity Practices," on which this work is based, and has been a Datamation advisor for nearly 15 years.

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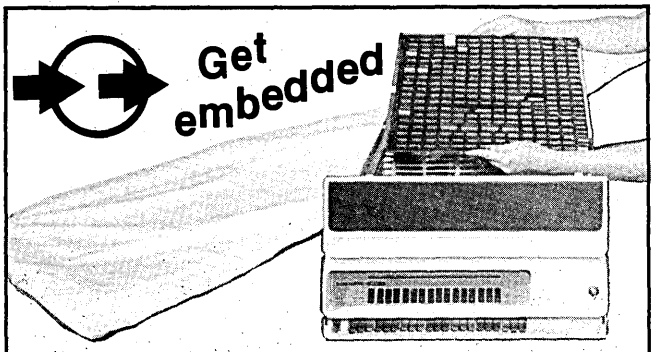

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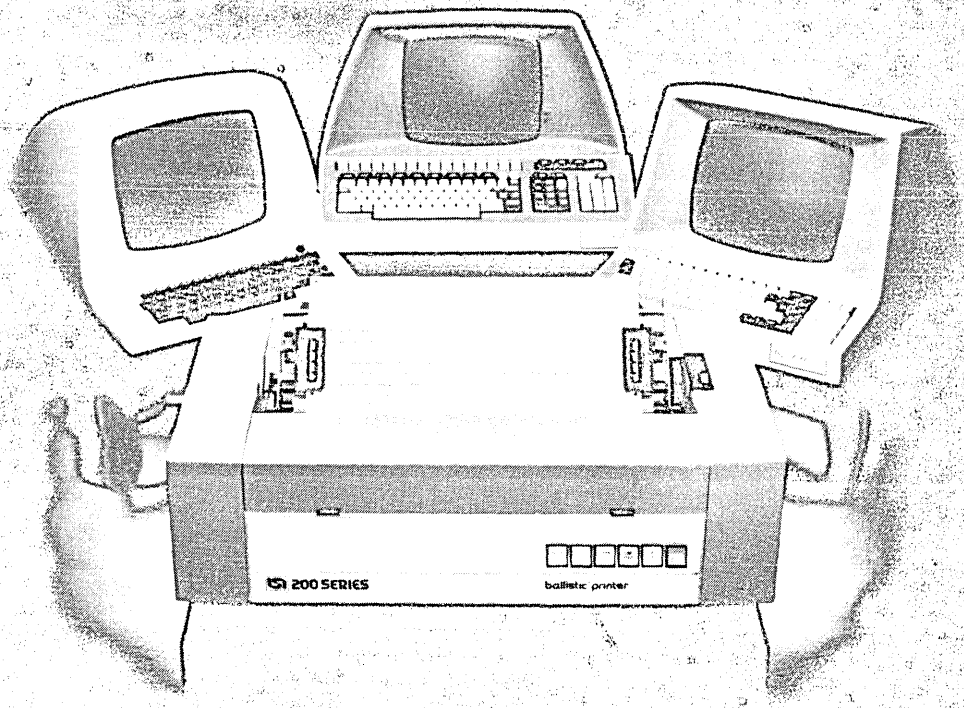

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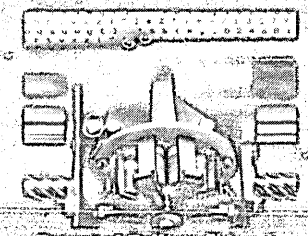

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Services

Poised to do Battle

ADP's acquisitions have shot firm's revenues up 23% as it uses newly acquired firms like building blocks

Frank R. Lautenberg, one of the founders of Automatic Data Processing and its current chairman and chief executive officer, sits in his spacious Clifton, N.J., office contemplating the possible reemergence of IBM into the computer services industry.

"My hope is that IBM won't do it," Lautenberg explains, "but we're prepared to do battle with whomever we have to."

An assertion that ADP would, or could, take on the likes of IBM would have been

FRANK R. LAUTENBERG
Prepared to do battle with whomever we have to

viewed at best as quixotic only a few years ago. But in the interim ADP, like the now $6 billion plus a year computer services industry, has grown into a big, big business, shucking the vestiges of the old "mom and pop" operation image.

Numbers tell story

For ADP the numbers tell the story. In its fiscal 1977, ended June 30, ADP which now has 8,000 employees on its payroll, had revenues of $245 million, a 23% increase—one that even IBM would envy—over 1976. Net earnings? They reached $23 million. Only the cash and marketable securities figures were off and for a good reason: ADP's been following that old maxim, "to make money, you've got to spend money."

And spend it has—$37 million for facilities and new dp equipment. "We believe that these investments in the latest technology, and in computer facilities designed specifically for both present and future requirements, will permit us to take full advantage of opportunities ahead, while also improving current production efficiency," the company told shareholders in its latest annual report.

Another big item on the ADP shopping list has been company acquisitions. Lately the service industry as a whole has been on an acquisition and consolidation binge. Tymshare recently purchased the assets of Western States Banking Assn., for example, while On-Line Systems picked up a pair of European time-sharing operations, and a number of other

> Lately the service industry has been on an acquisition and consolidation binge.

firms like National CSS are openly scouting around for prospective purchases.

ADP's acquisitions have seemingly come faster and more frequently than those of the rest of the industry combined, however. Brought into the company fold recently were First Data Corp., a Waltham, Mass.-based remote access computing outfit, which is being integrated into ADP Network Services, its time-sharing arm; three regional computer centers that will beef up the firm's Banking & Thrift Div. capabilities; CPI, a Newport Beach, Calif., concern with automated accounting and recordkeeping services geared to the burgeoning retirement plan field; additional computer centers in London and Seattle—areas not previously serviced by ADP's Commercial Services Group; and most recently Association Services Corp., a New York City firm which handles payroll unemployment tax processing.

Building blocks

Typically, ADP employs newly acquired companies like building blocks, adding to the capabilities of a particular group or service. Its Network Services, for example, was based on the acquisition of Cyphernetics a few years ago, enhanced and expanded with the purchase of the Delos International Group in England, and topped off with the First Data takeover.

Integrated, the three on-line processing groups, all of which utilize DEC-System 10s, afford on-line service to some 2,000 ADP clients in 70 U.S. and European cities through the firm's international teleprocessing network.

The other ADP acquisition strategy is to acquire a specialized service like that offered by National Inventory Controls Systems—a 1973 purchase—or Association Services, broaden it to meet the needs of a wider marketplace, then promote it to existing customers through the firm's national sales force.

And a network

The upshot of these acquisitions has been that ADP, basically a one service (payroll) company until a few years ago, today has several dozen service offerings in its product bag. Moreover, it now has the vehicle—the telecommunications network—to deliver them to a far wider

SERVICE INDUSTRY

IBM pulled out of the services business in the U.S. in 1973 when it sold its Service Bureau Corp. to Control Data as part of an antitrust suit settlement and agreed not to compete for six years. Will it reenter? That question is explored in three stories: a report on ADP, which is well prepared to do battle if IBM does come back, begins on this page. A story on page 192 speculates on what kind of services IBM would offer. And a report on page 193 shows the size of the industry and how it has changed in its approach since IBM left the U.S. market.

audience than any number of ADP "data wagons" ever could.

Says Lautenberg: "We've expanded the customer base and now can reach prospects who aren't located in an urbanized area. And with the customer connected by a dial-up terminal to ADP

JOHN WESTON
Working its way into a variety of doors

we can also take more work. We can handle all of the office processing functions including inventory, and consequently can continue to wed our existing customer base closer to ADP. Therein lies our major effort and opportunity."

> ADP is gambling that current dp users will take an increasing share of their processing load outside in the future.

ADP is gambling, then, that current dp users, many of whom may be using service companies on a selective, limited basis today, will take an increasing share of their processing load outside in the future.

This scenario jibes with what some of the industry analysts are currently speculating. For example, Input, the Menlo Park, Calif., market research firm, recently asserted that service demand would accelerate because . . . "many of the present monolithic in-house data processing organizations will begin to break up in the early 1980s. As the number of decision points for the acquisition of information processing products and services expands, so will opportunities for service companies, not only for data processing, but for word processing and communications—the total information spectrum."

Foot in the door

When and if this upsurge comes, the service firm that already has its foot in the door is going to be at a distinct advantage. And as Josh Weston, the firm's new president and chief operating officer, points out, ADP has managed to work its way into a wide variety of doors.

"On one side of the seesaw there's the small business market—companies with from 15 to 200 employees and at least a half million dollars in annual revenues," Weston explains. "We've gotten a respectable (roughly 10%) share of this market, and we'd eventually like to earn the kind of domination here that a Kodak or Xerox have in their field."

Basically, the ADP pitch here is a variation on an old Elvis Presley response to a question as to why he hadn't married yet. "If it's milk you want, why buy a cow?" the ADP ads read. "Get a computer? Don't. Most times you'd be better off getting computing instead."

"The customer doesn't have to worry about buying and operating his own hardware," Weston says. "There's zero technical involvement on his part."

Answer to hardware

And if the small customer should want his own in-house hardware? ADP has a answer for that one, too, in the form of a line of Microdata-manufactured minis it's offering, machines Weston claims price out very favorably over competing equipment such as IBM's System/32. Thus far, ADP has installed about 60 of these machines for customers, Weston says.

At the other end of the seesaw, ADP has a surprisingly large number of *"Fortune* 500" customers. Why should a major corporation with extensive internal dp capabilities turn to an ADP? Part of the reason has to do with the tremendous variance in state and city income taxes and the processing problems this entails for a multilocation company that does it in-house. ADP can, and does, handle payroll and receivables processing for big national concerns, including a major computer manufacturer, because it can do the job cheaper than the companies themselves can, Weston claims.

It is this large-scale user end of the market, which ADP also serves in an online capacity with data base management and modeling offerings, for example, that Lautenberg speculates will be a prime target for IBM if it reenters the services business in 1979. That, of course, is when the legal restraints imposed by the CDC settlement are lifted.

But Lautenberg holds an ace in the hole regarding the IBM threat. "I never really liked the idea of buying from competitors," he says. Does that mean ADP, which has close to 60 IBM systems including 15 or so in the 370 series, would drop IBM as a vendor if it reentered. "Well, in many areas (ADP is also a big DEC, Honeywell, and Univac user) we've been operating very successfully without IBM. And we're certainly not locked into the prospect of staying with someone who's going to present competition."

If Lautenberg's tough stance is picked up by other service concerns, IBM may have some serious second thoughts about the appeal of the service business. And if it does come back, this time around IBM won't be taking on mom and pop.

—Laton McCartney

IBM Back in 1980?

The giant's return to services may be in another form

Amid speculation in some quarters that IBM will never reenter the service bureau business in the U.S., Alan Brigish says, "My gut tells me that IBM will come back . . . but it won't necessarily be in 1979." The director of corporate development at National CSS Inc., the services firm based in Norwalk, Conn., explains that the market for services is growing faster than that for hardware. Besides, the U.S. is the world's largest market and is IBM's home turf.

The belief that IBM will be in the services business in the 1980s in a big way is also expressed by Peter Cunningham, president of the research firm of Input in Menlo Park, Calif. But he speculates that it may not be a service as we currently define it. IBM withdrew from the processing services business in settlement of a Control Data Corp. antitrust lawsuit. It sold Service Bureau Corp. to CDC in 1973 and agreed to stay out of the business in the U.S. until Jan. 15, 1979. But of course it continues in that line of work in Europe and in Japan.

Meanwhile, however, the computer services business in the U.S. has grown to become a $5 billion industry and on its way to becoming a $14 billion business

> IBM seems to be selling services as an entree to hardware sales.

by 1982. According to Input, the processing end, by itself, will come to more than $10 billion by '82, a market IBM can hardly be expected to ignore.

Three scenarios

Speaking at the 17th annual meeting of ADAPSO (Assn. of Data Processing Service Organizations) in San Francisco,

Input's Cunningham sketched three scenarios relating to IBM's return to the processing services business. He pointed out the problems and opportunities the company faced with each alternative, and concluded that IBM would concentrate on software. They will offer hardware enhancement services in the 1980s, he said, wherein hardware is not considered a separate entity from software but rather as a software delivery vehicle. The services they offer in the next decade may be in such diverse fields as publishing, printing, consumer services, and education.

Another slant

NCSS' Brigish put another slant on it. He said, "IBM's number one rival, clearly, is Japan Inc. The one and only entity that can compete with and maybe beat IBM are Japanese manufacturers." He sees the Japanese as being strong in manufacturing but lagging in software. So IBM must stay ahead in software, and the only way to do this, he explained, is to compete with the best—ADAPSO members.

Noting that industry analysts think the Japanese manufacturers will begin to seriously impact IBM earnings in the 1982 to 1984 period, he said he foresees IBM reentering the U.S. marketplace along about 1980.

Brigish traced IBM's services activities abroad to see if that would foretell what the company would do in the U.S. He estimated the firm's overseas revenues at $1.5 billion. Assuming $400 million comes from World Trade Corp., that leaves $1.1 billion that originates in the U.S., this from package sales and miscellaneous services to overseas customers. Thus IBM is already in the services

FINANCIAL PERFORMANCE OF U.S. SERVICE COMPANIES

($ million)

	1976 % Total	1976	1981	1981 % Total
Processing Services	68%	$3,605	$ 8,038	67%
Software Packages	10	550	1,856	15
Staff-Support Services	13	675	1,087	9
Facilities Management	9	495	1,020	9
Total	100%	$5,325	$12,001	100%

(Source: IDC)

SERVICES GROWTH OUTPACES TOTAL DP SPENDING

The $5 billion computer services industry accounts for 16% of total dp spending in the U.S. Its revenues were almost four times the value of terminal and data entry equipment shipments in 1976, almost three times the revenues of all minicomputer makers, and about the same as the total of general purpose mainframe shipments in the U.S.

A study of the services industry by International Data Corp. shows a compounded growth rate of 17% over the next five years, compared with some 15% to 16% for total dp expenditures. Nancy Scull of IDC, speaking at the ADAPSO conference, said the service vendors are feeling less threatened by the proliferation among first-time users of minicomputer-based systems, and instead are putting them to use in the services business.

In the longer term, the vendors can see using minis to develop products. The research firm also notes a continuation of the trend toward increasing specialization by service companies.

Processing firms dominant

Of the $5.3 billion in revenues last year, processing service companies drew down a dominant 68%, or $3.6 billion. Next in line were staff-support services firms (that offer custom/contract software and systems development services) with 13%, followed by software package vendors with 10%, and facilities management companies with 9%. In growth, however, the packaged software business led the way, up 34% over the previous year and expected to continue at a 27% compounded rate over the next five years (see table).

As might be expected, international revenues of processing companies were much lower than of software companies. Among the latter, foreign sales accounted for an average 17% among large software companies, 15% for medium-sized firms, and 11% for the small. But among processing firms, it was only 6% for the large and medium, and a mere 1% for the small. Scull pointed out, however, that this does not include revenues derived by any joint ventures abroad.

In general, she said, the companies' strategies look like this:

Processing companies are interested in enhancing their current products and adding packages for the same industries they now serve. Medium and small firms are interested in geographic expansion, both domestic and international, and have some interest in minicomputers—but she reported that overall there's little interest in minis.

Large companies are interested in mergers and acquisitions. Medium-sized companies anticipate getting into packaged software, while the large firms are moving into DBMS packages. There's also a strong interest in turnkey systems.

Systems software packages

Software companies are also enhancing their current products. Large and medium companies, in particular, see growth through geographic expansion, while medium and small firms are looking for growth through specialization, mergers, and minicomputers. In the matter of new products, all seemed interested in the systems software packages market, the medium-sized firms planning to do more in DBMS packages. All seem interested in minicomputer packages and in applications for manufacturing, banking, and insurance. ✲

THE SERVICES MARKET IN THE U.S.

($ billion) (Source: Input)

	1976	1982	Average Annual Growth
Remote Computing	$1.8	$5.7	21%
Batch Processing	1.6	2.4	7
Facilities Management	.8	2.1	17
Total Processing Services	4.2	10.2	16
Porfessional Services*	1.1	2.2	13
Software Products	.6	1.9	21
Total Market	5.9	14.3	16%

*Custom software and dp consulting

business in the U.S. and is the largest. It is also the dominant services organization in England, France, Germany, and Canada, he added.

France is largest

The largest service market outside the U.S., he continued, is France, where IBM does some $50 million in business, half from service bureaus and half from packaged software. The market, growing at some 20% a year, is dominated by package sales, and IBM there has offerings not available in the U.S. or Canada. "To the best of my knowledge," said Brigish, "the IBM service bureau operation in France is not profitable."

The U.K. services market is growing at some 15% a year, and it is led by professional services. With 8% of the market, or some $33 million, IBM has the largest segment of the market of any of the European countries. But perhaps 55% of IBM's revenues come from network information services. It does well in services for manufacturers and for small businesses. IBM has about 5% of market share in Germany, coming to some $36 million, and $14 million of that derives from local batch services. Again the manufacturing system is popular, as is an APT numerical control service. The German operation is thought to be highly profitable.

Canada, with about 140 companies in data services, is a $450 million market, mainly for RJE services and facilities management. IBM has some 9% of this market, or $40 million, Brigish said, selling industry-oriented, on-line services such as to the banking field, auto dealers, and the medical and insurance fields. The speaker said IBM seems to be selling services as an entree to hardware sales ("never knowingly underpriced").

"The conclusion I would come to is that IBM's role in Europe and in Canada, at least on the surface, is that the data center operation exists to help hardware sales," Brigish said. "I think it's no more and no less than that."

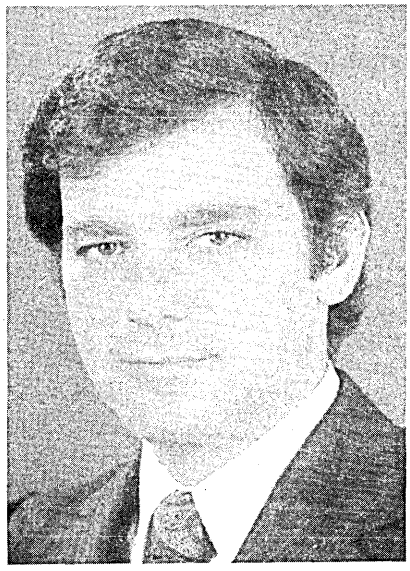
—Edward K. Yasaki

ADAPSO'S NEW BIGWIGS

The huge and fast growing data processing services industry, now accounting for about 16% of total dp spending in the U.S., feels its weight these days. The industry's trade association, Assn. of Data Processing Service Organizations (ADAPSO), recently elected Richard Crandall, president of Comshare, Inc., Ann Arbor, Mich., as its 1978 president, and John Imlay, president of Management Science America, Inc., as first vice president.

The association also announced a reorganization under which committee operations and programs have been placed on a functional basis, headed by five vice presidents. Imlay, besides serving as first vice president, becomes chairman of the public relations and industry image committee. Robert E. Weissman, president of National CSS, Inc., Norwalk, Conn., was named vice president of governmental relations committee; Bernard Goldstein, vice president for corporate development at Tymshare, Inc., Darien, Conn., vice president of the unfair competition committee; Stephen Beach, vice president of Control Data Corp., Greenwich, Conn., vice president of the communications committee; Brinson Weeks, president of Computer Management Corp., Oklahoma City, vice president of the education and self development committee.

Arthur Kramer, president of Praxa Data Centers, Cherry Hill, N. J., was elected treasurer of ADAPSO. Mr. Crandall succeeded Louis E. Pfeiffer, Data Systems Div. of A. O. Smith Corp., Milwaukee, who was the 1977 president. ✲



RICHARD CRANDALL

JOHN IMLAY

Retailing

POS Systems: "It Ain't Easy"

"No matter who you go with you're going to have problems, with hardware, with software, with training, and telecommunications systems. It ain't easy."

This not so encouraging advice was offered by H. Braun, a principal with Touche Ross & Co., to retail data processing people attending the National Retail Merchants Assn.'s 19th annual Edp and Data Communications Conference last month in San Francisco. He was talking about installation of a point-of-sale (POS) system. His advice was based on an analysis his firm did of information garnered in a confidential survey of retailers conducted by NRMA. He said more than 200 companies came back with meaningful data.

One thing the analysis indicated, he said, was that "four myths of POS have been exploded." These he listed as:

1. POS equipment comes with complete software including a range of applications software. "No vendor has bug-free software. Error recovery is the key thing, and that is missing in state of the art POS telecommunications software."

2. The POS vendor can always modify the software to do what I want. "No. A major development effort is needed. A retailer must determine what he wants up front."

3. Because I place a large order I can get better service from the POS vendor.

4. The POS vendor will take care of me. "No. The buyer must manage the vendor."

Respondents to the survey, Braun said, included both department stores and specialty stores of a wide variety of sizes. Among the department stores, 34% had all POS; 36% some POS; and 30%, no POS. With the specialty stores it was 15%, all POS; 29%, some POS; and 56%, no POS.

Across vendors

"General attitudes were the same across vendors," Braun said. In vendor selection, items considered were ranked. Vendor support was the number one consideration. This was followed by ven-

dor credibility, vendor stability, vendor industry expertise, cost, terminal functions, systems architecture, and software, in that order.

He said those stores using POS perceived as achieved benefits: faster information, more accurate information, improved employee productivity, improved commission data, reduced bad debt, ability to handle peaks, improved store image, and reduced edp costs.

Listed as benefits not achieved by POS: increased gross margins, reduced shrinkage, reduced markdown, increased inventory turnover, reduced inventory levels, and increased sales.

In installing POS systems, said Braun, 69% of the cost is just getting the terminals in. This for department stores averages $5,283 per POS. For specialty stores it is $6,917 per POS.

In terms of numbers of terminals installed, Braun said, emphasizing that "this is not a report card on the vendors," the survey ranked NCR number one with department stores and number three with the specialties. Others ranked: Unitote/Regitel, second with both; IBM, third with department stores, no ranking with specialties; TRW, fourth with both; Singer, fifth with department stores, first with the specialties; Datatrol and Sweda sixth and seventh respectively with department stores and no ranking with the specialties; and Data Terminal Systems, eighth with department stores and fifth with the specialties.

No vendor has bug-free software. Error recovery is the key thing, and that is missing in state of the art POS telecommunications software.

A major effort

Charles E. Exley, Jr., president of NCR Corp., in a major address at the San Francisco conference, indicated that his company is going to make a major effort to maintain its present leadership position.

He predicted that, "over the next 20 years, the balance of expenditures by (dp) users will shift from the present balance of an estimated 47% for equipment and communications and 53% for personnel and overhead costs to one in which the preponderence of expenditure is on equipment and communications."

He said the driving force in the shift he predicts is the same force leading others to predict an opposite shift and that is "the continuing dramatic reduction in cost per instruction executed, per item stored in memory, per line printed, etc. To an appreciable extent, these gains in cost effectiveness already have been utilized to reduce the human cost of using data processing equipment. The movement from machine languages to assembly languages to high-level languages is a familiar example."

The development of software, Exley said, "is at the threshold of a new era, much as hardware development was 15 years ago." He said this will lead to cost reductions in the writing or buying of new applications, in the rewriting of applications, and in interfacing with the user.

He cited as "new today, the extension of high level languages through a system, even to very small processors and controllers," and named as an example, NCR's new I-8100 Direct Processing System and the company's terminal controllers.

CHARLES E. EXLEY, JR.
More for hardware, less for people

"The potential for cost reduction in writing new applications," he said, "also lies in the increasingly widespread use of sophisticated operating systems and utilities."

Second source

He labeled as "the second major source of increased productivity by analysts and programmers," a reduction in the cost of rewriting what already has been written. This will be achieved, he said, through system and device independence, migration path engineering, and modularity in both software and hardware design.

"Device independence at the application level is being extended to the smallest processors and controllers, so that user development in connection with equipment changes in the future should be limited largely to recompilation."

In application development, he said, "the increasing use of such techniques as structured programming and the development of operating systems for very small processors should permit program modification without the all too familiar domino effect running through a jammed-together mixture of application programming and operating system."

He said the cost of interfacing with the real user is of particular concern in retailing. "Most retailers are characterized by a wide dispersion of outlets, each supporting a number of user end-points. Couple this fact with the retailer's inherent requirement to respond quickly to the dynamics of the retailing business, and you have defined the essence of an ideal retail information system—to move the information coincident with the events that make information meaningful."

He might have been answering conference keynoter M. G. Morris, NRMA chairman and chief executive officer of Mervyn's, a Hayward, Calif., based chain of 40 department stores. In describing some of the things he's looking for in future information systems, he named "faster collection of merchandise statistics, the ability to transmit vendor orders from our computer directly to the manufacturer's computer, and the ability of the buyer to recognize the arrival of merchandise the minute it crosses our receiving dock."

Over the next 20 years, the balance of expenditures by users will shift to one in which the preponderance of expenditure is in equipment and communications.

Room at the top

Morris challenged the retailing data processors in other ways. "Can you tell me how many retail organizations you can identify where top management started in data processing? I think you might be hard pressed to find any."

Your challenge, he told them, "is to have the board room perceive you as one of the merchants in the company whose creativity and understanding of the firm's systems needs makes it mandatory that you be consulted on every procedure that the company wishes to implement, whether it is merchandising, finance, personnel, or wherever that challenge might lead you. Dispel any image that you are a good technician who needs constant supervision so that you can relate the company's information needs to configurations of hardware and packages of software."

G. Devers, vice president, Lerner Stores, New York, N.Y., advised those retailing dp managers looking for increased personnel productivity to take close stock of their training procedures. He called "specific training for specific, immediate tasks the most useful and necessary."

Training for a specific task was

touched on by another conference speaker, James Carreker, divisional manager, Receiving & Marking, Traffic, Pool Stocks, Singer-Harris, Dallas, Texas. He listed "mass company-wide retraining" as one of the disadvantages to one alternative his store considered in developing a system to develop more accurate and timely reporting for both sales and on-hand merchandise. It was the alternative selected—key punching of OCR-A marked tickets. It was chosen, he said, because it could achieve a 100% capture rate and could "enable us to test the viability of wanding." Singer-Harris began testing wanding in mid-November and Carreker said, "I know it's going to work well."

"Can you tell me how many retail organizations you can identify where top management started in data processing? I think you might be hard pressed to find any."

One thing holding back widespread use of wanding is the slow rate at which manufacturers are moving to use of the NRMA-adopted OCR-A marking standard. Brandon Collins, director of systems, Bobbie Brooks, Cleveland, spoke for one which has. "We were the first apparel manufacturer to support UVM (Universal Vendor Marking)," he said. "The cost benefits are greater to the retailer than to the manufacturer. We made the commitment because we are most successful when our retail customers are most successful, and we do get feedback which enables us to come up with more on-target products. It's time for retailers around the country to aggressively make the same commitment. Manufacturers are watching and waiting."

Forward movement

J. Jos. Miller, NRMA's director of universal vendor marking, said a number of manufacturers have begun to use OCR-A language and technologies as their way of controlling manufacturing. UVM, he said, could become a by-product. Miller said there has been "forward movement" toward use of UVM in the areas of luggage, toys, men's furnishings, and sporting goods. He said Recognition Products "to date has delivered 35,000 wands to 100 retailers, and 20,000 of their deliveries were in the last 12 months." He told of a new company in the wanding field, Caere Corp., Mountain View, Calif., which shipped its first wands in October. Caere is selling strictly on an oem basis to POS terminal manufacturers.

Recognition Products introduced a new wanding product at the conference. It was a portable ocr wand terminal designed for automatic transaction and inventory status recording in locations not readily tied to a distributed data entry or data processing system.

Some goodies for the future were described for the retailers by D. Kovar, director, Technology Research Center, TRW Communications Systems and Services. He talked about a mainframe on a chip and "brilliant terminals tomorrow. You ain't seen nothing yet." He described how use of nonvolatile bubble memories in POS terminals could make it possible to keep journal transaction data within the terminal. "Get rid of the journal? We would have this capability but would the auditors and accountants go along?"

Kovar thinks fiber optics as a communications means could be a boon to retailers in the future. "You could put cables in elevator shafts, in any electrically hostile environment. It would give you greater flexibility in design of your installations."

C. Warkow, corporate telecommunications manager, Montgomery Ward & Co., also looked ahead. He offered a "futures timetable." In 1978, he predicted, the WATS tariff will go up. Southern Pacific will get into the facsimile service business. The phone company's TNS (Transaction Network Service) will spread (it's now offered in St. Paul and Portland). Digital Broadcast Corp., McLean, Va. (November, p. 15), will get its FM radio station-based electronic mail offering up and running.

In 1979, Warkow believes, Satellite Business Systems will begin service with IBM as its first customer. "Bell probably will have pulse code modulation." By 1980, he said, Bell's Data Network probably will be operational. In 1981, he said, SBS will be moving to additional customers.

Wants new tariff

Kovar said Montgomery Ward is pressing the phone company for what he called a "disaster tariff." This would be a tariff for an alternate route a network would have to use if a site went down.

He urged retailers to consider privacy and security in developing a network. "It's not a big thing now, but the day we open our networks for that type of interface (electronic funds transfer) it will be. We know its coming. It's only a matter of time."

Quincy Rogers, Leighton & Conklin, Attorneys at Law, Washington, D.C., agreed with him. He advised the retailers to develop voluntary programs for privacy, "come up with voluntary codes like IBM's."

"It's just a matter of time before privacy legislation reaches down into the private business sector," said D. Thiel, manager, support systems, Carter Hawley Hale Stores, Inc., Los Angeles. He said some retailers are storing information that can be challenged such as: on customers—age, marital status, ethnic background, religion, and number of dependents; in payroll data—marital status, checking account number, savings account number, color of hair and eyes, and medical history; and in personnel data—social security number, sex, ethnic background, drivers license number, and parents' occupations.

Recognition Products to date has delivered 35,000 wands to 100 retailers, and 20,000 of their deliveries were in the last 12 months.

Exley said systems of the future "will become more complex technically, but more simple operationally. They will be more usable and will utilize more resources to achieve ease of operation. They will be easier to communicate with, easier to program, and easier to install and maintain." Hopefully they also will be more private.

—E. M.

Electronic Funds Transfer

EFT Not Popular In Texas, But . . .

If voters in Texas are typical consumers, then consumer resistance to electronic funds tsystems (EFTS) is a very real stumbling block for those who would provide systems.

Those Texans who were part of a light turnout for last month's statewide election overwhelmingly rejected a proposal to modify the state's constitution to allow off-premise automated terminals to be installed by commercial banks.

Speculation among proponents of the modification was that use of the words "electronic devices" on the ballot frightened voters. "They're scared of anything that smacks of computers. Many people feel they've been burned by computers."

Passage of the measure would have left Illinois alone as a state prohibiting the remote banking devices. Florida voters approved their use in that state last year.

As consumer perceptions of EFT can vary from state to state, ideas of what consumers perceive and want vary among those who would purvey various aspects of systems.

Visa's philosophy

D. W. Hock, president, Visa U.S.A. Inc. (successor to National BankAmeri-

card Inc.), told the 19th annual Edp and Datacommunications Conference of the National Retail Merchants Assn. (NRMA) last month that it is Visa's philosophy to satisfy what it sees as four primary interests of consumers: safety of assets; wide access, 24 hours per day, seven days per week; maximum return on that portion of their funds not being used; and personal, private control of the if, when, where, and how of exchange. "They won't care who."

Visa's plastic cards are issued by and access accounts in commercial banks, savings banks, and credit unions. This fall cards were issued that can access Merrill Lynch margin accounts (September, p. 15). Hock sees all this as just the beginning. He sees Visa cards some day being able to access such "reservoirs of assets" as real estate equity, insurance, investments, and securities. "There will be significant announcements in the next few months."

Fear of loss of privacy is perceived as a concern by many EFT purveyors. One observer said this was a big factor in the Texas election. Hock is concerned about "cries from retailers" who worry because they can't tell a Visa debit card (which accesses a customer's bank account) from a credit card (which accesses a line of credit). They want to know what assets are being accessed when a sale is made. "To give you that information," he told the retailers, "would be an invasion of privacy and we wouldn't tell you even if we could."

Jim Williams, NRMA president, had a different outlook. "The consumer should know at the point-of-sale (POS) which assets he's going to access, and the merchant should know so he can choose which to accept. We support the consumer's need for privacy but free exchange of legitimate credit information is necessary to business."

Quincy Rogers of the Washington, D.C., law firm, Leighton & Conklin, told the retailers' conference there ought to be "a right to privacy for business too." He warned of the proposed Federal Consumer Agency which he said, "could become a conduit for release of information, your information."

Another worry

Williams had another worry about the debit card. It's what he called "the reversibility and stop payment" feature which is not present in a credit card transaction.

"Obviously one cannot be for or against EFT," he said. But, 150 million charge accounts are open in retail stores. "We can't let that credit reservoir ever dry up. Credit is an integral part of our business." He said "more than twice as many consumers with incomes of less than $15,000 per year use retail credit as opposed to bank credit. If the advent of the debit card adversely affects retail credit, it adversely affects the retailer's ability to give credit to the higher risk consumer. This consumer suffers and retailers suffer . . . When financial institutions price EFT attractively, we will talk, but we will continue to resist paying the same percentage on a debit card as on a credit card." He advised retailers to "shop the market."

"The EFTS is a figment of the imagination," said Hock. "No such system will ever exist . . . Standardization is impossible and the most expensive and least useful use of electronics . . . we must reformat between nonstandard elements. Private enterprise can create effective value exchange systems by connecting systems of banks and retailers." He warned that "government, particularly the Federal Reserve, has an insatiable appetite for power and growth, and electronic exchange is a tempting morsel." He said the "dreams of empire of those refusing to link to gain dominance are fading fast. Hitch them (EFT systems) together and inform those folks in Washington that their services are not really needed."

He sees Visa cards some day being able to access such "reservoirs of assets" as real estate equity, insurance, investments, and securities.

At a joint Bank Administration Institute (BAI)/Foodmarket Institute (FMI) conference in Dallas, M. Dean Potts, senior vice president, finance, and treasurer, First National Stores Inc., also expressed concern about EFT and the government.

"Supermarket operators," he said, "are concerned that EFT networks may be regulated either as public utilities or as part of the banking system. If such systems are regulated as utilities, there is concern they will not develop as quickly from either the technological or cost view as they would in a competitive environment."

Customer service

What supermarkets want out of EFT, Potts said, "are first, and foremost, service to our customers at no additional cost with secondary objectives of cost reduction and retarding the paper explosion."

Potts said supermarkets believe EFT systems should be shared by multiple financial institutions and retail establishments, but do not favor mandatory sharing.

Burt Gantt, Republic National Bank, Dallas, one of those unhappy with the results of last month's Texas election, summarized findings of a joint BAI/FMI research project which ended with a similar conclusion. "Although some financial institutions may develop some initial competitive advantages, the retailer and consumer will eventually force sharing of POS terminals among financial institutions."

William M. Randle, Atlantic Bank in the luckier (for commercial bankers) state of Florida, described his bank's "electronic banking" system made up of eight on-line Diebold TABS 600 terminals, at the BAI/FMI conference. Three terminals are located in supermarkets and the other five within regional malls. "Committing a third of our ATM's (automated teller machines) to supermarket locations in 1976," he said, "was, indeed a calculated risk." He said it was a risk that turned out to be worthwhile. "ATM's in a supermarket environment provide an interesting alternative (to a major POS network) for the near term. The basic theory is sound. Retailing and banking are in partnership. Systems and operations may blend easily in a future POS system, but ATM's meet today's need at a price that can be afforded."

And in unlucky (again to commercial banks) Illinois, EFT pioneer Continental Bank, several times thwarted by legislators and the courts, is moving ahead in an allowable direction. It has added time-sharing computer options to the balance reporting and transfer of funds cash management services it offers to corporate and correspondent bank customers.

Their terminals

Through the bank's automated balance reporting and time-sharing transfer of funds systems, corporate and bank customers use their own computer terminals to extract information from Continental's time-sharing computers through a local telephone link between the customer's terminal and Continental. In contrast to systems operated by other banks which use outside computers, Continental's own computers are used to report balance information to the customer.

"Although some financial institutions may develop some initial competitive advantages, the retailer and consumer will eventually force sharing of POS terminals among financial institutions.

This could be a response to competition from corporations which are beginning to do their own computer-based management with the advent of such aids as automated clearinghouses and networks.

And on competition, a thing which Visa's Hock would like to see fostered, Visa itself seems to be fostering a bit.

John Russell, Bank Card Div., City National Bank, Columbus, Ohio, told the NRMA conference that, "Citicorp is trying to get Visa business away from the local banks" via an early, nationwide, mass mailing soliciting that business.

And there are other ways. Fred Meyer Savings & Loan, a subsidiary of Fred Meyer Inc., largest retailer in the Pacific Northwest, began this month to offer what it calls "a new, lower interest rate Visa card" to its savers. Interest rate charges on the unpaid credit balance of the Fred Meyer Visa card will be 10%, under the rate being charged in the Northwest by other Visa issuers.

Farther down the EFT road is bill paying by phone and Periphonics Corp., Bohemia, N.Y., said it has installed "the largest telephonic funds transfer bill payment system yet implemented in the U.S. Service began this month on the system which is called Bank-From-Home and is offered in North Carolina, South Carolina, and Virginia through Allied Financial Services, Inc., Charlotte, N.C.

Even farther down the road is in-home purchasing, but even that's being implemented on a test basis in 100,000 homes in the Columbus, Ohio, area by Warner Cable Co.

Texas voters notwithstanding, EFT is moving.

—Edith Myers

Meetings

CCIA's Crystal Ball:

On IBM case, market trends, and tax reform

A future in which the government will have won its antitrust case against IBM, the differences between word processing, data processing, and communications will blur, and more than two-thirds of *Fortune* 500 companies will have up and running electronic mail systems.

This was promised members of the Computer and Communications Industry Assn. last month by a number of speakers at a board of directors meeting in Los Angeles.

Less clear was what the future holds in terms of taxes. A tax reform proposal CCIA had expected would be introduced Nov. 1 when it put together its mid-November program was not, and the panel discussion on tax reform was more speculative than argumentative. The expected proposal was believed to have included elimination of preferential tax treatment of capital gains (August, p. 116) which CCIA and other trade associations feared would cut off sources of capital for small, high technology companies.

> "Remind them that no one can get a capital gain unless the company that underlies that gain is successful."

Congressman James Corman (D-Calif.), House Ways and Means Committee, said that if anything happens in 1978 it probably will be a cut in the tax rates and an adjustment in tax credits. Things are at a standstill now, he explained, pending adoption of an energy program.

"I don't see anything going that has a drying up stimulus," Corman said. He proposed a capital gains tax which would "tax real gains, not artificial gains, and permit roll-over like with residences. This might come, but not in '78."

JACK BIDDLE
"Less than a 50-50 chance"

But the spectre of drying up capital is still there. "Now is the time to get people in Washington to listen," said Ned Heizer, chairman and president of Heizer Corp., a Chicago investment capital firm, "and keep your suggestions on a general plane. Remind them that no one can get a capital gain unless the company that underlies that gain is successful."

Heizer would like to see a law passed similar to the Savings and Loan Act of the '30s which created the Federal Home Loan Bank Board (FHLB) and "got money for homes flowing to average Americans who could no longer get it from banks and insurance companies." The law he envisions would change the Small Business Administration into the Small Business Development Board and make it much like the FHLB. Small Business Investment companies would become Small Business Development companies and would be able to lend money to small companies with no interest due for 10 years.

Thomas L. Caps, Riordon, Caps & Carbone, tax counsel, was concerned with what the elimination of preferential tax treatment and of qualified stock options could do to the ability of small, high technology companies to attract good people. "If these go, how can you reward them? Cash, only cash, and only the big companies have that."

That one of the biggest of the big, IBM, will lose its court battle with the Dept. of Justice, was the prediction of J. Thomas Franklin of the Boston law firm of Sweeney & Franklin. "In my view, the Dept. of Justice now is concluding a winning case; its market definition is sound," Franklin said. "Within that market, IBM has a monopoly share and other indicia of monopoly power. And it has intentionally perpetuated that power by conduct designed to destroy competitors, not to benefit users . . . I believe that this audience, and the broader audience that will be affected by the decision of this case, should count on the government winning the case and should conduct their business strategy on that basis."

> "I think the main aim of this company must be to protect and expand our position in the marketplace, and this must be a consideration well above that of profit."—T. J. Watson, Jr.

Franklin based his conclusions in part on a review of the so-called intent documents, those documents relating to the intent or motive with which IBM entered upon the practices the government claims to be antitrust violations. "They (the intent documents) change otherwise neutral documents into incriminating documents," he said. "They completely

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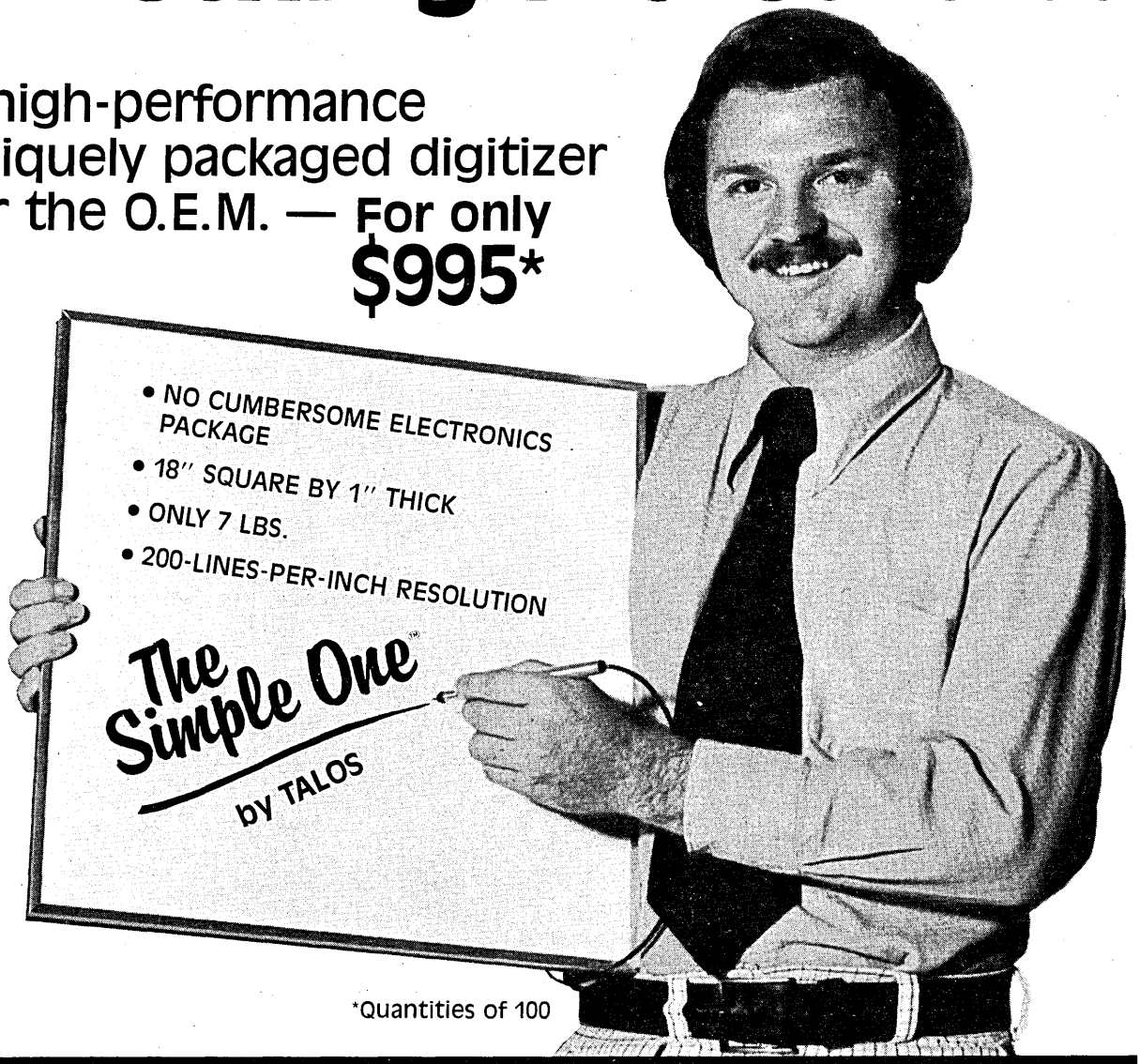

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undercut the IBM defense that it has engaged only in legitimate competition."

He said the government has "some pretty good evidence that IBM often chose a strategy which maximized market share at the cost of profits," citing as an example a letter written by T. J. Watson, Jr., to his brother, Arthur, in November 1964.

It said, "I think the main aim of this company must be to protect and expand our position in the marketplace, and this must be a consideration well above that of profit."

Franklin described a later document written by Bartow Farr, one of IBM's top internal legal counsel, which set forth a series of rules to be observed including: "Never imply that we would be willing to sacrifice profit for market share."

"Maybe he should have told that to Tom Watson back in 1964," said Franklin.

He said he had carefully reviewed the testimony of Dr. Alan McAdams, the government's chief economic advisor and its first economic witness. "The new perspective that Dr. McAdams has introduced to me is that IBM has maintained its monopoly power largely by strategies intended to avoid product-to-product competition with any competitor."

He was asked about the likelihood of interim relief being granted at the conclusion of the government's case. "That depends on what the government asks for. There is some interim relief IBM wouldn't oppose, would find palatable. I think it's a long shot that the government will ask for it or get it (interim relief)."

"They (the Dept. of Justice) are seriously debating this," said CCIA president, Jack Biddle. "If meaningful relief is granted, IBM will appeal all the way to the Supreme Court, which would delay the trial. Or, if sufficient relief is granted to come close to 90% of the government's objectives, the judge could say 'go ahead and settle.' If the relief is something IBM would accept, the judge could infer that the problem's not so big after all. I think there's less than a 50-50 chance they'll (Justice) ask for interim relief."

Where Franklin predicted an IBM failure in court, another speaker, Stanley Mantell, v.p., Input, a Menlo Park, Calif. research firm, talked about an IBM success—with its Series/1 minicomputer.

"IBM has maintained a growth rate with Series/1 that has been a surprise even to them," he said. His firm surveyed one-third of the then current users (some 200 systems installed) last summer. "They're pleased with the product. They're happy users." He said maintenance was the key factor with both oem and end users.

Mantell said the initial lack of software was a minimal problem. "There soon were people jumping over each other to provide this." He said IBM had a 5,000 unit backlog last summer and a 2% market share. He foresees 90,000 systems installed by 1981 and an 8% expansion of market share.

Mantell was the speaker who predicted the blurring of distinctions between word processing, communications, and data processing. He believes this will mean a merging of buying functions with finance, office administration, and data processing combining responsibilities.

The electronic mail prediction was made by Howard Anderson of the Yankee Group who contrasted his two-thirds of the *Fortune* 500 companies figure, which he sees for 1983, to 24 companies today which have "what we consider an embryonic electronic mail system. Electronic mail," he said, "needs an incubation period of about three years. In these three years, applications will catch up to technology, case studies will be available, and executives who have designed and implemented an electronic mail system will be in high demand and commanding absurd salaries as headhunters camp on their doors."

Anderson believes "internal managers of communications/electronic mail will be as much in demand as edp managers were some ten years ago."

Now, though, he feels, "electronic mail is like junior high school sex. Everyone talks about it. Nobody does it."

—E. M.

An Alert System Before the Fact

"Why are we always playing catch up?"

Erwin Tomash, chairman of Dataproducts Corp., Woodland Hills, Calif., was concerned about "Free Trade—Fair Trade—Open Trade" when he asked this question last month at the CCIA conference, a talk that was not listed on the printed agenda.

He said the U. S. has always led in computer technology, but now "the technology gap is closing and everybody wants to get into the act. It's a symbol of nationhood. It used to be a country gained status when it had an airline, now it's a computer industry . . . And there's growing nationalism all over the world, sometimes concealed." He pointed to the merging of computers and communications and said, "No country's going to give up control of its communications."

Tomash would like to have an "alert system" put in place ahead of time instead of a solution to a problem "we've gotta go fix."

"Are we headed for the 1970s problems of steel, automobiles, and tv sets? Is the word computer going to be added to that list in the 1980s? Is there anything we can do now not to get on that list?" He asked these and other questions of the CCIA members and provided a mechanism for them to answer. Each attendee received a copy of his notes with half of each page blank for responses. The notes were packaged in an envelope addressed to him which contained a felt-tip pen.

"This is not a big company versus little company problem," he said. "It isn't a one country problem. It could be a unifying thing which wouldn't hurt our industry." ✻

Getting Ready for Electronic Mail

Subject permeates Interface show in Los Angeles

Researchers at the Rand Corp. believe they'll have come up with ways to use electronic mail efficiently when that technology finally reaches the office of the future.

When that time will come, though, is anybody's guess. So far electronic mail and other blue sky features of the office of the future is restricted mainly to high technology companies, including those 10,000 persons on the Defense Dept.'s Arpanet (a network operated by the department's Advanced Research Projects Agency).

Dr. Robert H. Anderson, head of Rand's information sciences department in Santa Monica, Calif., said powerful intelligent terminals, sitting on the desks of "managers and other persons doing creative work," should be available within the next two to five years.

They'll be used, he said, to access huge networks of information such as the *New York Times* information service; to automatically check for incoming electronic mail; to sort the incoming electronic mail by priority; to make appointments for people in an on-line fashion; and to transfer a file to or from a remote computer in a data network.

The huge think tank has Defense Dept. backing to develop what it calls "RITA" (for Rand Intelligent Terminal Agent) in which user-defined "agents,"

or software, would take the mundane tasks out of the hands of users to do these things. "For example, instead of searching your 'electronic mailbox' for a message, the 'agent' might cause your terminal to ring a bell," Anderson said during a talk at Interface West, a three-day conference and trade show held last month at the Los Angeles Convention Center.

Rand currently is doing its research on a PDP-11/70 minicomputer with the Bell Laboratories developed operating system, Unix. Eventually, he said, desktop terminals with tomorrow's microprocessors will have the same power as today's minicomputers.

Small conference

Anderson was one of five panelists speaking during a session at the Interface conference on the "Office of the Future," a subject that seemed to permeate the rather small conference where sessions drew from as many as 125 to as few as 20 persons. It featured sessions on small computers, data communications, tele-

Desktop terminals with tomorrow's microprocessors will have the same power as today's minicomputers.

communications issues, and some low-attended sessions on microcomputers.

Overall attendance at the exhibit and conference was listed by the sponsors at "over 7,000," but most of the turnout was for the exhibit portion.

That pleased exhibitors—a mixture of telecommunications vendors, representatives of manufacturers, people selling small computer systems (including the ubiquitous Commodore Business Machines, Inc. of Palo Alto and its Personal Electronic Transactor, a $595 personal computer), and most major computer trade publishers. Said one exhibitor: "It's really quite a professionally run show." To another, "It was the best I've ever been to and that includes the NCC (the AFIPS-sponsored National Computer Conference). The exposition is so large at the NCC that it overwhelms the attendees; two minutes after they leave, they can't remember what they saw. Here the show is small enough to be comprehended and the crowd is manageable."

"This is a most under-attended conference," said George Glaser of Centigram Corp., Sunnyvale, and a former president of the American Federation of Information Processing Societies (AFIPS), who headed a session on Electronic Funds Transfer Systems. "We had a panel of the best experts on the subject and about 35 people in the audience," Glaser said.

Nevertheless, conference director Sheldon Adelson said the second annual Interface West conference will be held next year at the same place Nov. 13–15. "And we'll have 200 exhibitors," he added. At this year's first conference about 80 exhibitors turned out.

Adelson's organization also stages a national data communications show and conference, this year to be held in Las Vegas, March 6–9, under the name Interface '78. Five previous conferences have been held.

Adelson said of the Los Angeles affair, "There's a definite need for a realistic, how-to approach to data processing to give businessmen on the West Coast an opportunity to attend a wide variety of seminars in non-technical language."

Many consultants

That in a sense was true, but the turnout of 41 consultants on the program—which also provided them with a "consultants corner" where they could chat with prospects—may have overwhelmed attendees with consultantese.

Examples:

Einar Stefferud, president of Network Management Associates, Inc., a consultant firm: "We are discussing electronic mail for those of you who can afford it in the next three years."

Dr. James H. Carlisle, vice president of Office Systems Planning Corp., Los Angeles: "Everyone agrees that there is some kind of problem we are trying to solve, but no one has yet defined that problem to anyone's satisfaction." (Dr. Carlisle told a reporter his slide presentation was valued at $100 a slide.)

A disgruntled attendee, who said he was disappointed in most of the conference sessions, said he had listened to a consultant whom he thought would touch on "hot subjects" in a session on network planning and design. "Instead," he said, "all he did was promote his own consulting firm."

There even was a session on the subject, "Dealing with Consultants."

And William B. Lynch of San Francisco, himself a consultant, was so disturbed with the "puff pieces" listed in the printed program on the consultants, that he devoted the first third of his paper to a lecture that cautioned the audience not to believe consultants' "puff pieces or rely solely on published works, no matter how eminent the journal in which they appear."

Lynch, who is a managing partner in the San Francisco telecommunications consulting firm of Lynch, Victory and Young, and who addressed a session on interconnect equipment, gave a list of cautionary steps that should be taken in evaluating a consultant, including doing an audit of the consultant's income for the previous six months. Lynch then toned down his own billing in the program, noting that he had been in the telecommunications field three and one-half years (not the five mentioned in the

It's hard to know if distributed systems are doing what they are designed to do.

program) and that he had a BS degree (not an MS).

"We invite all of our speakers to submit written biographies for the program," said Alan Kaplan, director for the conference's program development. "His probably was late and we got the information by telephone."

Distributed computing was a popular topic. At a session of about 125 persons,

INTERFACE WEST drew some 7,000 persons to Los Angeles Convention Center.

David J. Farber, formerly of UC-Irvine and now with the Univ. of Delaware, said distributed systems can work, but we still lack the proper design tools. There is a need for substantial research in both design tools and computer architecture.

Quoting from a professor at the Univ. of Illinois, Farber defined a distributed system as "one that is neither here nor there."

Farber, an associate professor of computer science and electrical engineering when he was at UC, has studied reliability of distributed systems and local network architecture. At Delaware he has IBM backing to investigate distributed processing systems using Series/1 minis. He attempted to destroy the myth that it is new. Some, he said, might look back to the days of the 70XX and call it distributed processing because the cpu and channels were logically separate. Likewise, in the early '60s, use of front end/back end processors might be called distributed processing. And, he noted, there are some problems that just don't factor into distributed processing. "If you've got a number crunching problem, you're probably better off with a (CDC) 7600 than a handful of minicomputers."

Farber said it's hard to know if distributed systems are doing what they are designed to do. One solution, he said, is the use of a vitality monitor that is coupled to a distributed system. The monitor is given a model of how the real system should behave and it watches over the real system, making sure things are going as the model dictates. If not, it calls for attention. "Either the system is bad, or the model is bad."

Disturbed with puff pieces listed in the program on consultants.

Typing problems

A session on electronic mail brought forth an agreement from both the speakers and the audience that the telephone, in many cases, still will be the more effective communication medium. "I've had serious disagreements with many people on a network (using electronic mail) and have decided to pick up the phone," said Einar Stefferud, chairman of a session on the subject.

"Each medium had its peculiar advantages," he said.

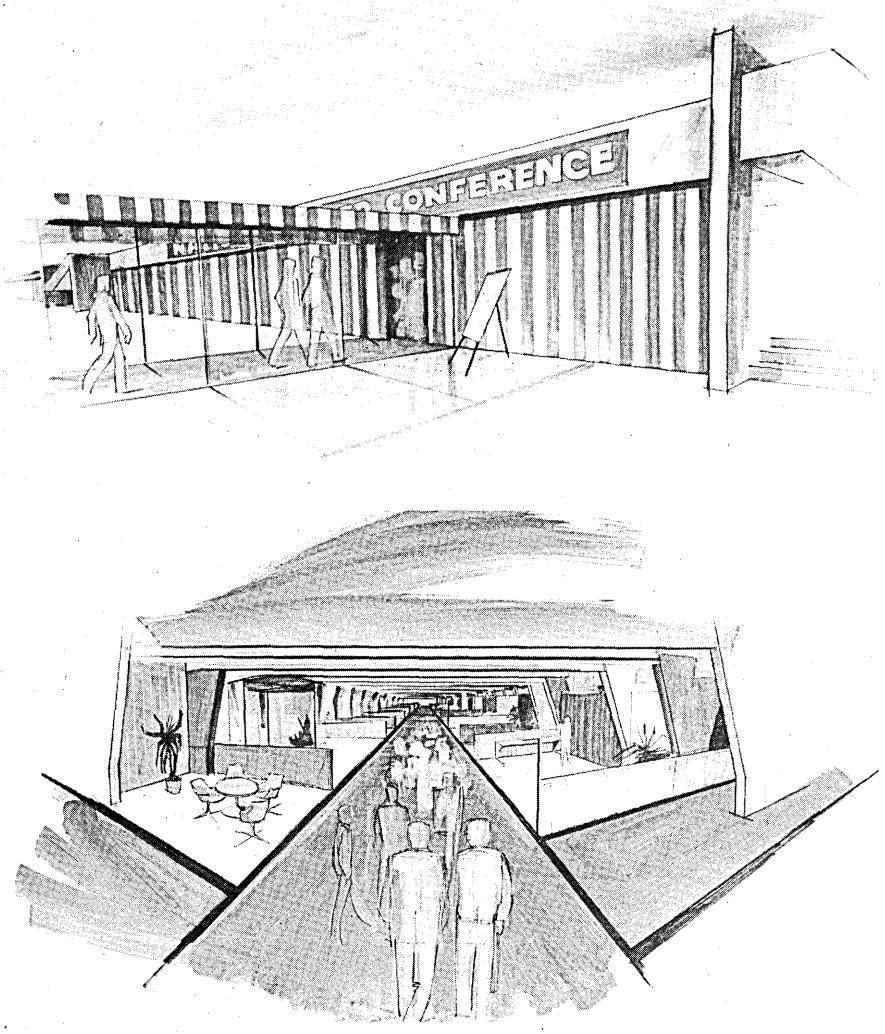
Stefferud said he uses a Texas Instruments model 735 terminal to type out messages on the Arpanet. He said his session mostly was planned through such communications over the network.

David H. Crocker, of the Rand Corp., said that while he felt the Arpanet was woefully behind the times ("We can't even distribute files."), he noted that there were some economies in the handling of electronic mail. "Software now enables a person who receives a message addressed to 18 other persons to reply automatically to all 18 without having to type out their names."

Typing seemed to be a problem in the progress of electronic mail.

"Typing is very slow and sometimes inaccurate," Crocker said. "It's also a low level function in most companies, and not a single executive would be caught

NCC ADDS ON FOR A RECORD TURNOUT



COVERED walkway will lead to "West Hall" at NCC where sponsors are investing $100,000 on a refurbishing program to accommodate record turnout of exhibitors.

The National Computer Conference is growing up and out. Some 248 companies already have signed up for all 1,108 booth spaces in the Anaheim Convention Center for the conference next June 5–8. To accommodate the waiting list, the sponsoring American Federation of Information Processing Societies has decided to invest $100,000 in acquiring space for an additional 270 booths.

The new space will be in a newly built carport outside the hall. AFIPS will erect heavy gauge canvas along the walls, air condition and light the facility, install carpeting, and build a huge sit-down restaurant.

A covered walkway will connect the West Hall, as it's being called, to the North and South halls of the convention center.

Gerard F. Chiffriler, director of NCC operations, said the additional space should accommodate all of the persons on the waiting list. Afterwards it will be offered to other companies who fulfill NCC exhibit requirements.

The addition of the West Hall will provide for a total of 1,378 booths, which would make the 1978 NCC the largest in history. The previous record was set last June in Dallas when 1,146 booths were occupied. ✲

saying he's able to type."

But, said Dr. James Carlisle, "72% of all business telephone calls are not completed when first placed," thus assuming a major saving in time through electronic mail. "It sends information when the sender is ready and the source gets it when he or she is ready." ✲

People

Geoffrey Cross Leaves ICL For??

Geoffrey R. Cross, the American managing director and driving force behind British computer giant ICL, resigned last month.

He immediately flew to New York to begin the hunt for a new job—though not necessarily in computing. Cross is succeeded by Dr. Chris Wilson, director of ICL's international division.

Cross' departure after more than five years with the company was sudden and totally unexpected by other ICL executives. Forty-three year old Cross said he had resigned for "family reasons." Both his sons, aged two and five, suffer from bronchial asthma, and doctors have advised a warmer, drier climate, Cross explained.

> ICL's board has always understood that he intended to return to the U.S., though the timing of his departure has surprised them.

British-born Cross emigrated to the U.S. 20 years ago. ICL's board has always understood that he intended to return to the U.S., though the timing of his departure has surprised them.

Two other American directors at ICL, Brian O'Heron and Ed Mack, have made it clear to the board that they, too, will leave the company and return to the U.S. at some stage. But this isn't likely for at least a year.

Both O'Heron, ICL's trouble-shooter and New Range launch man, and Mack, director of product development, are long-time friends and associates of Cross. And both were recruited by him from Sperry-Univac only months after he left that company to head up ICL.

Apart from fears for his children, there are indications that the British tax man has added further weight to Cross' decision to quit.

Both O'Heron and Mack are believed to be paid through ICL's New York subsidiary into their respective banks in the U.S. As Americans they pay tax on these earnings in both the U.S. and the U.K. The losses that accrue from the British tax system are made up by ICL New York so that on balance the two men lose only a small amount, say $1,000, company sources reveal.

His English birth

Cross, however, though he is an American citizen with a U.S. passport, pays only the punitive rate of English taxes. The U.K. Inland Revenue said this must be so because of his English birth.

In Britain, entire salaries are taxed at the rate of 83% if they exceed $38,000/year. This means that Cross must give the vast majority of his $83,000/year salary to the tax man.

Sources indicate that Cross is "legally" reimbursed for these losses by ICL. They say that ICL makes up the difference by payments to a company called G.R. Cross Associates, Inc., in the U.S.

GEOFFREY R. CROSS
A sudden departure from ICL

At the time of writing ICL declined to comment on this and Cross was not available for comment.

A more sinister interpretation of the function of Cross Associates was offered by the monthly trade magazine, *Computer Decisions.* The magazine reported in October that Cross Associates was being used by Cross, O'Heron, and Mack as a "money laundry" to siphon off large sums of cash from ICL "disguised as consultancy fees."

In a statement to DATAMATION on Nov. 16, 1977, a spokesman for ICL said of the *Computer Decision* story, "It is inaccurate, misleading, and defamatory. ICL will be taking the necessary action to deal with it." Cross was expected to sue in due course on his own behalf.

A little company

A friend of Cross said that he, O'Heron, and Mack had determined to set up a "little company" shortly after joining ICL. "They thought they'd look around for some small investments—maybe buy an English pub or something—so Geoff set it up. But as far as the involvement of O'Heron and Mack was concerned, the whole thing just died a natural death because it was never used on their behalf." Both men declined to comment on the story.

Cross is described by ICL friends as a "quick kind of guy." He quit Univac in a day (June 1972, p. 96) and the next day he was with ICL. He could be speedily in a new job though not necessarily in computing because "he's always had an ambition to get out." Cross should have little trouble in getting a new job: "In fact, some of the companies he has worked with would snap him up just like that," they agreed. Both CDC and NCR were mentioned favorably.

> Cross is described by ICL friends as a "quick kind of guy." He quit Univac in a day and the next day he was with ICL.

As Cross is known to favor Phoenix, Ariz., and its climate for his children, Honeywell's operation in the locality has been mentioned as a possibility. But Cross could just as conceivably choose some other country with a climate similar to Phoenix.

The futures of Cross, O'Heron, and Mack could possibly be linked again, but this is unlikely in the short term. Mack and O'Heron are crucial to the launch of ICL's new S Series of computers—known within ICL management as the "new" New Range. Mack designed the S1—or 2950—and O'Heron leads the 80-man software team charged with bringing the series' real-time operating system, VME/K, up to scratch. "VME/K will be released in the next few months, and it will probably take a year to get it straightened out. I'm here to finish the job," O'Heron said. Mack is known to feel the same way.

This should make ICL's new boss, 48 year old Wilson, sleep a little easier. He has been in computers for 24 years—14 with ICL, and mostly in marketing.

It's expected that the marketing thrust of the 2950 could net ICL £ 30 million next year from the sale of some 60 systems. Sources also reveal that the company is expected to provide some 400 to 500 releases of VME/K each year.

—Ralph Emmett

No Big Machines for Datapoint

Datapoint's 6600 *is* the top of its product line. And it will remain at the top, at least for the foreseeable future, because the mini maker currently has no strong inclination to build a larger processor.

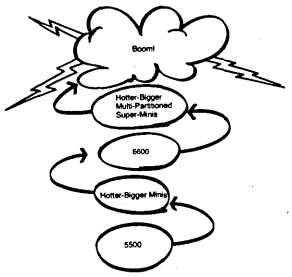
That's not to say the San Antonio firm has turned a deaf ear towards its larger users which are clamoring for more power. Instead of answering their needs with yet another processor, the company will provide an essentially transparent method for interconnecting its processors over a 250K Bps coaxial cable data link. These networks, known as Attached Resource Computer (ARC) systems, have the potential for rivaling the performance of mainframes, according to Victor D. Poor, senior v.p. of R&D.

ARC divides processing into three functional areas: application processing, data storage and management, and interprocessor communications. The firm's existing 5500 and 6600 series of processors fit into the ARC system architecture as either applications processors or file processors (for system-wide data storage and management). Resource Interface Modules (RIM), based on bipolar microprocessors, interface processors to the co-ax data link. A junction box, called a "hub," interconnects the co-ax cables, which may be as long as 2,000 feet. IBM mainframes also may join on the co-ax party line, through a Direct Connection Interface Option (DCIO).

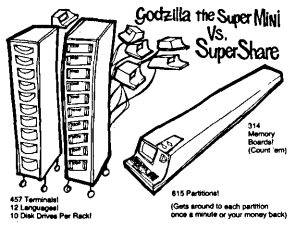
Datapoint modified its operating system software to fit the new environment, but maintains that the changes essentially will be transparent to users. And, although the firm doesn't have a larger processor waiting in the wings, it does plan to introduce two new series, the 3800 and 6000, which include their own RIM's, and offer performance comparable to the 5500 and 6600, respectively.

For Datapoint, which for its fiscal year ended July 31 reported that roughly two-thirds of its domestic revenues came from lease and service billings, not adding a new top of the line makes a lot of marketing sense: the firm won't get a lot of returned systems. Establishing ARC systems of processors already in the field also will extend the life of the current product line. And, by keeping users in the fold as their needs grow, Datapoint generates more of a market for itself: ARC systems can grow by plugging in new processors as they are needed. The incremental cost will be the price of the processor (and RIM, if it isn't imbedded in the processor) and whatever co-ax is needed, in most cases. In some instances an additional hub will be needed.

Before Datapoint could begin selling ARC systems, it had to sell its sales force. The sales force kept calling for bigger machines to compete with the larger processors the competition kept introducing. But Poor foresaw this escalation



getting out of hand. At an international sales meeting last April, he gave a slide presentation to drive this point home. When he got to his "godzilla" mini slide, the audience broke up in laughter. Poor



then described ARC systems, then known by the internal name of Internet. The sales force was told not to expect a larger machine, but rather to prepare for a way to configure multiprocessor systems of whatever size their customers required.

Poor says the sales force left the meeting enthused over ARC. Potential users are likely to hear their sales person tout the product on several points: modularity and ease of expansion; security; performance; reliability; and last but not least, price.

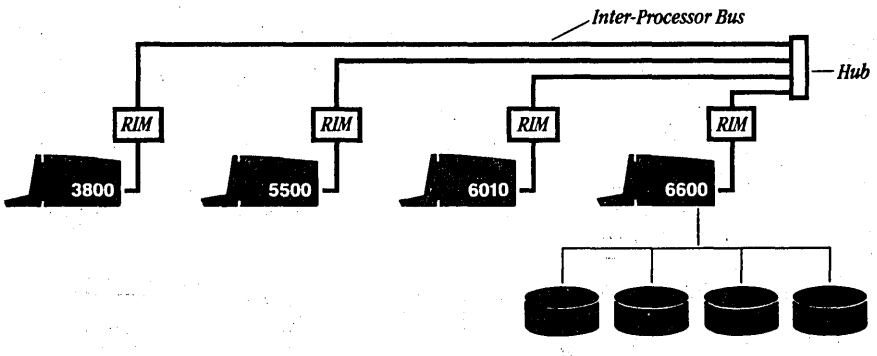
ARC systems may comprise as many as 255 processors, at least one of which must be designated a file processor. The DCIO, which allows IBM mainframes to participate in ARC's, attaches to a byte multiplexor channel and provides eight channels which appear to be unit record devices (a card reader/punch or printer). A program running on the mainframe can then communicate with the ARC by reading or writing to one of the eight unit-record pseudo devices. More than one file processor can serve an ARC system; all other processors are available for applications processing. These applications processors can communicate only with file processors, and not directly with each other. Thus, discs attached locally to an application processor are accessible only to that processor.

Datapoint doesn't expect 255-processor ARC systems. Poor feels that a large system would typically have 30 to 40 processors. It's more likely, he continues, that an installation with quite a few processors would choose to set up multiple ARC's, divided along functional lines. Any processor may belong to as many as six ARC's at a given time; since applications processors can only access common data bases (via file processors) and ARC system software provides access privileges, each ARC can be protected from the others. One possible configuration of multiple ARC's would have a management ARC belonging to separate ARC's local to the accounting, planning, and manufacturing departments of the company. In another multiple-ARC system, one processor, dedicated to a specific function (such as printing spooled disc files) might belong to all the ARC's (up to the limit of six).

It's more likely that an installation with quite a few processors would choose to set up multiple ARC's divided along functional lines.

For flexibility

To provide configuration flexibility, two types of hubs are available. For small systems, a *passive* hub can interconnect



A four-processor ARC system, explicitly showing RIM's and the hub. The 6600 processor (right) has been designated the system's sole file processor.

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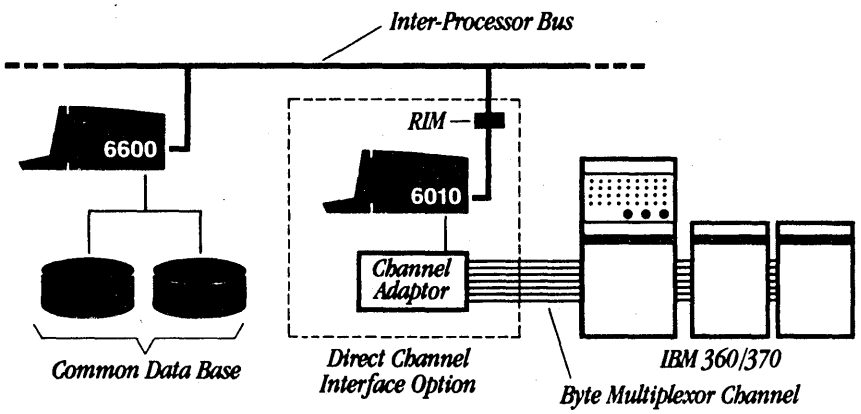


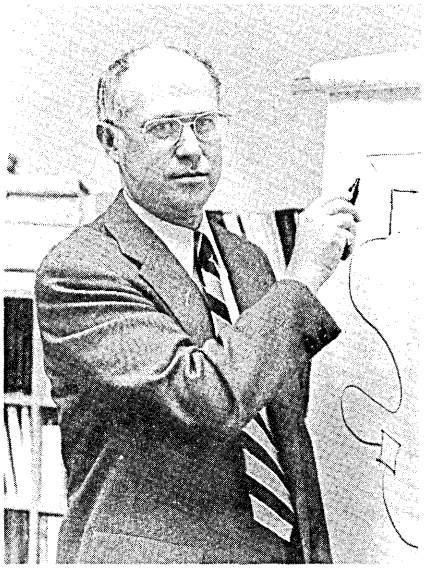
An IBM 360 or 370 also may participate in an ARC system, via the Direct Channel Interface Option (DCIO).

as many as four processors. With a passive hub, no processor may be more than 200 feet from the hub. *Active* hubs can handle as many as 16 processors over co-ax links of 2,000 feet. Ten or fewer active hubs can be connected to a co-ax link, and acting as signal repeaters, these active hubs can send a signal as far as four miles.

Poor says that in some cases an ARC can perform better than a processor with local disc drives. This might happen when using ISAM files maintained by a file processor; the indices to the files will tend to become resident in the file processor's buffers, reducing the overhead on disc accesses.

"Comparing an ARC system to a mainframe is still a matter of comparing apples to oranges," Poor notes. A rough factoring of an ARC onto a mainframe would compare file processors with the mainframe's operating system overhead, application processors with the processing in each mainframe partition, and the aggregate instruction execution rate of all attached processors with the mainframe's instruction execution rate.

An ARC does offer a degree of reliability not available on a single large processor. If an application processor fails it has no effect on the rest of the ARC, but if a mainframe goes down, computing comes to a halt. However, if an ARC file processor dies, all the disc volumes it controls become unavailable to the entire ARC. But the mean-time-to-repair is low:



VICTOR D. POOR
Datapoint's senior v.p. of R&D explains his alternative to monster minis.

all the user need do is preempt an applications processor, physically move it to the disc drives, and replace the down file processor. Processing may degrade in the case of an ARC consisting of all 6600 file processors and all 5500 applications processors, but at least the ARC will be back on the air.

As for pricing, Poor says "it's down at the noise level," particularly considering that most of Datapoint's systems are leased, and few are sold at the list price.

Just how noisy is the pricing? It's hard to get exact figures for the price of each individual component for an ARC, but Datapoint gives a "typical" system as an example. The system includes seven processors: a 4634 system (a 6600 processor and 60MB of disc) for the file processor, a 6020 applications processor (with 120KB of main memory), and five 3810 applications processors (each with 60KB). In addition to the processors this system includes 24 terminals, three multiport adaptors, and an active hub. List price: $155,850, or $4,938/month on a three-year lease. We were able to price the DCIO separately; it sells for $22,908 installed, or $918/month on a three-year lease.

—Bill Musgrave

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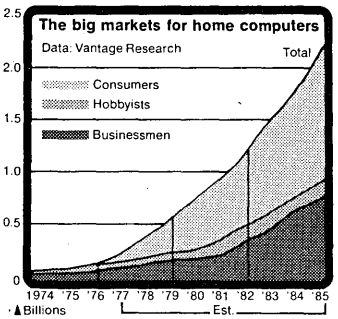

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Computer Pros, Non-Pros: A Government Quandary

Defining professionalism in the fledgling computer industry is becoming more and more of a hairy problem. And making this problem even hairier is the federal government itself which, over the past 40 years, has hammered out a litany of landmark labor laws dictating, and not too precisely either, what jobs fall into professional categories. These laws also lay the groundwork for unionization—a trend which appears to be picking up steam in the data processing world.

One ruling which seemed to give this dp unionization drive impetus was made six years ago by the Labor Dept.'s Wage and Hour Div. Under this ruling, certain categories of dp employees, including some programmers and analysts, were pegged as nonprofessionals, making them non-exempt from provisions of the Fair Labor Standards Act.

Another more recent move on the federal government front to pin down computer practitioner professionalism was made by the Civil Service Commission. Several months ago, CSC decided to reclassify scientific and research computer jobs as professional, giving them the tag of computer scientists. Before, all these jobs were lumped together with all computer-type jobs which are slotted as administrative and not professional.

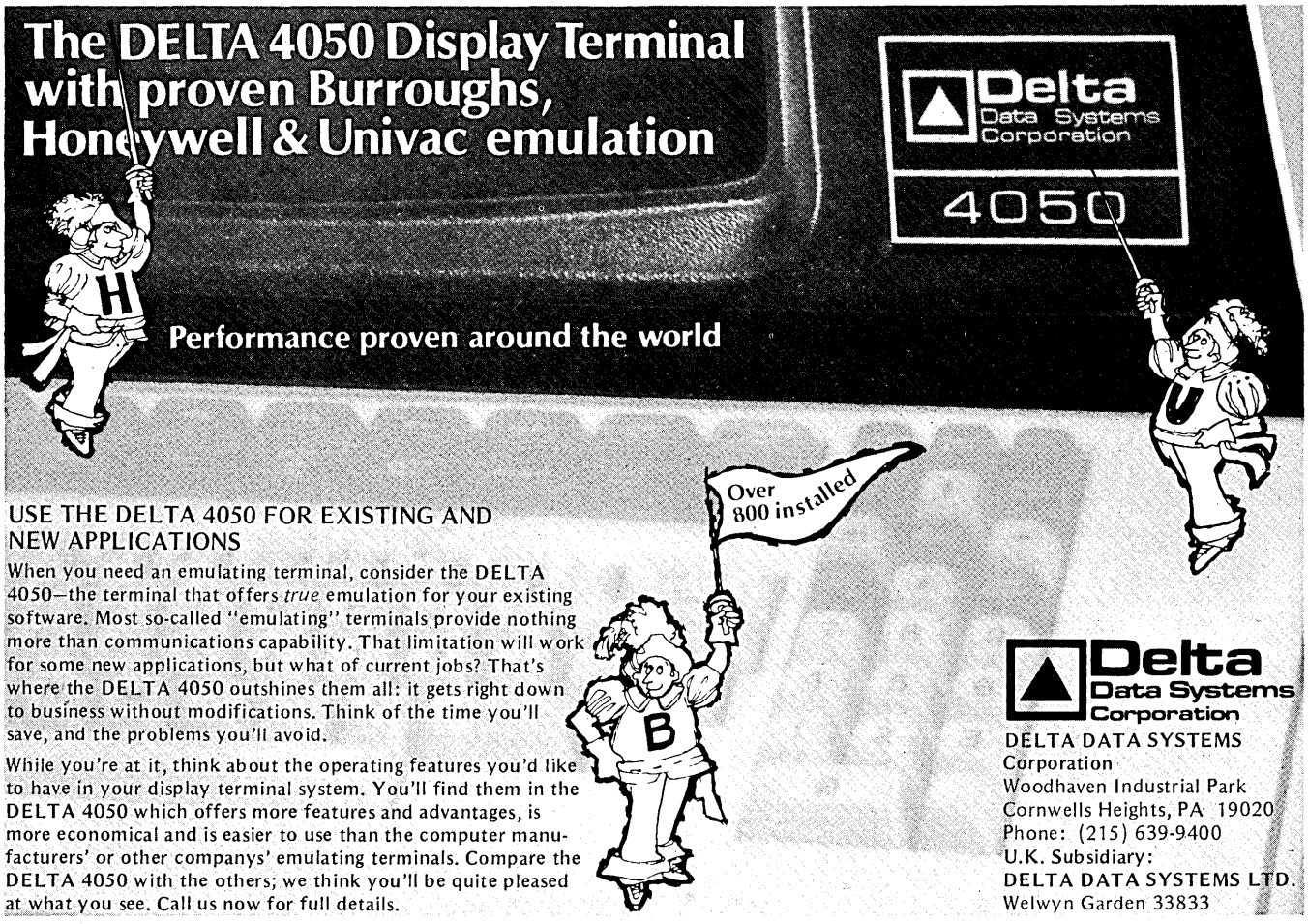
Trying to pigeonhole computer workers into appropriate professional and

nonprofessional classes has left the government in a quandary. While tackling the sticky problem on a piecemeal basis, the feds have yet to come up with satisfactory and definitive classifications. As one more savvy observer wryly notes, "our non-visionary government is still trying to figure out what this new and burgeoning high technology industry is all about. When it finally gets that figured out, then maybe it can sort out the question of exactly who is and who isn't a professional."

But until then, both government and even private industry must fall back on the old standby laws. The benchmark amendment, which spells out the rules of the road in professional categorization, is bundled into the National Labor Relations Act.

It's this subsequent add-on to the 1935 law which lays out the definition of a professional along such traditional lines as doctor, lawyer, etc. And it's the National Labor Relations Board, which mediates in unionization efforts, which administers this law—and apparently very strictly. (Only recently has the NRLB started considering engineers as professionals "and it hasn't quite caught up," insists one lawyer, "with the fact that most computer people are just as professional as engineers.")

One place where this debate over dp professionalism has erupted into an unexpected controversy is at the U.S. Postal Service's Research & Development Div. in Rockville, Md. Anxious to build up its membership roster, the American Postal Workers Union, part of the mighty AFL-CIO, targeted this USPS headquarters



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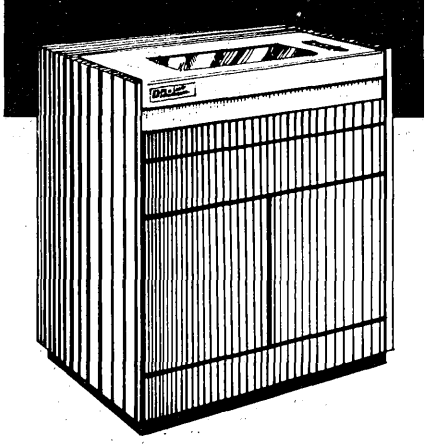

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splinter group as a likely candidate for unionization. This was despite the fact that most of the R&D employees (around 200 total) are engineers and the remaining smaller percentage are high level computer types—all of which are under the Postal Executive Service (PES) grade structure.

The APWU petitioned the NLRB for a collective bargaining election at the USPS R&D facility, and won the board's blessing. But to get that election, union representatives argued heatedly at January NLRB hearings that all of the R&D workers were nonprofessional. Countering this, USPS management contended that almost all the employees were professional, including the executive secretaries. However, with a precedent and the NRL Act to support its side, the undaunted APWU refused to back down. So a compromise was finally worked out, which, for purposes of the election, categorized all engineers at the research center as professionals and all employees with the word computer in their titles as nonprofessionals.

The simplistic and simple-minded precedent that helped win the union the right to hold its election was established a couple of years ago and involved postal data center computer personnel. In that ill-fated battle, the USPS maintained that computer workers in such high level positions as systems analysts at the operation were indeed professionals. The NLRB rejected that, and the delighted union proceeded to organize at the center, which mainly has computer operators.

Using this precedent as leverage in its latest battle, the union irrationally reasoned that since the data center workers with computer titles were judged nonprofessionals, then the R&Ders with computer titles were also nonprofessionals. Needless to say, the disgruntled computer specialists at the Rockville site were less than pleased to find themselves being considered nonprofessionals.

But the newly dubbed non-pro's didn't find out their inglorious status until the day of the election to decide the union question. Held early last month, the fateful election resulted in a 3 to 1 victory for the union. The computer-titled non-pros were allowed to vote on only one question—whether or not to have the union come in—while the engineering group, classified as pros, were able to vote on the additional question of whether or not they wanted to be supported by the same union that represents the non-pro computer types.

All that may sound complicated, but what it basically boils down to is the fact that the union, with a little help from the NLRB, was able to railroad these ill-conceived classifications through and win the election. They also got a little unwitting help from USPS management.

Says senior computer systems analyst Nino Trower of the R&D group: "The environment here is such that no one is surprised that it (the union) was voted in by such an overwhelming majority." Describing some of the workers' dissatisfaction with that environment, he cites two things which he claims "were the straws that broke the camel's back."

First come the salary problems. Although the R&Ders are paid pretty well under the PES merit-based system, they haven't received a cost of living raise in over two years. This particularly rankles them since Civil Service workers get six or seven percent a year cost of living bonuses in addition to their normal raises. Then when USPS management backed down and decided to give these raises based on the last merit rating, the benefits were out of synch with performance.

To further irritate the already disgruntled R&D troops, management instituted some rinky-dink supervisory procedures such as a sign in and out card system which has been in effect for over six months now. The employees, fed up with the stinginess and nit-picking practices, began to resent these management moves.

Building resentment

And this resentment began to build. So much so that some of the engineers began to look at the union as a possible answer to their problems. But now that the union is in, Trower argues, the situation still may not improve, and may even get worse. The APWU, he declares, "is the most do-nothing union I've ever seen. And the people here who think it's going to be their savior are in for a rude awakening."

> The disgruntled computer specialists at the Rockville site were less than pleased to find themselves being considered nonprofessionals.

Trower, who's been at the USPS R&D branch for four years, is one of a small band of protesters who are upset by the classification scheme which labeled the computer-titled workers as non-pros. Spearheading this protest crusade is computer integration specialist Matthew Hassett who is putting together a petition to get a reclassification done. He's also been working through his Congressional representatives to try to get some action.

Both the outspoken R&D dper's feel

strongly that the question of whether or not to have a union is not the real issue. The real issue, they stress, is the slotting of bonafide computer specialists into a nonprofessional category. This, they claim, could have broad implications throughout the entire dp community, as well as have direct negative effects on their salaries and other benefits. And despite assurances from USPS management honchoes, they feel that lower salary increases could become a reality in a union-management face-off. And they're worried.

Hassett pragmatically speculates that the APWU could negotiate with management for separate benefit packages—one for the pros and one for the non-pros. Such a deal, he contends, would be less than advantageous to the non-pro computer people since they would end up with a lump-sum raise while the pros get higher, percentage-type raises.

One benefit from unionization, however, could accrue from overtime pay. But Hassett still believes the negatives of unionization the way it's currently being handled at the R&D center far outweigh any potential boons. One of the biggest negatives, he points out, is demoralization caused by the professional-nonprofessional distinctions.

The same office

As an example of this he cites a situation where two people, each with a different professional status, share the same office. "Their grade levels," he explains, "may be the same or the computer guy's may even be higher, but now they're being treated differently because one is a professional and the other isn't. So already there's a division," he protests, "even before the damn thing gets started."

Hassett, who seems to be single-handedly fighting the union dragon, sees himself as a Don Quixote, fruitlessly dreaming the impossible dream of reforming the senseless classification scheme that got him and his computer compatriots into this whole mess. Having already raised management's ire, he's turned to Congress to put the heat on the NLRB. He says he's making some progress and he won't give up. The stakes are too high.

Laying out those stakes, senior systems analyst Trower explains: "We're not really fighting whether or not there's a union here. What we're fighting, what we're upset about are the classifications—the way we were classified. And it's not a question of pride or having our noses bent out of shape because we've been labeled nonprofessionals. What we're concerned about is that if it's the law of the land that dictates this classification of computer people as nonprofessionals, then there are a hell of a lot of people working in our profession who are not professionals. And that contains many ramifications." —L.F.

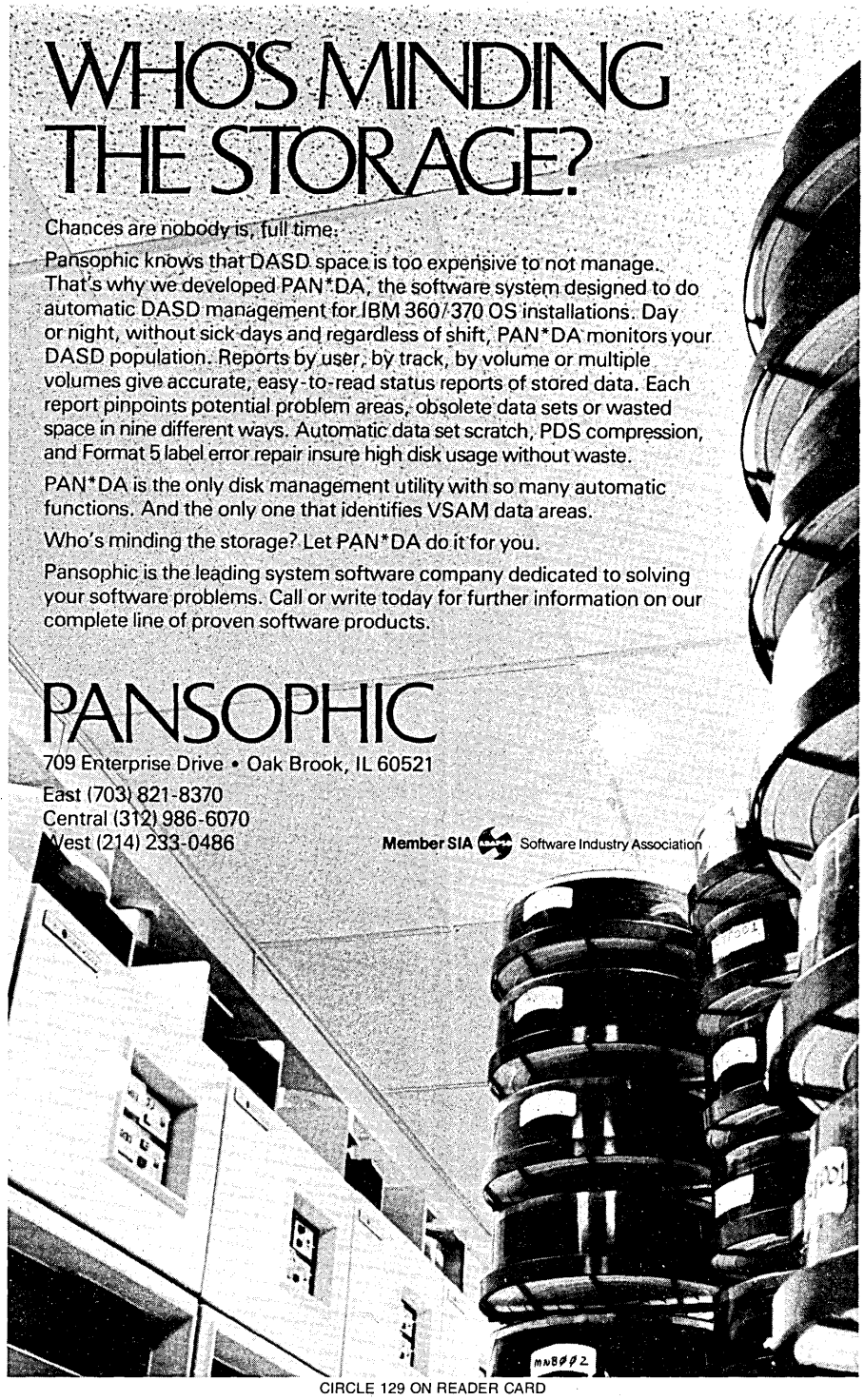
Communications

Primary Instrument Concept Opposed

"The idea that there is some technical magic in a phone simply because it is leased by a telephone company rather than sold directly by a manufacturer . . . is simply incorrect, especially when the phone's adequacy will have been established through a government certification process."

That's how New York's Public Service Commission responded recently to the "primary instrument concept," the telephone carriers' latest attempt to fend off competition from independent terminal suppliers.

Under this proposal, all residential and business customers who lease single-line voice service would have to obtain at least one main station telephone from a telephone company. Additional terminals could be acquired from an independent supplier, and users of multiline voice circuits would be allowed to obtain all of their terminals from independents. But IBM and a number of other terminal



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manufacturers contend they nevertheless would be shut out of some major markets.

"We believe the little old lady may someday want a data terminal, in addition to a plain black telephone, and we think she ought to be able to get it from anybody she wants," said IBM v.p. Wally Doud last September at a House Communications Subcommittee hearing. The independents are also worried about being locked out of the EFT/POS terminal market. They expect AT&T's Transaction Network Service (TNS) to become a major funds transfer mechanism in the next few years. Many TNS customers will access the network through single-line voice circuits which, under the primary instrument concept, would have to be terminated in a telephone company-supplied main station.

Orderly introduction

One benefit of the primary instrument concept, according to a statement prepared by AT&T for the House subcommittee, is "to permit orderly introduction of technological innovations . . ." Later in the same statement, the phone company says that "PIC" would "assure a basic service compatible with network facilities even during periods of changes or innovations in the operating environment."

When the Independent Data Communications Manufacturers Assn. (IDCMA) subsequently asked whether this wording meant the primary instrument might be subject to changes over time, an industry spokesman replied that no changes "are presently being considered" but "this does not mean . . . technology will not result in a redesign or modification of the basic instrument."

> "If the primary instrument was defined as a basic, voice-only telephone, and the carriers were proposing to make its use mandatory for a limited period, the concept would be far more acceptable."

An IDCMA spokesman said: "If the primary instrument was defined as a basic, voice-only telephone, and the carriers were proposing to make its use mandatory for a limited period—until they eliminated existing inventories or for other proper reasons—the concept would be far more acceptable. But if they are attempting to build in and perpetuate a prospective advantage—one enabling them to combine data entry and voice capabilities in a single instrument that could be marketed at a lower price than competing equipment offered by independent manufacturers—there would be serious objections. We are still studying the specific proposal and haven't come to any conclusion except that we have to be extremely careful; the carriers have a long history of using interconnection restrictions to gain market leverage over their competitors."

The New York Public Service Commission also questioned the carriers' motives in its recent comment on the primary instrument concept: "Arguments implying that (telephone) company-provided station sets are so reliable that only they can provide an adequate test comparison . . . in the event of trouble do not hold up under close scrutiny. . . Many independent telephone companies supply their customers with phones produced by manufacturers who are now supplying their products directly to consumers. . . A telephone company's 'main' station has no greater claim to technical reliability than any other cer-

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tified phone installed on a customer's premises. . . In short, the primary station concept would ensconce monopoly power in a place where it has no right to be."

What happens next in this controversy is difficult to predict, but it's clear the carriers are losing ground rapidly.

Last objections

Until last October, the only independently made terminal equipment that could be connected directly to the interstate dial-up network were data terminals and other "ancillary devices" that satisfied commission-authorized technical specs. In October, the U. S. Supreme Court rejected the carriers' last objections to permanent establishment of a direct connection program based on these specs, and the FCC soon afterward expanded it to include main station and auxiliary telephones; direct connection of PBX and key telephone equipment is likely to begin early next year. Meanwhile, intrastate direct connect programs are being enlarged.

Last July, California added extension phones, PBX's, and key telephones to an earlier order allowing certified ancillary devices to be attached directly to the in-state telephone network. (The California commission added insult to injury by requiring the carriers to issue refunds. Previously, users of independently made extension phones, PBX units, and key telephones had to rent protective couplers if they wanted to attach these devices to the telephone net. The carriers were ordered to refund the accumulated coupler charges, with interest).

Last October, New York expanded its program along lines similar to those followed in California. These two states, together, account for about 25% of Bell's terminal market. Illinois and North Carolina also have begun implementing an expanded direct connection program.

Flurry of petitions

One result of this activity has been a flurry of petitions to the FCC, requesting it to order a "temporary postponement of the registration program as it applies to single-line subscriber services." That's how the National Association of Regulatory Utility Commissioners (NARUC) put it in a submission to the FCC early last month (November). Similar pleas were made earlier by the telephone carriers.

> The California commission added insult to injury by requiring the carriers to issue refunds.

In addition, Congressman Lionel Van Deerlin, chairman of the House communications subcommittee, has written to the commission: the primary instrument concept, he said, appears "to have a number of transitional advantages. Primarily, these involve allowing time for companion regulatory adjustments to be made before the (FCC registration program) goes fully into effect. . . The transition (to a fully competitive terminal market) will inevitably involve difficult situations for some telephone companies and subscribers."

An FCC staffer believes the commission, in January, will begin an inquiry into the need for the primary instrument concept. The big question is whether the commissioners will also postpone direct connection of telephone terminals. If they do, it will indicate that despite all the slights Ma Bell and her sisters have suffered in the years since the Carterfone decision, including their failure to win enough support for the Consumer Communications Reform Act, they can still charm government policymakers.

The big test of their charm will come next year, when Congress begins considering revision of the Communications Act of 1934. The chief manager of this exercise will be Congressman Van Deerlin.

—Phil Hirsch

Mr. Hirsch, a frequent contributor to this magazine, once was its Washington editor. He specializes in communications-related reporting.

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News in Perspective
BENCHMARKS . . .

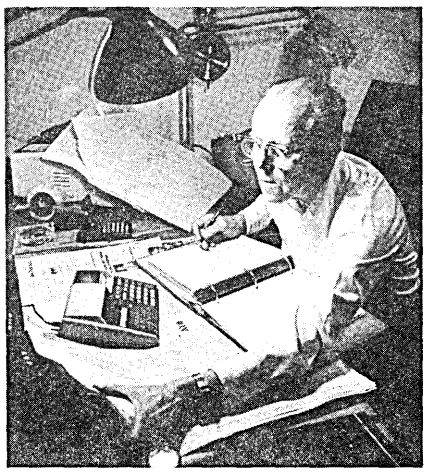
Nine Years Later: Back in 1968, the New York brokerage firm of Merrill Lynch, Pierce, Fenner & Smith issued what it called a "wire flash" to its customers that Scientific Control Corp. would break even the next year and earn $2 a share. That statement, plus others, including one that the firm was a "little IBM" whose stock would reach $100 a share, led to an order last month by the Securities and Exchange Commission that Merrill Lynch reimburse its customers up to $1.6 million for losses on their stock. Scientific Control folded shortly afterwards and the SEC estimated that some 4,000 Merrill Lynch customers bought 400,000 shares of the Dallas company's stock and lost more than $9 million. It said it found that Merrill Lynch's research department had been too credulous in accepting statements from Scientific Control's management about the computer company's prospects.

Off to Dallas: Harris Corp.'s Data Communications Div., of Dallas, which acquired the former Sanders Data Systems group in Nashua, N. H., last January, is moving all but manufacturing facilities to Dallas. Off to the big D first are product development activities, and the 65 persons involved in hardware and software development at Nashua will be offered similar positions in Dallas. Next, the company will move marketing, service, manufacturing, and administration to Dallas. Some 400 persons involved in manufacturing will remain in Nashua where the company is negotiating with Sanders Associates, Inc., to buy an 80,000 sq. ft. production facility and 12 acres, and to which the company will transfer its manufacturing employees. Jack C. Davis, division v.p. and general manager, in explaining the move said the company "has been evolving a unified approach to the distributed processing marketplace."

Computer Automation in Texas: Irvine, Calif., minimaker Computer Automation opened a new manufacturing facility in Richardson, Texas, a Dallas suburb. Carl Carlson, v.p. of manufacturing, said 82 employees have been recruited from the Dallas area to handle initial operations of the 40,000 sq. ft. plant which will manufacture a variety of the firm's products. He said the company's two existing manufacturing plants in California are operating at near capacity.

Encryption Hardware Validated: The Commerce Dept.'s National Bureau of Standards has tested and validated a one centimeter-square MOS device developed by Rockwell International's Collins Group. It's the first validation by the bureau of a commercial implementation of the Federal Data Encryption Standard published earlier this year. IBM and Motorola also have announced their intention to build data encryption hardware for NBS validation. The companies said the hardware will be used by government departments in protecting sensitive computer data during transmission. They'll also be used in terminals, communications processors, cash issuing machines, and identification mechanisms.

From Retirement to Riches: Seventy-three year old Carrol Smith of San Jose, Calif., found a new career after his retirement in 1971 from Hewlett-Packard. A stock market buff for years, he went at it full time after retirement, and within six years he's moved more than $5 million in and out of the market, yielding an average income of $30,000 from an initial investment of about $35,000. Using an HP-97 programmable printing calculator, a desktop computer, and years of experience in watching the stock market, Smith



is earning more now as an investor than he ever did as a working man in the company's corporate training department.

Modcomp Folds Subsidiary: Modular Computer Systems' president, Kenneth Harple, said Modcomp made a "mistake" in getting into the small business systems market. The Ft. Lauderdale, Fla., firm closed its Massachusetts-based subsidiary, Modular Business Systems (MBS), formed only last March when Modcomp acquired ECS, a software house. "It was draining cash when the business plan said it should have been contributing it," said Harple. The discontinuation had no apparent impact on Modcomp's third-quarter earnings which were up to $1,066,000 after absorption of a $982,000 pre-tax charge from discontinued operations. In the third quarter of 1976, Modcomp sustained a loss of $753,000.

General Automation Sued: Public Agencies Data Systems, Irvine, Calif., processes data for the Orange County cities of Tustin, Fountain Valley, Brea, and Placentia. Last March the agency installed a General Automation GA 16/440 computer system, about two months before GA formally announced the system. Now the agency has filed suit in Los Angeles Superior Court alleging the system "is defective . . . and of no use to plaintiffs for any purpose whatsoever." The suit asks for recovery of a $67,100 deposit, $60,000 for costs it claims were incurred in service bureau use and other expenses after the machine was installed, plus $500,000 for punitive and exemplary damages.

CalComp Asks New Trial: California Computer Products feels the Ninth Circuit Court of Appeals' Greyhound decision entitles it to a new trial in its antitrust suit against IBM. In a final reply brief filed with the court, CalComp argued that the Greyhound decision, ordering a new trial in the Greyhound versus IBM antitrust suit, "requires that CalComp be accorded a new trial." In both cases, district court judges issued directed verdicts in favor of IBM after hearing only the plaintiffs' cases. CalComp alleged that IBM's latest brief with the circuit court ignored its Greyhound decision, focusing instead on other cases, primarily the Telex case in which a circuit court reversed a district court finding favorable to Telex.

The Business in Data Bases: Data base generated revenues at $740 million in 1976 will climb to $1.1 billion by 1980 and to $1.6 billion by 1985, says a 178-page report issued by the New York research firm, Frost and Sullivan. The report breaks down the annual growth rate to 1980 by market sectors: scientific/technological information, 10%; economic/econometric, 20%; securities prices and data, 10%; business news, 25%; legal research, 20%; business credit, 10%; consumer credit, 5%; and specialized marketing information, 10%.

Prescription for CSC: Computer Sciences Corp. and Paid Prescriptions, Inc., Burlingame, Calif., have agreed in principle on the acquisition by CSC of the Burlingame firm's commercial claims processing business which handles some one million prescription claims per month for medical plans, insurance companies, unions, self-insured organizations, and other nongovernmental customers. Its annual sales volume exceeds $5 million.

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LOOK AHEAD

(Continued from page 16)
basically supports the overall thrust of the planning effort in the big systems project being run by SSA's Office of Advanced Systems.

But still the big hangup, they conclude, is how to distribute the agency's 1.1 trillion byte data base. The NAS panel seems to favor a combination central/regional distribution approach over SSA's original totally centralized concept. They also are critical of the agency's low end estimates on how long it will take to train personnel, and they question the feasibility of SSA's plan to put terminals on every desk in district and branch offices. However, the panel stresses the fact that the overall future system could be implemented with present computer and communications technology. Specifically, they recommend that SSA use only standard hardware and software products and a segregated data communications subsystem which would handle both packet and line-switched communications.

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INTRIGUE IN ISRAEL

International Peripheral Equipment, a Tel Aviv firm which is Israel's major PCM supplier, admitted hiring two private detectives to investigate an alleged bribery of Israeli officials by IBM Israel. IPE managing director and president Penny Yohananoss claimed IPE had to resort to such tactics because it had been subjected tc a wide range of illegal and unethical practices by the virtual monopoly of IBM Israel. He said he knows of two government investigations of IBM Israel activities but he doesn't think the government "will do anything against IBM unless faced with overwhelming evidence -- for a lot of reasons. This is the Middle East after all." The hiring of the investigators came to light when the two were arrested with classified government documents in their possession. They were subsequently released.

RUMORS AND RAW RANDOM DATA

Burroughs Corp., which announced with much fanfare its BDLC communications protocol shortly after IBM announced SDLC, is going to drop it. Control Data also will discontinue its CDCDLC it's been learned. Both will support ADCCP which both ANSI and the federal government are expected to adopt as a standard... Citibank reportedly will be dropping five or six IBM mainframes at its Huntington, Long Island dp facility and replacing them with Itel/National Semiconductor systems...New York City's mini-based criminal disposition reporting system will soon expand statewide and the city is bringing in a Burroughs B-6700 to make an upgrade and is inviting vendors to bid on 160 addressable crt's that will be scattered throughout the state...Yet another vendor of IBM-compatible mainframes? Promising to be much more is Magnuson Systems Corp., which is preparing a line of five replacements for the IBM 370/115 through 158. Wait and see hcw tiny a 4-meg 148 can be packaged with eight inboard channels. Details next month... Presumably because they want international coverage, directors of Hewlett-Packard Co. are planning to drop Main LaFrentz & Co., its independent public accounting firm for 30 years. H-P stockholders will be asked to approve the appointment of Price Waterhouse & Co. at the annual meeting in February...The term Computer Store has become commonplace but Computer Boutique? The Australian trade newspaper Computer Weekly says one is coming -- in Paris, of course.

Turning a profit in turnkey systems:

If your business is selling turnkey computer systems, using the right computer can be the key to making more sales—profitably.

You need a computer that's easy to use—and adaptable to many uses so you can get more customers. And you want a computer that's priced to sell, at a margin that's profitable.

You want a computer that can really protect your proprietary software—keep it safe, and saleable, sale after sale. And you need a better way of supporting your software than having to visit sites.

You need a computer with proven reliability, so there'll be fewer service problems. And you want a fast, dependable service network when there are.

Needs and wants met here

For all this, the one computer you want is the one we make:

The BTI 4000 Interactive Timesharing System.

It's a ready-to-go system with 10 megabytes of storage, magnetic tape drive, and 8 ports—just add terminals. And it's easily expandable—add disk storage to 400 megabytes, increase user capacity to 32 ports, add peripherals like industry-compatible magnetic tape and a line printer.

The BTI 4000 is designed, manufactured and supported by Basic Timesharing Inc. We're the manufacturer with timeshare experience. Which has helped us produce a computer uniquely right for multi-user applications.

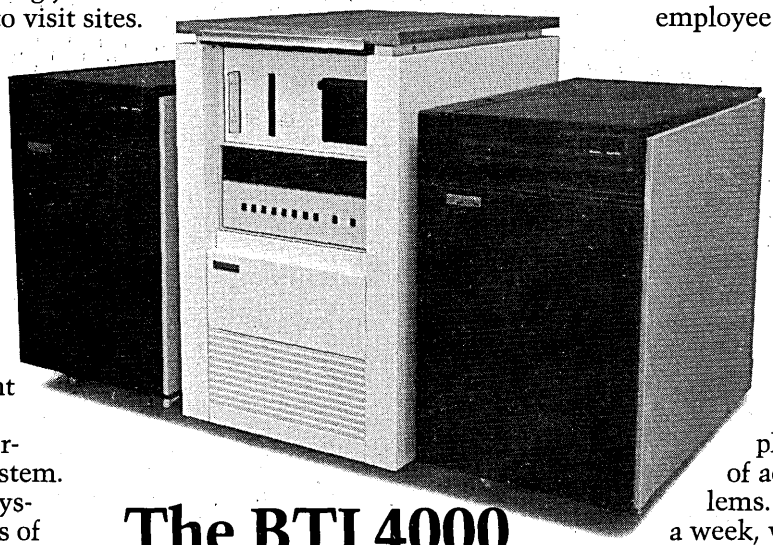
A dedicated performer

The BTI 4000 has been proven in all kinds of applications—general accounting, dealer inventory control, entertainment ticketing, text publishing, school administration, and more.

What's more, the BTI 4000 is proving its reliability at locations in 39 states, in 5 provinces of Canada, and in Europe, too.

Things you'll like

The BTI 4000 uses BASIC-X, an unusually powerful extension of BASIC. With the features you need to get your software up—quickly, efficiently. So you can start selling sooner.



The BTI 4000 Means Business.

Especially important to you, the BTI 4000 protects your proprietary software. So you can count on selling it again, and again. Without losing control of it. And with the convenience of dialup access, so you can support it without the cost of site visits.

Things your customers will like

The BTI 4000 is a true timesharing system. It allows doing any mix of tasks, all at the same time, from any number of locations.

Your customers will enjoy faster response, because the BTI 4000 implements many of your application program operations in firmware.

The system also offers continuous availability, because software backups, updates, and other housekeeping activities can be performed locally, remotely or programmatically, with users on the system.

And the BTI 4000 is so easy to manage, your customer won't have to add a specially-trained employee just to run it.

Service—good and fast

In the packaged systems business, service can have a real impact on your success.

That's why service is such an important part of our business.

The BTI 4000 is designed for over-the-phone, on-line diagnosis of actual and potential problems. 24 hours a day, 7 days a week, we're ready to help. If a BTI 4000 ever needs on-site service, we have a network of field specialists to provide just that.

Priced to please

A single BTI 4000 costs $35,950. There are attractive quantity discounts—like $28,760 each for a quantity of 10.

For that price you get all the features and support benefits mentioned above, not a scaled-down version.

You can get complete information at your BTI regional office, listed below.

The BTI 4000. It could be your key to turning more profit in your turnkey installations.

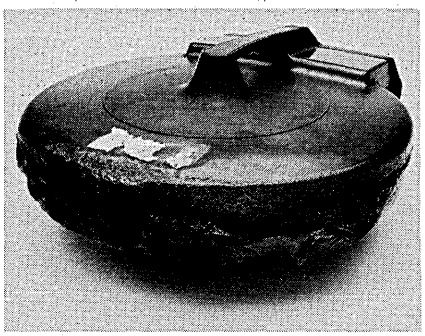
Basic Timesharing Inc., 870 W. Maude Ave., Sunnyvale, CA 94086. Sales Offices: East: Cherry Hill, NJ (609) 662-1122; Midwest: Minneapolis, MN (612) 854-1122, Chicago, IL (312) 298-1177; South: Dallas, TX (214) 630-2431; West: Sunnyvale, CA (408) 733-1122, Anaheim, CA (714) 533-7161

hardware

Off-line

U.S. congressmen saw how microfilm and computers can be used to reduce and organize their paperwork in a "Congressional Office of the Future" exhibit. For a real-life demonstration, documents from the office of Rep. Charles Rose (D-NC) were placed on microfilm and indexed on a computer. The documents included letters from constituents, letters from other congressmen, and important bills. Search inquiries were entered at a terminal, and the computer indicated which reel and frame of the microfilm data base contained the document. The correct reel of film then was placed in a microfilm reader/printer, the document's ID number was keyed in, and the document appeared on the screen. Dry print hard copies also were available. The exhibit, sponsored by CBEMA, used microfilm equipment manufactured by Kodak.

BASF says this data module, retrieved from the aftermath of a five-alarm fire, actually

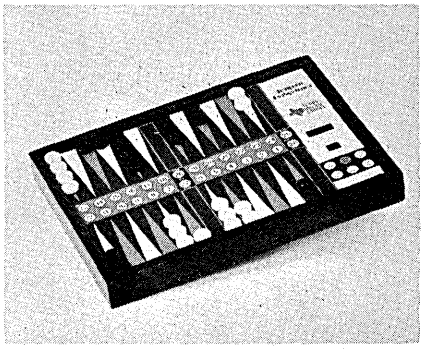


retained its 35MB of data. The data subsequently was dumped onto another module, and its owner, American Technical Industries, was able to resume its dp operation.

The Votrax Div. of Federal Screw Works has begun production of two prosthetic devices for the verbally impaired. Two hand-held devices, known as Phonic Mirror HandiVoice units can synthesize speech for non-verbal/non-vocal persons. One model operates like a calculator with word storage and recall functions, the other has a graphically illustrated keyboard for pre-language or developmentally disabled users. Votrax will manufacture the units, and world-wide distribution will be handled by HC Electronics, Inc., of Evanston, Ill.

Backgammon

When the Chess Challenger came out (July, p. 162) we knew a Backgammon counterpart couldn't be far behind. It's here, but from a different firm. Computer Backgammon plays a pretty good game (it beat us two out of two), and it's easy to use. We spent about two minutes with the instructions, then sat down to play. After setting up the board and pushing "start



game" the machine said "ROLL" (the first two letters were displayed in lower case on the machines four-digit seven-segment LED display). We pushed "roll" and it rolled the dice, starting us off on a game that ended in our aggravating defeat (too bad the poor machine doesn't have feelings so it could gloat over its win). Throughout the game the machine rolls the dice for both players. The machine tells its opponents what to do next (roll, play), and it verifies moves by having the player touch the pressure-sensitive number above the points moved from and to. Computer Backgammon also displays the current state of the board on demand, so the board can be corrected after someone bumps into it. It also allows the user to set up positions and start play at that point.

We'd like to make a few observations about the game (call them sour grapes, if you will): it has no provision for doubling (considering the complexity of the doubling decision that's no big surprise), and it seems to have some strange fondness for moving from its mid-point to its eight point just about any time it has a five to play. One more comment from a sore loser: it was the dice (that's the backgammon player's standard excuse for losing). It sure hurts when the blasted machine turns the game around by rolling a 17 to 1 shot.

Computer Backgammon is sold in game stores and other retail outlets for about $200. TEXAS MICRO GAMES, INC., Houston, Texas.
FOR DATA CIRCLE 516 ON READER CARD

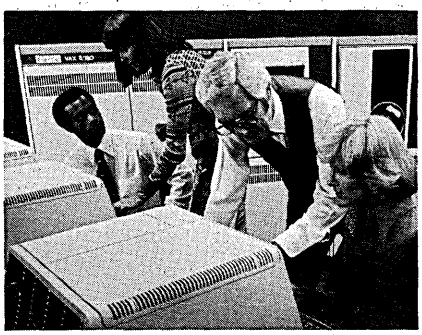
Modem

The VA 3467 modem is like a chameleon: it changes its appearance to fit its environment. The microprocessor-controlled modem automatically determines if the modem at the other end of the line is a Bell 212 or 103, or a VA 3400 (also made by this vendor), switching into the proper compatibility mode. A full-duplex unit, the 3467 also determines the proper transmission speed up to 1200 bps. Compatible with two of Bell's modems, the unit also is compatible with Bell's phone system through its built-in DAA. The unit's microprocessor also performs self testing; when the modem isn't connected to an active line, the micro routes the transmitter into the receiver, continually sending a random bit pattern through itself. If the pattern sent doesn't match what's received the modem flashes an indicator light to tell the user it's in trouble. The VA 3467 sells for $850; deliveries will begin next month. THE VADIC CORP., Sunnyvale, Calif.
FOR DATA CIRCLE 531 ON READER CARD

Computer

DEC has entered the 32-bit processor market with the VAX-11/780, a machine that's been the subject of rumors for months. The firm calls it "an upward extension" of its PDP-11 family, and although it can't directly execute all the PDP-11 code, it does offer features to bridge the gap.

The VAX-11/780 is an interactive, multiuser system with a virtual memory operating system, VAX/VMS, which provides users with up to 4.3 billion bytes of virtual addressing space. The



main memory has error correction and is built of 4K MOS RAM chips; memory sizes range from 128KB to 2MB The memory cycles at 600 nsec, and an 8KB write-through cache memory gives an effective memory access time of 290 nsec.

VAX has a new instruction set with 243 instructions, nine addressing modes, and five data types. Floating point, packed decimal arithmetic, and

HP9830A/B and Infotek...

If you use the HP9830A/B, you know that it has great potential.

Now you can extract the full measure of 9830 capabilities with Infotek's Memory, ROMs and Peripherals.

Memory. The EM-30, 32,192 byte memory for the '30, pioneered by Infotek, is one of the most significant contributions to increasing the '30's power.

EM-30B, in conjunction with Infotek's Mass Memory II ROM multiplies the speed of the 9880B Mass Memory System by avoiding redundant disc operations. A must for the 9880B user!

Fast Basic ROMs. The Fast Basic ROM series provides 54 statements, functions and commands. With these ROMs your '30 acquires versatility and speed superior to any other desk top computer. Here's just a few examples of Fast Basic Power.

*** Dimension arrays any size you like. Sort or search any array that will fit in your memory!**

- Move information in or out at 10K bytes per second . . . fabulous for instrumentation and control applications.
- Interrogate and amend variables without halting the program, just like a live keyboard.
- Suspend any program including mass memory operations to cassette or floppy for future completion.
- Interrupt capability — a peripheral can now demand service, branch or initiate program execution.
- Edit program test and super-secure both program and data files.

If this is the kind of added capability that you can use in your '30 then read on, there's more!

The FD-30 Series Floppy Discs. Each of the FD-30s stores 305K bytes. Organize this information any way you like up to 2387 files. Best of all, you can talk to the FD-30s without any software changes because the FD-30 series obeys *every* 9830 cassette instruction.

The series consists of the FD-30A single disc unit, FD-30S slave drive, FD-30M multiple disc drive which contains a master and up to three slave drives, and the FD-30SR slave drive system which will accommodate one to four drives.

A single master will support up to seven slaves and only one I/O slot is used.

Peripherals. Infotek has applied the same level of ingenuity reflected in the ROMs and floppys to the development of extremely high quality and reliable peripherals tailored to the needs of the 9830A/B. Now available are:

- LP-30, a 200 line per minute matrix printer
- CP-30, a 45 character per second character printer/plotter
- PS-30, a paper tape punch/reader
- TC-30 and RT-30 time clocks
- RS-30, a 9600 BAUD RS 232-C interface with 7 quartz reference rates.
- FI-30, a 10K byte/sec TTL I/O

Contact us now for the name of your local Infotek representative. Discover why more than a thousand 9830 users working with Infotek enhancements believe that the 9830 and Infotek are made for each other.

World-wide service and distribution centers back up Infotek's liberal warranty and service commitment.

At Infotek we're dedicated to making good computers better.

Infotek Systems

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The 9830A/B is a product of Hewlett-Packard Company.

character string manipulation instructions are included. As an example of the power of the new instructions, DEC says the overhead for a FORTRAN DO-loop translates into a single add-compare-and-branch instruction.

The VAX bus also is a new design, but a MASSBUS adaptor permits attachment of high-speed PDP-11 peripherals, while a UNIBUS adaptor provides an interface for conventional PDP-11 devices. The console is notable because it's a subsystem comprising an LSI-11 microcomputer with 16KB of RAM and another 8KB of ROM, a floppy disc drive, and an LA36 terminal.

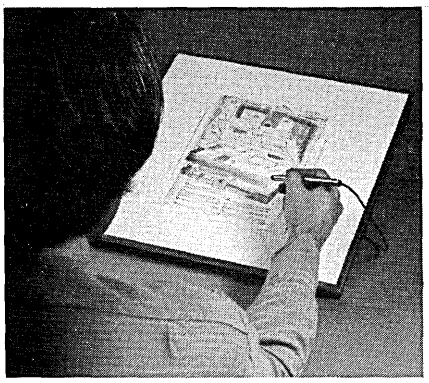
The single virtual memory operating system, VAX/VMS, supports as many as 64 simultaneous interactive users. Batch capabilities including job control, I/O spooling, and accounting also are supported. Languages supported include VAX-11 FORTRAN IV PLUS, VAX-11 MACRO, PDP-11 COBOL, and PDP-11 BASIC-PLUS-2. An Applications Migration Executive is said to allow RSX-11M/S nonprivileged tasks to run with little or no modifications. At the assembler level, the new machine uses mnemonics similar to those used on the PDP-11; DEC says this similarity has made it easy for its systems programmers to learn the new machine. VAX' FORTRAN is extended beyond the PDP-11's but programs written for the 16-bit machines will compile on the 32-bit processor. COBOL and BASIC are the same on both series.

A minimum system, consisting of cpu with 128KB of memory, LA36 DECwriter II console terminal, two 14MB disc drives, a multiplexor for eight EIA terminal connections, and the VAX/VMS operating system is priced at $128,000. Deliveries are scheduled to begin in the first quarter of next year. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 515 ON READER CARD

Digitizer

This vendor has drawn a bead on the oem small-systems market, hoping to replace joysticks, lightpens, and other position or motion sensing devices with its Simple One digitizer. And the $995 price (quantity 100) is certain to be one of the first things they mention when they talk to potential customers. The Simple One has an 11 x 11-inch active surface, and is packaged in an 18-inch square, one-inch deep frame plus stylus. It has 200 line per inch resolution and is said to be accurate within 0.02 inches. Potential uses include source data entry, menu selection, and display manipulation. The digitizer has a switch for selecting a run or point operating mode. Standard output format is 16-bit parallel with RS232 available as an option. The unit can output



100 coordinate pairs per second. Deliveries are to begin before year's end. TALOS SYSTEMS, INC., Scottsdale, Ariz.

FOR DATA CIRCLE 524 ON READER CARD

Graphics Option

The Option 40 Programmable Keyboard Capability adds some interesting and useful functions to this vendor's 4014-1 and 4015-1 19-inch graphics terminals. Option 40 lets the user save graphics, displays, picture segments, symbols, and alphanumerics for later use. Stored information can be recalled and displayed by typing one or two characters on the keyboard or under program control. Command strings also may be held in the unit's memory. The unit enhances alphanumeric editing: the latest alphanumeric line may be displayed on the screen in refresh mode (as opposed to storage mode, where the screen's bi-stable phosphor holds the image until the entire screen is erased), allowing character delete, replace, type over, and insert operations. Graphics displays, symbols, character sets, commands, and alphanumerics may be down-loaded from the host computer or from a local storage device such as floppy disc or cartridge tape unit.

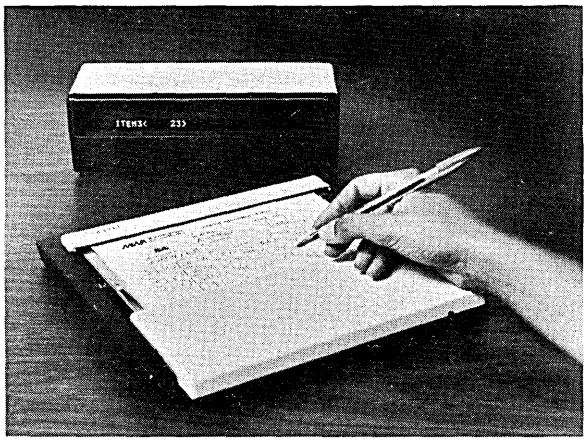
Option 40 consists of an 8-bit microprocessor (Motorola's 6800), 3.25KB of RAM, an extended memory board for more RAM (16KB or 32KB), optional ROM kits, and a new minibus extender. Slated for February deliveries, Option 40 sells for $1,900 with minimal work space or $3,200 with a full complement of memory. TEKTRONIX INC., Beaverton, Ore.

FOR DATA CIRCLE 512 ON READER CARD

Megabyte Floppy

Designed for use with personal computers using the S-100 bus, the Meta-Floppy 1054 Mod II comprises four

product spotlight



Handwritten Data Entry

"Handwritten data entry" doesn't necessarily imply character recognition, as the Datapad System demonstrates. Instead of capturing keystrokes, this system captures pen (or pencil) strokes. The group marketing the system in the U.S. says it was originally developed by Quest Automation Ltd., in England, and has been in use for better than a year.

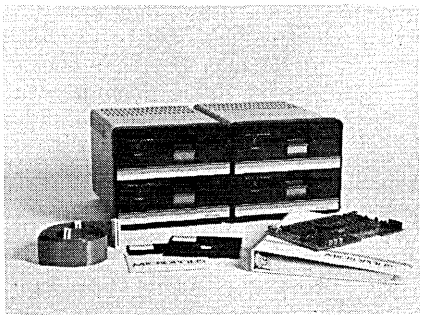
The system is controlled by a minicomputer, which can support as many as 12 writing stations. Each writing station consists of a display, a pressure-sensitive writing surface, and associated interface electronics. As in ocr, software recognizes the digitized input characters. The software examines both the shape of the character and how it was written (i.e. counting pen strokes). The system is said to accept different handwriting styles and character sizes, and it accepts letters, numerics, and special characters. The user may define edit checks, including table lookups and cross-checking against another field. Once the controller is satisfied that the input is accurate and acceptable, the data is written to magnetic tape.

Input formats are defined by overlays on the writing surface. At any given time, several different formats may be used by different operators.

A system consisting of eight writing stations, controller, system console, and mag tape drive sells for $49,250. Deliveries are quoted at 60 days. MONCHIK-WEBER ASSOCIATES, INC., New York, N.Y.

FOR DATA CIRCLE 532 ON READER CARD

5¼-inch floppy disc drives (actually, two dual drives), a controller, power supply, chassis, enclosure, all cabling, and an extended BASIC interpreter. Total capacity for the system is 1,260,000 bytes. The unit has file protect circuitry, and a disc insertion interlock which prevents the drive door from closing if the diskette is improperly positioned. Track-to-track access time on the 1054 is roughly 30 msec. Data transfer rates can go as high as 250K bps. The new BASIC interpreter

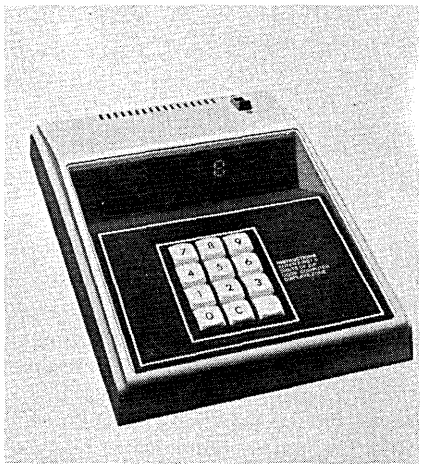


runs on 8080 and Z-80-based microcomputers with at least 24KB of RAM. To take advantage of the floppy system, it includes a CHAIN command, allowing users to segment large programs and run the segments in any order. The MetaFloppy has a single unit price of $3,220; deliveries are quoted at 45 days. MICROPOLIS CORP., Chatsworth, Calif.

FOR DATA CIRCLE 519 ON READER CARD

Zip-to-Zone Converter

The Zone-Finder is such an obvious, and useful, application of microprocessors that we're surprised we haven't heard of it earlier. Instead of making mail clerks look up parcel post zones on reference charts, they simply key in the first three digits of the parcel's zip



code and the zone number appears on the unit's display. The unit comes programmed for the user's point of origin; it's said to be compatible with both the United States Postal Service and United Parcel zone charts. The Zone-Finder sells for $295. GATEWAY SYSTEMS CORP., St. Louis, Mo.

FOR DATA CIRCLE 511 ON READER CARD

Peripherals

Three cartridge disc drives for minicomputers, and nine tape drives for large mainframes have been added to this vendor's catalog of peripherals. The 9448 cartridge module drive (why they just don't call it a disc is beyond us) can be configured with 32MB, 64MB, or 96MB of capacity, arranged as a 16MB front loading cartridge and as much as 80MB of fixed disc. An oem product, the 9448 remains compatible, at the interface level, with the vendor's existing storage module drive and minimodule drive families of discs. Available in either a pedestal cabinet or 19-inch rack mountable enclosure, the 9448 has microprocessor-based control logic which is said to include more fault monitoring and detection capability than is currently available in any other cartridge disc. The units have an average access time of 30 msec, and average rotational latency of 8.33 msec. Prices for the 32MB, 64MB, and 96MB units are, respectively, $3,900, $4,950, and $6,000, in oem quantities of 100. Second quarter 1978 deliveries are planned.

Designed for use with the vendor's Cyber 170, Cyber 70, and 6000-series of large scale computer systems, the 677 and 679 tape transports operate at speeds of 100 ips, 150 ips, and 200 ips. The 679 group comprises six 9-track

INTERACTIVE REPORTS:

SYSTEMS CORPORATION

The UNIX* Time Sharing System

In the early seventies, two researchers at Bell Labs set out to design a new operating system. Not under pressure to meet a particular project goal, the designers, Ken Thompson and Dennis Ritchie, could collaborate freely. The system had only to satisfy their personal requirements. This somewhat unusual task was undertaken because of their dissatisfaction with available systems. None provided a hospitable and naturally interactive environment for programmers or users. The fact is, few today do.

UNIX, a time sharing operating system now widely recognized as a model of conceptual elegance and simplicity, was the result of their efforts. It eliminates the need for such seemingly inescapable horrors as I/O records, formatted files, physical device dependencies and incomprehensible job control languages. Gone, too, are the overhead costs of reserving machine resources for each process.

UNIX features include a hierarchical system of files with directories and nested subdirectories easily added and removed. Overhead per file is low and, therefore, short files are not disproportionately costly. The file design is both simple and powerful; it provides the foundation for many other basic system capabilities.

Automatic I/O redirection is one such capability. This feature of UNIX provides for the complete interchangeability of I/O streams—resulting in device-independent programs. This means, for example, that you can write a program to take input from a terminal and, without changing your program, direct it to take the input from a file, or from the output of another process. And, best of all, it's very easy to do.

The flexibility of the original design and the availability of the high-level language, "C," in which the system is written, fostered evolutionary system growth: the powerful command interpreter, security, filters, pipes, the file system, asynchronous processing, etc., etc. Each of these is, in its own right, an enriching feature worthy of a complete report.

Over the last few years, UNIX has developed a significant following. First, at universities where it was provided for educational purposes. Later, despite licenses explicitly excluding software support, at commercial institutions. Its many proven advantages were broadcast by a word-of-mouth campaign of user endorsement and praise.

As one of its early supporters, Peter Weiner was instrumental in obtaining the first commercial UNIX license. Now, several years later, Peter is President of INTERACTIVE Systems Corporation, which holds the first commercial license of PWB/UNIX (which stands for Programmer's Workbench—more on that in a later INTERACTIVE Report). INTERACTIVE is providing complete UNIX systems: from licenses for fully supported software to PDP-11 hardware sales and full system integration. Through INTERACTIVE, UNIX has become a commercially viable system.

Single source availability plus support for UNIX aren't all we have to offer, however. We are offering our improved and enhanced version of UNIX—INTERACTIVE System/One. IS/1 includes the new INTERACTIVE editor, INed, a screen-oriented editor that...but that's another report too.

Meantime, don't wait for our next report. Whether you now own PDP-11 systems or are contemplating their purchase, call us or write to us. We'll tell you more about ourselves and more about the other improvements that make up our unique product and service package.

INTERACTIVE Systems Corporation
1526 Cloverfield Blvd.
Santa Monica, California 90404
Telephone: (213) 829-7741

*UNIX is a trademark of the Bell System.

CIRCLE 118 ON READER CARD

models; three are offered in 800 bpi and 1,600 bpi densities, with NRZI or PE recording, and three with 1600 bpi PE recording or 625 bpi GCR recording. Transfer rates range from 160K bps to 1.25M bps. For users needing 7-track transports, the 677 can offer 556 bpi or 800 bpi NRZI recording, with transfer rates ranging from 55.6K bps to 160K bps, depending on tape speed selected. Two controllers, the models 7021-31 and 32, may be used with the 677 and 679 series. As many as eight intermixed transports may be connected to these microcoded, single or dual channel control units. Purchase (and one-year monthly lease) prices for the three 7-track units are $17,500 ($416), $21,500 ($512), and $24,500 ($583). Maintenance is $97, $102, and $133 per month, respectively. Prices for the six 9-track transports range from $18,000 to $30,600, depending on tape speed, recording mode, and density. Lease rates range from $428 to $680, and maintenance is $97 to $141 per month. The three 1,600 bpi/6,250 bpi units are available for delivery now; the other units will be available late in the first quarter of next year. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 522 ON READER CARD

Mini Floppy Drive

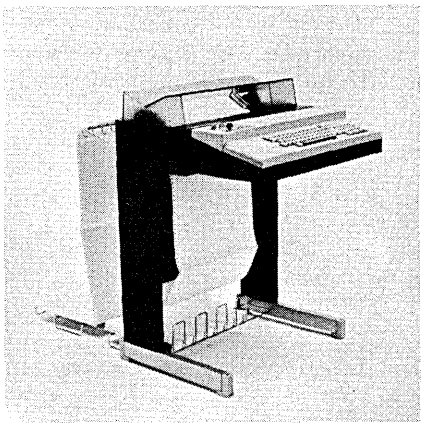
Capable of emulating paper tape and magnetic tape, the microprocessor-based Digidisk system works with data communication printers and crt terminals. Connection is made through an RS232 interface. The unit may be used for data storage, automatic send/receive program loading, and data collection applications. It uses mini diskettes with a capacity in excess of 100KB. Software for the microprocessor comes on a diskette, so future upgrades can be made by getting the latest diskette. A Digidisk with an RS232 interface sells for $1,199; with a built-in 300 bps originate-only coupler it goes for $1,299, and with an integral 1200 bps 202-compatible coupler the price is $1,699. DIGICOM DATA PRODUCTS, INC., San Jose, Calif.

FOR DATA CIRCLE 525 ON READER CARD

Terminals

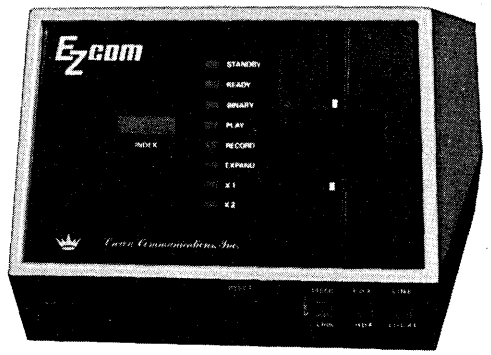
An 8-bit teleprinter and a terminal system with integral line control unit are the latest additions to this vendor's line of terminal products.

The TC480 teleprinter comes in receive-only (RO), keyboard send/receive (KSR), and automatic send/receive (ASR) versions. Additional I/O units and memory may be added to the TC480, upgrading it to an interactive terminal for a number of applications including on and off-line data collection, time-sharing, and text editing and



word processing. The basic terminal comes with a DTL/TTL serial interface for local connections; optional interfaces include RS232 and 20 mA current loop. The unit communicates in ASCII (using 10 or 11 bits) at asynchronous speeds ranging from 75 bps to 1200 bps. In quantities of five or more, a receive-only TC480 has a typical price of $1,625, and a keyboard send/receive unit goes for roughly $1,750.

The TC808 terminal system is addressed to on-line communications users and those who require limited intel-



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The EZ Com price makes it easy to own. Contact Joel Stephens, VP Marketing, Crown Communications, Inc., 2750 Northaven, Suite 111, Dallas, TX 75229.

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Also Crown's CCI-5000 — For those who need a cassette device Crown offers the CCI-5000, with many of the advance advantages of the EZ Com, but in cassette form.

CIRCLE 113 ON READER CARD

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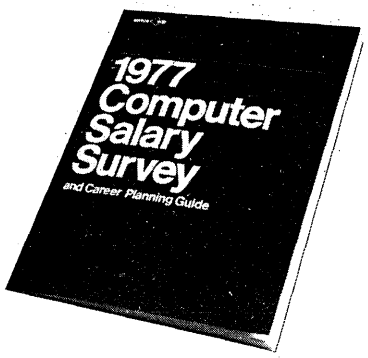

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CIRCLE 153 ON READER CARD

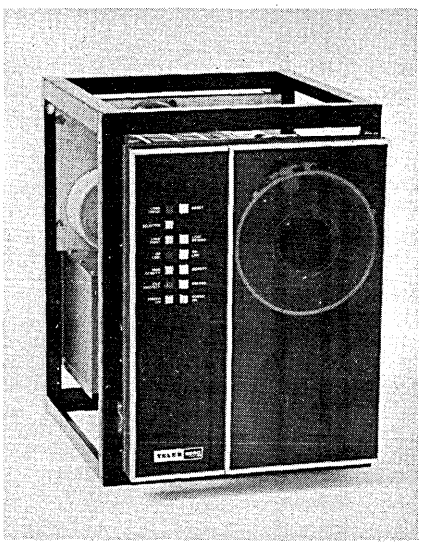
hardware

ligence, limited peripheral connections, and printed output. A standard TC808 includes a central control unit, a synchronous or asynchronous line control unit (said to be able to handle a wide range of protocols), and a workstation with keyboard and printer. Options include automatic forms handling, with either front or sprocket feed, platen splits, a 260-character display, and an additional 8K of memory which ups the unit's memory complement to 24K. The TC808's price ranges from $7,500 to $10,000 in orders of five or more. OLIVETTI CORP. OF AMERICA, New York, N.Y.

FOR DATA CIRCLE 513 ON READER CARD

6250 bpi Tape Subsystem

After many years of selling plug-compatible peripherals to large mainframe users, this vendor has entered the minicomputer peripheral market with a 6,250 bpi tape subsystem for PDP-11s. It interfaces through either DEC's UNIBUS or MASSBUS; the vendor is in the process of selecting the next mini to build an interface for. Dubbed the model 6250, the unit operates with GCR and PE data formats. A lower performance model, the 6240, works with NRZI and PE formats. Three plug-in modules and the head assembly are the



only differences between the two models. Both are available in 45 ips, 75 ips, 100 ips, and 125 ips versions; rewind speed is 500 ips. The maximum data transfer rate is 781 ips. The subsystem includes a microcoded formatter/controller which can handle as many as eight drives. In 100 unit quantities, a 125 ips model 6240 sells for $6,995, a 6250 for $7,495. The 6240 is available now, the 6250 will be available in the first quarter of next year. TELEX COMPUTER PRODUCTS, INC., Tulsa, Ok.

FOR DATA CIRCLE 518 ON READER CARD

PRO-GRAMMERS/ ANALYSTS

BCS Richland, Inc., Richland, Washington (a subsidiary of Boeing Computer Services), has immediate openings for the following positions:

- **Business Systems Analyst**

  Several openings exist in all phases of Business Systems application developments from design to maintenance. Also need personnel to assist in a major conversion effort from a CYBER 74 to a UNIVAC 1100/40. Positions open will range from senior analyst with four to six years of lead experience to junior programmers with a bachelor's degree in Computer Science or equivalent.

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Handheld Data Logger

The Porta 200, a handheld data entry unit, can store as many as 85,000 characters on a data cassette. The cassette subsequently may be read by one of this vendor's RS232 plug-compatible Datacassette tape units. The Porta 200

has a 16-key pad and a display to verify input. Weighing only three pounds, the battery-powered unit is said to operate for roughly four days between charges. It sells for $825 including battery and charger. TECHTRAN INDUSTRIES, INC., Rochester, N.Y.

FOR DATA CIRCLE 514 ON READER CARD

370-Compatible Mainframe

We mentioned the AS/6 last month in our coverage of the IBM 3031/3032 announcement, but it also deserves a place in these pages. Being 370/303X-compatible, much of the story (architecture, available software and peripherals) is already well known. The AS/6 is said to have 1.1 to 1.25 the "power" of the recently announced 3032. The air-cooled processor starts off with 2MB of main memory, expandable to 16MB. The memory is built of 4KB chips, with a chip-level access time of 100 nsec. A 64KB buffer sits between memory and the cpu (which cycles at 72 nsec, compared to the 3032's 80 nsec cycle). Reloadable control storage holds the microcode that controls the cpu. Two microcoded I/O processors provide for up to eight channels each. As standard equipment, the AS/6 has one byte multiplexor, two selector, and three block multiplexor channels. A two-byte interface for selector and multiplexor channels also is offered. An AS/6 with operator console, 2MB of main memory, with two I/O processors with a total of six channels, carries a purchase price of $1,960,000. Deliveries are scheduled to begin in March of next year. ITEL CORP., San Francisco, Calif.

FOR DATA CIRCLE 523 ON READER CARD ✻

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Updates

"It seems to be very difficult for IBM to find a representative for the ALGOL committee," according to the European SEAS ALGOL Committee Newsletter of July 1977. IBM did deputize its representative to the FORTRAN committee, a Mr. A. Sigg, to fill in for the missing ALGOL committee member. SEAS comments that this "is promising in view of the fact that the FORTRAN and ALGOL committees will join their work." A long-time IBM observer suggests that one way to ensure IBM's participation on the ALGOL committee would be to merge it with the SEAS PL/1 committee.

The Women's Clinic at the Duke Univ. Medical Center uses an interactive clinic resource scheduling system which tries to match patients and physicians in specific service areas of the clinic. The Patient Appointment (PTA) System maintains records of demographic data, current appointments, and providers for each patient. PTA is provider-selective; his or her detailed schedule is on file and the system tries to match patients with available time slots in the provider's schedule.

Lockheed Electronic's Vessel Traffic Data Acquisition and Control System (VT-DACS) has been accepted by the U.S. Coast Guard for use in monitoring ship traffic in the Houston/Galveston area. The system will provide data on status and location of vessels in the ports of Houston, Galveston, and Texas City, as well as along 50 miles of interconnecting waterways. One service the system will perform will be the scheduling of tanker and wide-beam, deep-draft vessel traffic to minimize the possibility of collisions and other accidents (the petrochemical area served accounts for roughly 18% of the oil spills occurring in U.S. waters).

The Univ. of Waterloo chose not to publish its October issue of The WATNEWS newsletter this year, publishing instead three separate newsletters for the users of WATFOR-II, WATBOL-II, and WIDJET. The supplier of educational systems for DEC's PDP-11 line of minis issued the newsletters to provide users of its COBOL (WATBOL), FORTRAN (WATFOR), and job preparation and debugging (WIDJET) systems up-to-date information on the three products.

Financial Planning

Designed as a tool for budgeting, forecasting, and financial modeling, Data*Model is written for Datapoint processors and may be used by non-dp personnel. The financial planning and risk analysis program provides an integrated data base and a report writer, and can handle amortization, depreciation, present value, internal rate of return, and data projection calculations.

English language crt prompts, menu directions, and interactive editing allow users to get immediate results with minimal instruction, according to the vendor. It is said that non-dp personnel have been fully trained in one day.

A minimum system for running Data*Model consists of a Datapoint 1500 processor and a serial printer. The program also can run on larger Datapoint processors. For current Datapoint users, the package carries a price tag of $10,000. The vendor also will sell complete systems starting at $19,900. Program maintenance is $25 per month, which includes all forthcoming revisions. MINICOMPUTER MODELING, INC., Seattle, Wash.
FOR DATA CIRCLE 510 ON READER CARD

Management System

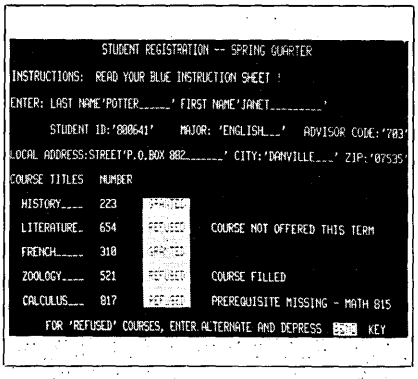
The Master Administrative Software System (MASS) is a data base-oriented operations management information system. It consists of a module, MASS Main, central to all systems, and any number of applications modules (to date there are eight of these). The currently available modules are: budget, land management (including demographics and mapping functions), manpower forecasting, preventive maintenance, building space forecasting, medical, project control, and payroll/personnel. Users can link their own modules, written in APL, COBOL, or FORTRAN, to the MASS data base.

MASS can be thought of as performing three separate functions within one system: data base management, applications processing, and data retrieval. If the user has installed more than one application module, he can specify that the system run a sequence of modules without operator intervention between each run. The data base is accessible to all modules. The system can retrieve data ranging from a single item to an entire file; the results can be routed to a line printer or displayed on an on-line terminal.

MASS is written in FORTRAN and is said to be operational on any computer with at least 64KB of memory, although 128KB or more is recommended to increase performance. A direct access storage device and an on-line interactive terminal also are required; the system can operate interactively or in batch mode. The package carries a price tag of $15,000 for the main MASS module and the first applications module; additional applications modules range in price from $5,000 to $10,000. AMERICAN SYSTEMS CO. Tarzana, Calif.
FOR DATA CIRCLE 506 ON READER CARD

On-line Processing

Users of this vendor's 32-bit line of processors can use ITRAC to develop, implement, and maintain on-line transaction processing systems. Compatible with COBOL, ITRAC offers interactive screen formatting and on-line screen form testing capabilities. System designers may allow users to design their own screen formats since forms definition is independent of the program. The on-line testing feature allows forms to be tested before use. Testing is a part of ITRAC and does not require a COBOL applications program. A utility, MODIFY, allows changes in parts of the screen without affecting the entire format. Additionally, the vendor says



changing a form does not require changes to the COBOL program.

ITRAC runs on one of the vendor's 32-bit processors with 192KB of memory, a 10MB disc, and one or more model 1200 video terminals. ITRAC has a $6,500 per cpu license fee. Required software includes the Dynamic OS/32 MT operating system, the ITAM telecommunications access method, and COBOL with ISAM. The total price for the required software and ITRAC is $21,200. ITRAC is available as object code on mag tape or disc media; deliveries start this month. INTERDATA, INC., Oceanport, N.J.
FOR DATA CIRCLE 503 ON READER CARD

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Manufacturing

A manufacturing cost control system, CostControl/80 handles accumulation of actual and standard costs against work orders, labor distribution, purchase variance reporting, work in progress variance analysis, and work in progress and inventory valuation. The package runs on 360s and 370s under OS or DOS. The vendor, which in the past has directed its manufacturing software at technical planning applications, says CostControl/80 represents the first product in its new line of independent, functionally oriented manufacturing software. The next product in this line will be ShopFloor-Control/80, a package which concentrates on work order release, scheduling, and control. CostControl/80 consists of five modules; package prices range from $13,000 to $25,000. INFORMATICS INC., Woodland Hills, Calif.
FOR DATA CIRCLE 505 ON READER CARD

Micro Cassette OS

Consisting of a full Z-80 assembler, text editor, in-memory file system, labeled cassette tape storage system, and a variety of utilities, the ZAPS cassette operating system will run on most 8080 and Z-80 microcomputer systems. It occupies 14KB of memory, including buffers and a 1KB symbol table. The text editor is full context, requiring no line numbers. The assembler uses Zilog-recommended mnemonics and allows variable names of any length. It also includes a variety of pseudo-ops including origin, define string, and equate. It generates English error messages and has the capability of accepting numeric values in hex, octal, decimal, or binary form. The 90-page user's manual includes examples of how to adapt the system to a variety of microprocessor I/O devices. ZAPS is available in Tarbell, Digital Group, and TDL tape formats. Priced at $60, ZAPS may be purchased in computer stores or directly from the vendor. ALGORITHMICS INC., Newton Upper Falls, Mass.
FOR DATA CIRCLE 502 ON READER CARD

On-line Processing

Designed for writing real-time, on-line, multiterminal systems, Easy-Mac runs on Interdata's 7/32 and 8/32 processors under this vendor's proprietary

software spotlight

C Compiler

C, an Algol-like structured programming language, has been described as an implementable Algol 68. At the source level, C is more terse than Algol. For example, Algol's BEGIN and END keywords are replaced by left and right brackets in C. This vendor's C compiler runs on DEC's PDP-11 minicomputer family (models 20 through 70) under the RSX-11M or UNIX operating system. An Intel 8080 version is in the works and is slated for availability at the end of next month. Because the compilers are modular, the vendor says it will be possible to construct cross-compilers between supported machines by reworking a small portion of the compiler. On a PDP-11 under RSX-11M the compiler requires 32K words of user space (a 20K word version is in the works, we are told); under UNIX 20K words are needed. The compiler is available on a perpetual lease basis for $11,575. Updates will be available on a value-added basis, typically for several hundred dollars. YOURDON INC., New York, N.Y.
FOR DATA CIRCLE 509 ON READER CARD

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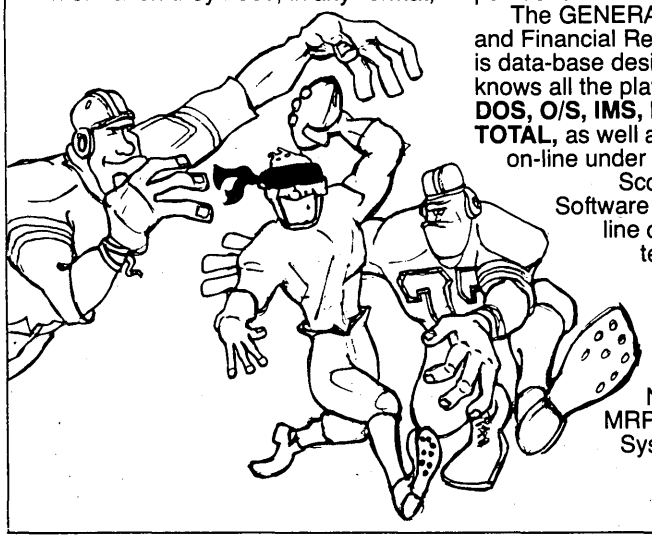

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CIRCLE 135 ON READER CARD

operating system. A keyword-type macro language, Easy-Mac is said to be easier to learn than COBOL while generating object code with virtually the efficiency of assembler coding. Instead of using position-dependent parameters in its macro calls, the language uses keywords to identify parameters. The operating system handles real-time multiprogramming, reentrant coding, programming of video display formats for I/O, data base organization, I/O errors, sorting, and job control. As many as 15 line printers, and up to 200 terminals (on a 1MB processor) can be supported, according to the vendor.

Object code produced by Easy-Mac is compact because much of the code for implementing source macros resides within the operating system. This allows application programs to fit within the 5KB partition allocated each terminal.

Users are relieved of sorting file entries because the operating system maintains indexed files; multiple indexes may be assigned. A source language editor (SLED) helps programmers develop Easy-Mac applications. Easy-Mac, the operating system, and SLED are sold as a package for $25,000. They are not separately priced. VIDEO-COMP BUSINESS SYSTEMS, Elizabeth, N.J.

FOR DATA CIRCLE 504 ON READER CARD

Fortran Subroutines

Fort/Lift consists of 24 FORTRAN IV subroutines, character and table manipulation, sorting, and file organization. The in-core sort of numeric arrays (either floating point or integer) is a new subroutine; the remaining subroutines are original or updated versions of this vendor's earlier offerings. The disc file sort, which sorts on as many as five keys (character or numeric) is an updated product, as is the key-based file access method. The character string and ordered table manipulation subroutines are the vendor's STRING70 package (June, p. 215). Supplied as a source deck of cards, Fort/Lift has a one-time lease fee of $250. SOFTWARE '70, Anaheim, Calif.

FOR DATA CIRCLE 501 ON READER CARD

Statistics Library

With the release of edition six of the International Mathematical and Statistical Library, the library has grown to 403 FORTRAN subroutines for use with scientific and engineering application programs. Edition six also marks the first time a subset of the library is offered for a minicomputer: the Data General Eclipse running under AOS or RDOS. Among the 36 subroutines added are enhanced random number generation, cluster analysis, regression analysis, differential equations, and Bessel functions. To make use of the library, a user needs some background in FORTRAN and mathematics or statistics. The package is available for large scale computers from Burroughs, Control Data, Digital Equipment, Honeywell, IBM, Univac, and Xerox. A subscription to the library is $1,220 per year, which includes the programs and manuals. Discounts are offered for educational institutions and multiyear subscriptions. INTERNATIONAL MATHEMATICAL AND STATISTICAL LIBRARIES, INC., Houston, Texas.

FOR DATA CIRCLE 508 ON READER CARD

Pascal Compiler

Originally developed for the Univ. of Lancaster in England, this PASCAL compiler implements the language's P4-standard. It operates on Data General Nova and Eclipse computers under the Realtime Disc Operating System. The Algol-like language, widely used in universities and research establishments, was originally developed in Switzerland by Niklaus Wirth. Distributed on a 9-track, 800 bpi mag tape in RDOS dump format, the compiler carries a distribution charge of $70. GAMMA TECHNOLOGY, Palo Alto, Calif.

FOR DATA CIRCLE 500 ON READER CARD

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An entire file (or just parts of it) can be printed in hexadecimal format with version seven of Easytrieve. Several restrictions have been removed: users now can include an unlimited number of IF statements in a program (the previous limit was 50), and the LABELS command has gone from a six line maximum to as many lines as desired.

Under IMS the READ statement can now perform get unique, get next, and get next within parent functions. Security is enhanced by controlling access to the source statement library containing Easytrieve's macro processor. The package is said to be compatible with all 360/370 hardware. For a DOS system the package carries a perpetual license fee of $12,500; for OS the fee is $15,000. Maintenance after the first year is $1,250 and $1,500 respectively. For low end DOS users, the vendor offers an entry level price of $8,500, with maintenance priced at $750. PANSOPHIC SYSTEMS INC., Oak Brook, Ill.
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Under AOS, users will need an Eclipse with 192KB of memory, under RDOS the Eclipse must have 96KB of memory. In either case, the DG/L development system carries a license fee of $5,000, which includes 40 hours of systems engineering services, although the program comes on an as-is basis without warranty. Updates may be purchased for $150. DATA GENERAL CORP., Westboro, Mass.
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RPG Programming Aid

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a robot experienced conversion
and overcame doubt,
but then shorted out
in the rite of baptismal immersion.
—Gloria Maxson

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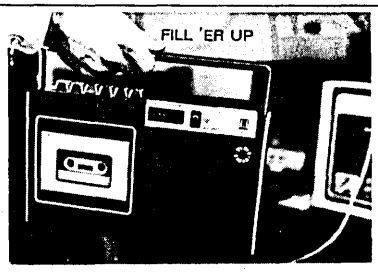

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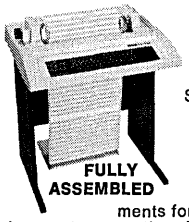

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CIRCLE 250 ON READER CARD

personal computing

Portia Isaacson, Contributing Editor

1978 will be the year of the home computer. A completely self-contained system will cost about $600 and include the computer, tv display, keyboard, and cassette tape drive, and will come completely assembled. In fact, its case will discourage tampering with its innards. Like a stereo it will come ready to plug in and go.

The home computer is targeted for an audience of non-electronic-wizards who probably won't learn to program in any significant way. Eventually it will be offered with a library of programs costing $10 to $20 each—just as

Dear Santa,
I've heard about the great things I could do with a computer of my own, so for Christmas I would like:
a computer
a Star Trek game
a biorhythm program
a stock market analysis program for my mom
an inventory control program for my brother's bee saw collection
a chess game
instruction programs for all my 8th grade subjects
a French language instruction program for my dad
an astrological forecast program
assorted games
Thanks, Santa. I can hardly wait.
Love,
Virginia

records are offered for stereo systems.

Home computers will be sold directly from the manufacturer by mail order, by department stores, and by specialty retail stores in much the same way stereos and cameras now are sold. Department store clerks may have a limited knowledge of the computers, and will demonstrate only a few standard program features. Hobbyists requiring more guidance will find computer stores will fill the information gap.

Over the next few years millions of these units will be sold, and they will become common home appliances. Entertainment and education are the two primary reasons for the purchase of millions of these computers.

The computer offers a new form of intellectually challenging entertainment. It can be a formidable adversary in traditional games such as poker, chess, and backgammon. More importantly, they offer a new form of entertainment through simulated experience.

Captain Kirk and Mr. Spock

In the very popular Star Trek game, for example, the player pretends he is captain of a star ship. The objective is simple—destroy the enemy before he destroys you. However, the game involves sophisticated strategy formation since the energy used in moving the ship, firing weapons, raising shields, and launching probes must be conserved and periodically replenished at a star base. The enemy can be very aggressive, depending on a selectable skill level. A star ship captain must be very knowledgeable about his ship's capabilities in order to make rapid, correct responses to changing conditions. Star Trek is the most popular of computer games, and is renowned in university computer centers for its addictive characteristics. Classes and dates frequently are forgotten because of an all-too-absorbing game of Star Trek.

The simulated experiences offered by computer games can vary almost without limit. In addition to the starship captain, roles as ruler of a country, candidate in a political election, pilot of a lunar landing module, and president of a company can be chosen. These "games" are not only very entertaining; they are, in a very important way, educational. They offer the opportunity to make important decisions under pressure, based on the facts provided by the simulated experience, without real risk. The player learns to

Two by Christmas

At least two companies, Commodore and Radio Shack, will introduce home computers in time for Christmas this year. These new units differ from the personal computers of the past three years in several important ways. First, the price tag is about half that of a personal computer. This has been achieved by volume manufacturing and by sacrificing some features, such as ease of expansion. Second, the new home computer is not available in the kit form that appeals only to hobbyists. Last, the home computer will be marketed to the general public via mass media and department stores.

The entry of game manufacturers, electronics companies, and computer companies into the home computer market is expected soon. ❋

	Commodore PET 2001	Radio Shack TRS-80
Similarities	A complete pre-assembled computer with ROM floating-point Basic, video display, keyboard, single cassette tape unit in expandable system.	
Price	$595.00	$599.00
Packaging	one big box	four small boxes
Display type	9 inch video	12 inch video
Display format	25 lines X 40 chars.	16 lines X 64 chars.
Graphics	special chars.	48 X 128 map
Keyboard	73 key calculator type	53 key standard type
System memory (ROM)	14KB	4KB
User memory (RAM)	4KB	4KB
Maximum User Memory	32KB	62KB
Basic character handling	Arrays of variable length strings	two 16-byte strings
Cpu	6502	Z-80
First delivery	October '77	October '77

make good, rapid decisions under fire and is rewarded or punished, depending on the value of his decisions. A game may be judged by some as more or less educational depending on the similarity of the simulated situation to real life experience.

CAI in sex education

As an educational vehicle, the home computer will find a huge market. Computer-assisted instruction programs as simple as arithmetic drills for the first eight grades will have wide appeal to parents. CAI programs for elementary grammar, history, and science also will be great motivators for families. CAI materials for the adult probably will develop more slowly due to the difficulty in developing them and the smaller market for more specialized materials. However, we may see a few subjects having wide general appeal. How about a computer-assisted instruction course in sex education? The educational potential of the home computer will at least give a family the rationale for spending nonentertainment money for the computer, even if the primary reason for the purchase is entertainment.

$600 is a small price for a device that offers both entertainment and education to most family members, and the possibilities don't stop here. Possible applications include stock market analysis, astrological forecasting, inventory of collections, and personal financial control. The uses of computers are as varied as the individuals that use them.

The computer is our first major mind-amplifying tool, and one that can be used by each person in a unique way. Therein lies the secret to its almost unlimited potential as a personal and home appliance.

Dear Virginia,

I hope you like this fine little computer. I'm sorry, but most of the programs you asked for aren't to be found. So I'm including a book on BASIC programming. You can write your own

Santa

When discussing the enormous market potential for the personal appliance computer, an often-raised question is what impact such abundantly available computers will have on our way of life. Although it in no way answers the question, a little hypothetical situation certainly points out the magnitude of the possibilities.

Suppose a few thousand people owned home computers along with identical stock market analysis programs. Further suppose that these few thousand people made identical moves in the stock market based on the recommendations of the program. Wow! This unobvious possibility is probably typical of many subtle traps waiting for us when home computers become commonplace.

Maybe next year

Unless Santa's elves do a lot of programming, Virginia will be disappointed this year. Although the price is right for the home market, the program libraries for the general public simply don't exist yet. Until then, the market will be limited to those few persons who write their own programs. ❋

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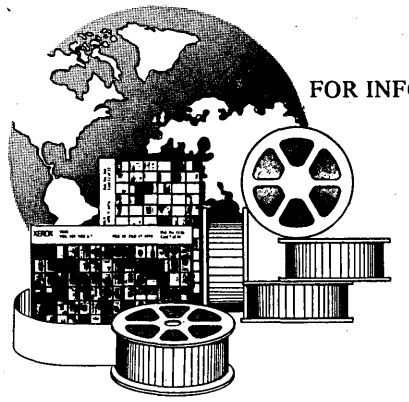

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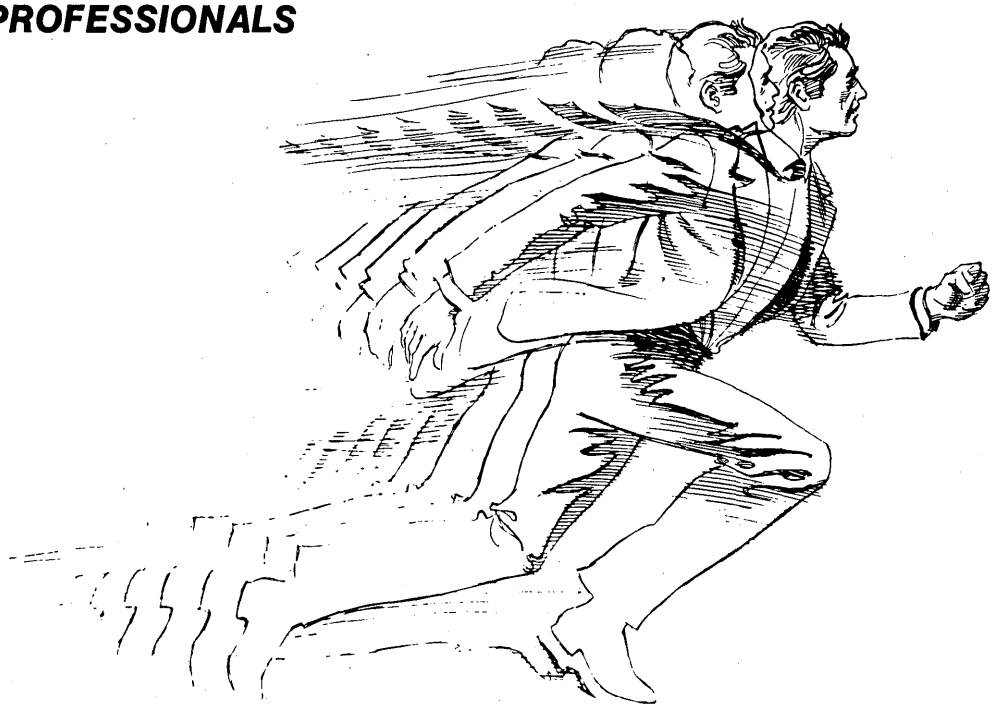

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Structured BASIC is Alive and Well in Denmark

In his excellent article, "Structured Programming in BASIC" (June, p. 149), Peter B. Worland states: "Ideally the structuring should be built into the compiler/interpreter." Such an interpreter has been designed. It was implemented on a Nova 1200 in 1975 here at the Computer Science Dept. of the Government Teachers' College, Tonder, Denmark.

The interpreter is now used at most schools and institutions in Denmark having RC 7000 minicomputer systems. (The Nova 1200 central processor unit is a component in the RC 3600 and RC 7000 minicomputer systems, manufactured by A/S Regnecentralen in Denmark.)

And by now we have gained considerable experience with our Structured BASIC, which we call COMAL (COMmon Algorithmic Language). The following are it's most important features:

1. Variable names

Variable names may contain as many as eight characters.

2. Assignments

LET statements may contain more than one assignment, for example:

LET COMCODE=COMCODE+1; P2=COMCODE*3; P1=P2-2

3. Control structures

In addition to the control structures available in BASIC, COMAL provides:

a. IF p THEN ... ELSE ... ENDIF
b. IF p THEN ... ENDIF
c. REPEAT ... UNTIL p
d. WHILE p DO ... ENDWHILE

Thus there are three loop structures in COMAL: FOR ... NEXT, REPEAT ... UNTIL, and WHILE ... ENDWHILE. And there may be seven of each type nested in one another regardless of the order, and seven IF branch constructions too. In all cases, *p* is a Boolean expression, and the program text is indented for easier reading.

Still another control structure is:

e. CASE expr OF .. WHEN <list$_1$> .. WHEN <list$_n$> ... ENCASE

The *expr* may be an integer expression, Boolean True or False, or a string variable; each *list* may be a list of integers, Boolean expressions, or strings. On processing, each list is examined to see if it fits the present case, and a default case may be inserted for the times when no list fits. In COMAL, the number of WHEN's used for any given CASE is not limited, and CASE ... ENDCASE construction, may be nested to any depth.

4. Boolean expressions

Full Boolean algebra with the Boolean operators AND, OR, and NOT is available. COMAL also has inherited the pseudo-Boolean expressions from Extended BASIC: a numerical expression is in proper context considered false, if it has a value of 0, and true in all other cases. A numeric variable may be assigned the value of a Boolean expression, 1 if the expression is true, and 0 if the expression is false. Also, Boolean expressions may be included as parts of algebraic expressions with the same evaluation.

5. Subroutines

If a program is initiated with the statement *PROC* <name> where <*name*> is a string formatted as a variable name, and is terminated with the statement *ENDPROC*, this program may be called as a subroutine by another program using the statement *EXEC* <*name*>. When the subroutine has been executed, control is passed to the statement following the EXEC statement that called the subroutine.

If you think that EXEC is nothing but GOSUB, well, try it!

Furthermore, the program text between the PROC and ENDPROC statements is indented in the program listing. This makes it easier to identify the subroutine.

A subroutine may call another subroutine, but there may not be more than seven nested subroutines.

6. Comments

The keywords ELSE, ENDIF, REPEAT, ENDWHILE, ENDPROC, and END have the same status as REM with regard to comments. In other words, an explanatory comment may be inserted after any of these words.

Small enough and plenty fast too

By now you may think that a Structured BASIC interpreter is a huge affair compared to the Extended BASIC interpreter (which is still a proper subsystem of ours). But this is not so. In fact, we added only 12% to 15% more code to what was already there. Size is therefore no excuse for continuing to use an outdated, inadequate language like Dartmouth College BASIC, simply "because it *was* there," as Dr. Worland aptly remarks.

The first version of COMAL was implemented here at Tonder in 1975, on a Nova 1200 with 24K words of core

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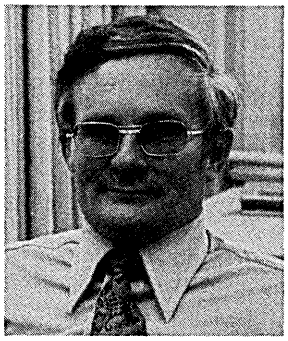

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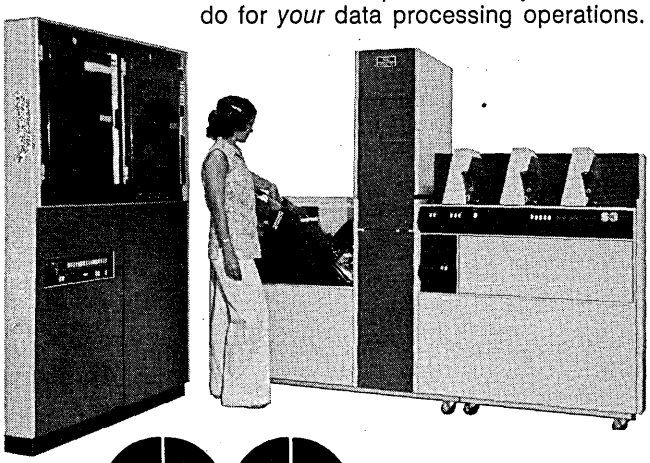

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and paper tape peripherals. The whole thing was done on paper tape—miles of it. At that time, the smallest version took 12K words of core and extended versions took 14K. (Some of these versions are still running at some high schools in Denmark.)

We've been running our current version for over a year, this time under RDOS on a 32K Nova with a Diablo moving head, 2.4MB disc. This same version is used by some large school systems and by the Univ. of Aarhus. COMAL *and* the operating system take up 22K of the 32K memory.

There are three of the very latest versions: (1) a mini-COMAL meant for small standalone machines with at least 16K; (2) a midi-COMAL for machines with at least 24K and dual floppy discs; and (3) the maxi-COMAL for cpu's with at least 32K and either dual floppies or a hard disc. The mini version uses 12K words, the midi 15K, and the maxi 18K. (The maxi version, by the way, handles integer, real, and Boolean data types and strings. It also handles arrays of all the mentioned types and 14-digit arithmetic.)

We plan to produce a version for the Zilog 80 microcomputer too, but are having difficulties in finding a good BASIC to build it on.

The original Extended BASIC was reasonably fast compared to other BASIC versions I've seen. COMAL is faster, sometimes up to 40% faster than equivalent BASIC programs, because the structured algorithms may add substantially to efficiency.

Here is an example: If one implements a branching by means of GOTO <line number>, the original interpreter will start scanning the line numbers from the beginning of the program until it finds the right one.

In COMAL, the interpreter "knows" that it has to look forward for an ENDIF or an ELSE, depending on the value of the Boolean expression in the control statement IF . . . THEN. Similarly with REPEAT . . . UNTIL and WHILE . . . ENDWHILE. When you work with structured programs in a way you work with "hidden labels."

By throwing away the GOTO completely, it would be possible to make a very fast COMAL, because we might then "semicompile" the source text, thereby making jumps and subroutine calls as fast as just looking for "the next line."

The impact of Structured BASIC in the schools has been significant. Not only are students writing better, more valid, and more readable programs—that was to be expected—but they also are being encouraged to write more ambitious programs due to the relative ease with which one can grasp a well-structured program. Perhaps I should add that the long variable names have proved to be of great importance in making programs self-explanatory, and some of my colleagues even say that this facility is the last one they would be without.

Classical BASIC may be of use in laboratories for short numerical problems, or in the newest hand-held calculators, but it has long ceased being *the* language for schools, and the fact that so many teachers still think it can only be due to their ignorance of more modern ideas such as those found in PL/1, PASCAL, or SIMULA.

One last remark: our COMAL interpreter has been taken over by the Danish computer manufacturer A/S Regnecentralen for further development and maintenance, and Structured BASIC is now spreading throughout Europe with the RC 3600 and RC 7000 minicomputer systems.

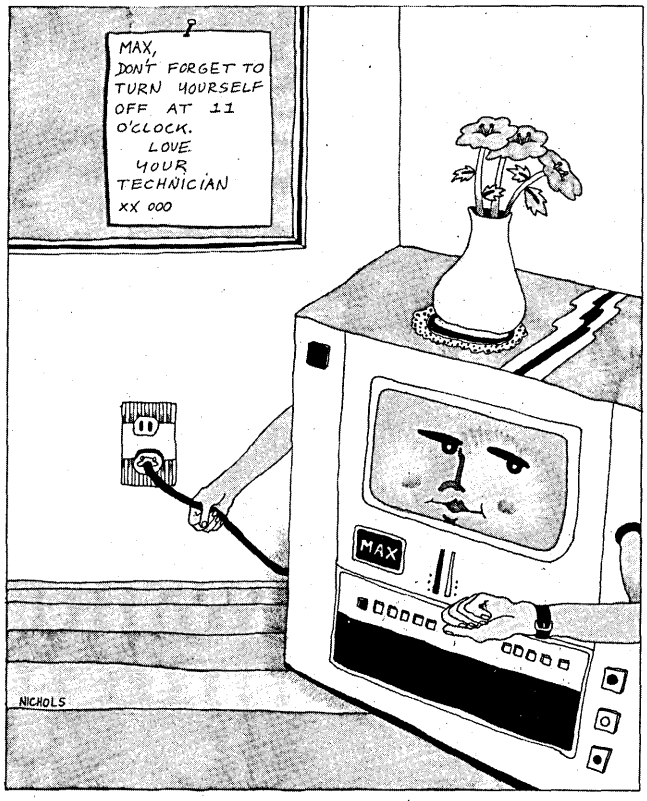
—**Borge R. Christensen**

Mr. Christensen is the computer center director and a lecturer in math and informatics at the Government Teachers College, Tonder, Denmark. He is also the co-developer of COMAL.

Computer-Controlled Computers?

Every day, it seems, the computer takes over the management and control of some new service, function, or process. Unattended banking stations permit a computer to substitute for the teller, providing bank depositors with their balances, entering interest, etc. Other computer systems control functions like oil production and pumping, regulating flows and quantities over thousands of miles. Man, even as monitor, is no longer needed; innumerable services and processes have "come of age" and manage themselves, thanks to computer systems.

The situation in the computer room is different, however. The computer is rarely left alone for long without its wet nurse. Oh, it is true enough that some centers have worked out ways of leaving their computers unattended for long periods. One such center, for example, loads a batch of work at closing time, with a special last job at the end of the



batch. This last job, executed when all others are complete, is nothing more than the printing out of instructions for shutting down the system. The night watchman, on his rounds, checks for this message. When it appears, he does as bid.

Other centers, in which union and job definition problems rule out the night watchman solution, load batches at closing time and just leave the machine running when processing is complete. The cost of the modest power requirements of today's computers makes doing so cheaper than paying a night shift operator.

Even such primitive solutions to the problem of who turns off the machine are, nonetheless, rare. Normally, there

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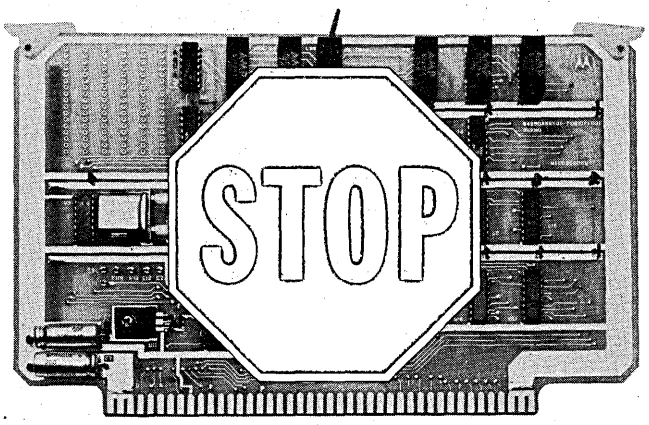

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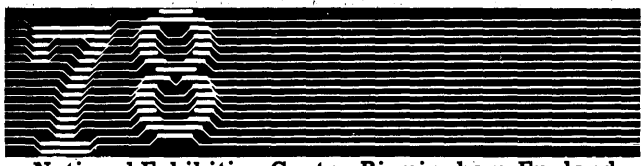

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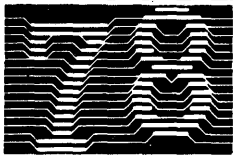

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is a person waiting around somewhere for today's sophisticated operating systems to finish processing whatever is being done in order to shut down the equipment. The computer is not, of course, trusted to shut itself off. (Some terminals and facsimile transceivers are. So are hand calculators. Many of the latter are equipped with energy savers that shut off the power supply when a certain time has elapsed between calculations.)

The problem of setting up shut-down mechanisms to turn off the several components of contemporary computers in their proper order is technically a trivial one. Computer engineers have solved far more difficult problems. Examples of mechanisms for turning off power supplies abound: timers, thermocouples, etc.

The same thing, interestingly enough, is true of devices for turning power supplies *on*. Think of all the electric coffee makers that start cooking away in the morning in response to time signals. Or the heating systems that start up when temperatures fall below an established minimum.

The big brotherly hand

Why is it, then, that the computer always has to wait for a big brotherly (or sisterly) hand to get going? Having a computer turn itself on in the morning, perhaps in response to an external timer, could have definite advantages in extended computer utilization without corresponding increases in personnel costs. A computer that turned itself on might initiate early morning tasks like system loading, system generation, diagnostics, printouts of disc files, etc.

While the computer was clearing up the morning's work the operator could be: checking previous runs (those the computer did the night before); setting up new runs; running off-line jobs; on the way to work; or doing some other job, having been replaced in a multioperator team by computer "power-control" equipment.

Having the computer finish up the evening's work, turn itself off, and then subsequently start itself up to begin specific morning tasks is certainly within the realm of capabilities of today's hardware and software. Once the idea of a computer that "minds itself" has been accepted, there is no end to the possibilities for methods, checks, and functions. A new instruction, TYO—"Turn Yourself Off"—for example, might be added to computer hardware to permit privileged programs to initiate the shut-down procedure.

The oft-demonstrated ingenuity of computer professionals, once turned to the problem, should produce an infinity of techniques and applications for computer "power-control" capabilities. The results could be gains for man and machine alike.

Self-starting and stopping features would seem to be particularly desirable for minicomputer users. Processing with such systems is normally straightforward, requiring only the kind of intervention that an input clerk might provide. Should such systems control themselves, the job definition "machine operator" would no longer apply. Given that the yearly cost of a dedicated operator can outweigh the cost of a mini, extrapolating such operations costs over the life of a system could be a deterrent to installing one.

It would seem time that some thought was given to having the computer "grow up" and become responsible for controlling itself, not just for trivial tasks like the automatic transfer of millions of dollars, or the guidance of space craft.

—Dorothy A. Walsh

Ms. Walsh is the author of two books, one on programming and the other on documentation. A dp consultant since 1955, she now works out of Rome.

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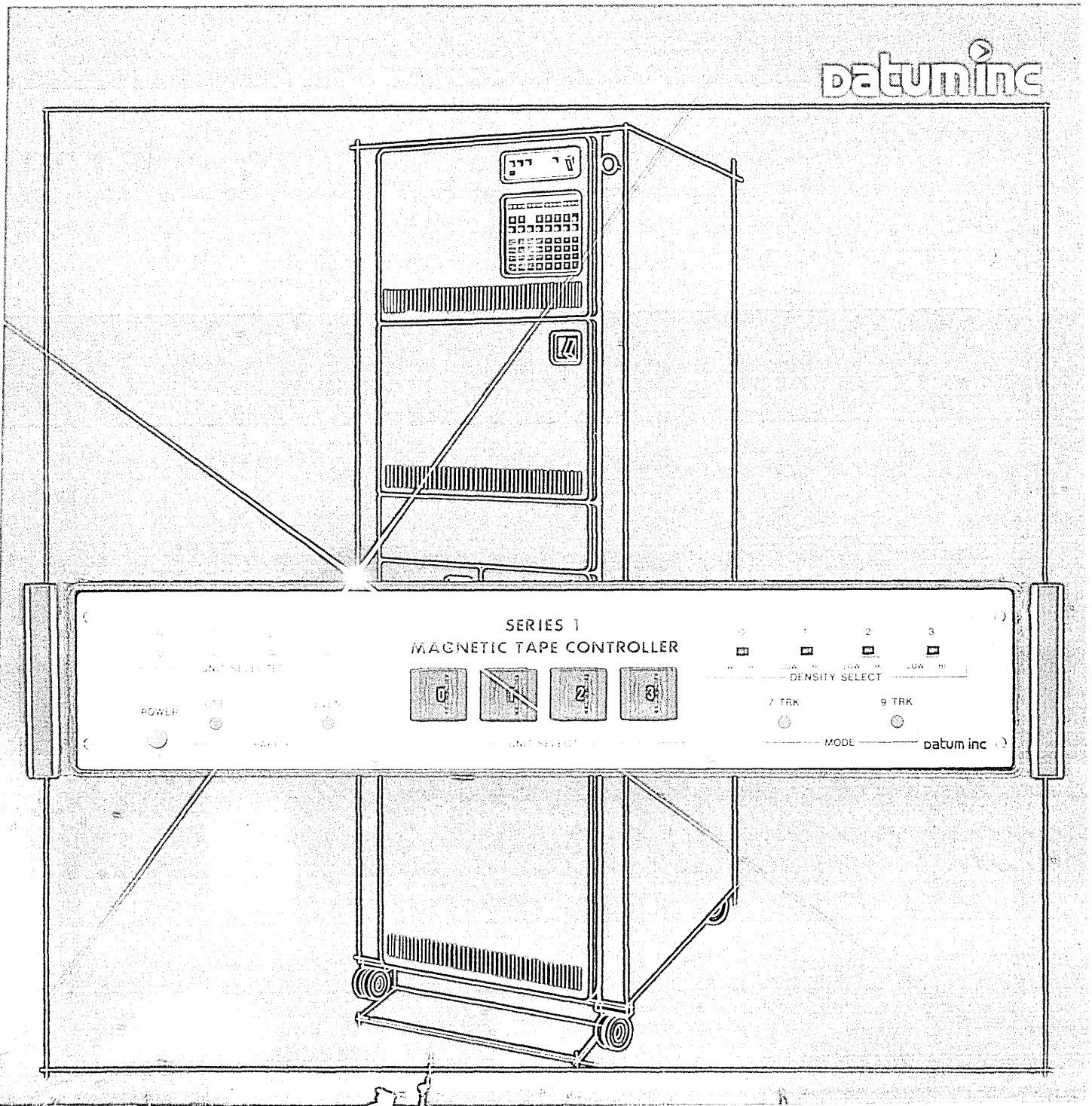

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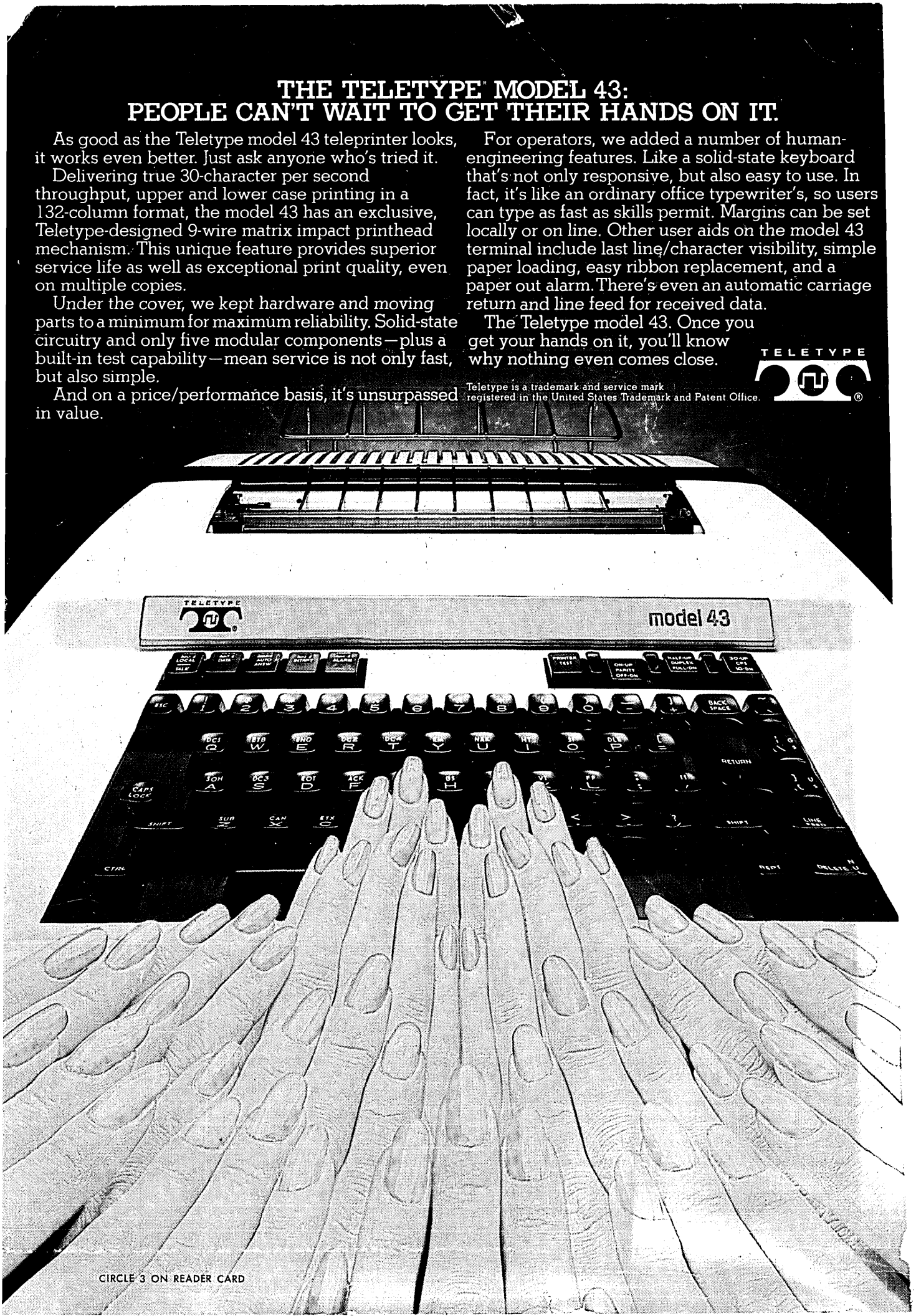

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