DATAMATION 78®

DECEMBER/3.00 U.S.A.

SOFTWARE PACKAGE RATINGS

Also: ACS implications, back-end processors, the Top 50 dp importers, and getting ready for IMS/VS...

Models 9100/9300 Vacuum Column Tape Transports . . .

Proven. Period.

Kennedy's vacuum column digital tape transports weren't designed yesterday to grab a piece of a growing market. In fact, they virtually founded the vacuum column market. They were the first to have such features as a capacitive tape-location detector for improved tape life; air bearings and hardcoated read-after-write heads to reduce tape wear and improve data integrity.

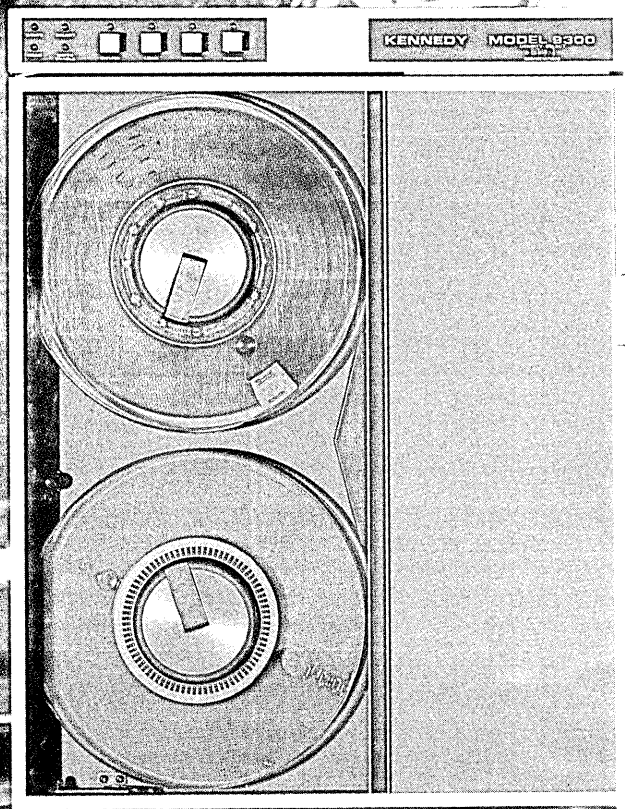
Model 9100 (75 ips) and 9300 (125 ips) offer crystal-controlled timing, read-after-write shortened skew gate, front-accessible test panel, quick release hubs and simplified [illegible] loading.

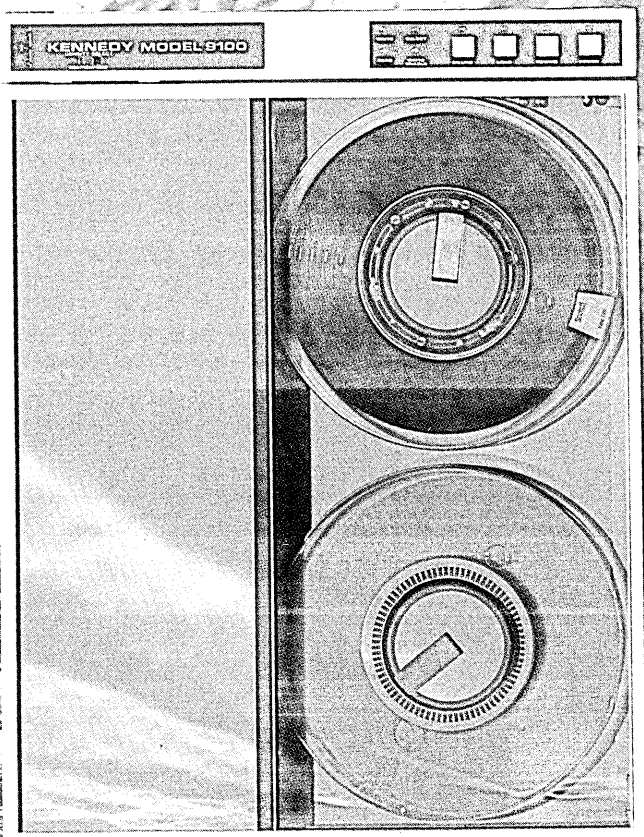
Data densities are 200/556 cpi or 556/[illegible] on [illegible] units and 800 cpi, 1600 cpi or 800/1600 cpi on [illegible] transports. The format is NRZ1/PE.

Models 9100/9300 offer more features, more performance, and most important, more time-in-the-field than any competitive units.

Why do we think so? Simple. Our figures show that we are about 3000 satisfied users ahead at this point.

KENNEDY CO.
540 W. WOODBURY RD., ALTADENA, CALIF. 91001
(213) 798-0953





CIRCLE 1 ON READER CARD

KENNEDY- QUALITY- COUNT ON IT

Now appearing on your favorite network: XL Distributed Processing Systems

Your Denver regional office needs up-to-the-minute reports from Los Angeles and Seattle . . . the central parts depot in Atlanta must maintain current inventory based on information received from six supply centers . . . Warehouses in Rochester and Raleigh need to access the data base in Atlanta, but don't need local processing . . . Branch offices in Calgary, Phoenix and Toronto must process orders and transmit to regional managers . . . headquarters in Minneapolis needs to communicate with all regional and branch offices . . .

Presenting XL Distributed Processing Systems from Pertec Computer Corporation: A family of microprocessor-based computer systems—and an approach to distributed processing—that cuts through the buzzword maze to provide state-of-the-art hardware and software solutions.

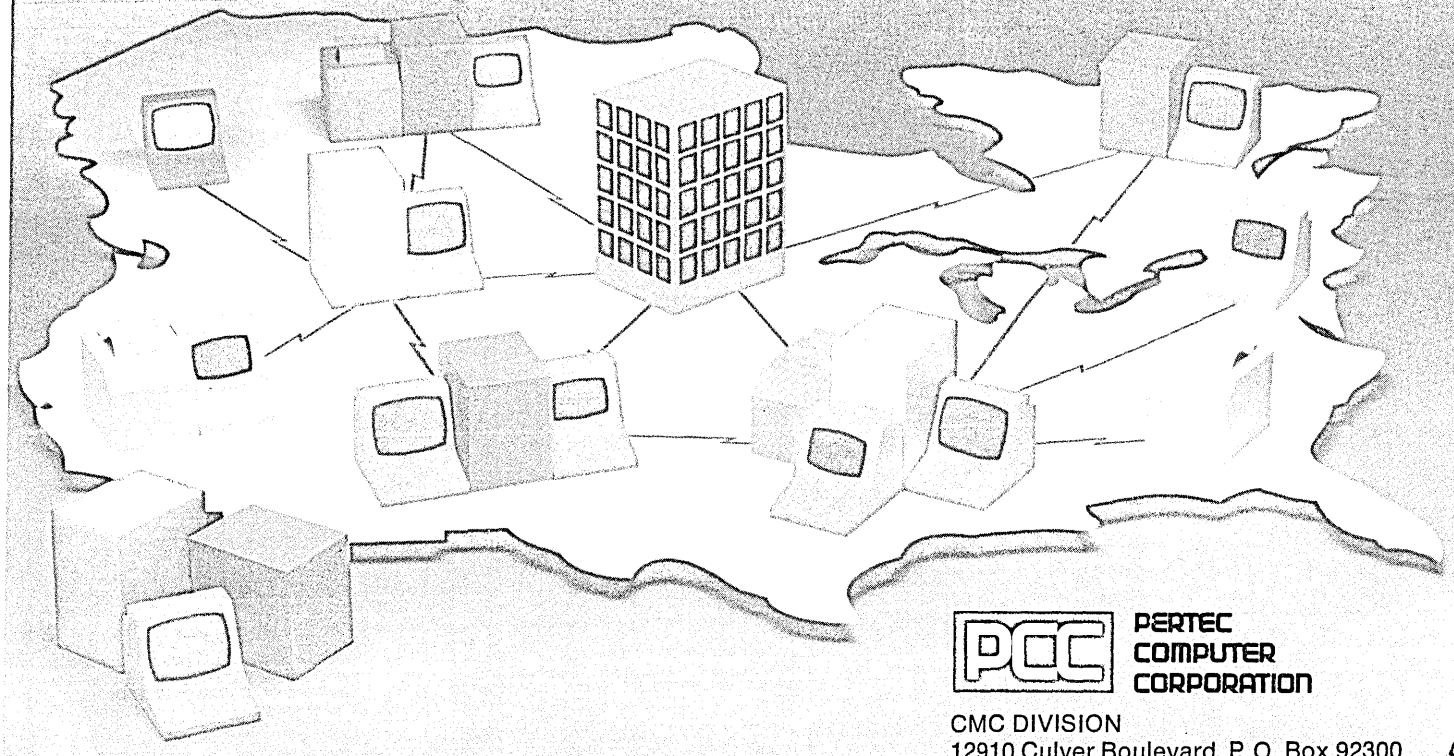
High-power processing
The top-of-the-line XL40 handles up to 16 local and remote terminals. With up to 512K bytes of memory and disk storage expandable to 70 megabytes for local data bases, it can also interactively access your headquarters mainframe via 3270 inquiry mode for non-XL40 resident files. Put one in Denver, another in Atlanta.

Remote Access
XL Remote On-Line SubSystems (ROLS) consist of remote printer/terminal configurations that access the power and data base of the XL40 interactively over telephone lines. ROLS can also take advantage of the XL40's 3270 mode to access the mainframe data base, greatly enhancing the amount of data available to any one user. Order them for your supply centers and warehouses.

Introducing XL20
And introducing PCC's newest XL family member: XL20, a diskette system for applications requiring local intelligence, data bases, communication and processing power. The XL20 offers your branch offices up to 128K bytes of memory and 4.8 megabytes of diskette storage. And a plus: An optional on-line/off-line feature enables your XL20 terminals to operate interactively with an XL40 and to access the mainframe data base via the XL40 3270 mode whenever necessary.

Designed with compatible hardware architecture and operating systems, XL distributed processing networks install and upgrade simply. And they're supported throughout the United States by more than 400 service professionals in the PCC Service Division.

Call or write today for a detailed brochure on XL Distributed Processing—now appearing on your favorite network.



PCC PERTEC COMPUTER CORPORATION

CMC DIVISION
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Los Angeles, California 90009
(213) 822-9914 TWX (910) 343-6451

CIRCLE 4 ON READER CARD

MAESTRO.™
FOR THE SWEETEST SOUND YOUR PROGRAMMERS HAVE EVER HEARD.

Itel introduces a revolutionary advance in interactive program development. With Maestro,™ the first distributed programming solution.

Combining all the advantages of on-line programming with state-of-the-art distributed processing technology, Itel's Maestro takes program development off-line and puts it where it belongs—in the programming department. So your CPU has more time to concentrate on production. And programmers have more time to concentrate on creative problem solving. Because Maestro handles repetitive, time-consuming programming chores.

Itel's Maestro also provides programmers with advanced techniques, such as permanent audit trails, that are unavailable from existing interactive systems.

Maestro supports software development in all current computer languages and functions independently from your CPU and operating system.

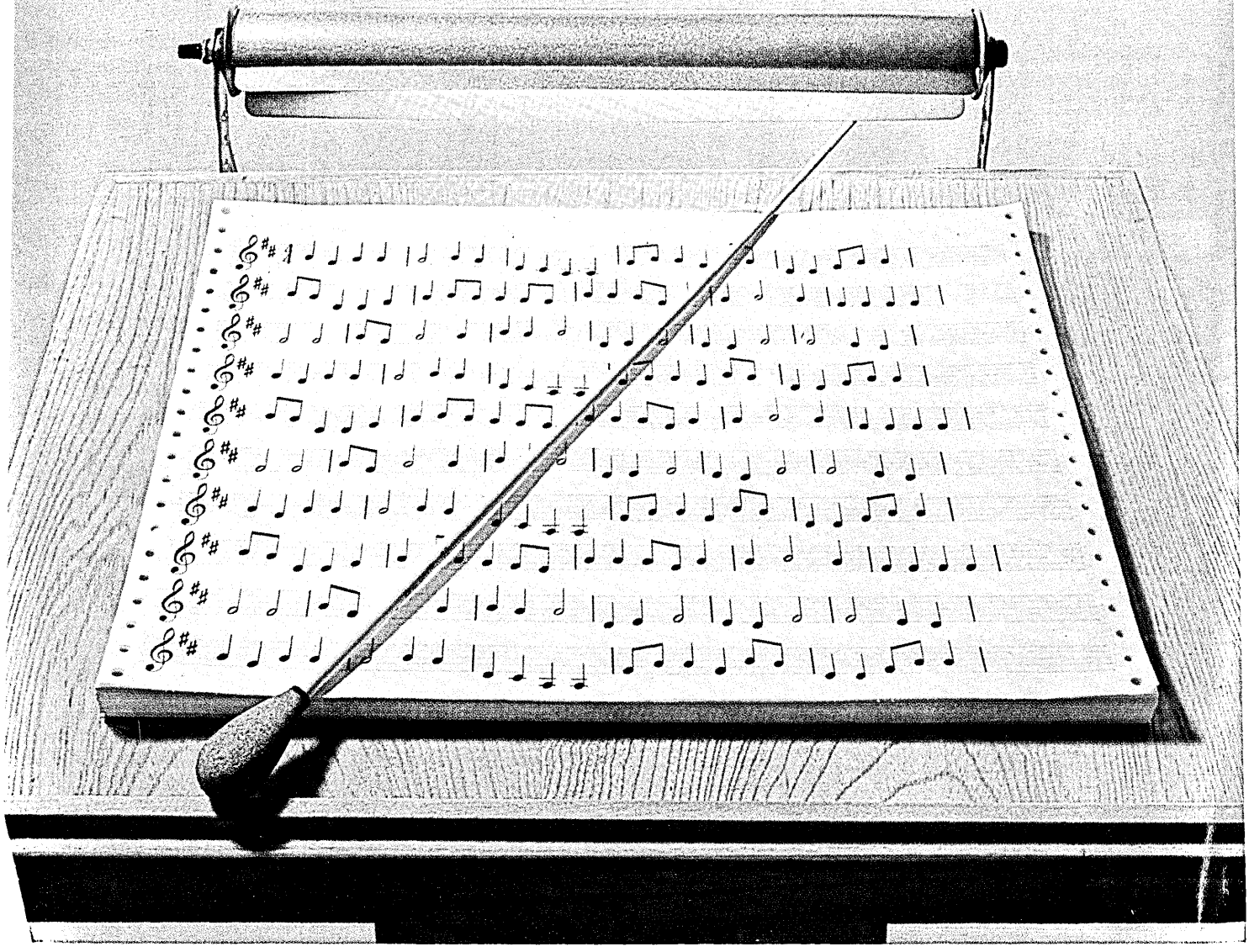
So Maestro delivers the best of both—off-line development and on-line implementation. To save you time and money, with the most advanced solution to program development and maintenance available.

For more information about distributed programming with Maestro, call Itel Corporation, Computer Products Division at 800-227-8425. Within California: (415) 494-3338

ITEL

CIRCLE 49 ON READER CARD

DISTRIBUTED PROGRAMMING FROM ITEL.



DATAMATION 78®

DECEMBER 1978/3.00 U.S.A.
VOLUME 24 NUMBER 13
This issue 147,398 copies

FEATURES

ABOUT THE COVER

Contents of packages are revealed by users in our annual software ratings survey. Design is by our art director; packages: Wrapping by Windsor; photo: © Holly Ahlberg 1978.

Season's greetings to the many people who helped us obtain the materials used in this month's cover photo. A tip of Santa's cap to Andy Swanson, Wendy Reid Crisp, and Stephanie Jones.

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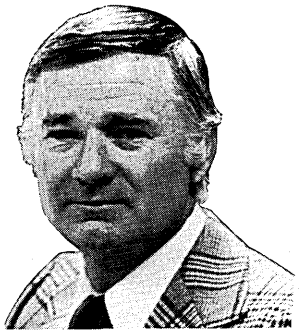

A message from John R. Bennett
President of Applied Data Research
Princeton, New Jersey

"ADR is now into DB/DC"

After a long and careful study, ADR has concluded that the critical future needs of computer users can most effectively be answered by online data base and data communications systems; by systems that are fully compatible under all of IBM's DOS, OS and VS operating systems; and by systems that can be extended to distributive processing and new IBM hardware.

Accordingly, ADR has made the largest single commitment to any product line in our history. We bought the INSYTE DATACOM line of products because it has all of these qualities plus those which we have traditionally offered in our products—productivity benefits, economic leverage, ease of use, efficiency, dependability and broad user applications.

Effective September 29, 1978, all of DATACOM's products, facilities and more than 60 professional staff members became part of ADR.

ADR will develop and enhance this new product line and provide technical support to its customers, just as we have serviced the 5000 customers who have purchased over 9000 of our system software products during the past 15 years.

Sincerely,

John R. Bennett

John R. Bennett, President
Applied Data Research, Inc.

The Products:

DATACOM Data Base Management & Communications Control System (DATACOM DB/DC). For an integrated, efficient balance of these functions.

DATACOM/DB. An efficient user-oriented DBMS which is characterized by full facilities, a fast processing capability and ease of implementation.

DATACOM/DC. A reentrant, multi-tasking, multi-threaded TP monitor that is efficient, flexible, and easy to use.

DATADICTIONARY. A central reference source for controlling and understanding your data base changes and data usage.

DATAQUERY. An English-language query facility for accessing your data base.

DATAREPORTER. A natural-language report writer for generating reports from DATACOM/DB data bases or standard files.

DATAENTRY. An easy, logical and inexpensive first step toward online data entry.

The Characteristics:

Most Comprehensive. DB/DC designed and implemented to work together. Operational on IBM hardware from the 360 to the 303x and under DOS, OS, and VS operating systems.

Most Efficient. Designed for online transactions or queries. Multi-user, reentrant code is useful for random or sequential processing, online or in batch, by programmers and non-programmers.

Easiest to use. Lets programmers think through problems in today's terms. Makes it easy to develop new applications. Responsive to end-user requirements.

Most innovative. Fully usable in tomorrow's technology, DATACOM software uses an inverted-file relational data organization which can be extended to distributed data bases.

Professional Assistance. Support for DATACOM users in designing, developing and implementing systems under DATACOM and in converting existing systems to the DATACOM environment.

APPLIED DATA RESEARCH®
The On-Line Data Base Software Builders™
3707 Rawlins Street, Dallas, Texas 75219
Telephone: 800-527-7572

Send information on:
☐ DATACOM/DB ☐ DATAQUERY
☐ DATACOM/DC ☐ DATAREPORTER
☐ DATADICTIONARY ☐ DATAENTRY

Name/Title
Company
Address
City/State/Zip
Telephone
Computer Configuration

CIRCLE 20 ON READER CARD

Still Getting Calls on MVS Performance Problems?

Now There's Help: We Guarantee Results Within 24 Hours!

Over 100 installations use OMEGAMON (a realtime software display system) to continuously monitor MVS and provide automatic warnings of critical situations. We've helped Systems Programmers diagnose problems 100% faster and improve overall performance dramatically! We've helped Operations personnel prevent IPL's and pinpoint reasons for system degradation!

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices ©1978 by CW Communications/Inc.

Vol. XII, No. 42 October 16, 1978 $1.00 a copy: $25/year

(Advertisement) (Advertisement)

Users Report First Day Experiences

OMEGAMON Producing Dramatic Results

MARINA DEL REY, CA. — "Saved IPL's" — "solved response time slowdown" — "found hardware problems" are a small sample of accounts given by MVS users of OMEGAMON within 24 hours of installation.

OMEGAMON functions on its own requiring little or no training as reported by a site in TORONTO which stated that the day OMEGAMON was put in there wasn't enough time to give the third shift operators any instruction on its use.

Automatic Exception Analysis Saves IPL

In the early hours of the morning the OMEGAMON Exception Analysis started flashing on a CRT set up beside the master console. Using the 'English like" messages the operators were able to save an IPL!

An installation spokesman said "Traditionally, it has been difficult to have operators determine the exact cause of a problem and take steps to correct the situation. With OMEGAMON the operators are automatically warned of an impending difficulty and can usually make the necessary adjustments before any users are impacted."

From the East Coast of the U.S. comes another first day experience this time involving IMS. Within the first 30 minutes after OMEGAMON was installed, IMS response time seriously degraded. A quick look at the OMEGAMON Exception Analysis display showed why. OMEGAMON was warning that the IMS address space was locked out from the control unit assigned to the IMS log tape used for transaction recording to rebuild the data base in case of a catastrophic error. OMEGAMON displayed another job with a tape in a runaway situation on the same control unit which prohibited IMS from accessing the log tape. The user quickly corrected the condition and IMS started running again.

First Display Shows Answer

One of the most impressive displays of fast diagnosis took place at a West Coast manufacturer. Just as OMEGAMON started it flashed warnings of a dropped ready disk drive and noted several jobs that were waiting on it.

A number of installations have reported receiving warning messages on MSS (Mass Storage System) devices that have located hardware problems requiring vendor support.

Another story comes from the Midwest where a user was installing OMEGAMON at a branch location. (Installing OMEGAMON takes only 20 minutes — there are no hooks, no SVC's, or authorized requirements).

Finds CICS Response Problem

The user spokesman said "While reviewing the standard OMEGAMON displays, I spotted what seemed to be a problem with CICS. I called operations but they said everything looked fine — there was no response problem. Egged on by the flashing OMEGAMON display I called a CICS user and asked if there were any problems with CICS response. He said, 'Sure, we were just about to call to ask what was wrong!' I called operations back and told them about the problem. A simple change and response was back to normal."

OMEGAMON is available from Candle Corporation, 4676 Admiralty Way, Suite 401, Marina del Rey, California, 90291, Telephone (213) 821-2902.

Act Now:

We know - that you're short of people
- that you're very busy
- that you have other software tools
- that you may not have money in your budget

That's Why In Order to Produce Immediate Results we specifically engineered OMEGAMON:

- to be installed in 20 minutes without any hooks!
- with an EXCEPTION ANALYSIS that automatically warns of hardware and software problems even if the master console is locked out!

So if you're still having those MVS performance problems call us now and find out about our trial which guarantees results in the first 24 hours!

Converting to MVS?

Call now to find out how to use OMEGAMON for free during your MVS conversion!

Mail to: A-22

CANDLE CORPORATION
4676 Admiralty Way, Suite 401
Marina Del Rey, Calif. 90291

☐ Send me information regarding a trial of OMEGAMON

Name_____

Title_____

Company_____

Address_____

City_____ State_____ Zip_____

Telephone ( ) _____

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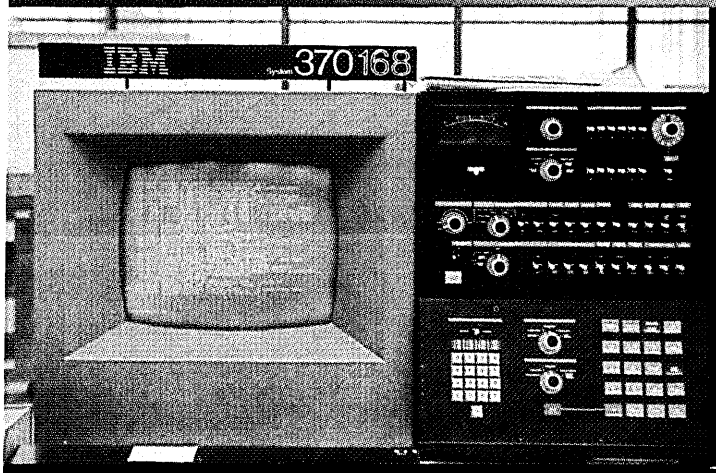
CIRCLE 14 ON READER CARD

NEW!

EPILOG

FINALLY! A *Breakthrough* in answering these crucial questions . . . . . .



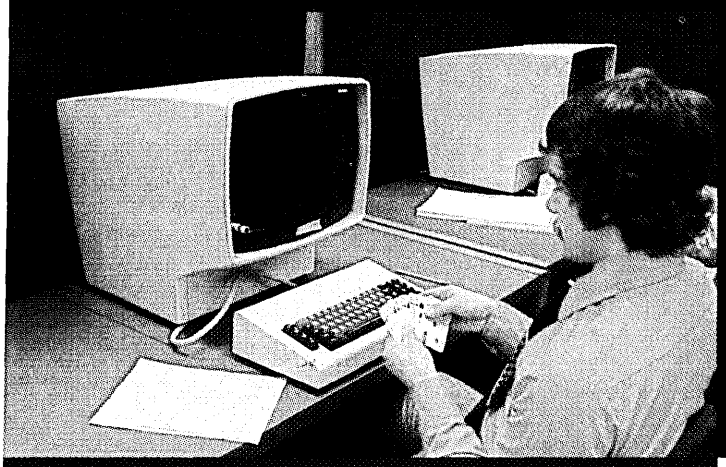
Batch:

Why was throughput terrible yesterday afternoon?

Why did the UPDATE job run so slow last night?

Operations:

How long do jobs wait for tape mounts?



TSO:

Why was response ~~slow~~ lousy between 2:30—3:00?

Why did user TS0013 have poor response time between 11:00 and 12:00?

! Candle Corporation

4676 Admiralty Way, Suite 401
Marina Del Rey, Calif. 90291
213-821-2902

Please send me more information: *A-20*

Name _____

Title _____

Company _____

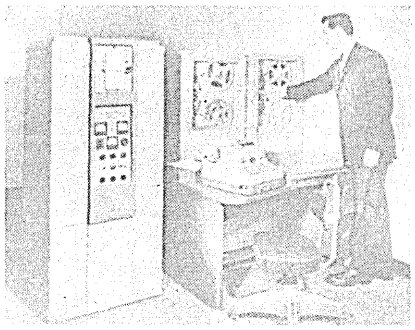
Address _____

City _____ State _____

Zip _____ Telephone ( ) _____

CPU Type _____ Operating system _____

LOOKING BACK



"An important feature of the G-15 is plug-in use of accessory equipment," Bendix proclaimed of its general purpose computer.

November/December 1958

The big event in the dp world in December 1958 was the Eastern Joint Computer Conference which promised "something for everybody interested in the automatic handling of information." Featuring a whopping number of technical sessions—seven, to be exact—the Philadelphia conference included 50 exhibitors displaying their wares on the 18th floor of the stately old Bellevue-Stratford Hotel. (The hotel has since been demolished after gaining notoriety as the scene of the original outbreak of the Legionnaires Disease in July 1976.)

The Bendix Computer Div. of Los Angeles showed up at the EJCC touting its G-15 "medium size" general purpose computer. The biggest system advantage, the company claimed, was its "high speed" photoelectric tape reader which read 5, 6 or 7 channel tape at the breathtaking pace of 400 characters per second.

To add a little variety to the show, Sylvania Electric Products Inc. of New York displayed a cutsey model of its MOBIDIC system which it called "the first all-transistorized mobile digital computer." Designed for military applications, MOBIDIC "will function in extreme climates and under battlefield operating conditions," Sylvania said.

December 1968

By the end of 1968, the 4½-year-old PL/1 programming language seemed to be coming of age. Several articles weighed some of the pros and cons of IBM's "universal" programming language for the 360 line of fighting machines.

Year-end 1968 was also a time for reporting some interesting computer applications. One was in the skies, as NASA used a huge fleet of number-crunchers to track and report on the progress of the Apollo 7 mission. During such space missions, 270K bits of information per second were captured at worldwide tracking stations. Relaying this vital data on to the Houston Manned Spacecraft Center was NASA's communications network, which turned out to be a showcase for Univac processing power. The NASCOM setup included 6 Univac 494 communications processors and 48 Univac 1230 and 33 Univac 1218 computers.

In a more down-to-earth application, computers faultlessly churned out voting results from the November Presidential election. While the official computerized tabulation and vote reporting went off without a hitch, it was in the unofficial tally of the National Election Service that things went haywire. Set up by the tv networks and wire services, the computerized NES operation was plagued with some bizarre mishaps. One such memorable mishap occurred when NES' 360/40s "began to issue some strange and surprising news...that comedian Dick Gregory had piled up 9 million votes in Pennsylvania." ✲

With SYSTEM 2000,® you get more than just a DBMS.

You also get

- Multiple DB/DC languages with integrated data dictionary
- Greater productivity in applications development
- Lower software maintenance costs
- Proven reliability & availability for complex applications
- Greatly improved use of your data resources
- A solid foundation for future systems

These are just a few of the special benefits of SYSTEM 2000—the most advanced data base management system on the market.

mri
SYSTEMS CORPORATION

SYSTEM 2000 offers something else really unique—MRI Systems Corporation. A company which has been developing data base management systems for almost ten years. A company staffed with 200 highly skilled people. A company which believes in customer services, and stands behind its products.

Visit MRI in Austin, Texas. You'll see that with SYSTEM 2000, you get more than just a great DBMS— *you get an entire company.*

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Dracula

Does something keep nibbling away at your DOS resources?

(Maybe it's one of those dread Transylvanian sort programs!)

Call (201) 568-9700.

Don't become a Child of the Night.

As part of our new series of non-commercial, public-service messages, we bring you the following:

TRAVELERS' ADVISORY

DOS/VS users planning extended journeys through uncharted sorting territories are advised to exercise *extreme caution.* Vampire sort programs have been reported preying on unsuspecting programmers and managers.

While these Vampires may at first appear hospitable, once the main gate has clanged shut behind the hapless traveler, a transformation soon takes place in the host.

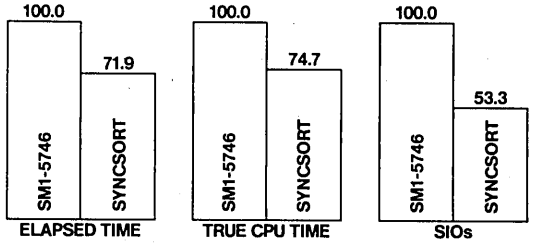
Victims report that they have been attacked, almost immediately, in their computer resources. A sharp stinging sensation in the neck is followed by weakness... loss of desire... and, ultimately, by an inability to perform even the simplest data-processing function.

Only one effective safeguard exists. Sorters are urged to carry a copy of SyncSort DOS with them *at all times.* If attacked, thrust SyncSort as close to the Vampire's face as possible and repeat loudly: "I challenge you to a benchmark!"

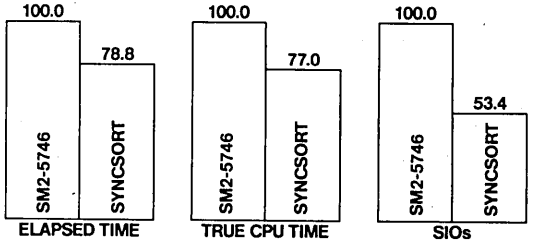
At this the Vampire can be expected to fall back in consternation, shielding his eyes from the light. Moments later he will flee screaming into the night.

The reason for this bizarre behavior, Vampirologists explain, is that no Vampire sort program can endure the thought of being in the same castle with benchmark results that look like this:

SyncSort DOS vs. IBM's SM1-5746.



SyncSort DOS vs. IBM's SM2-5746.



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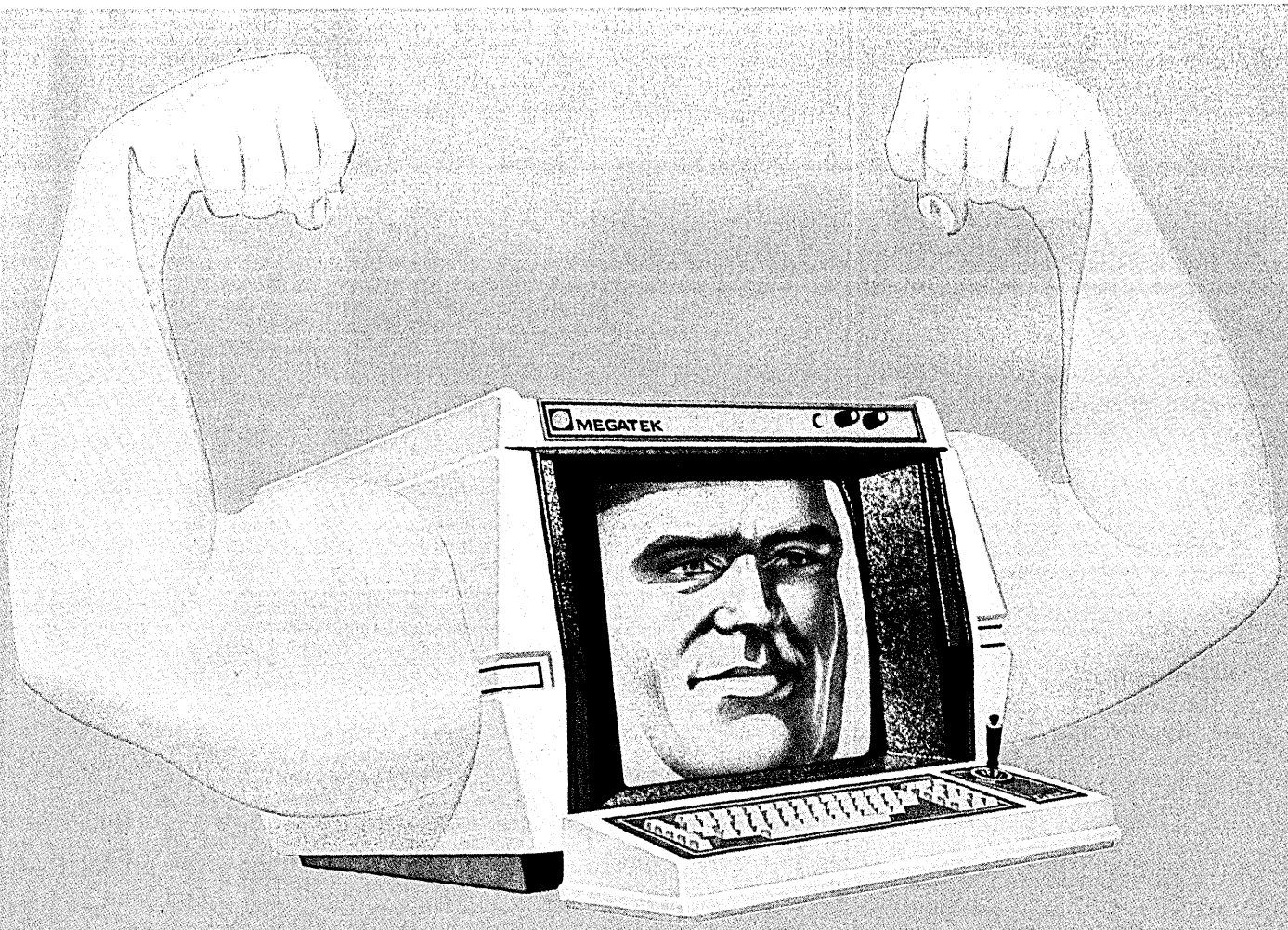


All muscle and no fat.

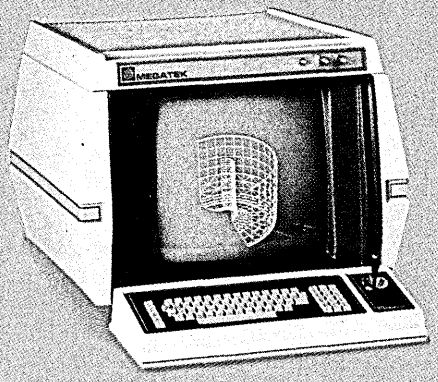
Most refresh graphic systems are flabby. With lots of features you don't need. Without a few you do.

The MEGATEK 7000 is built lean. You get fast graphics throughput. A high resolution, real-time, interactive display. Complete system modularity. An unmatched refresh graphics system. At a price that makes sense.

A built-in 32-bit microcomputer with a 64K byte, 32-bit wide refresh memory, expandable to 128K. Lets you process graphics data fast. And, saves you host computer time. Add MEGATEK's advanced vector generator and you get unbeatable graphics throughput.

Vectors and characters are displayed instantly. With precision end point matching. And constant intensity. 12-bit resolution is standard. Vector quality that outclasses every other refresh system.

Easy-to-use real-time interactive graphics. Outstanding display



dynamics. Hardware translation, blink, dashed lines. Absolute and relative jump. All standard. And, hardware clip, rotate, scale, and zoom are available as well.

Plus, the MEGATEK 7000 is easy to look at. 16 levels of image intensity. 8 programmable character sizes. The screen is clear and readable, even in a brightly lit room. And, with selective erase, you don't have to blank the screen to change a vector or symbol.

Add a universal computer interface that connects to any host computer. Field-proven software that cuts system development cost. A full line of peripherals and accessories. Even color, if you need it. And, you have the most powerful refresh graphics terminal for your dollar on the market today.

But, don't take our word. Prove it to yourself. Call or write for a demonstration. And remember, the MEGATEK 7000 is backed by a national service network with fast, hot-line access.

For full details, write or call Peter J. Shaw, MEGATEK, 3931 Sorrento Valley Blvd., San Diego, CA 92121. (714) 455-5590. TWX: 910-337-1270. (European office: 14, rue de l'Ancien Port. 1201 Geneva, Switzerland. Phone: (022) 32.97.20 Telex: 23343.)

The Visible Difference

MEGATEK CORPORATION

CIRCLE 50 ON READER CARD

Sperry Univac minis are doing

In Portland, Oregon, Sperry Univac minis help the Police Bureau come to the rescue hundreds of times a day.

Because Boeing Computer Services has computerized all of Portland's emergency services with Sperry Univac Series 77 minis.

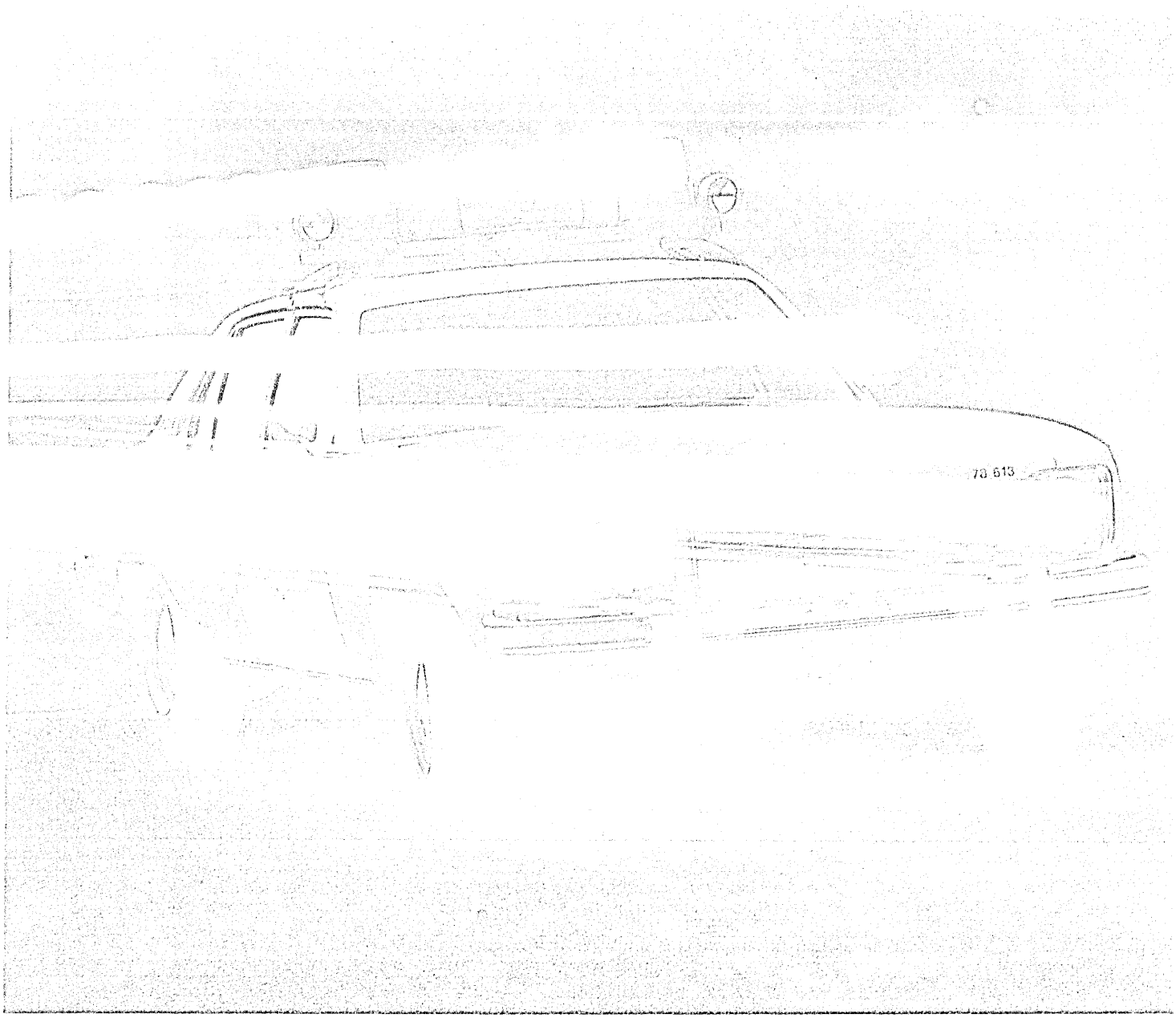
Now when a citizen reports a crime, our minis verify the address. Examine the surrounding area for similar calls, hazards, and temporary situations (such as streets under repair). And suggest which units should respond to the call.

This futuristic system coordinates dispatchers and officers and keeps them constantly updated. Much of the paperwork required of field officers is eliminated. And the data base it generates is used for uniform crime reporting and resource allocation.

Boeing Computer Services has found that our minis are cost effective and can handle the job efficiently and with real time speed.

The Sperry Univac minis used in Portland are just part of our complete family of minis. One and all of them are supported by our powerful software.

If you have a system application, we undoubtedly have a mini that's just right for it. Whether it be business data process-



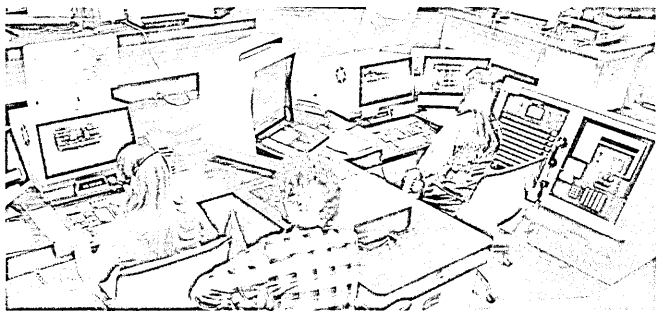
alarming things in Portland.

ing, scientific, instrument control, or data communications.

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

In Europe, write Headquarters, Mini-Computer Operations, London NW10 8LS, England.

We'd like to hear from you. Even if your system application isn't as arresting as the one in Portland.



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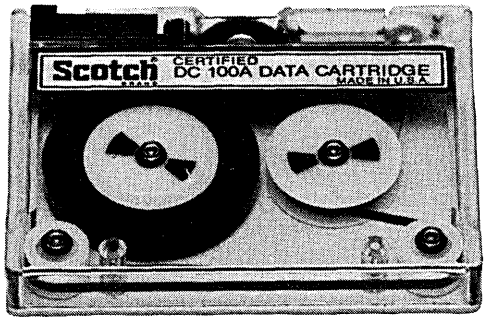
SPERRY UNIVAC IS A DIVISION OF SPERRY RAND CORPORATION

IT'S A GOOD CARTRIDGE WHEN YOU SEE OUR NAME ON IT.



AND EVEN WHEN YOU DON'T.

Chances are, the data cartridge in your system is ours. Even though it may not say so. That's because most of the world's top manufacturers of systems like yours specify our 3M Data Cartridges.

Why? Because we build more quality performance features into our cartridges than anyone else. Features that computer builders know will bring out the best in their equipment. Like a metal base plate that helps maintain constant tape speed and tension because it's unaffected by changing environmental conditions.

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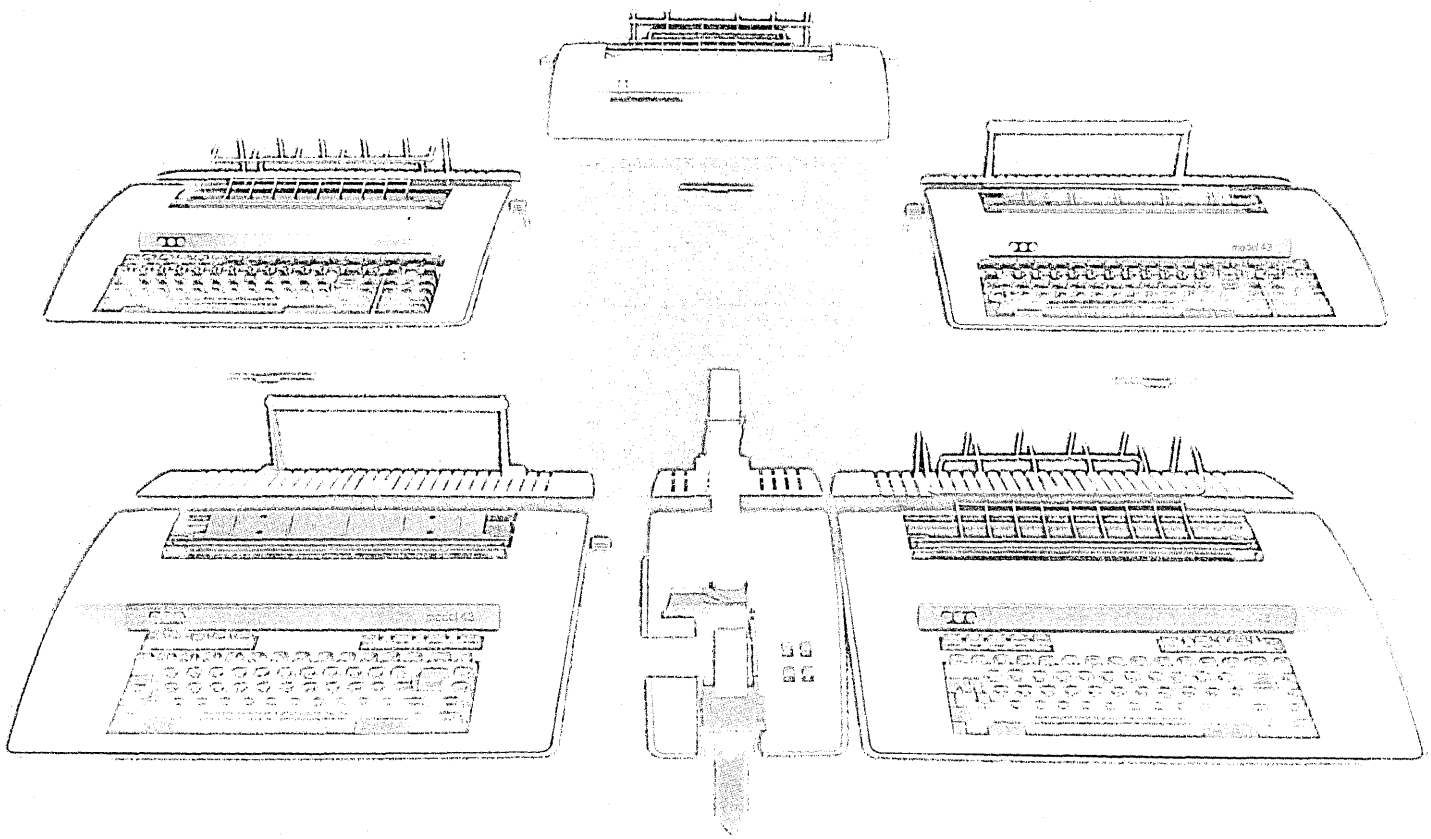
You see, systems manufacturers know a good cartridge when they see it. And we think you will too. Even if our name's not on it.

Check with your systems manufacturer when you need additional supplies. Or simply call 800-328-1300 for more information. (In Minnesota, call collect: 612-736-9625.) Or write: Data Products, 223-5E, 3M Company, St. Paul, MN 55101.

3M

CIRCLE 65 ON READER CARD



OUR MODEL 43 TELEPRINTER FAMILY IS THE BEGINNING OF A NEW LEGEND.

When we introduced it just a year ago, the basic idea behind the Teletype® model 43 proved so sound and flexible that today it's grown into a comprehensive terminal family with extensive capabilities for message communications.

Model 43's come in a variety of configurations with either 80 column inkjet-printed or 132 column pin-feed printers. Some units are designed for use on the switched network, others for point-to-point private-line systems. (There's also a new generation of 5-level buffered teleprinters for Telex applications.)

The basic model 43 series operates on-line at 10 or 30 cps in either the half- or full-duplex mode and prints multiple copies using the 96 character ASCII code set. A wide choice of interfaces, including EIA RS232C and DC 20-60ma, are available for easy system integration.

With the automatic send-receive configuration, messages can be prepared off-line via the paper tape punch, edited, combined with a master tape, then sent at maximum terminal speed—automatically and unattended—when line rates are lowest.

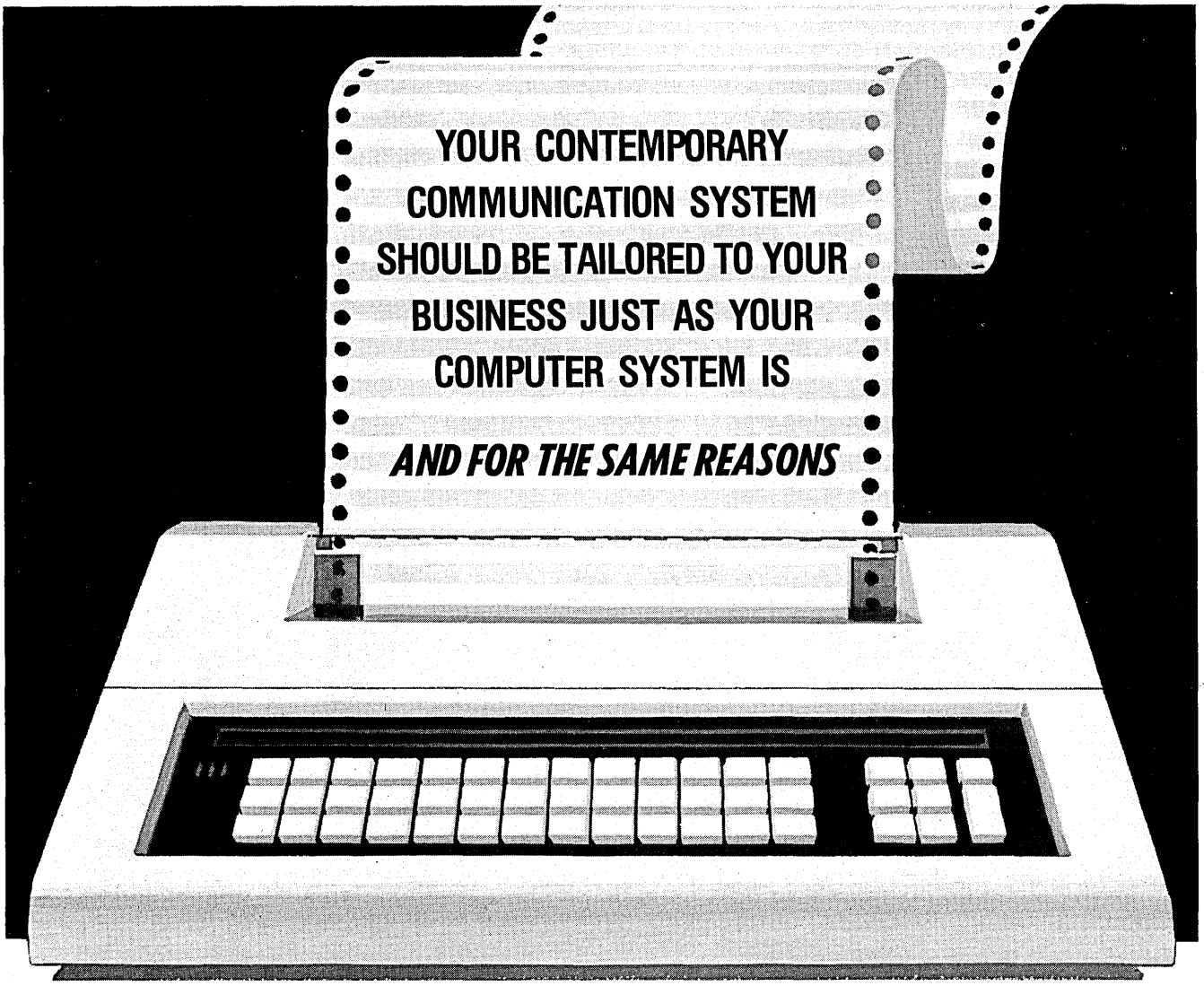
Buffered 43's operate on-line at speeds ranging from 10 to 1800 cps and provide up to 20,000 characters of storage for sending, receiving and editing. These terminals send and receive automatically via the buffer while messages are simultaneously being prepared for future transmission. They also include full forms control, the automatic answer capability and answer back.

Just like its predecessor, the legendary model 33, our model 43 family is designed for extreme reliability. The reason is simple: simplicity. Our model 43's use only five major pluggable components (six, counting the paper tape module on the ASR), along with extensive use of LSI circuitry.

So when you think of our model 43 family, think of it as the beginning of a new legend.

THE TELETYPE® MODEL 43 FAMILY.

Teletype Corporation, 5555 Touhy Avenue, Dept. 3K85, Skokie, IL 60076. Tel. (312) 982-2000.



Your company's computer systems undoubtedly were professionally designed to meet your specific needs and to accommodate the operational factors that make your organization unlike any other company. Accordingly, those computer systems focus sharply on your individual company characteristics and objectives.

For exactly the same reason, the most productive and successful micropublishing systems are those designed by experienced professional and knowledgeable micropublishing consultants together with company management teams. The do-it-yourself micropublishing approach on the other hand can cost a fortune — and still be a failure! We've seen it happen many times.

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The details of micropublishing are outlined in "Communicate by Microfiche", a brochure we'll be glad to send you, particularly if your sales, service or dealer organization consists of 300 or more outlets. If your operation is smaller we would be wasting your time, and that's exactly what our systems are designed not to do.

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LOOK AHEAD

NEW LIFE FOR THE SERIES/1?

IBM's General Systems Div. is preparing to offer the company's popular 370 mainframe operating system, DOS/VS, on its somewhat ill-fated Series/1 minicomputer. The company, which of course won't comment, is believed to have subcontracted applications software development to European companies to produce a microcode-enhanced extended version of DOS/VS. The result: a system with the power of a 370/148 at a minicomputer price. Or, for users who already own a Series/1, it means a 148 upgrade for next to nothing.

Another implication, as the Atlanta Tigers at GSD face off against the white shirts at Data Processing Div., is that the eagerly awaited E Series was designed to soak up the DOS/VS community and carry users up range, eventually to MVS. Now users don't have to, because DOS/VS is considered viable for at least another five years. It'll also help to sell Series/1 minis. An observer who calls the Series/1 a "market disaster," says that up to 30% of IBM's initial flood of orders have been lost because users don't know what to do with them.

EXXON AS A COMMON CARRIER?

A knowledgeable Washington source asserts that Exxon Information Systems, the oil giant's consortium of computer-related companies, is moving increasingly into the common carrier electronic message service. Exxon, which the source claims plans to lease a "staggering number" of AT&T circuits this month will serve initially as a private line facilities broker targeting on medium size companies. The Exxon subsidiary that will operate the new service is to be called Exxon Telecommunications, the Washington source maintains.

WHAT'S IN A RACQUET?

If Addressograph-Multigraph goes through with a proposed acquisition of Microdata (p. 77), it may have to deal with Richard Pick. Pick, architect of Microdata's Reality small business system and a one-time consultant to Microdata, is the object of two Microdata lawsuits and now has countersued on his own behalf charging Microdata with, among other things, antitrust violations, malicious prosecution, interference with economic advantage and theft of trade secrets. Pick's 77 page countercomplaint even accuses Microdata president Donald Fuller with brandishing a tennis racquet. "In or about April of 1976," states the complaint, "... a Microdata dealer requested permission from Microdata to have Pick manufacture for the dealer a disk interface. Microdata vehemently denied permission. In fact, cross-defendant Fuller became so incensed about the proposal that he raised his tennis racquet as if to strike the dealer and verbally abused the dealer for making the proposal."

RIFKIN'S "PLACE IN HISTORY"

Many who knew Stanley Mark Rifkin were neither surprised nor shocked when they learned of the 32-year-old Sepulveda, Calif. computer consultant's arrest Nov. 6 on charges he stole $10.2 million from Security Pacific National Bank by

LOOK AHEAD

using three key codes and the Fed Wire to transfer bank money to an account of his own. Rifkin had been a computer sciences student and a member of the faculty at California State University at Northridge near Los Angeles and worked for Planning Research Corp.'s International Reservations, Payment Systems Inc., and Infotech, a Pasadena-based data processing training firm. Former associates feel, if he did it, it was "to show off...to gain a place in history...to show it could be done." Some even feel getting caught was part of the scheme and that Rifkin somehow will come out ahead. But one former associate recalls he "would get going on a project, amass information, then not be able to meet the deadline. He couldn't finish the job." He sees this as analogous to the bank situation. Rifkin learned about wires and wire funds transfers at PSI. While there, he gave lectures on computer security. His role at Security, which gained him access to the key codes, was as a security consultant.

At writing, Rifkin was in Los Angeles County jail under $200,000 bond. Said one former associate, "the only time Stan will serve is what he's serving now."

Rifkin is alleged to have used a portion of the stolen money to purchase $8.1 million in Soviet diamonds in Switzerland. The diamonds have a retail value of $13 million. He was no stranger to Switzerland having spent time there as a performance measurement consultant to CERN (Committee on Energy Research, Nuclear). One associate said he continued to maintain a Swiss bank account when this assignment was completed. Some feel he hoped to clear $3 million, the difference between the wholesale and retail value of the diamonds.

GAO'S DP DILEMMA

People in glass houses shouldn't throw stones. That's what everybody in Washington is saying these days about the Feds' watchdog agency, the General Accounting Office, that's having more than its share of adp woes. The GAO's internal dp support systems, reports one agency insider, "are an utter mess," with files spread "all over Washington." The GAO has a payroll operation running at the Justice Dept. GAO in an effort to straighten out this dp dilemma is expected to centralize some of these computer chores and pay more attention to federal dp standards which it's shunned in the past.

RUMORS AND RAW RANDOM DATA

Holders of United California Bank credit cards had their credit limits substantially increased in September, or so they thought based on that month's statements. But the bank soon corrected these impressions, blaming it all on its computer. "Our computer did it again folks," said a follow up notice, "fouled up"...Despite Honeywell's legal threats and pleadings, it looks as if the proposed federal I/O channel interface standard will be okayed by the National Bureau of Standards. Commerce Secretary Juanita Kreps, who is rumored to be in favor of the standard, is expected to get the NBS go ahead recommendation by the middle of this month.

"Thanks to MARK IV,® our users have beaten the computer room waiting line!"

Jennifer Thompson, Senior Computer Systems Analyst
Great-West Life Assurance Co., Winnipeg, Manitoba, Canada

Founded in 1892, Great-West employs 4,000 people, carries $43 billion in insurance annuities and has $3.3 billion in assets. It is Canada's largest life insurance company in terms of insurance income and the 14th largest life insurance company in North America in terms of total insurance in force.

"As the methods of storing and manipulating data become more varied and complex, the need for easy user access to this data has increased. Even though our 370/168 attached processor with MVS operating system gives us substantial computing power, and we have over 100 programmers and analysts, the company's demands on these resources are tremendous. User requests create an ever-extending queue because we simply could never do all they wanted us to do.

"With MARK IV, our users can get the information themselves, often in quite sophisticated ways. Thanks to MARK IV, they've learned how to avoid the programming waiting line. And from the feedback I'm getting, they're very pleased with this new environment!

"MARK IV has also had an impact in our Computer Systems area. We have developed some complete systems, using the many powerful capabilities of the language, such as transaction processing and file coordination. Even though the programmers were relatively inexperienced with MARK IV, they indicated the development times were considerably shorter with MARK IV than with PL/1.

"Most programmers show resistance to a new tool like MARK IV, but once they have used it, they come back to tell me how much they like it. It's the thrill of getting results!"

GET THE FACTS ON MARK IV. MARK IV is the most versatile and widely used software product in the world for application implementation, data management and information processing. Six powerful models (prices start at $12,000) are in daily use on IBM 360/370, Univac 70/90, Siemens 4004, Amdahl 470, and Itel Advanced System computers at over 1,300 installations in 44 countries. Programs in MARK IV require only about one-tenth the statement of Cobol, and users report 60 to 90% cost and time reductions on most MARK IV applications.

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The Bantam. The cocky new $599* CRT that just changed the pecking order.

User Need	Feature	P-E BANTAM	LSI ADM-3A	Hazel-tine 1400	Hazel-tine 1500	Adds Regent 100
Easy to read display	7 x 10 matrix for highly legible characters	Yes	No	No	Yes	No
	Black on white or white on black display	Yes	No	No	Yes	Yes
	Display set deep in hood to reduce glare	Yes	No	No	No	No
	Full 24 x 80 display	Yes	Yes	Yes	Yes	Yes
	Full upper and lower case	Yes	Option	No	Yes	Yes
	Non-glare screen	Option	Yes	No	Yes	Yes
High operator throughput, low operator fatigue	Tab stops/tab key	Yes	No	No	Yes	Yes
	Backspace key	Yes	No	No	Yes	Yes
	Repeat key	Yes	Yes	No	No	Yes
	Shiftlock key	Yes	No	No	No	No
	Separate print key	Yes	No	No	No	Yes
Convenient switching Local/on-line	Local—remote key	Yes	No	Option	Option	Yes
International Character sets	French/German/ Swedish/Danish/ British/Spanish	Option	Option	No	Option	Option
High speed numeric	Integrated numeric pad	Yes	Option	No	Yes	Yes
Convenient system interfacing	RS-232/CCITT-V24	Yes	Yes	Yes	Yes	Yes
	Current loop	Option	Yes	No	Yes	Yes
Simplified program debugging	Transparent mode and displayable control characters	Yes	No	No	No	No
Faster maintenance	Self-test	Yes	No	Yes	No	Yes
Minimum desk space	Small size	15Wx 19Dx 14H	15.5Wx 20.2Dx 13.5H	15.5Wx 20.5Dx 13.5H	15.5Wx 20.5Dx 13.5H	21Wx 23Dx 14.5H
Printer port	Printer port	Option	Yes	No	Yes	Option
Cost effectiveness	Qty. 100 OEM price	$599†	$740	Less than $550 in quantity 1000	$860	$895

*In quantities of 100.
†Qty. 1, End User Price $966.

Nobody ever offered you a tough, high quality, compact CRT like the BANTAM before. At $599 or any price. Designed for hectic office environments. And, human engineered to make an operator's life easier.

You get everything you need for cleaner input and faster throughput. An upper and lower case character set displayed on a sharp 7 x 10 dot matrix. A full 24-line by 80-character screen. A complete, sure-touch keyboard with shadow numeric pad.

You get complete tabbing. Full cursor addressing. Repeat, backspace and shiftlock keys. A transparent mode with displayable control characters to simplify host program debugging. And, a self-test mode for easy maintainability.

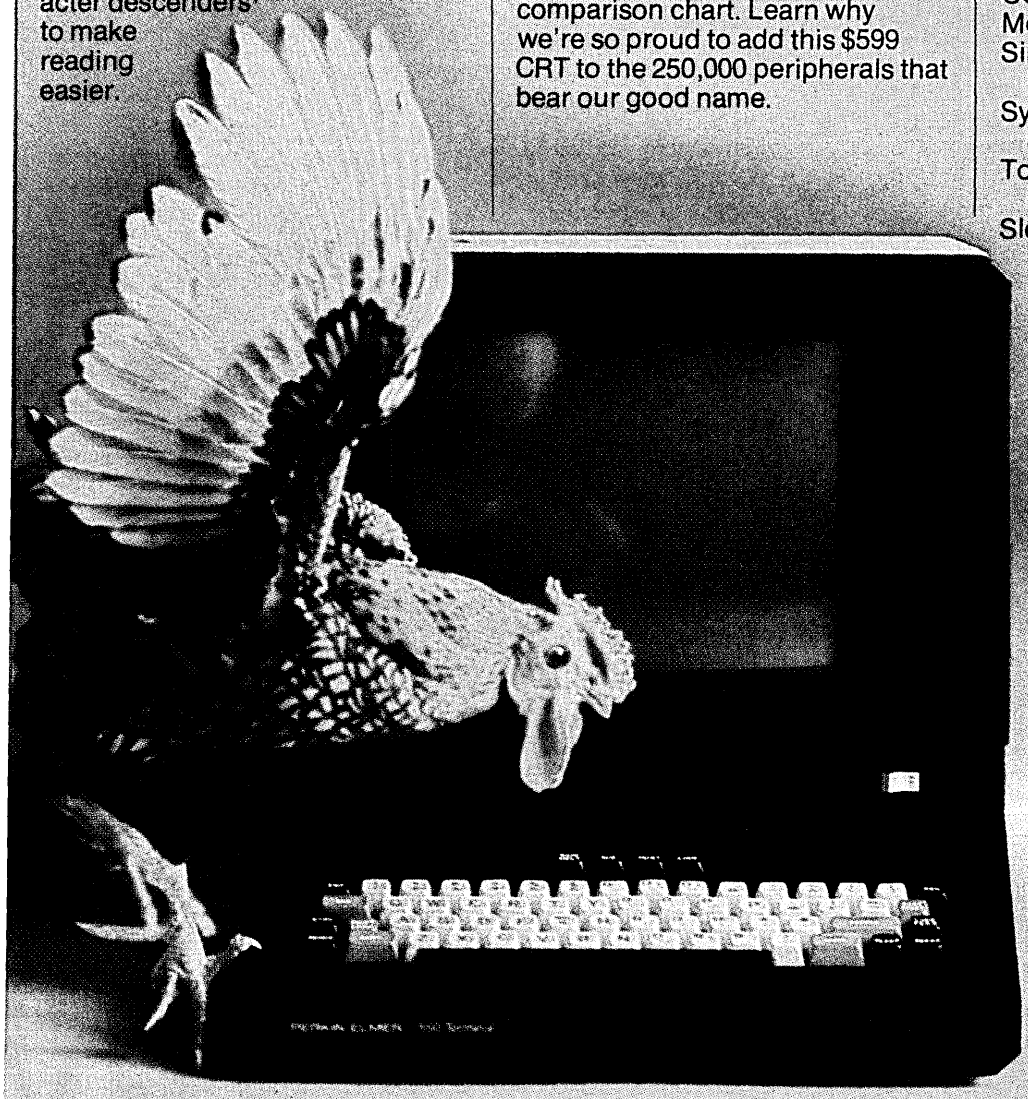
And, you get everything your operators need to make their jobs a joy. A hooded display that cuts glare. A wide bandwidth monitor for sharp images everywhere on the screen. Below-the-line character descenders to make reading easier. A switchable white-on-black or black-on-white display, whichever your operator prefers. An easy-to-find cursor that frames the entire character position in a transparent, inverted video block.

Plus plenty of options you can't get with CRTs costing much more. Like our low-cost Pussycat page printer. A full range of foreign language character sets. We even have a model you can switch from ASCII to full overstrike APL.

But that's not all. The BANTAM's compact good looks fit any decor. It's handsome enough for executive row and rugged enough for the stockroom. Silent? The BANTAM's fan-free design makes it quieter than an electric typewriter. And, the BANTAM only weighs 28 pounds.

Only an industry leader like Perkin-Elmer could do it. We designed a powerful, custom LSI controller chip that makes the BANTAM the one and only high quality CRT in its class.

But see for yourself. Use the comparison chart. Learn why we're so proud to add this $599 CRT to the 250,000 peripherals that bear our good name.



And, remember our terminals come equipped with a No Hassle, 800 toll-free service phone number.

One call does it all. We give you service *where* you need it, when you need it. We're there. Not just "worldwide," but wherever you are.

For more information call or write Perkin-Elmer Terminals Division, Randolph Park West, Route 10 & Emery Avenue, Randolph, N.J. 07801 (201) 366-5550. Or contact any of our sales offices. Then watch the feathers fly.

The Bantam's available at all these places

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...from every point of view.

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"Simplicity of design makes it ***Just Right!*** for highly-automated assembly and test . . .

Just Right! for high-volume production to meet customer demands!"

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"100% performance test of every IC . . . 7-day burn-in of every sealed, assembled unit! ***Just Right!***"

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"Advanced microprocessor technology increases reliability, reduces component count, lowers operating temperature. . .improves MTBF! ***Just Right!***"

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"Looks twice its price! Its clear, crisp display is ***Just Right!*** for all applications.

What's more, Hazeltine's worldwide distributor network is ***Just Right!*** for instant availability!"

Hazeltine

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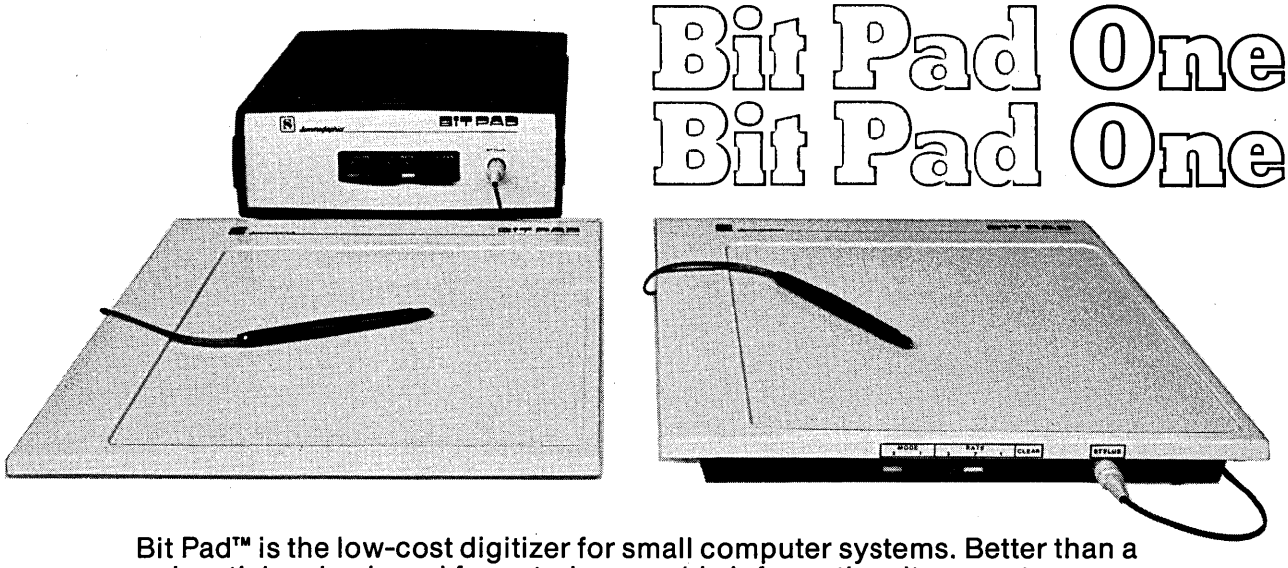

Bit Pad™ is the low-cost digitizer for small computer systems. Better than a joystick or keyboard for entering graphic information, it converts any point on a page, any distance into its digital equivalents. It's also a menu for data entry. You assign a value or an instruction to any location on the pad. At the touch of a stylus, it's entered into your system.

Who can use it? Anyone from the educator and the engineer to the hobbyist and the computer games enthusiast. The data structure is byte oriented for easy compatibility with small computers, so you can add a power supply, stand alone display, cross-hair cursor and many other options.

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CIRCLE 63 ON READER CARD

CALENDAR

JANUARY

MIMI 79, Jan. 16-18, Anaheim, Calif.
The seventh international symposium for mini and microcomputers aims to cover "all aspects" including technology, hardware, software, architecture, design procedures, systems, modular computers, distributed processing, peripherals, education, marketing, and applications. Contact: MIMI 79 Secretary, P.O. Box 2481, Anaheim, CA 92804 (714)774-6144.

OCR Users Association Meeting, Jan. 21-24, Denver.
For information about the winter conference of the optical character recognition users association, contact the OCR Users Assn., 10 Banta Place, Hackensack, NJ 07601 (201)343-4935.

Communications Networks Conference & Exposition, Jan. 30-Feb. 1, Washington, D.C.
Debate among users, key government policymakers, consultants, and equipment and carrier vendors is planned for the conference. User-based experience is promised for the application sessions, which are to cover network planning and operation, electronic message systems, and the office of the future. Panel discussions are planned on issues to do with revision plans for the Communications Act of 1934, on tariffing of new services, and on problems associated with specialized carriers. Speakers will include Richard E. Wiley (former chairman of the FCC); Professor Anthony Oettinger of Harvard Univ.; Dr. Carl Hammer, senior scientist at Univac, and Charles Lecht, president of Advanced Computer Techniques. Contact: Lee Mulder, The Conference Company, 60 Austin St., Newton, MA 02160 (617)964-4550.

FEBRUARY

IWP Spring Symposium, Feb. 13-15, Los Angeles.
The annual spring meeting of the International Word Processing Assn. will include panels, sessions, and workshops on subjects such as administrative support, photocomposition, word processing management, electronic mail, word processing education, work measurement/chargeback systems, dp/wp integration, micrographics, equipment trends, and "How to Communicate with Your Personnel Department." An exhibit of word processing and peripheral equipment is also to be featured. Fee: $150 ($125 for IWP members). Contact: IWP Conference Services, 2360 Maryland Rd., Willow Grove, PA 19090 (215)657-3220 or 657-4141.

Midwest Digital Equipment Exhibit & Seminar, Feb. 20-21, Minneapolis.
Over 1,300 users and manufacturers are expected to attend. There is no charge for either the exhibits or seminars. Contact: Clarence K. Peterson, sales manager, Deerland Distributors, Inc., Hennepin Square Bldg., Minneapolis, MN 55413 (612)331-6433.

Intelcom 79, Feb. 26-March 2, Dallas.
The annual international telecommunications exposition is to bring together manufacturers, users, educators, consultants, and governmental officials from "every continent." Among the speakers will be Dr. Mahmoud Riad, secretary general, Arab Telecommunications Union; John A. Johnson, chairman and chief executive officer of COMSAT General Corp; and Dr. Koji Kobayashi, chairman of the board and chief executive officer of Nippon Electric Co. Papers to be presented will cover data communications, fiber optics, the needs of developing nations, satellite communications, and telephone networks, among other topics. Contact: INTELCOM 79, Registrar, Horizon House International, 610 Washington St., Dedham, MA 02026 (800)225-9977 (in Mass. call 326-8220). In Europe contact Gail Deegan, Horizon House/Microsol, London 01-222-0466.

International Computer Expo, Feb. 28-March 2, Tokyo.
There will be no charge for exhibition attendance. The seminar program will include discussion of voice recognition systems; use of computer techniques in the management of large, complex projects; digital data communication; and peripheral devices for low cost computing systems. Contact Golden Gate Enterprises, Inc., 1307 S. Mary Ave., Suite 210, Sunnyvale, CA 94087 (408) 737-1100.

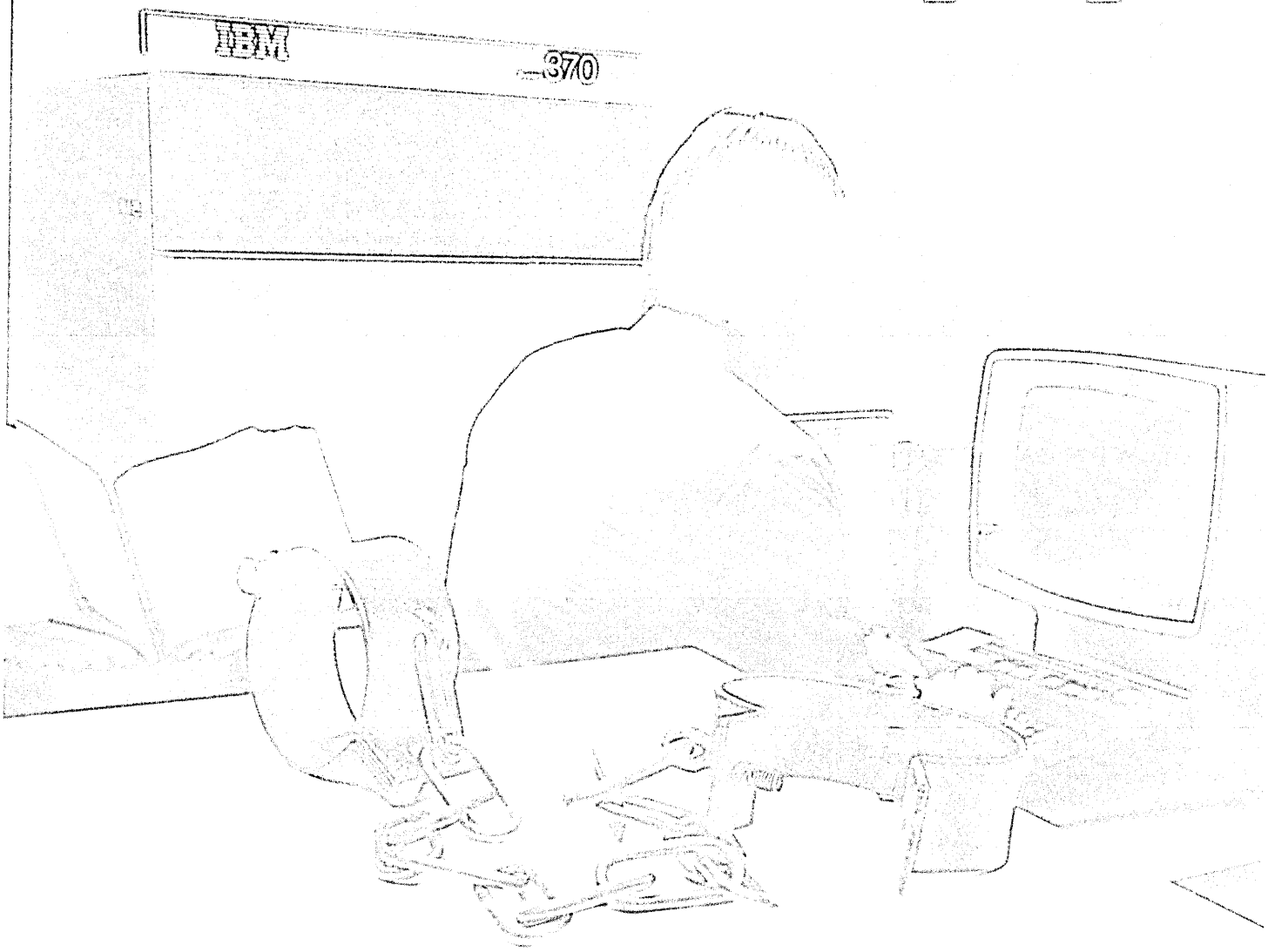
ADCIS Winter Meeting, Feb. 26-March 2, San Diego.
The acronym ADCIS translates into the Association for the Development of Computer-based Instructional Systems. Contact George Lahey, Navy Personnel Research and Development Center, San Diego, CA 95152.

MARCH

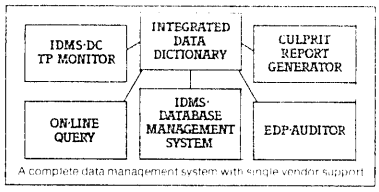
GAUGE Spring Meeting, March 13-16, Las Vegas.
The theme of the General Automation User's Group Exchange is to be "Management—Security, Communications, and Software Taxation." Contact Martha Gibbs, GAUGE Administrator, Box 8130, Anaheim, CA 92802.

ICES Users Group Conference, March 20-23, Dallas.
ICES stands for Integrated Civil Engineering Systems, subsets of which are STRUDL, COGO, ROADS, and PROJECT. This will be the

IDMS frees your most valuable resource...people.



A few years ago, your people were delighted to learn the seemingly endless complexities of your early-model DBMS. After all, it was the leading edge of yesterday's technology.



But today who wants to play nursemaid to an inefficient DBMS that eats up machine time as well as staff time?

Not your best people, that's certain. They want to move on to IDMS, the DBMS that gives them results quickly, easily, and with extreme flexibility.

Better yet, they are already looking beyond the DBMS...toward a completely integrated data management system fully supported by one vendor and kept up to date by the most advanced R&D staff in the business. Which is what we offer.

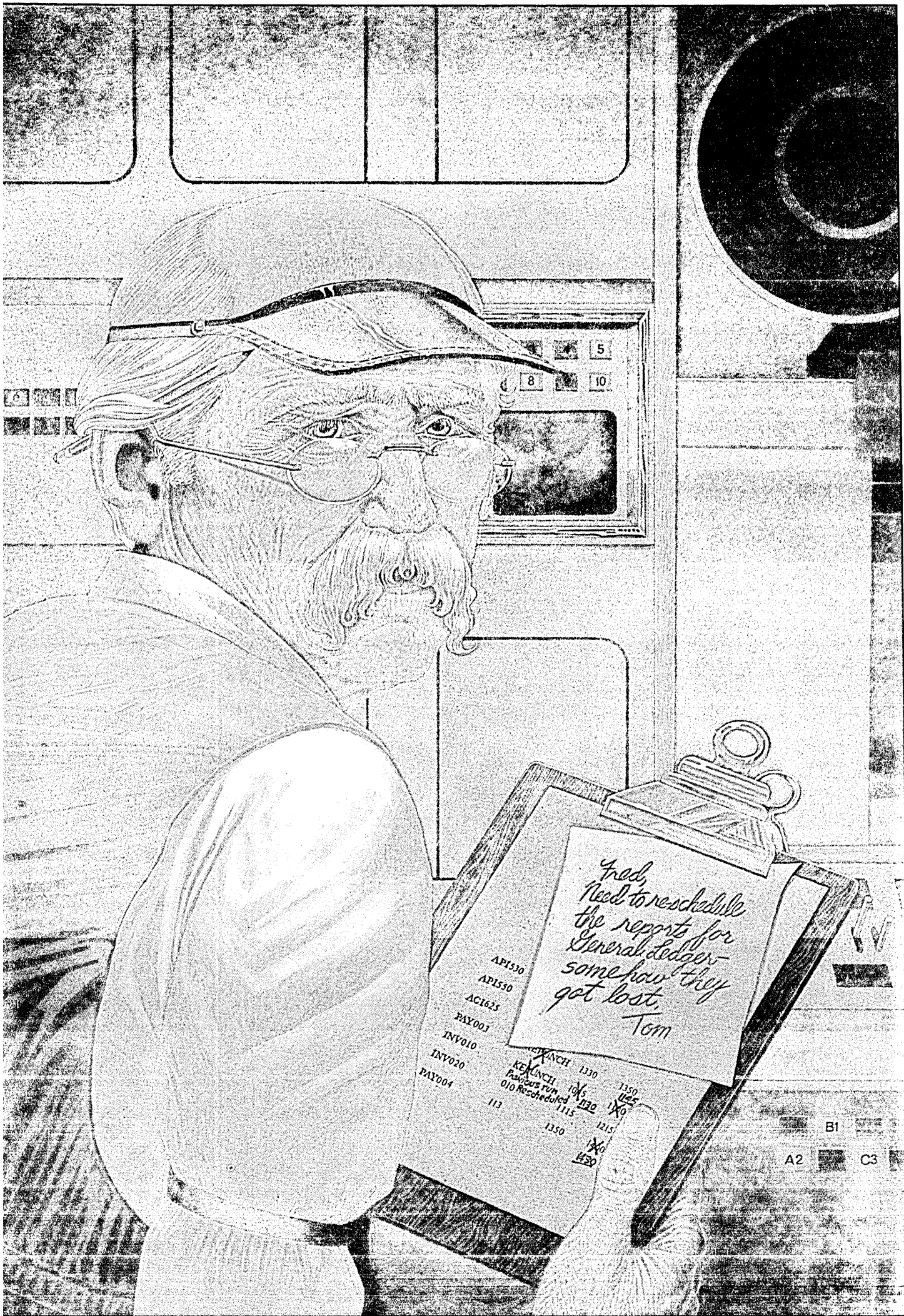
The trend is growing. Users are discarding their older DBMS in favor of IDMS. And they're getting efficiency and ease of use that justifies the change.

Write or call for details, plus a schedule of database seminars in your area. Cullinane Corporation, 20 William Street, Wellesley, Mass. 02181 (617) 237-6600.

Cullinane Corporation

Database: Cullinane

CIRCLE 18 ON READER CARD


Fred,
Need to reschedule
the reports for
General Ledger-
somehow they
got lost.
Tom
API530
API550
ACI625
PAY003
INV010
INV020
PAY004
KEYPUNCH
KEYPUNCH
Previous run
010 Rescheduled
1330
1345
1350
1115
1130
1215
1350
1430
B1
A2
C3

Our Production Control System makes scheduling systems seem... well... old-fashioned.

The UCC-7 Automated Production Control System does everything you do to manage production work. And that's just for openers.

Because only UCC-7 goes on to help you manage the data center's entire thruput. From Input Control... to Data Entry, Production Scheduling, Set-up, Processing and Output... all the way through Report Distribution.

UCC-7 eliminates many production control problems. It automates workflow, allows unheard of scheduling flexibility and alerts the proper operation point of any impending delays and their causes.

UCC-7 solves some big operational problems. It drastically reduces reruns and the need for manual intervention. It improves control of output distribution. With UCC-7, you can make a significant improvement in CPU utilization.

Now, for the first time, you can centralize control for all work areas—Data Preparation, Scheduling, Operations and Distribution. Plus, you have one common source of information for all user requests. UCC-7 can tell you where the job is, when it will be produced and, if it's being held up, *where* and *why* it's being held up. So you can do something about it.

The UCC-7 Automated Production Control System. All of a sudden, scheduling systems are obsolete. Call us toll-free at 1(800) 527-3250 (in Texas, call 214-688-7312), for more information on any of our software products, including:

A Tape Mgmt System that protects data from loss or destruction (UCC-1). Circle 90

A DOS Under OS System that lets you execute DOS programs under OS without program conversion (UCC-2). Circle 91

A Disk Mgmt System that could save you the cost of new disk drives (UCC-3). Circle 92

A PDS Space Mgmt System that eliminates PDS compression (UCC-6). Circle 93

A Data Dictionary/Mgr that really gets IMS under control (UCC-10). Circle 94

A Job Recovery Mgmt System that makes restarts and reruns simple. (UCC-15). Circle 95

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IMS System Aids which can help you manage your installations more effectively (UCC System Aids). Circle 97

A broad line of software for the Banking and Thrift Industries. Circle 98

We're helping the computer to do more of the work.

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Canada: 797 Don Mills Road—Don Mills, Ontario M3C 1V2 • Europe: 1258 London Road—London, U.K. SW16 4EG

CALENDAR

21st semiannual conference. Contact: T.W. Cook, president, American Section, ICES Users Group, Inc., 1111 W. Mockingbird Lane, Suite 832, Dallas, TX 75247 (214)630-4701.

APRIL

Computers and Peripheral Equipment Exhibition, April 2-6, Melbourne, Australia.
Presented by the U.S. Department of Commerce. Contact: Robert M. McLaughlin, Australasia Marketing Unit, Office of International Marketing, Room 2217, U.S. Dept. of Commerce, Industry and Trade Administration, Washington, DC 20230.

ASM Annual Conference, April 25-28, St. Louis.
Contact Richard B. McCaffrey, Association for Systems Management, 24587 Bagley Rd., Cleveland, OH 44138 (216)243-6900.

NICE III, April 29-May 2, Washington, D.C.
The theme of the National Information Conference and Exposition is "Managing Your Information Crisis: A Multidisciplinary Approach." The program is aimed at the information manager, featuring a preconference seminar (Sunday, April 29) "Becoming an Information Manager: A Primer." Workshops will be available on a variety of management topics, two of which are to be "What End Users Want and How to Deliver It" and "Information Services Charge Back: Funny Money or Reality?" Four two-hour sessions aimed at users will concern acquisition and evaluation of information resources, record-keeping requirements for regulation, product liability and litigation support, and increased regulation and organizational change. Four seminars offered in an "information provider" series will be "Dollar Dislocations in Changes Arising from Online Use," "State-of-the-Art of Home Information Systems/Services," "Provider/User Issues: Prices, Restrictions, etc." and "The International Scene." Fee: $100. Daily registration and government academic rates are available. Contact: Information Industry Assn., 4720 Montgomery Lane, Suite 904, Bethesda, MD 20014.

MAY

AEDS Convention, May 15-18, Detroit.
This is the 17th annual meeting of the Association for Educational Data Systems. The theme is "Renaissance Man—the Key Component." Topics of interest are computer applications, computer related curriculum, application development methodologies, and futures. Presentations are invited, particularly on the potential effective use of computer technology in solving "human problems." Exhibits, user group meetings and vendor sessions are also planned. Contact Arthur W. Daniels, Jr., convention coordinator, AEDS '79, 31202 Dorchester, Madison Heights, MI 48071 (313)585-7530.

ACM-SIGMOD International Conference on Data Management, May 30-June 1, Boston.
Papers to be presented are hoped to provide a balance between pragmatic and theoretical data base issues. Some topics of discussion will be data base interfaces—language, semantics, data models, view support; new environments—data base machines, distributed systems and data bases, very large data bases; DBMS implementation—data base integrity, protection, concurrency control, restart/recovery; and DBA and user tools—conversion, restructuring, design, performance evaluation/tuning. Contact: James B. Rothnie, Computer Corp. of America, 575 Technology Square, Cambridge, MA 02139 (617)491-3670.

Which CRT family
now includes a simple,
character-mode terminal with
bright, high-resolution display, two full
pages of continuously scrolling memory,
familiar typewriter-like keyboard with
embedded numeric keypad, comprehensive
character and line editing, eight
preprogrammed function keys,
self-test and optional built-in
120 cps hard copy?

HP introduc

We took a long, hard look at how you use a simple CRT terminal. We applied 10 years of experience producing sophisticated, high-performance computer products, so the newest member of HP's terminal family is engineered from just one point of view: yours.

If you used a CRT all day, you'd demand the brightest, sharpest display made. So we didn't take any shortcuts on the 2621's display. It's the same display with enhanced 9X15 character cell you see on every HP CRT terminal, even our top-of-the-line models.

Interactive sessions go faster if you can look back at what you've already done. So we designed two full pages (48 80-character lines) of continuously scrolling memory into the 2621.

Recognize the 2621's keyboard? It's a lot like the familiar typewriter almost everyone's used to. Which makes the 2621 easier to learn, faster to use. And to accelerate keying in numbers, we put the numeric keypad right in the middle of the keyboard.

Then we increased the capability of the 2621's simple keyboard with eight special keys. In regular use, they control the cursor, rolling and scrolling. But they're also labelled on the screen with preprogrammed functions which, with a touch of the shift key, control self-testing, terminal configuration, display functions and editing.

Editing? On a simple CRT? Sure, because editing gets more work done faster. The 2621's comprehensive editing includes character and line insert and delete, clear line and clear display. What's more, the 2621 keeps your input separate from your CPU's so you can edit data before sending it to your CPU. And all without rewriting a line of your system's software.

And the 2621 is Bell 103A compatible and communicates with your CPU at 110 to 9600 baud through an RS232C interface. Which makes interfacing a snap.

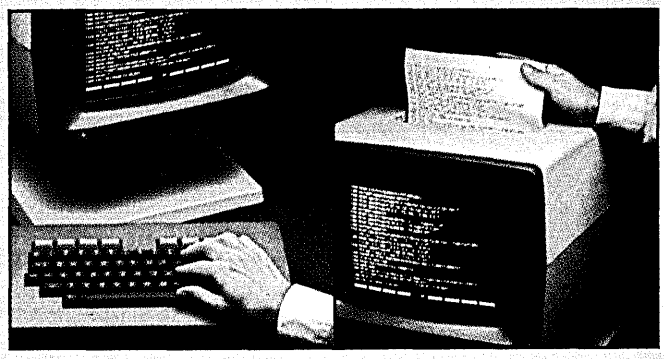
That's the 2621A.

But we've gone a step further. How many times have you wanted just to hit a key and get hard copy of your CRT display without making a big project out of it? Now you can with the 2621P. Its built-in 120 cps thermal printer zips out a page of hard copy in seconds. With a single keystroke.

And here's more good news: the 2621A costs only $1450; the 2621P with built-in hard copy costs only $2550.

Surprised by all these features in a simple, inexpensive, character-mode CRT? We don't think simple has to mean unsophisticated. To prove it, we're turning HP's advanced technology and 40 years of manufacturing experience into products you need.

Like the 2621: the simple CRT you'd expect from Hewlett-Packard.



Try this on your favorite CRT: With the 2621P, you just hit a key and walk away in seconds with hard copy of your CRT display. The built-in thermal printer prints upper and lower case at up to 120 cps.

The 2621's bright, high-resolution CRT displays the full 128-character ASCII character set, including upper and lower case, control codes, and character-by-character underline, in 24 80-character lines.

Eight screen-labeled preprogrammed function keys magnify the power of the 2621's keyboard. Preprogrammed functions include editing, terminal configuration, printer control and self-test.

To make numeric data entry faster and easier, we put the 2621's numeric keypad right in the middle of the keyboard, instead of at one side.

The 2621's familiar 68-key keyboard is almost as easy to use as a typewriter.

☐ I'd like to know more about HP's new 2621A and 2621P with built-in hard copy.

☐ I'd like to see HP's new 2621A and 2621P with built-in hard copy.

☐ I'd like to know more about HP's complete family of terminals.

Name _____

Title _____

Company _____

Address _____

Phone _____

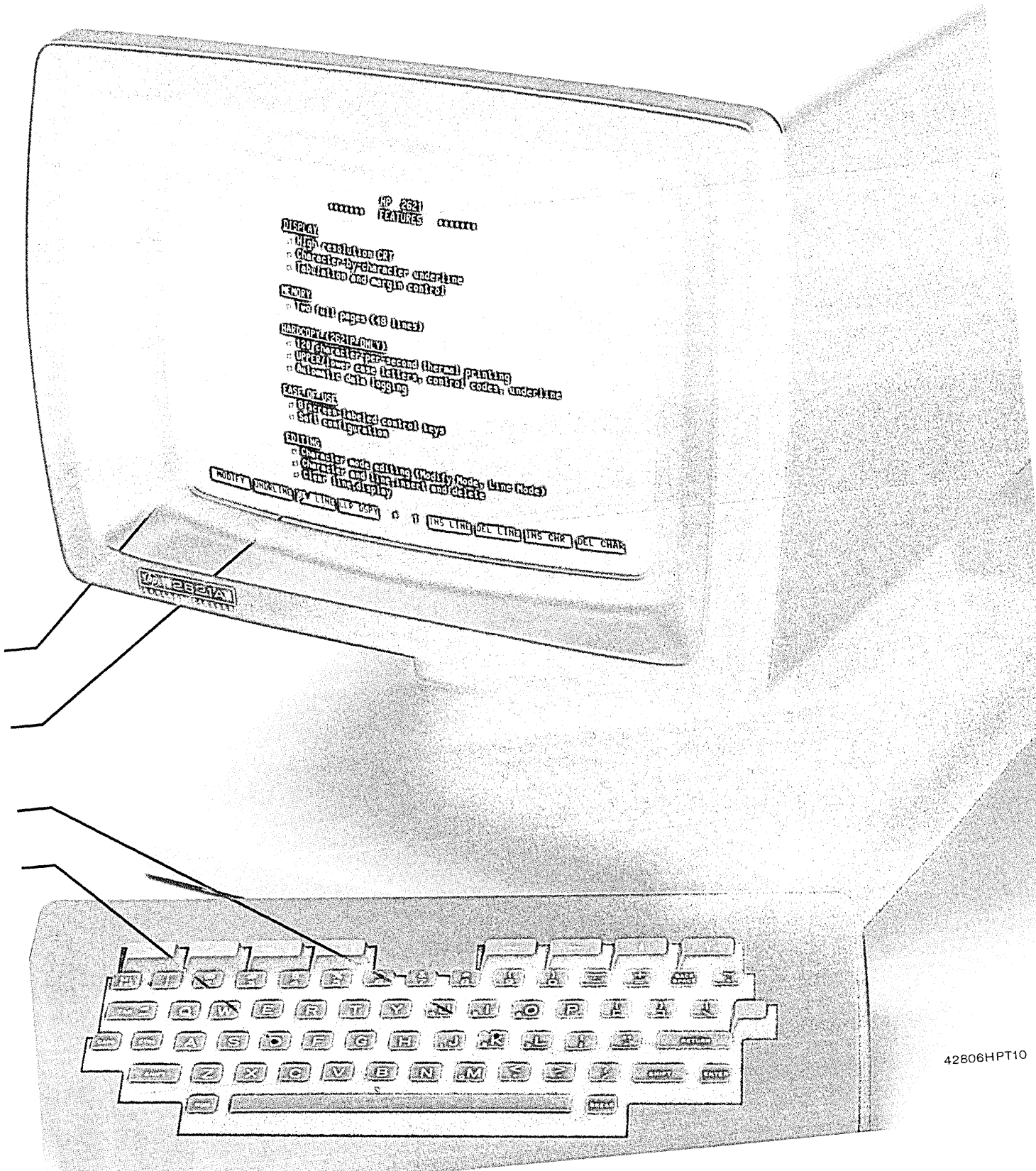
Mail to Hewlett-Packard, Attn: Ed Hayes,
Marketing Manager, Data Terminals Division, Dept. 439,
19400 Homestead Road, Cupertino CA 95014.

HEWLETT hp PACKARD

U.S. List Price

CIRCLE 6 ON READER CARD

es the 2621.



42806HPT10

CALENDAR

JUNE

NCC, June 4-7, New York.
The exhibit portion promises to be the largest ever assembled, with approximately 1,500 booths presently reserved. A separate Personal Computing Festival is planned, to feature both exhibits and program sessions; also, awards are to be given for the best papers on the application of microcomputer technology. The conference is being included in the U.S. Department of Commerce Foreign Buyer Program; an International Visitors Center will be available. Contact: NCC '79, c/o AFIPS, Inc., 210 Summit Ave., Montvale, NJ 07645.

Software Supermarket, June 4-7, New York.
The show will be next to the NCC's Personal Computing Fair. Space is limited to 38 companies. Contact: Lee Mulder, Software Exhibitors, Ltd., P.O. Box 1032, Oak Brook, IL 60521 (312)529-3518.

Teleinformatics, June 11-13, Paris.
Sponsored by UNESCO, the Commission of the European Communities, and the International Conference for Computer Communication. Teleinformatics' theme is "Applications." Contact AFCET, 156 Bld. Pereire, 75017 Paris, France.

Syntopican VII, June 26-28, Chicago.
Sponsored by the International Word Processing Assn. Contact IWP, Maryland Rd., Willow Grove, PA 19090 (215) 657-3220.

CALLS

The ACM Special Interest Group for Automata and Computability Theory is seeking papers for their Symposium on Theory of Computing, which will be held April 30-May 2, 1979. Some topics of interest are: analysis of algorithms, automata and formal languages, computational complexity, formal semantics and proof theory, mathematical aspects of programming languages, mathematics of computation, theoretical studies of computer systems, and theory of data bases and data structures. Eight copies of an abstract are due by Dec. 1, 1978 to the Program Chairman, Professor Michael J. Fischer, Dept. of Computer Science, FR-35, Univ. of Washington, Seattle, WA 98195.

The Society for Information Display seeks papers for their symposium in Chicago, to be held May 8-10, 1979. Areas of interest include flat panel displays, crt displays, projection displays, computer graphics, intelligent terminals, video disk/tape, nonvisual displays, interactive displays, and human factors/perception. Deadline for receipt of abstracts is Dec. 11, 1978. Contact: Lewis Winner, 301 Almeria Ave., P.O. Box 343788, Coral Gables, FL 33134 (305)446-8193.

Papers are being accepted for a conference on trends and application 1979: **Advances in System Technology** to be held at the National Bureau of Standards in Gaithersburg, Md., May 17, 1979. Special interest is in new developments in computer architecture, distributed processing, micros in consumer products, office system technology, networking technology, embedded micros and security from a system's viewpoint. Abstracts are due by Dec. 15, 1978, to Patrick V. McGregor, Network Analysis Corp., 410 Pine St., Vienna, VA 22180.

The Independent Computer Consultants Assn. will hold ICCA 79 under the theme "Increasing Professionalism," April 5 and 6. Outlines are being accepted for proposed sessions. ICCA, P.O. Box 27412, St. Louis, MO 63141. Deadline is January 5. ❋

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We provide data base and on-line software designed specifically for the needs of the '80's.

The new TOTAL and ENVIRON/1 Series '80' data base/data communication systems are more than the most advanced DB/DC Technology available today. They are also the beginning of the future in information system software for the '80's.

Conceived and developed after a decade of experience in over 2,000 customer DB/DC environments, TOTAL and ENVIRON/1 Series '80', plus a variety of related software products... such as the new T-ASK query facility... are directed toward the information system challenges of the '80's. They will form the nucleus and launch pad for the many end-user oriented software tools emanating from Cincom's substantial research and development commitment.

If you consider this type of product development commitment... coupled with a worldwide service support organization in 42 cities, in 11 different countries, on every continent... except Antarctica... to be important to your DB/DC success, shouldn't you consider Cincom?

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Cincom Systems, Inc.

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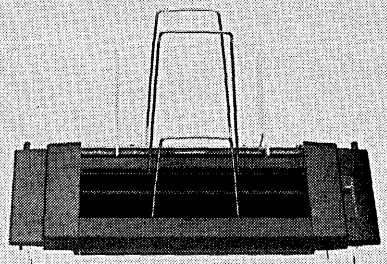
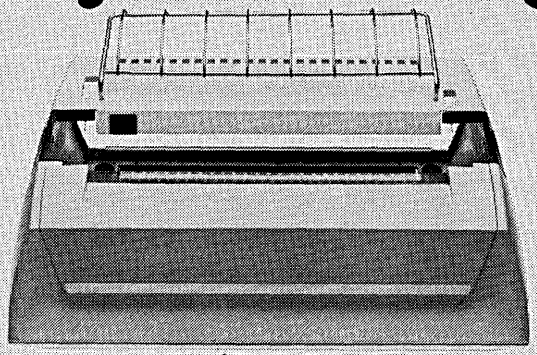
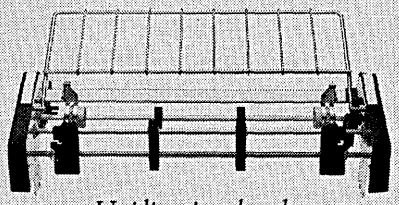
The new Diablo 1650. First we build it. Then you design it.



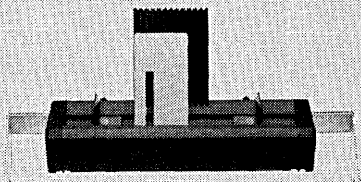
HyFeed Cut Sheet Feeder



RO and KSR Cover Sets

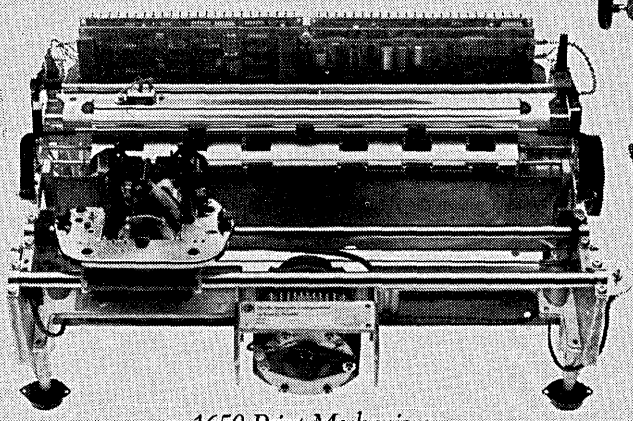


Unidirectional and Bidirectional Tractors

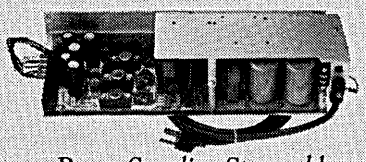


Mechanical and Auto Front Feeders

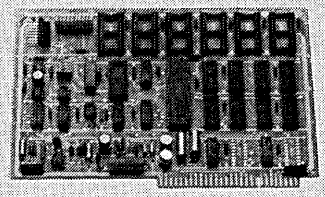
Friction and Pin Feed Platens



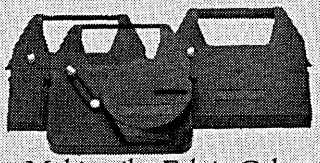
1650 Print Mechanism



Power Supplies, Strappable for Foreign and Domestic Use

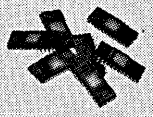


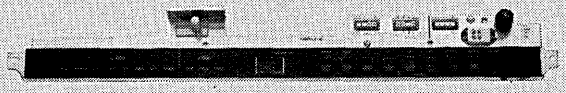
Options...Yours and/or Ours



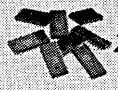
Multi-strike, Fabric, Color, and Two-color Ribbons

Firmware Options

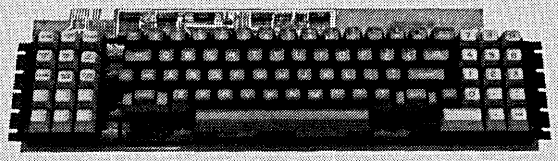




Operator Control Panel



2K Buffer Expansion



7 Standard Keyboards Including ASCII, APL and European

88, 92, 96 Character Long-life Metal Print Wheels

Interface Options

The new Diablo 1650 Series Printers and Terminals are what you make them.

Because you have a lot more options with Diablo than you'll find with other manufacturers. So now you can design the exact communications, word processing, or data processing printing system you need, and easily change it as your needs change.

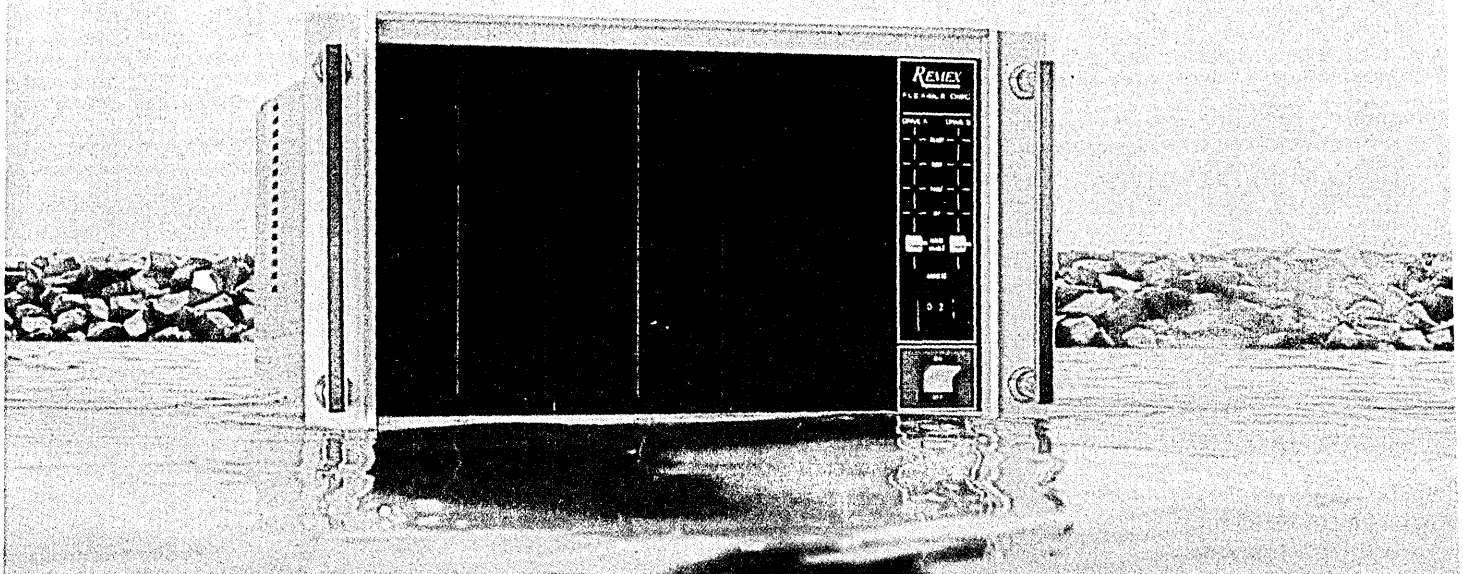
You can select interface options, paper handling options, as well as expanded processing options.

If you'd like to know more about the 1650 Series, call collect (415) 786-5207, or write us at 24500 Industrial Blvd., Hayward, CA 94545. We'll be happy to discuss your options with you.

And you'll see the advantages of having equipment designed by the leading authority in the field. You.

Diablo Systems

XEROX



Above DEC performance... below DEC price.

PDP/LSI-11 users couldn't ask for anything more. A plug-compatible, software transparent, flexible disk system that costs about 25 percent less, yet has more features than DEC's RX-11 system.

Each Remex-11 system has an array of special status indicators. One tells you when a head is loaded. Another tells you when the system is busy completing a command. Another lets you know when an error has been detected (it stays lit until told otherwise).

And both drives in the system have a write protect switch for guarding stored data (four-drive system optional).

Otherwise, it's pretty much the same as DEC's system, with full sector buffering and selectable-register address capability.

But we're even more DEC'ed out when you need it. Our *expanded capacity* Remex-11 uses 16 sector/track soft sectoring that increases storage capacity by some *25 percent* and throughput by as much as *20 percent* over DEC's version.

Either way, you benefit from exceptional reliability, lower costs and immediate delivery.

Call or write for complete details: Ex-Cell-O Corporation, Remex Division, 1733 East Alton St., P.O. Box C19533, Irvine, CA 92713. Phone: 714/557-6860. TWX: (910) 595-1715.

Ex-Cell-O Corporation

REMEX DIVISION

Paper isn't the only thing we look good on.

CIRCLE 44 ON READER CARD

The Data Communications Systems Of The Future

We're looking ahead to the data communications systems of the future. It's part of our determination to stay ahead in computer communications. To deliver systems today that stay with you as your computer communications grow.

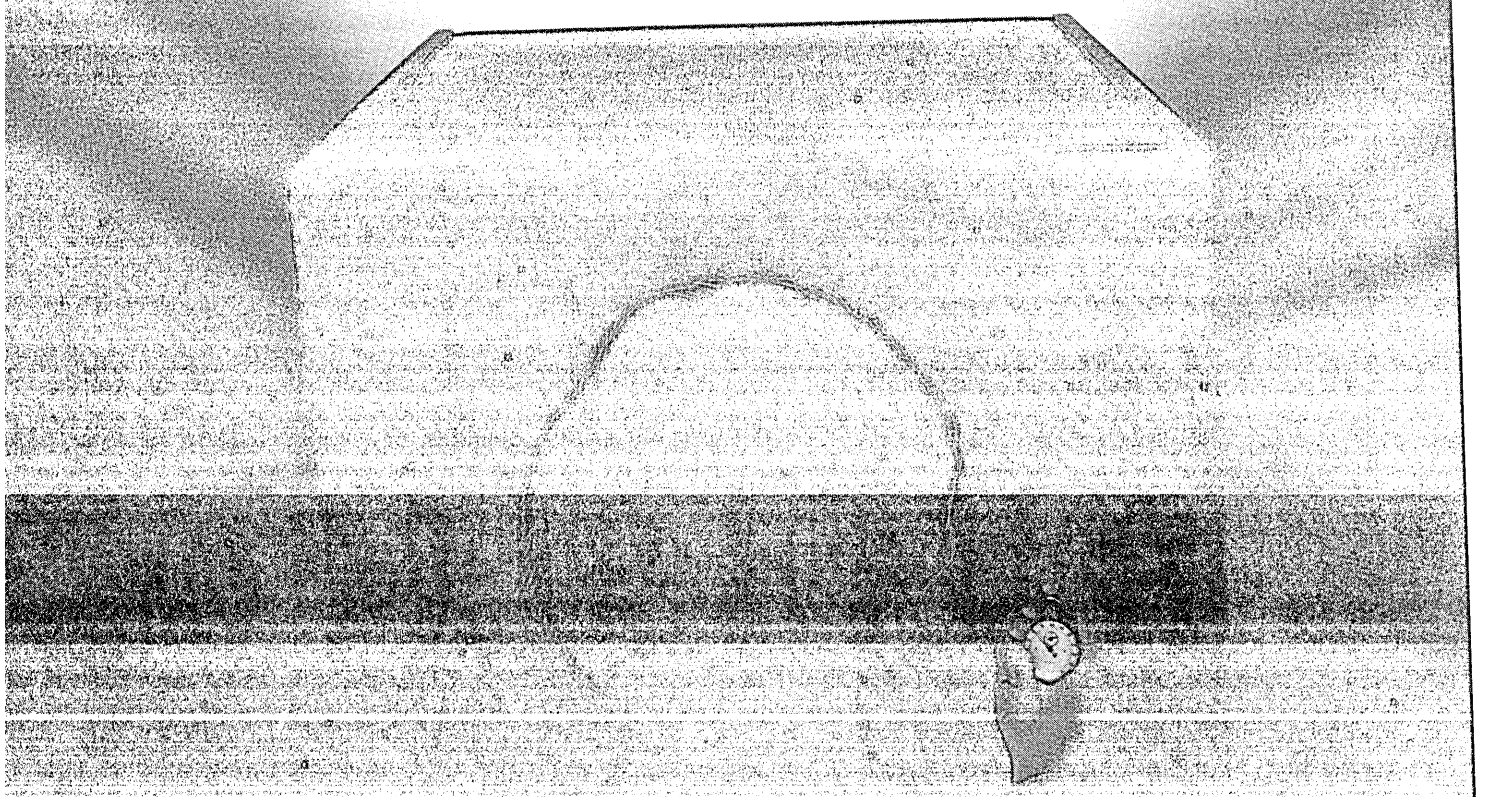
We see more use of computer networks for the future. Networks linking far flung terminals with central or regional computer sites. Providing improved access to vital data. Making more efficient use of your computer facilities. These networks will require a new generation of communications processors. More intelligent and powerful front-end processors. More powerful and efficient remote communications concentrators. Front-end processors that will have greater throughput, will operate at faster speeds, and will relieve host computers of more communications tasks. Able to access multiple CPU's while handling thousands of terminals. Remote concentrators more powerful to handle maximum transmissions speeds. Able to operate with conventional lines and satellite channels. Speeding the flow of data while saving line costs.

When it comes to computer communications, keep your eye on CCI. We're already working on the technologies of the future. We're looking ahead in computer communications to keep you ahead.

Computer Communications, Inc.

2610 Columbia Street, Torrance, CA 90503. (213) 320-9101.

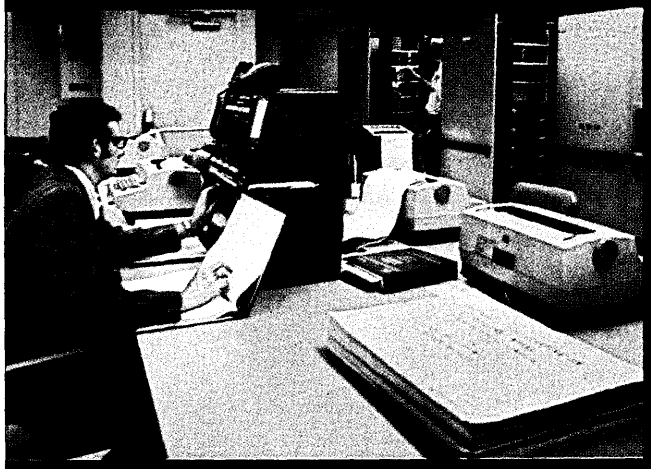
We're Looking Ahead In Computer Communications.



CIRCLE 29 ON READER CARD

i&se*

maintains more computers now than when GE made computers.



The reason: I&SE now services computers of other makes. Moreover, I&SE is offering its worldwide computer service network to OEM's and computer manufacturers who need a ready-made service organization.

The advantage: I&SE experience. I&SE computer service engineers are systems oriented. They're experts at making your entire system work, including the computer.

For full information, phone I&SE's Manager-Computer Service, (602) 264-1751, or write General Electric Co., Section 950-17, Schenectady, New York 12345.

Who's maintaining your computer system?

*INSTALLATION AND SERVICE ENGINEERING DIVISION

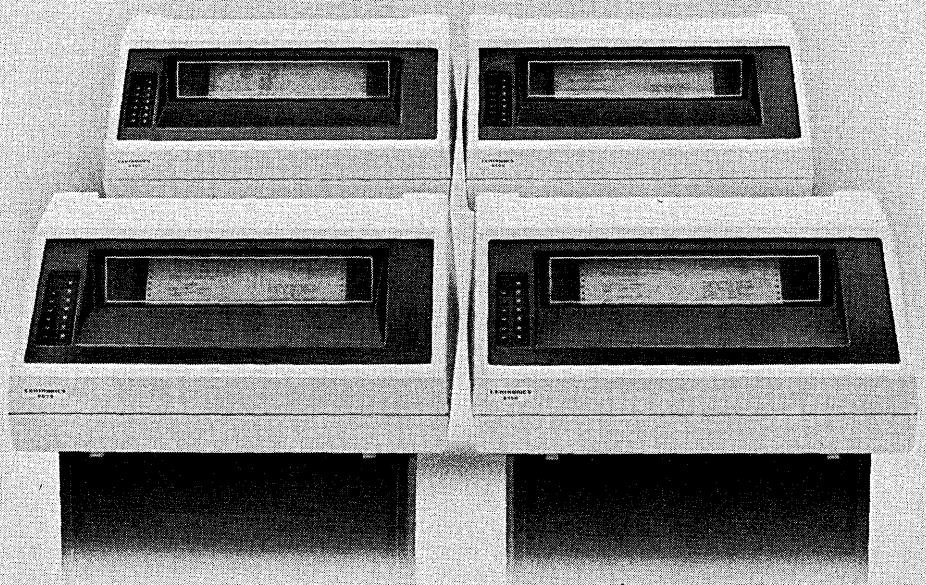
GENERAL ELECTRIC

Does 85% commonality make Centronics' line printer family the best?

NO. Centronics 6000 series band printers have much more to offer than just high parts commonality; technical features like an operator-changeable print band with a choice of EBCDIC character sets and microprocessor control, for example. Four models—providing superior print quality and a range of print speeds—75, 150, 300 and 600 lpm, plus design simplicity that provides exceptional reliability and makes the 6000 series a true family of low priced, fully formed character line printers.

And, as with Centronics' matrix printers and teleprinters, the 6000 series is backed by the largest worldwide service organization of any printer company, and Centronics' reputation for reliability.

Write or call for complete 6000 series information. Centronics Data Computer Corp., Hudson, NH 03051, Tel. (603) 883-0111.



CENTRONICS® PRINTERS
Simply Better

LETTERS

WHO'S ORIGINAL

I enjoyed the article by Louis B. Marienthal in the October issue, "Selling Small Business Systems" (p. 86). However, I believe he misused the term "oem." (I also was somewhat puzzled by the appearance of this abbreviation in lower case; and I regretted that you overlooked the desirability of spelling it out the first time it was used. *I* know what it means; do *all* of DATAMATION's readers also know?)

Marienthal described four ways in which computer systems can be sold, one of which was selling through "oem's." He then wrote, "An oem is a business that buys computer equipment from one or more manufacturers, adds software, and sells functioning computer systems to end users." There, I regret to say, he was mistaken.

Suppose the Ajax Computer Co. (a name I made up just now) sells some or all of its production through such businesses. In many cases the business will put its own name on the product; but whether it does or not, the end user regards the middleman as his supplier. He may or may not know, or care, whether the middleman built the hardware; but if he bothers to think about it or to investigate, he will discover that *the equipment was originally manufactured* by Ajax. Thus Ajax is the original equipment manufacturer, or oem. The middleman is *not*.

Ajax can sell its production through any of the four categories described by Marienthal. These methods of selling differ from one another in various ways, as Marienthal correctly points out; in particular, his mislabeled category often involves the shipment of products by Ajax in large lots rather than in small consignments of one or two. These shipments, in turn, may reflect on the organization and operation of the production line. Because of this, the class of middleman businesses to which such shipments are directed is sometimes generically called "the oem market." That bends the definition somewhat, but because it is succinct, it is not a bad way to describe these businesses collectively. However, the oem market is the market for which Ajax is the oem, selling through the individual businesses that compose the market. This does not make the individual business an oem.

WALLACE B. RILEY
San Francisco, California

The definition of "original equipment manufacturer" is inextricably tied to the distinction between a "component" and a "finished product," so the language problem gets even messier. (Firestone may be the oem for the "500" line of tires; GM is still the oem for the car using them.) We agree, however, that no one benefits when definitions are stretched too far.—ed.

MATERIAL CONSIDERATIONS

I found Bohdan Szuprowicz's article "Soviet Squeeze on Strategic Materials" (October, p. 147) to be interesting, but incomplete. What Mr. Szuprowicz neglected to mention is that three of the five Southern African nations which he pinpointed as containing minerals vital to U.S. industry are in desperate need of what Mr. Szuprowicz disparagingly calls "liberation." South African gold, for example, is cheaper than Mexican or Austrian gold because of the virtual slave-labor conditions in South African society. It would be reasonable to conclude from the article that the five nations mentioned must be defended at all costs, but to do so would be a tragic mistake.

If we are genuinely interested in maintaining access to South African minerals, we must promote a stable and equitable social and political climate in that region. We have it in our power to do this by enforcing, in concert with other nations, an economic and oil boycott of the "Republic" of South Africa, an action which we have repeatedly vetoed in the United Nations. Without the support of white Western nations, the racist regime in Pretoria would vanish like the anachronism that it is. The black majority government that replaces the racists will compete, like all Third World nations, for the favor of both East and West. I am confident that the technological, social, and cultural advantages of the free world can stand and triumph in such competition. By denying aid and comfort to those who are fighting for Southern African liberation, we are pushing them into the arms of the Marxists, a direction many of them say they do not want to go.

What we have done in South Africa, as in Chile and Vietnam and so many other places, is to give communism a moral advantage. By supporting wealthy, privileged dictators in underdeveloped regions of the world, we betray the noble ideals of our own revolution and destroy our credibility. We can capture the moral offensive by championing the implementation of the United Nations Universal Declaration of Human Rights in all countries. Working with other nations that share our ideals, we can enforce our will without violence through the use of economic pressure.

I agree with Mr. Szuprowicz that the situation in Southern Africa is volatile and dangerous, but I contend that the real enemy is in Pretoria, not Moscow.

LEE ELBINGER
Programmer
Yale New Haven Hospital
New Haven, Connecticut

IBM POSITION UPHELD

Your October 1978 Editor's Readout headlined "The Jury System on Trial" appears to encourage a totally erroneous inference—based upon many rulings favorable to IBM—that judges improperly take juries out of the process in complex litigation.

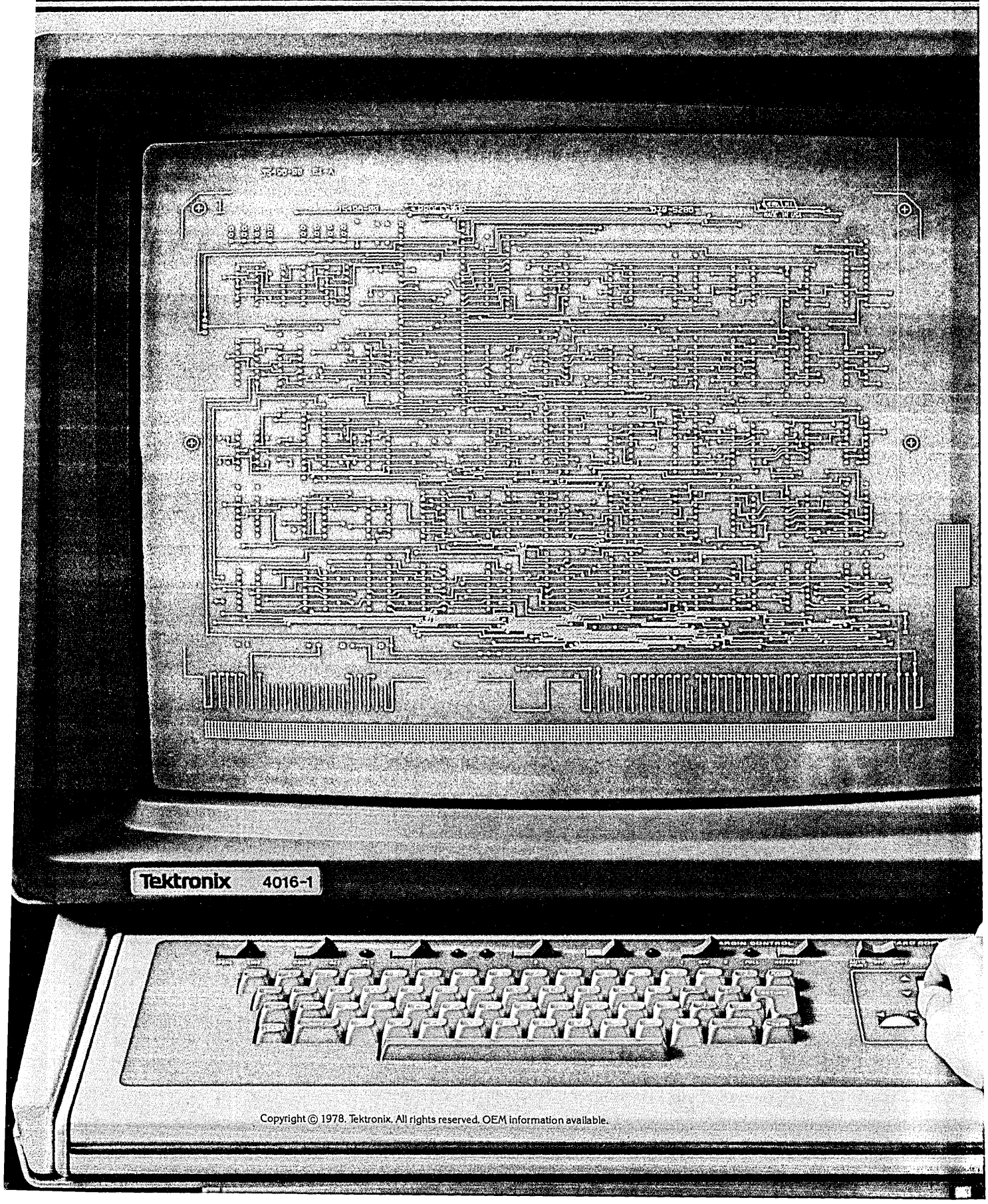
Your editorial ignores a very significant point. While the jury system is an important element of the judicial process, it does not stand alone in upholding the rights of plaintiffs and defendants. Summary judgment, directed verdict, judgment notwithstanding the verdict, and the right to appeal, all are long-standing and vital parts of the judicial structure. They assure the parties—whether company or individual—that any verdict rendered will be reasoned and in accordance with the applicable law.

In every antitrust case against IBM that has gone into court—including those you have mentioned and others you have not—IBM has been upheld either in the district or appellate court. One might reasonably infer from such unanimity of independent judicial opinion that IBM has not acted illegally.

As you know, antitrust litigation is complex, time-consuming and very expensive for all parties, including the taxpayer-supported courts. Many of the issues in the cases against IBM have been tried over and over again. There should be a limit to the number of times a company must defend itself against the same charges.

VICTOR J. GOLDBERG
IBM Director, Communications
Armonk, New York

From the graphics leader



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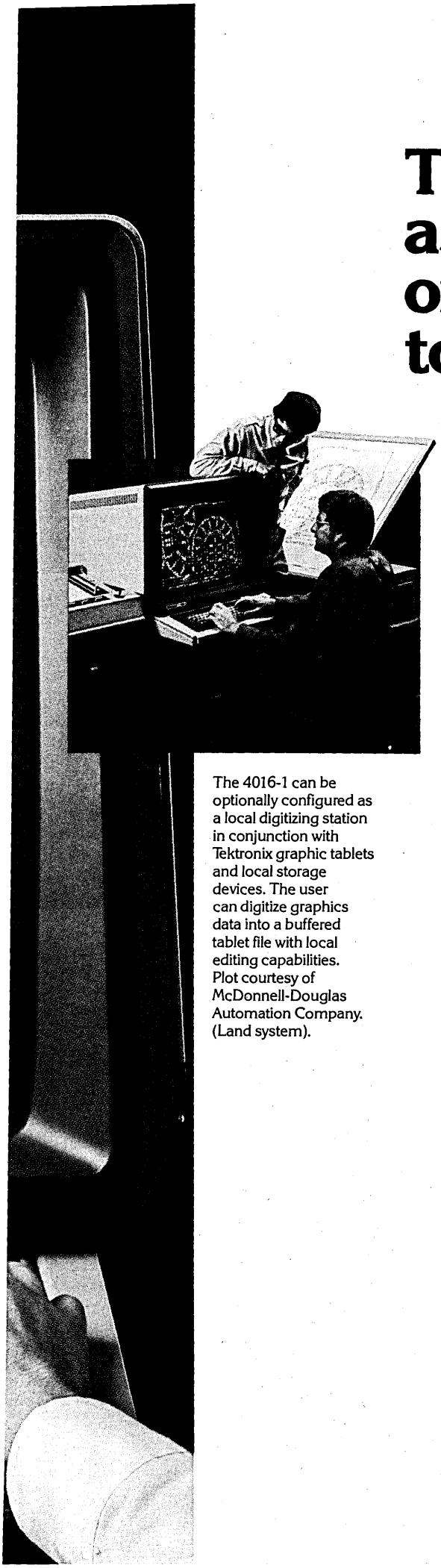

The 4016-1 can be optionally configured as a local digitizing station in conjunction with Tektronix graphic tablets and local storage devices. The user can digitize graphics data into a buffered tablet file with local editing capabilities. Plot courtesy of McDonnell-Douglas Automation Company. (Land system).

We designed the 4016-1 for professionals at the frontiers of graphics.

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LETTERS

NEW LIGHT ON PROFESSIONALISM

The chart accompanying Earl C. Abbe's letter (October, p. 39) is interesting, but indicates we have a long way to go toward professionalism. Perhaps one of the problems is the field of programming and systems analysis itself, often thought of in a limited manner and largely technician-oriented. The importance of these occupations in the fast developing computer field today must be recognized in a new light.

Certain levels within systems analysis, especially, require a very significant body of knowledge, a college degree, and a social organization. Some feel it beneficial to join organizations that have code of ethics, certification programs, and continuing education requirements. Others upgrade themselves as "systems consultants."

However, none of these efforts will allow the *general* fields of programming and systems analysis to be actually recognized as professions until each of the listed deficiencies in the chart are eliminated.

ROBERT C. VERKLER
Faculty
School of Business and Economics
California State University
Los Angeles, California

NEAR PERFECTION

As a former customer engineer and installation supervisor (eight years with Univac and seven years with Control Data), I was amused by George Champine quoting Dr. Robert Worsing on computer reliability ("What Makes a System Reliable," September, p. 194). All of us old computer jocks have done our very best to keep the machines running, but to compare a computer to an airplane is like comparing oranges to apples.

At the time of his original speech, Dr. Worsing never mentioned that aircraft are subject to teardown and complete overhaul every "x" number of hours. In spite of this very carefully planned PM program, planes frequently cannot take off because of component failure—ask any seasoned air traveler.

A computer is many times more complicated than an aircraft, and performs in a varied processing environment. Design parameters cannot consider all the variances of computer runs that can cause computer malfunction.

We in the computer industry would like to see our equipment run as perfectly as possible, but to demand perfection is a cop-out when management cannot meet its goals because of unreasonable or absurd forecasts. Near perfection, probably. Perfection?

RAYMOND J. STEPHON
Air Products and Chemicals, Inc.
Allentown, Pennsylvania

ASSEMBLER PROGRAMMER SCARCITY

I find your placement and handling of R. Edward Mitchell's article "Third Generation Myopia" (September, p. 239) highly questionable. The article, which is essentially opinion, more properly belongs in the Forum section, not in the section dedicated to feature stories based on documented case histories or researched, statistical surveys...

The claims that properly coded assembly language is fully translatable, that ALC programmers can outperform equivalent compiler language programmers, and that some ALC programs can be up for service in 60% of the time and effort of that required for compiler level implementation, leave far too much unsaid to be treated as fact. Nowhere is there any indication of the justification or background for these claims.

While the major point of the article, selecting a programming language which fits the application, is well taken, any call for a return to assembly language coding needs to be much more fully documented and justified; especially in light of the availability of optimizing compilers for high level languages and the extreme difficulty in training good ALC programmers for machines with upwards of 150 distinct instructions, dozens of general and special purpose registers, and many variations of addressing schemes.

DAVID A. FEINBERG
Seattle, Washington

We're glad to hear our credibility is so good, but must differ with your assessment of what constitutes an appropriate feature. We are interested in presenting not only facts but well-considered opinions stemming from an author's experience.—ed.

Mr. Mitchell replies: Mr. Feinberg is correct in pointing out the difficulty in finding or training good assembler programmers. Most dp managers acknowledge that a higher level of skill and aptitude is needed to deal with computer programming as opposed to language programming. Unfortunately, mere availability of talent suggests we apportion most of our applications to the high-level languages.

CORRECTION

We must apologize for having switched the photos of Mssrs. Geller and Barbuto, authors of "Tools for Top-Down Testing" (October, p. 182).

R. Edward Mitchell, Jr. makes a good case for assembly-language programming. Unfortunately, he seems to be ignoring the cost and impact of program maintenance and modification. According to studies by Barry Boehm and others, the greatest costs in the project (over 50%) are involved with changing the code, and over half the entire system cost is in maintenance and modification. Any reduction in hardware costs achieved by more efficient programs is going to have less of an overall impact than a similar reduction in the cost of maintenance. It has been shown that assembler language programs are harder to develop, more difficult to test and prove correct, and invariably harder to understand and thus harder to modify, than equivalent high-level language programs.

It is well known that change degrades software. Even the best-intentioned maintenance programmer runs a risk of damaging a program every time a modification is made. This risk is considerably lessened if the program is easily understood. Change is a fact of life in business dp. Hardware today is so cheap as to be effectively free. A fast, small program is totally meaningless if it is wrong, untestable, or unmodifiable. Our responsibility is to build useful, robust software; efficiency is a secondary concern.

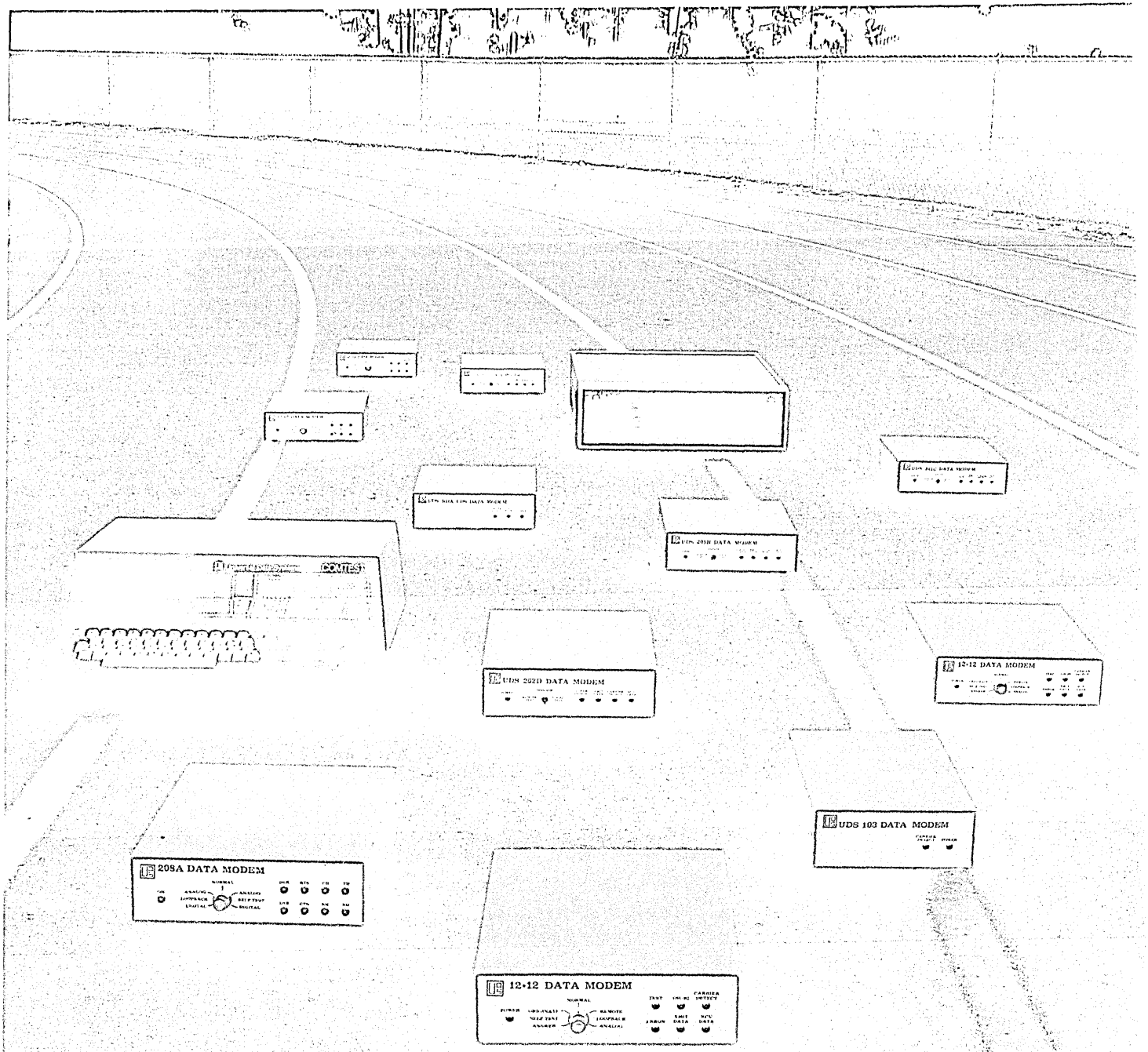
For these reasons, we should use the high-level languages and avoid assembler code.

LOIS A. ROSE
Senior Staff Consultant
Yourdon inc.
New York, New York

Mr. Mitchell replies: This is an especially disappointing letter, considering the source. I have learned from my programming experience and from reading studies by others in the field that program *organization* and *structure* are much more significant than programming language so far as maintainability is concerned. It is surprising to me that a Yourdon consultant would disagree with that.

Moreover, it has never been successfully proven to me that "assembler language programs are harder to develop, more difficult to test..." and so forth. In fact, just the opposite may be true in many cases, depending on the experience and competence of the programmer.

None of the reasons listed in Ms. Rose's letter appear to be particularly significant for selecting the programming language; perhaps if she qualified her reasons by adding that she had no assembler programmers on her staff, we could see where her reasoning might apply.



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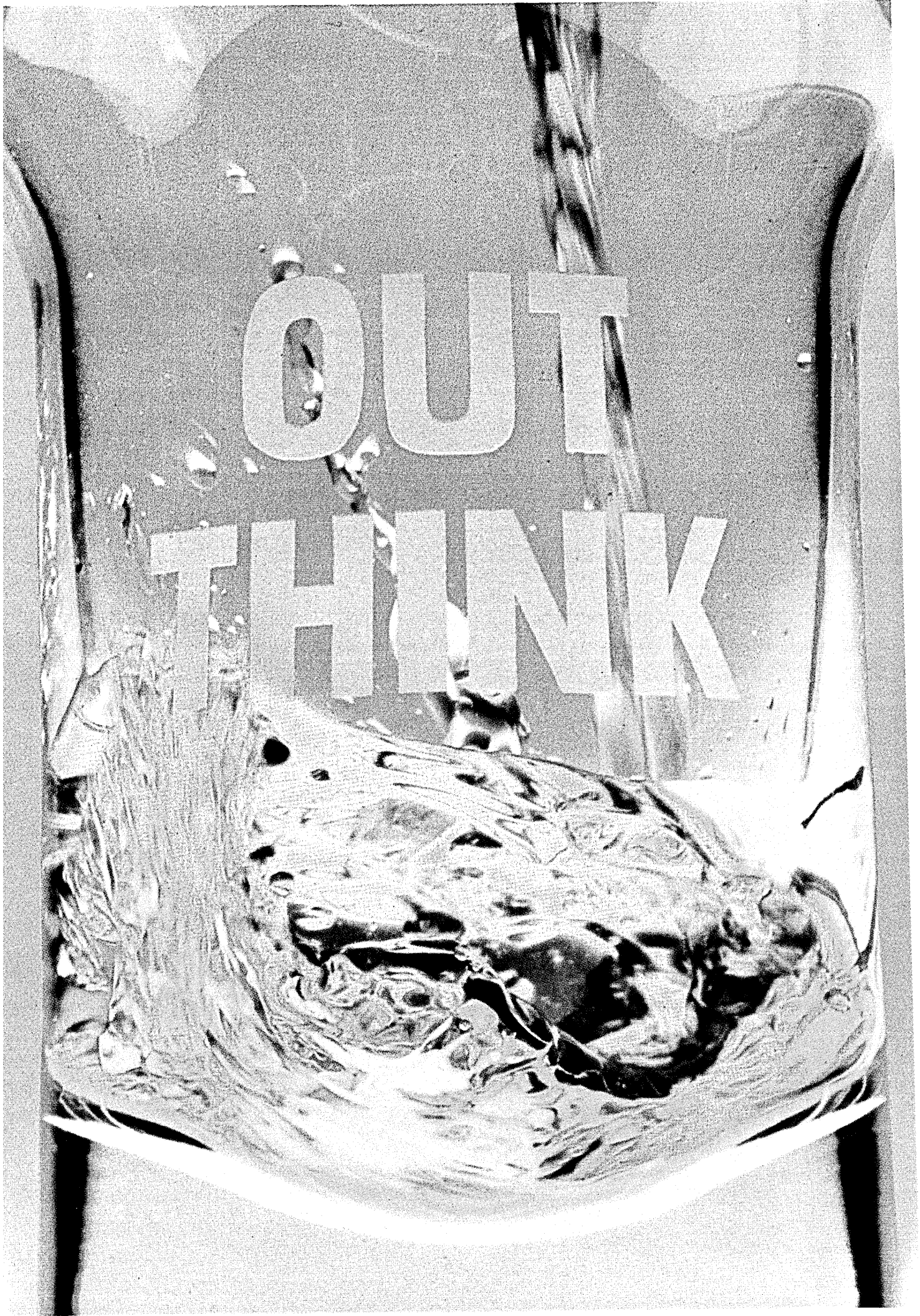
OUT
THINK

Liquids, the most adaptable of all matter, shape themselves exactly to fit their containers.

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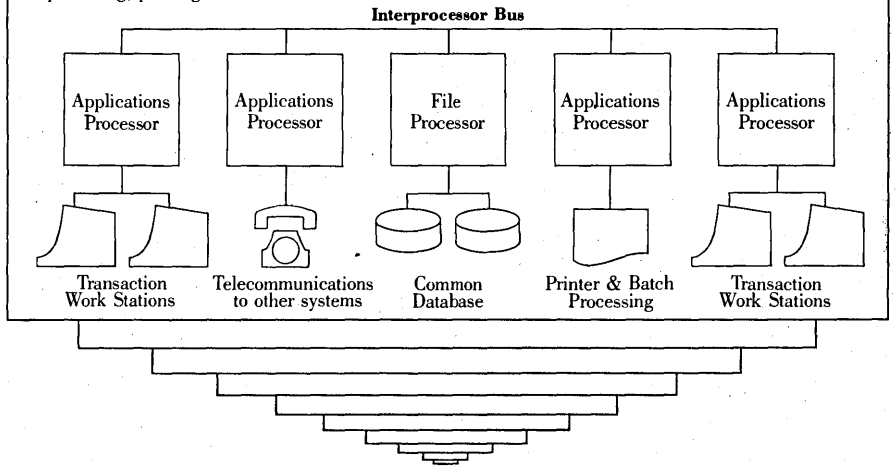

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CIRCLE 215 ON READER CARD

JOHN L. KIRKLEY, EDITOR

EDITOR'S READOUT

REFLECTIONS ON THE 8100

ILLUSTRATION ©MIKE NICHOLS 1978

At first blush IBM's 8100 distributed processing system seemed to be a paper tiger. "A phantom machine," said one analyst, citing deliveries scheduled a year or more in the future.

Its unveiling at the Info show in Chicago last October was less than auspicious. The sales people in the booth seemed to know little about the system except that it was made by the Data Processing Division and looked nice. A skimpy brochure offered as much hard information as a politician's campaign speech and the system on display wore a lock on the hood. Commented one observer snidely, "There's probably a Nova under there."

The whole scene had a frenzied, hurry-up air to it; an IBM with its hair ruffled, rep tie uncharacteristically askew. Underscoring IBM's lack of aplomb was the same-day announcement of Hewlett-Packard's latest minis ... with a 14 week delivery schedule and evaluation units already out the door.

Why rush? What caused DPD to abandon its normally stately march into the marketplace for an ungainly trot?

Competitive pressures from within and without appear to have supplied the impetus. Outside, the concept of distributed data processing (ddp) has been accepted with open arms by cpu-bound users; the likes of HP, Datapoint and DEC have been happily moving into a wide-open market with alternative network architectures and scads of super-minis.

Internally, IBM seems to be evolving toward a structure resembling General Motors with DPD, the General Systems Division, and the Office Products Division all making forays into each others markets. Observers speculated that GSD's introduction of "Pacific," the System 38, goaded DPD into rushing the 8100 announcement.

But although the 8100 was whelped prematurely, it is hardly a paper tiger.

Upon viewing the progeny, the other vendors made time-honored responses which fall neatly into two categories: 1) "IBM is finally playing catch-up—we've been doing that for years," and 2) "No, we don't feel this will hurt us competitively; IBM has blessed this market and opened it up for all of us." (Well, we all tend to whistle in the dark.)

But it's readily apparent that with one leap IBM has given its large users what they want and what IBM wants: a hierarchical system that is capable of internode communication but with the host firmly in control. And, in the process, a faltering SNA has been given new life.

The system's 16-bit architecture may not be fancy but then it's designed as an applications oriented and not a general purpose system. Its price is very attractive: for example, in 1980 a user will be able to upgrade from 256KB of memory to 512KB for just $4,500 ... a true bargain at $18K per megabyte. (Compare the $110K per meg cost for the 303X memory; could this be a portent of future big machine memory prices?)

The hardware is priced to sell; the fully unbundled software is on lease. Over the life of a system more than 50% of the revenue could come from the software, thus yielding the best of both possible worlds: a big bundle of pocket money up front from hardware sales, a steady cash flow from software rentals.

DPD also appears to be eyeing new markets with its precedent-breaking announcement that the 8100 will accommodate other manufacture's cpu's.

And, in another interesting competitive move, IBM has matched Japan's introduction of a 64KB chip ... a company pitted against a country.

So it appears that the 8100 (not to mention its denmates, the System 38 and the 3730 text processing system) is highly competitive, designed to thwart IBM's competitors, prevent defections from its user ranks, and open up new markets.

A paper tiger with jaws that bite and claws that snatch. ✲

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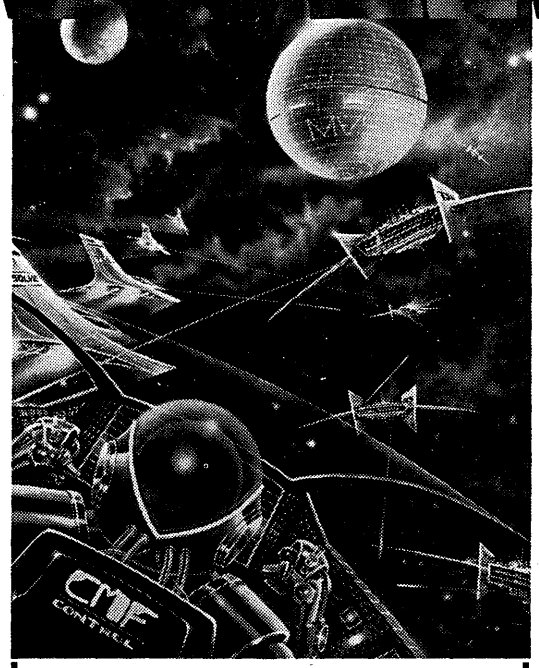

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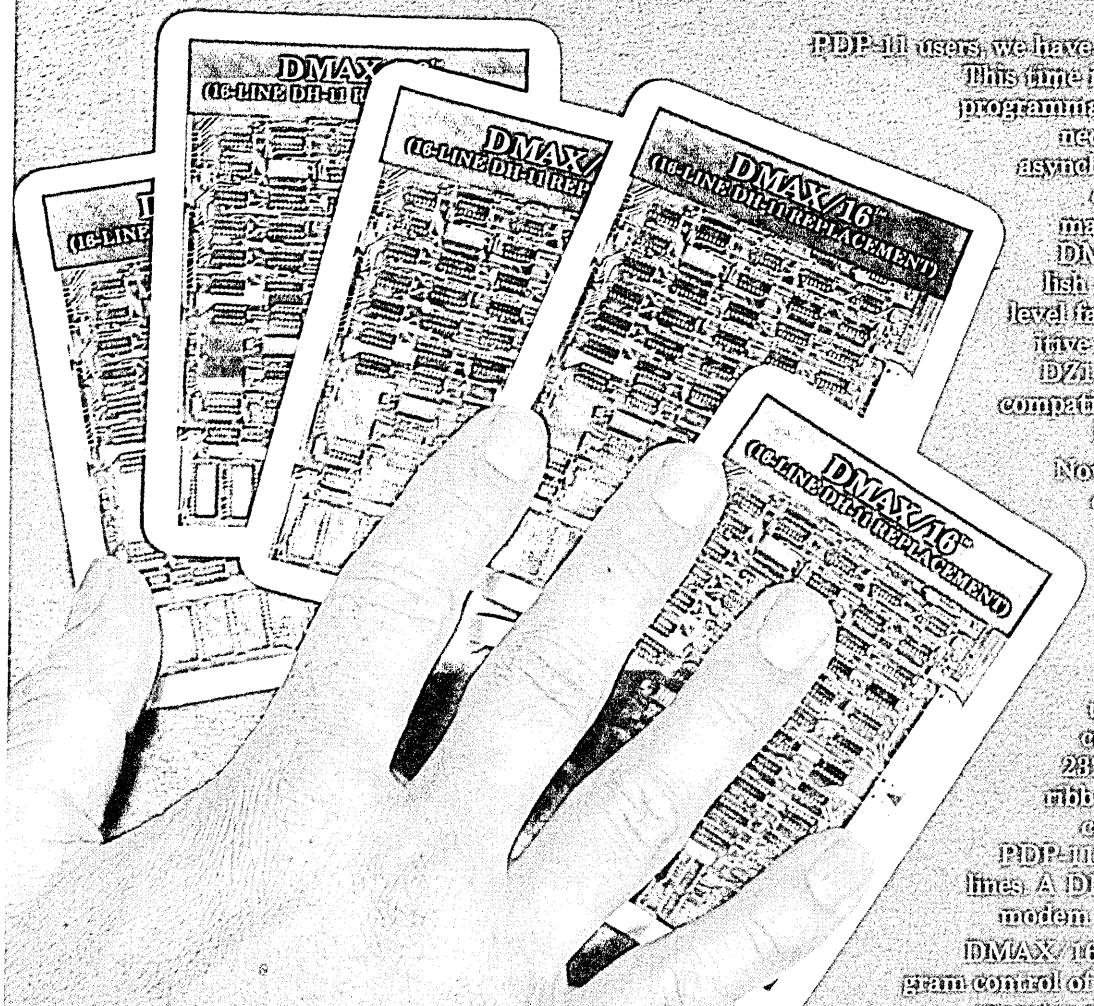

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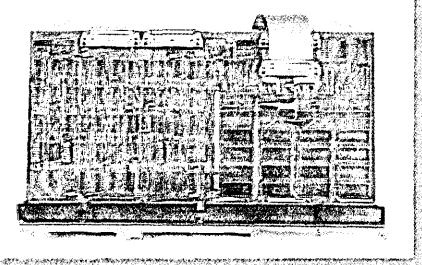

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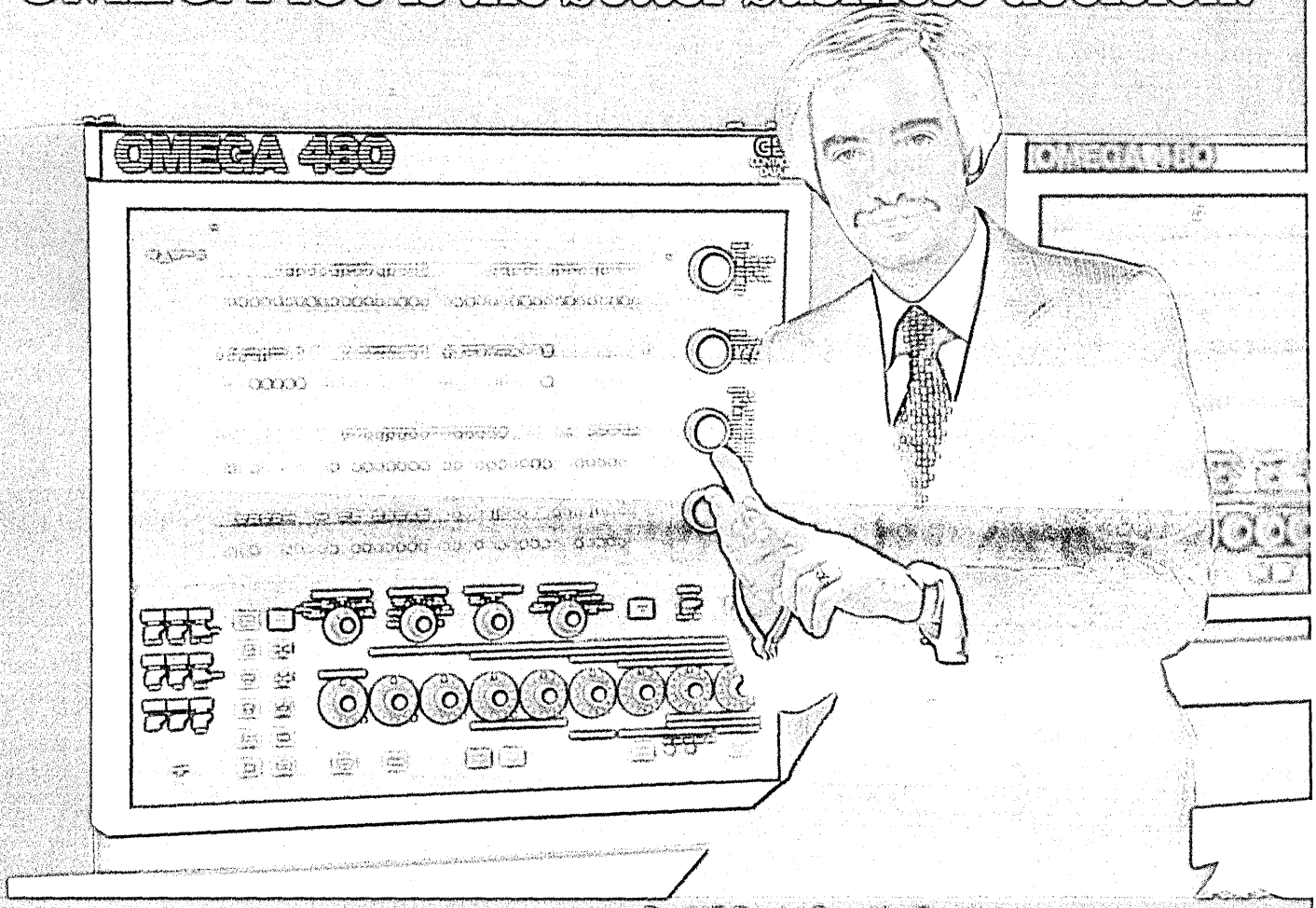

Donald E. Roepke, Group Vice President
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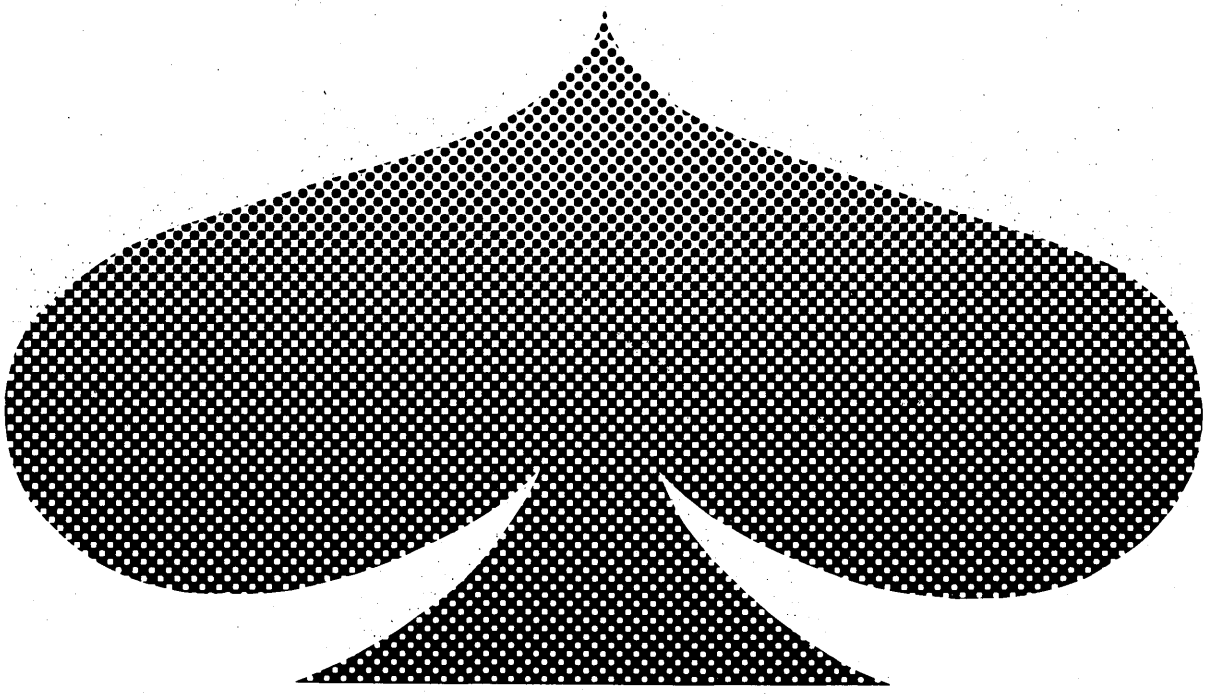

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NEWS IN PERSPECTIVE

XTEN FROM XEROX

Copier giant proposes nationwide network using microwave instead of telephone company provided circuits.

Xerox threw down the gauntlet to AT&T and the U.S. Postal Service last month. The copier colossus unveiled plans for a nationwide data/communications network that incorporates key features of the phone company's Advanced Communications Service (ACS) and the electronic mail system planned by the Postal Service (see following story). Possibly the most interesting feature of Xerox's new scheme is the use of microwave, rather than telephone company-provided hard-wired circuits, for local loop connections. That innovation could break the monopoly control of local exchange distribution facilities long enjoyed by AT&T and the other telephone carriers.

Xerox calls its proposed system XTEN (for Xerox Telecommunications Network). Service will be available late in 1981 or in 1982, according to marketing vp Bill Coombs. The network will supply each customer with up to 256kbs of all-digital message-transmission capacity, beginning at or near his premises. Through a series of microwave links and local switching nodes, intercity messages will be carried to an earth station—one for each of the nation's largest cities. Satellite circuits, leased from other carriers, will interconnect the earth stations (connection to terrestrial intercity circuits is also planned).

On-line document distribution, data communication among computers and computerized general purpose terminals (interactive as well as batch), plus teleconferencing are the major applications contemplated for XTEN. Ultimately, Xerox plans to reach the nation's 200 largest cities—"down to and including Fargo, N. D.," said Coombs.

A major advantage of XTEN, according to a company press release, is that it will "eliminate the costly delays and quality loss resulting from routing data over voice telephone circuits, or the even more costly alternative of installing individual earth stations or private cable circuits." Compared to existing analog local loops, XTEN circuits will accommodate considerably higher bit rates. They'll also support a much greater variety of communication protocols, transmission codes, and switching arrangements—packet, circuit, and message-switched services, for example, will all be supportable, said Coombs.

Asked whether the growing use of T-carriers by prospective competitors might not dim this advantage, Coombs said T-carrier local loops are much more expensive than XTEN's proposed microwave facilities, and besides, the local telephone networks in many cities to be served by XTEN won't be digitized for several years.

Xerox also said XTEN will permit design of "a new generation of terminals that allow customers to reduce significantly the costs associated with the handling of documents before and after delivery." Independent studies, according to the company, have shown that these handling costs are currently "in the range of 60 to 75 cents a page." A related objective of the new network is to reduce document-transmission costs. "For the majority of current facsimile units," these costs range from $1 to $3 a page, Xerox said, adding that it expects XTEN will provide "extensive additional services and more rapid delivery" at prices "competitive with the anticipated rates for first-class mail in the early 1980s."

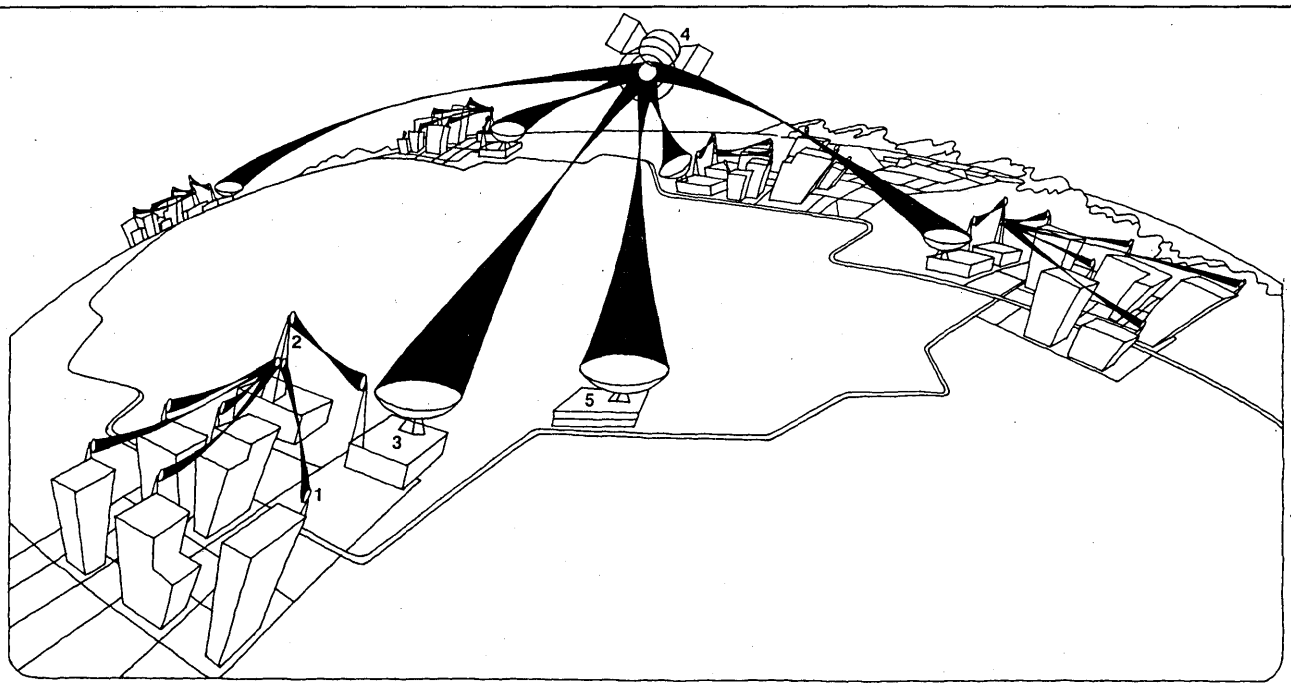
Store/forward service is one of the promised enhancements; others include automatic addressing, priority routing, multipoint delivery of a single message, automatic retransmission of previously stored messages, on-line text-editing, improvements in scanning, printing speed and quality, as well as new software that will "greatly reduce the need for the sender to be concerned with the characteristics of the recipient's terminal device."

For users who need computer-to-computer, interactive and/or batch terminal services, Xerox promised that its proposed network will lower entry costs. Now, the company explained, these users must invest in sophisticated terminal systems if they want such services as speed, code, and/or protocol conversion. XTEN will provide such services from within the network on a shared basis, for a much lower price.

Local telephone networks in many cities to be served by XTEN won't be digitized for several years.

None of this sales rhetoric is particularly new. Last summer, when AT&T announced ACS (August, p. 51), it stressed the system's ability to promote compatibility and also described how the network would save money for users by providing a variety of "communications processing" services from within the network.

The idea of using a "cellular radio" microwave system, in place of telco-provided local loops, while novel, is hardly unique, and probably won't gain XTEN much competitive leverage. The



XTEN—Xerox's proposed network would enable a customer's message to move from a terminal to transceivers linked to a rooftop antenna (1). From there, the message would be beamed to a substation or city station (2) and then to an earth station (3) for transmission to a satellite (4). At the destination site, the message would travel a reverse path to the receiving terminal. Documents, messages and data also could be transmitted to a network control center (5) where they would be recorded for subsequent retrieval.

same technology is now being tested by AT&T and others for use in mobile radiotelephone service.

In a cellular radiotelephone system, communication is provided through a number of low-power radio stations. Each operates on an assigned frequency band and services only those users within a radius of about six miles. This arrangement allows the same set of frequencies to be reused a number of times within any area, thus conserving spectrum and making the FCC happy. Essentially, Xerox is proposing to substitute 2 ft. dish antennas for the radiotelephones.

The antennas, installed on the subscriber's rooftop or alongisde his office, will provide a two-way, 256kbs message path (5Mhz in each direction). Users served by the same radio station—Xerox calls it a "local node"—will share the send channel, and a TDMA (time-division multiple access) system will slice up and assign the transmission capacity. The receive circuit will operate on a broadcast basis—all stations will receive all messages, but each will accept only those having a specified address. A separate set of circuits will interconnect the local nodes with each other and with a central node providing access to the intercity links of the XTEN network.

Although XTEN, as announced, doesn't appear to be a startling technological advance, Xerox almost certainly hasn't revealed all of its plans. When asked for a hint of what future enhancements might be like, a Xerox spokesman referred us to the article in last August's issue of DATAMATION (page 54), entitled "Xerox and the Future." It describes a "developmental office information" system, designed by the company's Palo Alto, Calif., research facility, which combines printing, word processing, and sorting. These services are accessed through modular work stations, each equipped with a keyboard, crt, disk memory, and minicomputer.

All stations will receive all messages, but each will accept only those having a specified address.

Xerox is also working on innovative teleconferencing systems. In a lengthy petition to the FCC last month, which accompanied the XTEN announcement, the company said that "while teleconferencing has had only limited use to date, this situation must change. Business travel consumes a steadily increasing portion of the budget of most U. S. business and government organizations. As energy and labor costs continue to grow, it is clear that alternatives to travel must be found. Studies published by Stanford Research Institute . . . indicate that some 20% of all business travel might be eliminated without loss of efficiency if effective teleconferencing services were generally available. This represents a potential savings of several billion dollars per year in travel time and expense. Savings in excess of 20% have been recorded by . . . NASA."

The company added that "too much emphasis has been placed on full-motion video" (because the bandwidth required is too expensive for most users) and not enough attention has been devoted to "obtaining high-speed, high-quality hard copy on demand." The teleconferencing service to be offered by XTEN will include still-frame video, two-way voice channels, and high-speed hard-copy production. This offering "is designed to stimulate the introduction of efficient terminal devices which will permit the use in teleconferencing of the same audio-visual tools and techniques normally employed in business conferences today: slides, transparencies, blackboards, and oral discussion. With high-speed data facilities available nationwide, users will be able to substitute teleconferencing for travel with savings in overall cost and considerable improvement in employee productivity."

To get XTEN on the air is going to take a while, as Xerox freely admitted by stating that it doesn't plan to begin service before 1981. Last month's FCC filing, although it included a description of the new network, doesn't actually represent a request for operating authority. Xerox is asking only that the Commission reallocate the 10.55–10.68 Ghz. frequency

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CIRCLE 16 ON READER CARD

band to permit its use by Xerox and other electronic message systems vendors.

"We're hoping to get this petition approved by mid- to late-1980," said Coombs; "then, we'll ask for an operating license." But "within the next month or two," he added, Xerox expects to begin demonstrating XTEN on an end-to-end basis. Probably the demos will feature prospective customers, in various parts of the country, sending and receiving various kinds of data through portable transmission facilities.

Teleconferencing service will include still-frame video, two-way voice channels, and high-speed hard-copy production.

A new subsidiary, tentatively called Xerox Communications Inc., is also likely to be announced within the next few months. Headquartered in Washington, it will be headed by Burton Tregub, who is now vp and general manager of Xerox network services. Coombs, who presided over Tymshare's Tymnet subsidiary before joining Xerox last August, will be marketing vp of the new Xerox venture, and legal services will be provided by the firm of Kirkland and Ellis, whose newest member is Richard Wiley, former chairman of the FCC.

—Phil Hirsch

FIGHT OVER ELECTRONIC MAIL

Postal Service may be heading for a victory on long-simmering fight with commercial suppliers.

The U.S. Postal Service may be heading for another victory in its long-simmering battle with commercial suppliers of electronic message services.

Last fall, USPS lobbyists played a key role in defeating legislation that would have allowed "time-sensitive" letters to be handled by commercial firms without payment of postage. At about the same time, the agency asked the U.S. Postal Rate Commission for authority to offer an on-line service called Electronic Computer-Originated Mail or ECOM. While numerous private suppliers of competing services have objected, there is a good chance USPS will get around them and begin ECOM service within the next few months.

ECOM basically is a bulk Mailgram service. The customer generates each "letter" through an on-premise terminal and transmits it on-line to each destination post office. There, the mail is converted to hard copy and delivered in the usual way by a mail carrier. Each ECOM customer must send at least 5,000 messages a month, and there must be at least 200 messages in each batch. While the new service is slower than Mailgram—delivery is promised within two days, rather than one—the proposed rates are much lower. Depending on volume, they range from 30 to 55 cents for a one-page message, and 10 cents more for a two-pager. Computer-originated Mailgram service, by comparison, costs $1.15 for the first 600 characters (roughly one page), plus $1.00 for each additional 800 characters.

The Postal Service estimates it will handle 5.9 million ECOM messages during FY '79 (which ends next September 30), and earn $2.7 million. In FY '80, volume is expected to total 35 million messages and bring in $14.8 million. Two-thirds of the traffic is expected to consist of bills and past-due notices originated by utilities, credit card services, large retailers, and similar users. Although two-day delivery service is an officially stated promise, a USPS spokesman says that "at least 95% of ECOM traffic is intended to be delivered within one day after it leaves the sender's premises."

During the first 15 months ECOM is offered, messages will be transmitted over Western Union's terrestrial switched circuit network to 25 cities. Users will access the WU Infomaster switch via MTS or WATS lines leased at their own expense. At the end of this period—officially called the "test and evaluation phase" by the Postal Service and the "preliminary phase" by WU—USPS says it will be free to contract with another network supplier for a follow-on "standard service phase" lasting three years. However, the telegraph company, in a recent filing to the FCC, offered a somewhat different interpretation: If USPS "decides to proceed with the standard service phase," said the telegraph company, "that phase will continue for at least three years and the Postal Service must give Western Union two years notice of its intent to terminate the service . . . Western Union will receive 45% (of the fees charged for ECOM by the Postal Service) through the preliminary phase and . . . the first three years of the standard service phase." During this latter period, Western Union added that it plans to switch from terrestrial circuits to satellites and small earth stations—the latter to be installed at destination post offices and user premises.

Whether ECOM represents a threat to commercial suppliers of electronic message services depends largely on which "expert" you want to believe.

At one pole is the Computer and Communications Industry Assn. (CCIA), which told a Senate subcommittee last August that since USPS is the only agency legally authorized to distribute letter mail, allowing it to transmit letters electronically would discourage commercial firms from offering electronic message service—particularly since "historically, the Postal Service's definition of a 'letter' has been highly revenue-driven; once given a mandate (to offer) electronic message services, (USPS) could well assert . . . that most forms of business data communication were a form of electronic message service and therefore within the Postal Service monopoly."

The speaker, CCIA general counsel Philip Nyborg, added that USPS shouldn't even be allowed to operate an electronic mail service in collaboration with commercial vendors, for the agency would then have a justification for developing new terminals and delivery systems at taxpayers' expense which would reduce the potential market for private sector EMS offerings.

Postal officials insist they aren't trying to freeze out commercial suppliers of on-line services. As one official explained, "Congress tells us what to do. They've made it clear, repeatedly, that the cost of mail processing and delivery must be reduced and service must be improved wherever possible. That means using modern technology. But it doesn't include an end-to-end electronic mail service because our postal monopoly, by definition, is limited to messages delivered by a postal carrier."

ECOM messages would consist mainly of bills originated by utilities, credit card services, and large retailers.

This could very well be a distinction without a difference, however.

Commercial and private systems are handling a rapidly growing percentage of messages that would otherwise go into the first-class mail stream, and Postal Service costs for all classes of mail are rising accordingly. Last year, Chicago banker Gaylord Freeman told a House postal affairs subcommittee that unless USPS "finds dramatically new methods of combining its delivery system with some form of electronic communication, it will inevitably suffer more volume and revenue losses." Freeman chaired the National Commission on Postal Services, which had just completed an in-depth study of USPS problems and prospects. He added that the only alternative to EMS would be "to raise rates beyond a politi-

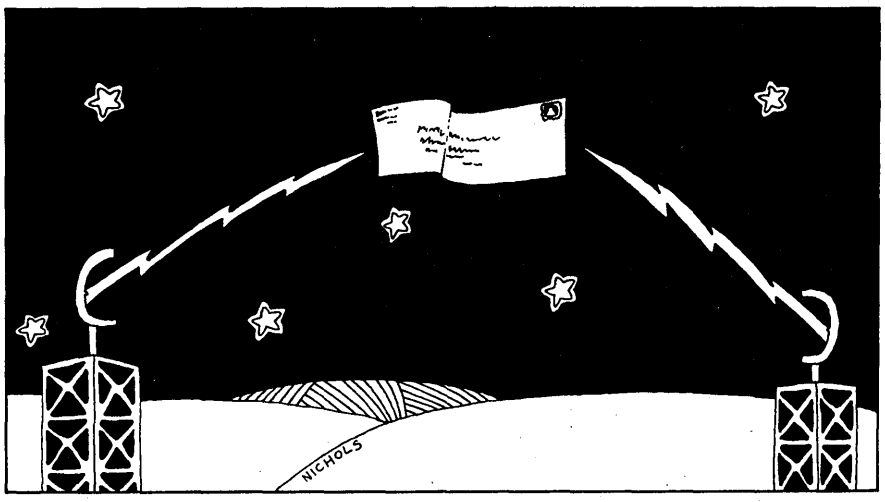
cally and publicly acceptable level or to increase subsidies greatly." The Carter Administration has made it clear, however—most recently in the President's announcement of his new anti-inflation program—that it intends to lower the federal deficit, so higher postal subsidies don't appear very viable either.

Although the Postal Service likes to think of itself as an obedient servant of Congress, desirous only of implementing the services explicitly authorized under the Private Express Statutes, not everyone accepts this image. At a recent conference on postal issues in Washington, sponsored by the American Enterprise Institute, Justice Dept. Attorney Kenneth Robinson observed that "the Postal Service currently pursues real and imagined competition with a . . . reactionary attitude . . . that makes (AT&T's) management appear . . . progressive." Robinson added that it's "not unreasonable" to expect the Postal Service will use the Private Express Statutes against commerical EMS suppliers in the same way it allegedly has used them against private courier services. Specifically, "with the advent of the Postal Service's 'Express Mail' offerings . . . private courier companies have complained of postal inspectors visiting their customers to discuss the Private Express Statutes and their assorted prohibitions (followed by visits from) Express Mail marketing personnel. Indeed, it has been asserted by private couriers that in some instances inspectors have . . . simultaneously (explained) the express laws and (distributed) promotional literature for the Postal Service's own competitive offerings."

The Private Express Statutes consist of a body of laws and court decisions that go back to the 18th century. Essentially they vest in the Postal Service a monopoly over the transportation of letters. The primary purpose is to assure that the government receives all the related revenues.

The root of the current controversy is that the term "letter" has never been adequately defined. It's essentially the same problem that exists in telecommunications, where a semantic disagreement over "communications" and "data processing" has made several lawyers rich and enabled Ma Bell to gain a foothold in a market which the dp industry contends she isn't legally entitled to. The Department of Justice, among others, has suggested that the Postal Service is behaving like AT&T, for similar reasons.

Another speaker at the American Enterprise Institute conference in Washington, attorney James Campbell—who represents a private courier service called DHL Communications—said USPS will have trouble getting Congress to broaden the private express monopoly by statute, given the intention of the Administration



to reduce government regulation (as exemplified by the recent deregulation of the airline industry, and the planned deregulation of railroads and trucking). But Campbell added that the Postal Service now seems to be doing by "indirection" what it apparently is unable to do more openly.

A good example is the series of events that recently led USPS to ask for authority to begin ECOM service. Last September, the Senate Governmental Affairs Committee reported out a bill (S3229) that would allow commercial firms to transport "time-sensitive" letters independently of the Postal Service. A time-sensitive letter was defined as one which "must be delivered before noon of the next business day . . . or within 12 hours, whichever is later." There was one major exception, however. Time-sensitive letters could be carried by an independent service firm only if "the needs of the sender for prompt transmission and delivery . . . cannot be satisfied by a comparable service of the Postal Service . . ."

The Postal Service's "reactionary attitude makes AT&T's management appear progressive."

As mentioned earlier, astute USPS lobbying played a key role in defeating S3229. While the bill is virtually certain to be reintroduced in the 96th Congress (which begins next month), the Postal Service is now in a far better position to defend itself because it has proposed and may soon be operating ECOM, which appears to be a "comparable service."

Sources at the postal rate commission said it probably will be several months before the ECOM authorization petition is disposed of. However, USPS contends that if this happens, it can, on its own, begin offering and charging for a "temporary" ECOM service 90 days after requesting permanent authority from the rate commission. That would allow a startup of ECOM this month.

It isn't clear things will happen that fast, though. For one thing, prospective competitors say they'll take the Postal Service to court if they have to. For another, the Postal Service, apparently mindful of this possibility, says it hasn't definitely decided when to begin ECOM service. But even if the Postal Service is forced to delay ECOM for awhile, the resulting uncertainty will tend to discourage commercial firms from investing in competing services. That may turn out to be a key consideration, for it would preserve the status quo, and prevent another gap from opening in the postal monopoly, through which additional business almost certainly would be lost.

Much more may be at stake than postal revenues, however.

Late last October, at a conference on electronic message services sponsored by the National Academy of Sciences (NAS), there was an extended discussion of how and when these services would reach the home. Several speakers pointed out that the costs of logic and memory have come down rapidly: according to one estimate, a twofold improvement in price/performance is occurring every two years. The recent announcement by Texas Instruments and IBM of a 64K RAM chip, along with the report that IBM is developing a personal computer, suggests the trend will continue. But even so, most speakers at the NAS conference agreed the home terminal market can't really develop until new service capabilities are developed that will attract new types of buyers, beyond the kit builders and computer games players who constitute the bulk of the present customer base.

One speaker, Ed Gladstone, of Quantum Science Corp., described a study recently completed by his company of

the market for on-line consumer entertainment and information services. One of the study's major conclusions is that allowing commercial vendors to deliver first-class mail would significantly shorten the time needed to develop a mass market for the on-line, home terminal.

Congress already has made it clear that the Postal Service should not compete with private industry. The report that accompanied S3229 out of the Senate Governmental Affairs Committee last September said, "the Postal Service should not enter areas where private industry has the capability to provide the services." The underlying question facing Congress next year is whether private vendors have the capability to provide ECOM-type services.

Technically, there's no reason why leased or purchased facsimile machines, or telephone-tv hookups like the one IBM reportedly is developing, couldn't replace a postal carrier, at least for delivering some types of mail to some residential patrons. If postage was paid for this electronic mail, USPS might benefit along with the vendor, since fewer postal carriers would then be required and some of the costs now incurred in moving hard-copy mail to each destination post office could be eliminated.

Until fairly recently, such a change in mail distribution methods was out of the question because of opposition from the

Could commercial vendors deliver first-class mail through the on-line home terminal?

postal unions. But the USPS workforce has declined by 85,000 since 1971, from 741,000 to 656,000, and some 340,000 additional employees reportedly will reach retirement age before 1986. According to James Campbell, one of the speakers at the recent AEI postal issues conference in Washington, this numerical decline in the workforce may be less important than another factor: "The 1978 contract gives current employees a guarantee of lifetime employment (so) it has removed much of their personal incentive to fight the political battle . . ."

What impact these trends will have on the lawmakers is impossible to predict at the moment. The big change, if any, seems likely to occur when Congress reconsiders whether the Private Express Statutes should be amended to exclude time-sensitive letters. Almost certainly, USPS will oppose that amendment. It's also likely commercial suppliers will try to get the amendment enacted without any qualifications allowing the Postal Service to retain its monopoly by offering "comparable service." ✲

ACS AND COMPUTER MAKERS

Bell's offering seen as a boon to computer manufacturers

Advanced Communications Service, AT&T's recently announced digital data network, will significantly stimulate the dp market, a report by Salomon Brothers, the investment banking firm, indicates.

"On the surface, this new Bell network might appear competitive to the computer industry alternative of having the user establish his own private intracompany digital data network with on-site computer hardware," says Salomon vice president Stephen T. McClellan, who is chiefly responsible for the report. "In other words, in ACS Bell might be doing much data processing at its centrally located computer center 'nodes'. Nevertheless, ACS should noticeably expand the market and lead to new applications due to cheaper data communications."

Based on discussions with management of about a dozen computer manufacturers and service concerns, including IBM, Sperry Univac, DEC, Four Phase, Datapoint and Tymshare, the Salomon report maintains that many computer firms will benefit from ACS for a variety of reasons.

The new competition from Bell should spur IBM, for example, into introducing even more competitive communications related hardware and software projects along the lines of the new 3791 controller and the 8100 "cooperative network processing system."

"It is doubtful that IBM will become vulnerable to plug-compatible replacement of its communication based systems," the report says, adding that ACS is not a negative threat to IBM as the new Bell service is not likely to be on an exclusive franchise basis.

"If AT&T's ACS offers the same types of services for smaller computer users (as IBM's Satellite Business Systems does for larger users)," the report continues, "it is to IBM's and all other computer manufacturers' advantage. ACS will open vast new real time, on-line data communications markets such as manufacturing. To date these areas, unlike back office accounting, were limited in terms of computerization due to expensive communications charges."

ACS, SBS, and other future communications developments like Western Union's "Advanced Westar," may well change this, the report asserts.

Nor should ACS have an adverse impact on non-IBM mainframe vendors, such as Sperry Univac, Burroughs, Honeywell, Control Data, and NCR.

"The existence of ACS may redirect the industry away from IBM communications protocol standards and put all mainframe computer vendors on the same footing with respect to compatibility. The development and marketing of new applications is easier with improved digital data communications, which ACS, like SBS, will bring. ACS is not applications oriented, but rather hardware and communications oriented. It is application systems rather than raw mainframe computer hardware that the mainframe vendors will be offering in the future. ACS will therefore not be competitive."

Independent minicomputer, terminal, and distributed data processing business should also boom as a result of ACS, Salomon asserts. "Terminals will proliferate. By AT&T's own estimates, some 137,000 terminals will be hooked into its network by 1983 and this is probably conservative," the report maintains. "Most of these are likely to be from independent suppliers rather than the terminals of AT&T's own Teletype Corp."

The report adds that most minicomputer manufacturers such as Data General have not made an investment in communications protocol architecture, and therefore will find ACS to their advantage.

ACS will open vast new real time, on-line data communications markets such as manufacturing.

"It will now be easier for non-IBM compatible computers to function and to communicate. Most of the distributed data processing companies, such as Datapoint and Four Phase, provide functionally dispersed data processing in a limited geographic area, such as the same building. They do not provide long-distance geographically dispersed processing."

Consequently, the report maintains, ACS will not be competitive to their products. In fact, these companies will need ACS for longer distance distributed processing. Moreover, by interconnecting their equipment to the ACS network, they avoid the IBM communications protocol standard.

Distributed processing was made possible in the first place by cheaper computing and communications, Salomon notes. ACS encourages this trend.

Since the ACS network endorses the concept of data services networks, it should also stimulate that market, particularly remote computing and network-oriented software and services. "New network related data services should

abound, including value added services for text, data, message handling, video and facsimile, electronic mail, distributed data processing and data and information bases.

"ACS will not be suitable for data services which require considerable clerical input, such as tax preparation or claims processing, nor will it be oriented toward specific industry applications, such as hospital, auto dealer, or banking data processing."

Most ddp suppliers will be able to avoid the IBM communications protocol standard.

As a result, companies such as Automatic Data Processing, Electronic Data Systems and Reynolds & Reynolds should be unscathed. Further, software applications packages and unique proprietary data bases developed by data services companies will continue to represent value-added services which ACS cannot match.

"Although AT&T is a powerful company, and with ACS it is stepping further into the province of data processing, we do not believe the FCC will allow ACS to have any major, unfair advantages over the unregulated computer companies," the report concludes. "The computer industry has experienced large new entrants before and has usually prospered from the effect this has had in stimulating the market and broadening the use of computers. ACS should be no exception."

—Laton McCartney

MANAGEMENT

FROM DP TO THE TOP

DPMA conference focuses on paths to the executive suite . . . if your IQ is higher than 60.

Data processing managers aspire to higher things.

Or so it seemed in New Orleans in late October at the Data Processing Management Assn.'s annual conference and business exposition. Probably the best attended and best received session was a well-staged panel presentation by three who have made it through dp to the executive suite.

Preceded by a panoramic slide presentation which covered their careers plus the history of the importance of data processing in business and, more nebulously, what makes for success, the three, seated in easy chairs before a homey coffee table replete with flowers, made it all seem easy. The audience loved it.

Lead-off speaker Jerry W. Geckle, president, Peterson, Howell and Heather, Inc., Baltimore, set the stage when he said, "I'm one of you and I've brought my credentials." He then showed what he professed were among his most treasured possessions, a number of plaques certifying to positions of power he's held in DPMA.

Geckle felt it necessary to explain his company. "PHH, a company I've been with for 23 years," he said, "is in the business of business service for other corporations. We commit to corporate purchases."

Of his own progress, he noted, "I was tenth and last in a large, Catholic family. I was a high school dropout. Later I was a sergeant in the Marine Corps . . . PHH was a WASP organization. When I got started I was just the guy who ran the machine shop."

Geckle believes the way to the top doesn't involve gimmicks. "There's no easy way. Brains are very important. Managers are born with intuition and people skills." And, he cautioned those data processing managers who don't aspire to anything higher, "there's nothing wrong with being a manager of something you're proud of. Professionals are needed and they always will be."

But to those who want more, he admonished, "technical excellence only gets you half way. The two most important words in my dictionary are results and solutions. The word that doesn't count is problem."

He said he'd heard that distributed data processing was today's data processing manager's worst crisis. "That turns me off. It (ddp) is a golden opportunity for the data processing manager to get into the business, to contribute to the objectives of the business."

The session's second speaker, John L. Jones, vice president of management information services, Southern Railway System, Atlanta, Ga., amended his list of keys to getting to the top as a result of listening to Geckle. "Whenever you can, try once to work for an s.o.b." Geckle had said he had done that, to advantage.

Jones' other keys included: good timing (dumb luck); the ability to make good decisions most of the time; sensitivity and the willingness to recognize those decisions that are going to be mostly bad and adjust to this; the ability and willingness to explain things in a logical and straightforward manner, in simple language; understanding of the business; understanding of the management style of the company; the ability to do everything needed to make it understood what you, as a data processing person, are doing without implying you're smarter than everyone else; the ability to recognize that there are no pat solutions; and to always have a retreat position.

In outlining the history of data processing at Southern Railways, Jones made it clear that, as a company, South-

THE PATH UP—Three who made it to the top (left to right), Jerry W. Geckle, John L. Jones, and Roy N. Linton, told DPMA conference attendees how it's done.

ern didn't like the leading edge. When Southern was installing an IBM 7000 series based system and IBM announced the 360 and tried to sell him, he decided to wait. "You folks helped us out and Southern Railways appreciates that," he told his DPMA audience.

But Southern did get out front once, he conceded, in 1971 when the decision was made to go to distributed processing. This was for switching yards and the firm started with a network of five minicomputers. These were Data General minis and Data General, at the time, was only two years old. "It was a management judgment that the opportunity was so great the risk was well worth taking." Southern now has 300 installed minis in a distributed processing network encompassing 50 locations.

The third panelist in the "arrows" session, Roy N. Linton, president and chief executive officer of Standard Register, Co., attributed a little bit of his advancement to luck. "It can be done by marrying the boss' daughter and there is some truth to the adage, 'it's not *what* you know but *who*,' and there is value in visibility to decision makers. But, for the most part all of this is a by-product of good performance."

DPMA underscored its appreciation of dp managers who have reached top echelons by naming one of its own who made it as DPMA Man of the Year for 1978. He's Irwin J. Sitkin, vice president, corporate data processing and administrative services, Aetna Life & Casualty Co., Hartford, Conn. Sitkin manages Aetna's data processing and administrative services functions which add up to an annual budget of $63 million, including data processing equipment renting for $17.2 million. He supervises a staff of 2,000.

"There's no easy way. Brains are very important."

Aetna has been involved with data processing for 60 years and Sitkin has been part of the involvement for more than 20. He is credited with developing the company's dp installation as one of the most sophisticated in the country, the DPMA citation said.

A graduate of Cornell Univ. with a bachelor of science degree in economics, Sitkin joined Aetna in 1956 as a programmer/analyst. He was named a superintendent in 1958, assistant secretary in 1960, secretary in 1965 and assistant vice president, dp development in 1968, and assistant vice president, corporate development, the following year. In 1972, he was appointed vice president, corporate data processing, and assumed his present title in 1976.

IRWIN J. SITKIN—DPMA honors one of its own.

B.C. Christensen, vice president and general manager, IBM World Trade Corp., was DPMA's keynoter. He talked about trends. "We're back to a point of understanding economic realities . . . we're all coping with uncertainties." He was worried and optimistic at the same time. "The order backlog of the industry is impressive . . . the computer is no longer a sacred monster accessible only to the high priests of data processing."

"If the aviation industry had progressed as fast as the computer industry has between the 701 and the 3033," Christensen said, "we now would be able to fly from California to New York for $1 and do it in ten minutes."

Christensen was one of three IBM speakers on the DPMA agenda. And IBM made a rare appearance in the DPMA exhibit halls, showing its 8100 (November 1, p. 55) series. Of the five vendor speakers on the conference program, five represented exhibiting companies. In addition to IBM, these were Quantor, Decision Data Corp., Logical Computing Corp., and Leibert Corp.

Lila Parry, another IBM speaker, was a last minute substitution. She talked about network management from the vantage point of being first level manager in charge of network control of IBM's internal data communication network. She made the point several times that the network exists because people within the IBM organization need to talk to each other and not because "we sell computers."

She pointed out that "we are a multivendor user and are as much involved as anyone else with the problem of multivendor interfaces." Her biggest problem, she said, is user education. The IBM network is one with 9,000 different devices connected to it and with "400 million eight baud lines criss-crossing the United States."

Another IBM speaker was a favorite of dp conference circuits: Robert Courtney, member, data security development staff, Kingston, N.Y. He defined security as, "safety of data from all bad things that can happen to it. Integrity is no more than freedom from surprises." His talk was full of oft-told horror stories and the warnings they imply. New was his warning against dp professional groups going for "after dinner confessionals" of uncovered dp crooks. "Did you really learn anything? After all, he's the one who got caught."

IBM's booth with the 8100 was one of the busier of 100 busy booths at the DPMA's exhibit. Most exhibitors were happy with attendance and interest. "These are the people we need to talk to," said one. One with a problem was a representative of Dialog Systems, Inc., trying to demonstrate a voice response system. "We've had a lot of interest but our demonstrations haven't gone as well as they should." The exhibit area was generally noisy and, during breakfast and lunch hours when DPMA was serving buffet style in a room adjacent to the exhibit area, loud music was piped in and Dialog's input via telephone was picking up all of the extraneous noise.

In terms of attendance and number of exhibitors it was a successful conference for DPMA. Attendance, including exhibitors, approximated 4,000. Sessions generally were well attended—too well in many cases where they were held in rooms far too small for the crowds.

"It was a management judgment that the opportunity was so great, the risk was well worth taking."

One such was on "EFTS: Here Today and Here Tomorrow," in which an uncomfortably crowded-in group was treated to a dimming and raising of the lights during a slide presentation that approached a Lasarium showing and caused speaker John K. Totten, vice president, Visa USA Inc., Washington, D. C., to quip, "This is one of the most dynamic lighting systems I've ever seen."

Robert R. Sumrall, president of Logical Computing Corp., Metairie, La., made the point that "the computer has gotta respond in terms of the users," in a way that delighted his crowded session.

Seems Sumrall has a CB radio in his car. In an en route conversation with a Texan traveling the same highway he was traveling, Sumrall happened to mention that he was in the computer business,

Look again.

Take this quick quiz:

Look closely.

Very closely at our new Model 85 remote information system.

How many functions do you see?

There are more than meet the eye.

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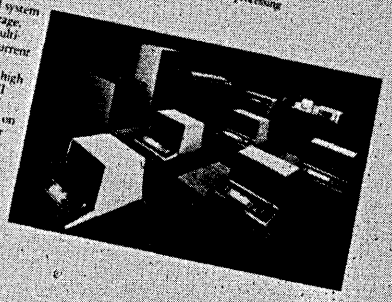


Is our expanded Model 85 system in your future?

(WARNING: there may be more than one right answer to each question)

1. Model 85 is:

(a) a remote information system we first introduced in 1978.

(b) a distributed data processing product.

(c) a multifunction data processing product.

2. Its features include:

(a) multitasking for up to four applications.

(b) large disk capacity.

(c) modular configuration.

(d) more than these.

3. New improvements are:

(a) increased processor memory to 256K bytes.

(b) the addition of remote workstations and printers.

(c) increased disk storage to 100 MB.

4. Model 85 functions are:

(a) remote file management and high level language processing.

(b) on-line file management and stand-alone processing.

(c) batch communications and volume data entry.

5. Available languages are:

(a) RPG II.

(b) COBOL.

(c) ESPERANTO.

6. Model 85 saves users money as an alternative to:

(a) enlarging mainframes overburdened by network interactive applications.

(b) adding communications lines with greater capacities.

(c) maintaining a mainframe configuration only fully used at peak time periods.

(d) losing time and money due to mainframe downtime.

7. For more details on Model 85, you should:

(a) phone your nearest Data 100 sales office or one of the numbers we've listed.

Now check your answers.

All answers but these three are correct.

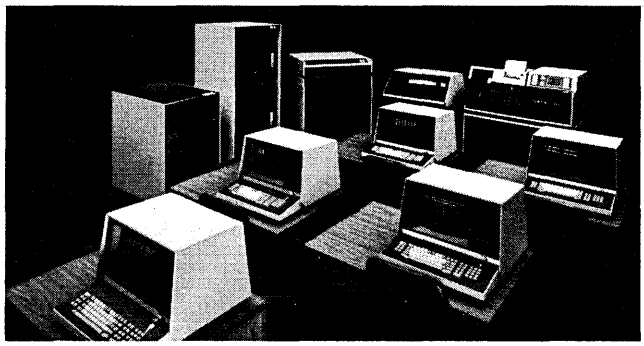
2a: Model 85 offers multitasking for up to *eight* applications.

3c: 100 MB is old figure; Model 85 is now *245.6 MB* disk storage.

5c: No, Model 85 doesn't speak it. Yet.

DATA 100 CORPORATION

multifunction data processing



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CIRCLE 37 ON READER CARD

leading the Texan to a story about the latest computer game at the Dallas-Ft. Worth airport—a voice response game.

"On one afternoon," said the Texan, one guy paid the computer his dollar and got the response: "I am your voice response computer, what is your IQ?"

"160."

"Good, we'll have a five minute conversation on Einstein's theory of relativity."

The conversation, according to the Texan, took place and another guy came up and paid his dollar.

"We now would be able to fly from California to New York for $1 and do it in ten minutes."

"I am your friendly voice response computer. What is your IQ?"

"120."

"Good, We'll have a five minute conversation on 'NFL Today.' "

That took place. Next, the Texan told Sumrall, a guy who had been lurking in the corner during the two conversations decided to take his chances and paid his dollar.

"I am your friendly voice response computer. What is your IQ?"

"60."

"Ten-four, good buddy. What's your handle?"

—Edith Myers

OPERATING SYSTEMS

FIRST CP-6 CUSTOMER

On-line medical service bureau also was an early user of CP-V.

Honeywell has its first customer for Control Program 6, its successor to CP-V, an operating system for multiuse computing offered by Xerox Data Systems, much loved by its users and supported by Honeywell since Xerox went out of the general purpose computer business.

The customer is Science Dynamics Corp., Torrance, Calif. on-line service bureau for the medical profession. Science Dynamics was one of the first users of CP-V back in 1973. "CP-V became available just as we were going on-line," recalled Sandy P. Panzarella, president of the company. "It became viable and delivery schedules were met right from the beginning. That and DMS (a Xerox data management system) contributed to our growth. We've been growing at 40% per year. Today we're the leading company in our field. We've never lost a user."

Panzarella said Science Dynamics got into what now is called distributed processing right from the beginning. "We have microprocessors at the user sites. Appointment scheduling is handled at the user end and they are hooked into a network. They interrogate their own data bases, setting their own parameters."

He said moving to CP-6 will enable them to get better system response time, decrease the cost of processing, and to add functions like medical records processing.

Science Dynamics expects to get CP-6 and a Honeywell Level 66/DPS/CV computer in June or July of 1979 and to have them in production by January 1980.

Panzarella emphasized that his is not a beta test site. "We're an actual customer. If it's like it is on the drawing boards there's nothing to match it."

Shel Klee, director of Honeywell's Los Angeles Development Center where CP-6 has been under development since 1976, said he expects to have four or five beta test sites by the end of this year.

Panzarella doesn't expect the conversion from CP-V to CP-6 will be easy. But, he said, "there are lots of aids. Honeywell will help. It will be an evolutionary change. Our 300 users will only be converted as new features become available. The users won't even know."

He said he has received three times as much help from Honeywell "as in five or six years with Xerox. We have acute problems and we've been pressuring the Honeywell people. We're our own user group and we're on the firing line every day."

Science Dynamics will continue to update existing programs and to receive CP-V enhancements through March of next year.

"We think the Level 66 hardware will have more capacity," Panzarella said. "It can execute COBOL ten to one over a Sigma. It's directed at a COBOL data base management system user."

Klee said CP-6 is right on the schedule set for it back in July of 1976. He said a software factory for CP-V on which CP-6 can be written, executed, and debugged has been completed and has been licensed to Xerox in Rochester. In October, CP-6 was brought up for four hours a day in the development center, the first time in a production environment. "Recovery has not yet been completed and we have to reboot." But, he said this will come soon and in January he expects the system to be in full production for everyone in Los Angeles. The center has a staff of 148 people, 100 of them programmers.

They started the center, after the demise of XDS, with 65 people, including 40 to 45 programmers. "They're some of the best," said Klee. "We have part of the original design team from CP-V and we've surrounded them with young kids out of school."

When the center first became part of Honeywell there was a problem because of its group of senior people having a high average salary under the Honeywell scheme of things. Hiring young people has kept this down and has kept the average age down to about 34. "Among the programmers it's probably under 30."

Klee thinks hiring young people has other advantages. "They take more readily to higher level languages.

He said CP-6 is more secure than CP-V. "The operating system can't clobber user programs."

Extensions of CP-V promised for CP-6 include: substantially increased user program sizes; enhanced protection and security features; extended communication and real-time facilities; unexcelled functional commonality and integration; retention of CP-V's functionality and ease of use; a wider range of languages and services; the protection of the CP-V user's software investment; and the integration of CP-V capabilities into the total spectrum of Honeywell's information processing facilities.

Klee said he's going to try something for the second time next summer—hiring "kids" from CP-V schools and turning them loose to try to break and find bugs in CP-6. He's tried it once with a group from Northern Arizona State Univ. "They found 60 or so bugs and we fixed them."

Klee, who played a major part himself in the development of CP-V, sees his charter and that of the "cadre that did it before," as special. "It's great to have an opportunity to do something over again and do it right."

—E.M.

SOFTWARE

SECURITY IS A WARM PACKAGE

At only 200 or so IBM computer sites, a new breed of software package is being put to use. These packages, designed to provide data security, bear such names as Secure, RACF, Secure/IMS, and ACF2. They are all attempts to compensate for holes in operating systems that were never designed with the need for security in mind.

At virtually every corporate data center, measures to provide physical security against trespasses and physical attacks

are employed. They make entry into the computer center impossible except by those authorized to be in the machine room or rooms. And systems designed to be remotely accessible employ passwords and user ID's to control access to a system. But these newer packages build upon that, restricting an authorized user's access only to specific and predetermined data sets.

For example, there's Secure, a package from Boole & Babbage of Sunnyvale, Calif. It allows access to certain data sets

First they controlled access to systems. Now you can restrict authorized users only to selected data sets.

at only certain times of the day. It can restrict access to TSO only or to batch only, or it can allow a person to write a data set but not scratch it. And it has such options as execute only or update only.

Similar capabilities are provided by another package, Secure/IMS, which was placed on the market recently by Software Module Marketing of Sacramento, Calif. It allows a security manager to determine the parameters of who can do what from which terminal, such that data entry operators, for example, would be allowed to update only certain portions of the data base and not be able to access any other part. And again, access can be restricted to only certain times of the day.

In addition, however, these packages also produce an access history of activity against protected information. They provide an audit trail of access activity, admittedly an after-the-fact sort of protection, right?

"Yes, but normally no one is going to hit you the first time," says Software Module president Harris A. Herman. He explains that attempts to penetrate a system are usually made by a terminal operator at the urging of a friend. They will attempt to see what kinds of data they can gain access to, probing the system over a period of time. These probings, these attempts to browse, can be spotted and action taken in real-time. The security manager is alerted to the use of a bad password or to someone trying to access data without proper authorization—in which case the IMS master terminal operator is immediately notified.

Secure/IMS, which operates with IMS in the teleprocessing environment, logs every access to the data base from any terminal. "We even monitor the security manager," explains Herman. He says a security manager can, from his terminal, change the parameters under which someone can access the data base—per-

haps staying on-line beyond the terminal operator's normal 5 p.m. quitting time. "But the auditor will get a report, so he will know each time the security manager is changing parameters," says Herman.

"It's not at all difficult for someone to really hurt a company very badly with some fairly simple computer-type thefts," says Shawn McLaren, director of the Cambridge Systems Group, Cupertino, Calif. "So a lot of people are being pressured by their managements or their auditors to make a decision on a security product."

A security manager can, from his terminal, change the parameters under which someone can access the data base.

A major New York City bank recently went through such an exercise. It was not prompted by any federal requirements, according to a spokesman in dp. Rather, the dp auditing group reviewed some of the applications running, indicated that the level of security was not as high as they wanted, and so dp started a search for products available to them.

They looked closely at three of the four packages mentioned above (they don't run IMS) and settled on ACF2. Why that one? Because, according to the spokesman who asks not to be named, they thought it would require the least amount of time to achieve some acceptable level of security, and it would take the least amount of resources to get there.

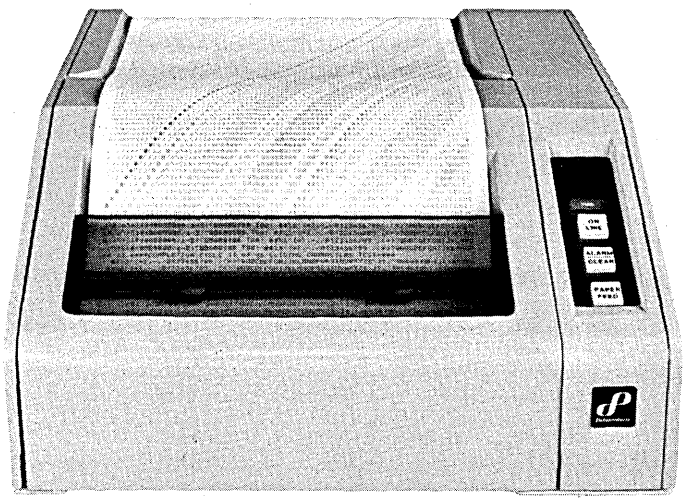
When asked whether any of these packages really provide security, users and vendors alike admit that security is a function of the care exercised by individual users. Write your password down where others can see it and the system is compromised. For this reason, some packages use no external password, but instead generate them internally.

"There are two questions here," says McLaren. "One is whether you can really provide security. The other is whether you can provide a semblance of security. For some companies, a semblance of security is good enough." It is enough, he explains, to satisfy an auditor who says you must have a security product in place. "Most auditors aren't capable of distinguishing between a really good security product and one that just says it's a security product."

Banks, of course, are not the only users. Manufacturing companies, oil companies, insurance firms, and service bureaus are also mentioned by the package vendors.

McLaren's company has been selling ACF2 for six months or so, and during that time has installed 20. He figures it will

KEEPS QUIET. WORKS HARD. FOR VERY LITTLE.



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NEWS IN PERSPECTIVE

have 25 out by year-end and an additional 75 next year. "The only limitation in the market, I guess, is the fact that there are only so many MVS sites out there." His package runs only with MVS.

The best seller to date is Boole & Babbage's Secure, of which some 130 are said to be installed. IBM has installed an estimated 20 of its RACF, which has been on the market the longest. Secure/IMS, on the market for only a few months, is only now being installed.

"I can see every computer system in the world having some sort of security package within the next five years," optimistically says David Tootill, senior software engineer at Boole & Babbage. The firm's product manager David L. Mosby notes that IBM doesn't enter a software market that doesn't ensure a good return on its investment. And IBM, he says, has made available in Europe an enhanced version of RACF.

Harris Herman foresees an active interest in data security by users in the late 1979-early 1980 timeframe, when he foresees legislation requiring some level of security in systems. It's a new technology and a young market that is only now getting set to take off. "People all know they have a security problem," says Herman. "But they're approaching it first, I guess, with physical security."

For now, it seems, these retrofits are the best that users can hope for. But Robert P. Abbott, president of EDP Audit Controls in Oakland, Calif., says vendors are working on new systems in which security has been designed in from the beginning. And they're going to be tough, he says.

"The biggest holes today are through the JCL," Abbott notes. Many changes to the operating system today are motivated by the wish to improve the facilities of the job control language, he explains. "That's where the weak link is right now, and it'll be that way when these new systems come out." Five years after these new systems come out, Abbott says, he'd like to have the intimate knowledge of how they work that he does of today's systems. "I'd be very interested in seeing whether the constant changes to operating systems, the improvements, the new releases erode the security that was in the first versions. That's where the problem is going to be." The reason, he adds, is that the people who do the maintenance on those systems will not be the same people who designed them, and thus they won't know why all those functions are in the operating system.

Abbott, who earlier had studied security flaws that exist in numerous operating systems for the Defense Department (February 1974, p. 90), says of access control software: "Some of them have as many holes in them as the holes they're trying to correct."

And a dp executive with a manufacturing firm admits that "a good systems programmer can get to anything. I don't think you can protect against that."

But this is perhaps best placed into perspective by Boole & Babbage's David Tootill: "The fact that you can't protect something completely is no reason not to make it difficult to penetrate."

—Edward K. Yasaki

SERVICES

HEALTHY CONFUSION

ADAPSO: the lines of demarcation are blurring, but the common denominator is service.

The Assn. of Data Processing Service Organizations (ADAPSO) emerged in its 49th Management Conference last month as an association of prosperous confusion.

The group reviewed its 1978 Annual Computer Services Industry Report, produced by Input, Menlo Park, Calif. The survey indicated growth and profit rates for 1978 will top those of '77. For the first quarter, ended March 1978, the

JOHN IMLAY—ADAPSO's new president.

annualized revenue growth rate of 18 public companies surveyed was 25% versus a 21% growth rate for 1977. Recent profit margins, the report showed, were 12.9% versus 12.3% last year. "Next year's annual report may well reflect a growth rate in the 20% to 22% range."

ADAPSO itself reported a surplus in its treasury and members were treated in

Orlando to one of the most sumptuous conferences in the association's history, complete with a boat ride around Walt Disney World and a banquet replete with Disney-style entertainment.

The 1978 survey showed computer processing services to be the largest industry segment in terms of revenue. Richard Crandall, association president and president of Comshare Inc., Ann Arbor, Mich., writing in the ADAPSO *Update*, described this category as "firms who procure computers and provide services ranging from raw computer time resale to high value-added, end-user applications that solve very specific problems. Traditionally these services have been thought of as batch, time-sharing, distributed processing, remote batch, and facilities management, but now the blend of processing types is so far along that any further attempt at differentation is sure to be meaningless."

And now the number of service firms offering hardware has further blurred distinctions. "I find it hard enough to describe what business we're in," said a representative of National CSS, Inc., which recently added hardware to its offerings (April, p. 186). "It's even harder to describe what it is ADAPSO represents." He agreed that service is probably the main common denominator.

Tom Campbell, product line manager, computer services industry, Digital Equipment Corp., speaking in a session titled "The Computer Services Industry and Hardware Manufacturers," said the immediate future for the services industry "is one of confusion, of overlap between oem's, vendors and service bureaus."

Stu Johnson, director of commercial marketing and planning, Burroughs Corp., said dealing with the services industry "is like trying to hit a moving target."

"Dealing with the services industry is like trying to hit a moving target."

Campbell didn't see "many new companies entering the computer services industry. I see mergers, acquisitions, product specialization and subsidiaries spinning off offering services."

Hal Pray, product planning and manager, small business systems marketing, Data General Corp., would like to see service bureaus "as suppliers of our systems. You add services, tailor the systems for small businesses." He mentioned four that do: Itel Corp.; The Computer Center, Falmouth, Maine, which sells Data General computers on a retail basis; Keydata, and Insurance Systems of America.

"It's working. It's a natural evolution in the type of business you offer today. Radio Shack, Heathkit, that's where the hobbyist goes. Small business is looking for more."

Joe Hayes, director, consultant relations for Honeywell, Inc., said his company is looking to the services industry for joint ventures, subcontracts on software development, and cooperative marketing strategies. "Work with us on joint bids, joint developments, and referral agreements."

All of the hardware manufacturers' representatives agreed that software is an important area for the services industry.

"We need help in the acquisition of applications products," said Bill Anderson, manager edp systems marketing for Control Data Corp.

"You can serve best with effective, efficient software," said Johnson of Burroughs.

"Software, that's where it's at," said Campbell of DEC.

Leon Weisburgh, president, Anstat, Inc., New York, writing in *Update*, went a step further. "The real strength of the data services companies . . . resides in their expertise in both specific applications and processing techniques. Producing a total product demands far more than processing transactions in a computer. It involves interfacing with management to determine their requirements, designing the product, and later modifying the product as management's needs change and technology advances."

Which is what some service bureaus are doing by offering hardware and installing complete turnkey systems they service and maintain.

"On your computer system or ours," proclaims Yellow Pages advertising of Advanced Data Systems, Inc., Long Beach, Calif., a small bureau servicing the greater Los Angeles area. With the increasing popularity of the minis, said Dennis Christy, ADS president, "we called on our existing customers and said, 'Hey, there's a thing out there called a mini.' We talked about their applications as related to a mini. We tried to make sure the hardware vendor couldn't get to them first and give them a low-ball price." He said when they got there first they were successful.

Cliff Asplund, president, Manus Computer Services, Inc., said his firm decided, "If we're going to lose some business to minis, we might as well lose it to ourselves." His firm offers services or turnkey systems on DEC computers. "In mid '76, we asked ourselves what business we were in. We decided, the business of information services for other organizations. We went from the defensive to the offensive. We offer customers time-sharing or in-house services. If he starts out with time-sharing he can later trans-

SAVING'S THE THING

"Don't throw anything away," urged Paul Armer, executive secretary of the Charles Babbage Institute.

He was talking to the ADAPSO conference in Orlando about the institute which was formed to preserve the history of computing. He said one problem the institute is running into is that too many things of historical value have been thrown away.

"The past has lots to say about the future. There will be a payoff in the morale area, too," said Armer.

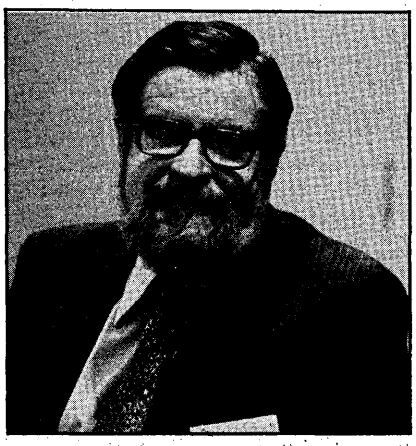
He said the institute was "the brainchild" of Erwin Tomash, chairman of Dataproducts Corp. "Tomash wanted to write a book on the history of computing. He took history courses at UCLA. But he decided his perspective was too narrow, that it wasn't appropriate to write it himself."

So he brought some people together two years ago in Los Angeles. They discussed some of the efforts of the American Federation of Information Processing Societies (AFIPS) in the mid '60s with the Smithsonian Institution but concluded these had fallen off in 1974.

"They concluded the institution needed one full-time person and I was the one," said Armer. He described its nature as ecumenical, scholarly, and fun.

He said the institution is looking to large manufacturers for support, but also will seek out small members and individuals on an associate basis, "more to involve people than to bring in money.

"Preservation is the top priority." ✲



PAUL ARMER—"Preservation's the thing."

fer his software. He's deferred his capital decision."

Manus offers services to the distribution industry and has a management system for law firms to which Asplund said they expect to tie in word processing later this year.

His was not the only mention of word processing. Pray of Data General advised the services industry that small business is going "to want word processing as well as data processing."

Campbell of DEC said, "Office automation, that's the new hot button."

Manus' Asplund cited one of his firm's biggest problems: "Finding qualified people is ghastly." Discussions over lunch and in the corridors indicated that keeping them is equally difficult. There was talk of prizes and incentive programs, some of which worked and some of which didn't.

Sessions on Personnel/Retention, Personnel/Stress Management, and Personnel/Compensations drew crowds that spilled out five deep into hallways.

Another interest-drawing topic was IBM. Larry Welke, president, International Computer Programs Inc., chairman of the session with the manufacturers, said, "Many were invited. Five responded." IBM wasn't one but was a topic for discussion at the session.

Questions inevitably came up about IBM's reentrance into the services market and about what the giant is doing in the OEM market. On the services side the consensus was, IBM will be back but the question is where.

Data General's Pray chose to field the oem question. "I had Series/1 marketing responsibility in New England. I think Series/1 has been a major disappointment to IBM . . . IBM does not have an oem policy . . . Now we see the 8100 (Data Processing Div.) and GSD's (General Systems Div.) 38. The Series/1 is in big trouble. There's open warfare between the divisions now."

Crandall, in *Update,* touched on IBM in services. "If anything is as sure as death and taxes it is that IBM will reenter services in some fashion; this will undoubtedly be the latest forecast of doom for computer services. To the contrary, analysts oriented toward fundamentals will conclude that computer services is an industry that has its own place in the sun with unique values in its products and real economic benefits to its markets. No single event will deal a serious blow to the health of the industry . . . not minis, not micros, not IBM."

Users were not overlooked at the ADAPSO conference. A session on user groups turned into a real give and take with the audience seeming to represent as much experience in their formation as did the speakers. There was agreement that it's difficult to get one going, but it's worthwhile. "Promise them they're going to learn something new, entertain with a quality speaker, make it as memorable as possible, and maintain some point of control," said Margle Davis, national coordinator for General Ledger Training, Management Science America, Inc.

"The benefits far outweigh the other thing, doing it by phone," said Lee Mulder, marketing consultant, Keith Bates & Associates.

John Imlay, Jr., president of MSA and elected president of ADAPSO at the conference, brought along a special guest who has made an appearance at a number of MSA user group meetings, a tiger named Mabel. This would follow Davis' "Make it as memorable as possible" advice.

A. S. Blankenship, Jr., president, Data Processing of the South, Inc., Charlotte, North Carolina, was elected senior vice president and Lawrence J. Schoenberg, president, AGS Computers, Inc., Mountainside, N.J., was elected treasurer.

—Edith Myers

AIRLINES

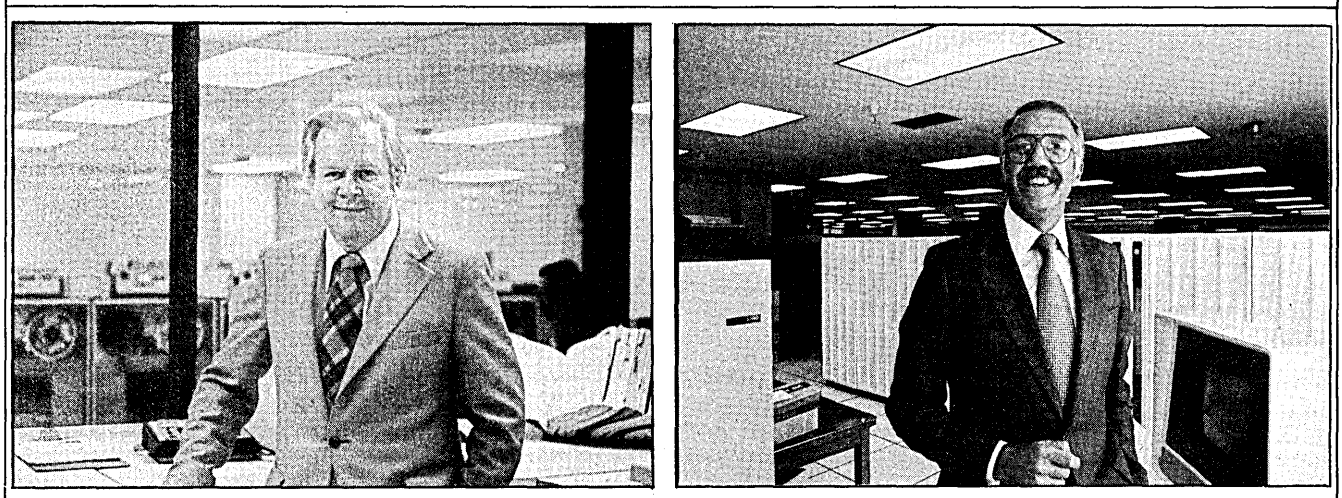
GETTING TO KNOW YOU

Proposed merger of two airlines could mean major economies for dp departments.

The proposed merger of the nation's eighth and ninth largest airlines has their data processing departments thinking of how they'll live together. So far, the answer is wonderfully.

The two companies, Continental Airlines and Western Airlines, are about the same size. Western in its last fiscal year reported revenues of $755.6 million and Continental $715.5 million. Both are based within a few miles of each other near Los Angeles International Airport. And the data processing organizations of both face some hefty expenditures for hardware and software development, hastened by the phenomenal growth in passenger traffic. Airline industry sources estimate that 280 million passengers will board the nation's aircraft this year, compared with 240 million in 1977.

Although directors of both airlines ap-



WESTERN's Walter Bambrick (left) and Continental's Mauro Weissman. How to plan for a merger.

proved the merger in September, approval still is needed from the Civil Aeronautics Board, which isn't expected to act until the spring or summer. But the data processing chiefs of both airlines have been meeting since last spring to talk things over.

What Mauro Weissman, vice president of data systems management at Continental, and his counterpart at Western, Walter Bambrick, vice president of data processing and systems, look forward to doing among other things is to share the cost of massive upgrades to their reservations systems.

For instance, computers bear a heavy load in keeping track of the many kinds of fares offered by the airlines, some differing even by flight number. And new codes are being devised to accommodate more airports than are now possible with the traditional three character code (LAX for Los Angeles) and to accommodate more airlines than with the two character codes being used (CO for Continental). And upgrades to their reservations systems could take from 50 to 100 man years of development work at a cost of $1.5 million to $3 million for each airline. Together, they estimate the cost would be cut in half.

Until recently, Continental handled its own and the reservations systems for 12 other airlines on three IBM 360/65s and it used two more 360/65s and an IBM 370/155 for commercial applications and backup. In September, it installed an Amdahl 470V/6, which Weissman says has five to six times the power of a 65 in reservations applications. He said the Amdahl acquisition is the first step in a planned conversion to fourth generation equipment which might also involve two IBM 3033 or two Amdahl 470 V/7s or V/8s should the merger with Western go through, and perhaps an IBM 3031 or 3032.

Western does its reservations processing on two 370/158s that provide about 1.3 times the power of a 360/65. Bambrick says this is a stop-gap upgrade for the 65s and soon must be replaced by later generation machines. Last September, Western had been given access in its Los Angeles dp center to an IBM 3031 as part of an agreement it had with the Mexican government to set up a reservations system for Mexico's airlines. But Bambrick said the most Western could do with the 3031 was to test programs on it, since it will be dedicated to the Mexican government's reservations project.

Continental installed an Amdahl V/6 with five to six times the power of a 65 in reservations applications.

Continental's Weissman, a tall, dapperly dressed native of Chile who majored in political science at the Univ. of Chile, and Bambrick, a tweedy one-time Ottawa journalist who first learned the computer business in the RCAF, envision many other benefits in a merged dp operation.

When it acquired the flight control systems company, Dixon Speas, from Planning Research last July, Continental became the world's largest supplier of flight planning systems, a business it's been in 10 years. Its 58 airline customers throughout the world buy up to 70,000 flight plans a month from Continental. Western, on the other hand, uses Delta Airlines' system through a telephone link to Atlanta.

Western is developing a real time crew management system while Continental still is developing such a system. It also is installing a new payroll system that will be linked to the crew and flight attendant systems to pay the group automatically. Continental hasn't such a system. But Continental has a highly cost effective materials management system and Western has nothing comparable. It also has an automated schedule change in a system which reduces clerical efforts drastically, and Western is about to start on a similar project. Western, however, is well ahead of Continental in implementing conversational programming.

And Western last May moved to a three-story and basement building built to its specifications near Los Angeles International Airport (October, p. 137). The building was designed to accommodate an expansion of the computer equipment and people. Western now has almost twice the capacity it needs.

The good news about a merger, says Bambrick, is that it wouldn't take away any jobs because of the expanding workload of both companies. "Nobody would be laid off and any necessary tightening would be accomplished by attrition. And attrition is prevalent in the data processing business."

—T.M.

SEMICONDUCTORS

SEMINAR IN SILICON VALLEY

Japanese semiconductor manufacturers attempt "to increase mutual understanding."

Some very uncomplimentary charges have been leveled of late by American semiconductor manufacturers against their strongly competitive Japanese counterparts, and relations between the two sides have been deteriorating rapidly. Last month, in an effort to improve this

ATSUYOSHI OUCHI—"The U.S. semiconductor industry has captured an estimated 62% of the total worldwide market."

situation and to "increase mutual understanding," an all-day seminar in California's Silicon Valley was sponsored by eight major Japanese semiconductor companies.

The Japanese, attempting to show that they pose no threat to the American industry, cited statistics that indicate the dominance of U.S. manufacturers in world trade. "The U.S. semiconductor industry has captured an estimated 62% share of the total worldwide market," said Atsuyoshi Ouchi of Nippon Electric Co., Ltd. "Furthermore, in the IC (integrated circuit) field, where the most advanced technology is being developed, the U.S. has as high as an estimated 70% share."

He added that American semiconductor manufacturers sell much much more of their products in the Japanese market than do the Japanese in the U.S. marketplace, both in terms of dollar volume and percent of total market.

The speaker also defended Japan's government-funded research into the VLSI (very large scale integration) technology, noting that "the subsidy represents only a small portion of the total research and development costs." The majority of the costs are being borne by private companies, he said, and the subsidy is to be repaid when the project is completed. Additionally, he explained, the national project is limited to development of the basic technology; participating companies must fund their own production expenses when they get into the manufacturing phase.

Ouchi pointed to government support for R&D into computer and semiconductor technologies in the U.K., France, and West Germany, and noted that the U.S. Defense Department has proposed a $200-million grant for the development of a VLSI-like technology.

"In view of this widespread practice," he said, "singling out Japan for unfairness is, in itself, unfair, discriminatory, and contrary to American notions of 'fair play.'" And he added that patents developed by the Japanese from their VLSI project would be available for licensing by foreign manufacturers.

But the concern of the American manufacturers over the growing prowess of the Japanese competitors was sharply sketched by Charles E. Sporck of National Semiconductor Corp. He traced briefly how the "Japanese protectionist and anti-free trade policies and biases" earlier had wreaked havoc on American steel and color tv producers.

"We are determined that a similar fate will not befall us," he said. "To date, the impact of these policies has not been seriously felt by the American semiconductor industry, but intentions must count for something. The Japanese have targeted the semiconductor industry for domination in the 1980s," he continued, and U.S. companies must take steps to protect themselves.

Sporck was critical of a two-tier pricing system in semiconductors that he said the Japanese maintain—artificially high domestic prices with which they can absorb all their overhead costs, plus lower export prices that merely cover incremental variable costs.

"And with this two-tier price structure," he explained, "when a cyclical downturn occurs and demand weakens in the domestic market, the Japanese, with heavy fixed obligations and guaranteed employment and further government-provided export incentives, are obliged to flood the export markets with products at bargain prices until their (production) capacity limits are reached."

"Singling out Japan for unfairness is unfair and discriminatory."

So far, Sporck added, the U.S. side has played fairly. It has maintained an open market and a free trade philosophy. American firms have generously licensed technology to Japanese firms. The government here has allowed imports at consistently low tariffs, has allowed the Japanese to make equity investments here, and has even allowed the outright acquisition of a U.S. semiconductor firm.

But in return, he said, the Japanese have maintained consistently higher import tariff and nontariff barriers such as a "Buy Japanese" policy "at most Jap-

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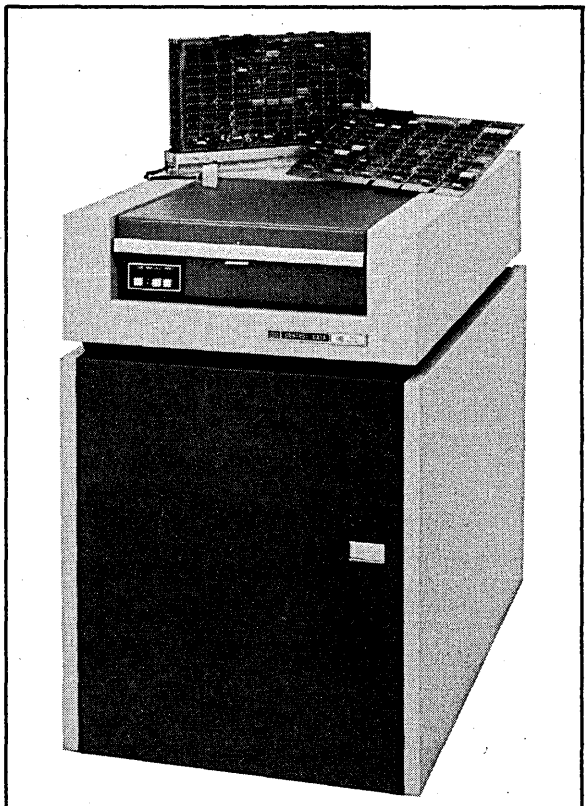

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anese companies." He called for the elimination of the two-tier pricing system and of trade and nontrade barriers in the Japanese market, as well as free access under appropriate licenses to all the Japanese VLSI research results.

Sporck, in his presentation, suggested that the two sides meet again in one year to review progress made in the intervening period. Robert Noyce of Intel, in his talk, reiterated that idea. And Toshihiko Kubo of Hitachi, who made the opening and closing remarks, suggested that it was not only a good idea but that the meeting next year be held in Japan—as though to intimate that the Japanese delegation felt a bit uneasy in the States.

—E.K.Y.

MEETINGS

ROOM FOR STARTUPS

Market for small entrepreneurs in micro field characterized as an "ungainly adolescent," but doing very well in school.

The Astrodome's 30,000 car parking lot looked mighty empty last month when the Mini/Micro show played the Astrohall in Houston. But although attendance was in the neighborhood of 4,200, a random sampling of booth workers turned up only one comment that came near to being negative; and, while underattended, most sessions were well prepared and of high quality.

A Tektronix booth worker noted that his company's booth location next to the entrance may have helped. So, too, could their large, attractively outfitted booth. "Look at those inquiries," said another exhibitor, showing a two-inch high stack of embossed forms. "And those are just from today's visitors."

"There aren't many people here," noted the most dissatisfied vendor talked to, but he added, "I'm still up to my ears in spec sheets for the disk drives."

A rather unexpected exhibitor was the Internal Revenue Service, in town to tell users how they can file W2 forms on magnetic media.

There's still room for the entrepreneur in the small computer marketplace, but without good business planning even the man with the better microprocessor-based, time-shared mousetrap is running head on into Chapter 11 of the Bankruptcy Act. Planning was a major point stressed in three sessions running under the theme of "Computer Business."

You must know what you want, and plan accordingly, noted George Snively of Meta Financial Corp., a financial consulting firm. Develop a plan. Ask "what if?" then revise the plan, he said. Continue the process until there are no more what ifs, then toss the plan because you have certainly missed a what if. "Hope for luck," Snively concluded, for "luck is what happens when preparation meets opportunity."

For the entrepreneur seeking outside funding, a business plan is mandatory, according to Phillip J. Sabol, of Corporate Planning and Finance, a business consultant. Whether you're seeking equity capital from investors, or debt capital from lending organizations, the person with his hands on the purse strings will want to see a well prepared business plan, Sabol said. He'll want to make certain it makes good business sense before he'll part with funds he's responsible for. Your plan, which will probably take 1½ to 2 man months to prepare, and will turn out to be a 45 to 60 page presentation, should cover eight major topics: your company, the industry, the market, operation, organization and management, operating plan, critical risks and problems, and financial plan.

Sabol said a venture capitalist offering equity funding looks for three major things in evaluating prospective investments: management, market, and method (does the plan make sense?). He'll also be asking a few secondary questions, such as, "how much can I make (or loose)?" "how do I get my money out?" and "who else is in the deal?" In general, Sabol feels venture capital isn't for the new company; it's better to wait until the company has a good track record so it's in a better bargaining position.

Significant advances in software development seldomly are used on minis or micros.

A lending organization is much better for the first timer, according to Sabol. Here, the loan officer also wants a business plan. He'll look for the quality of management, the existence of management information systems, market trends, and management structure. Far down on his list, and contrary to what a CPA may tell you, is the certified audit, Sabol says.

Entrepreneurs also offered their wisdom. "I am an entrepreneur," said Randal Walti of Randal Data Systems, Inc., which makes small business sys-

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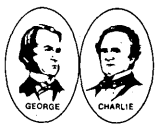

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tems, "speaking to you under the assumption that you are fellow entrepreneurs." Describing the market as "an ungainly adolescent; awkward, pimples, voice changing, but doing very well in school," he went on to comment on the many opportunists in the field. "I think they will mostly fall by the wayside from lack of preparation for success," he added.

Growth is critical to the entrepreneur. He either stays in business with the good deals, or goes out with the bad, said Bill Goodwin of The Data Companies, a systems house. Being wise enough to walk away from the bad (read unprofitable) deals was stressed by both Goodwin, and David R. Black of David R. Black & Associates, software consultants and turnkey system maker. Black, who has done business with a number of vendors, warned newcomers to watch out for the manufacturer's salesmen because they'll tell you anything you want to hear. "Our loyalty is to our customers, not manufacturers," he said, adding that his company requires manufacturers to demonstrate all claims. It also adds a page to the manufacturer's contract, stipulating all of the salesman's claims. To date, said Black, none of the manufacturers has refused to accept the addition as part of the contract.

Goodwin and Black both offered advice on how to build up business: have a prosperous image, with a nice office that lends a look of stability. You'll need a demonstration room, work areas, and an administration area, Goodwin said. Black suggested involvement in professional organizations that can help build an image, find sales leads, and locate talent for your staff. He summed up by stressing three points: never trust salesmen, make a plan, and learn to say "no" to bad sales.

In a session provocatively titled "How to Cut Software Development Costs," Dr. Ned Chapin, a software specialist with InfoSci, pointed out that purchasers see the low price tag on computing iron, but often fail to realize the total cost will be about five times higher when the software is added. The significant advances in methodology over the last decade seldom are used on minis and micros, according to Chapin. Structured techniques provide many benefits, including cost reduction, faster implementation, greater reliability, and reduced maintenance costs, Chapin said.

Representatives from several vendors discussed how the right tools—both hardware and software—can aid implementation efforts. Tom Miller, of Texas Instruments, noted that there is lots of jargon floating about, but few tools. He advocated the use of a systems programming language, allowing the programmer to concentrate on the problem, not the hardware. An engineer by training, Miller suggested the use of "software instrumentation" akin to the hardware designer's bench of electronic instruments. Such tools should improve debugging aids beyond breakpoints and dumps. Monitoring the program's execution can tell its author which routines require fine tuning.

—Bill Musgrave

THE MICRO MOMENTUM

The first Federal Computer Conference in Washington last month drew more than 5,000, exceeding expectations of the conference organizers, who had predicted a turnout of 3,000 to 4,000. "I don't think they'll have to even market it," a government attendee observed. "It looks like the show is marketing itself."

Indeed, most exhibitors not only signed up for next year's event but have booked additional booth space. Next year's conference—again to be held Nov. 7-9 at the Sheraton Park Hotel—will fill three exhibitor halls compared with this year's two, suggesting that the show proved itself to companies reluctant to take a chance on an unknown expo.

Federal dpers, who have never had a major show of this scope in their own backyard, have needed one, mainly because their limited travel budgets have kept them away from such national events as the National Computer Conference.

The three-day conference program's first day included a full day of "Professional Enhancement" workshops on topics such as privacy and security, data communications, and programmer productivity. The next two days featured concurrently running Management Workshops, Product Workshops, and Issues and Answers sessions.

An issues and answers session, on ADP Standards, developed into a debate between Charles Lecht, president of Advanced Computer Techniques Corp., and Computer and Communications Industry Assn. president Jack Biddle over the

Amdahl asks federal users to demand rigid programming rules so that programs can be made portable.

proposed I/O channel interface standard, which is expected to be adopted soon as a FIPS (Federal Information Processing Standard). Biddle called the proposed standard the user community's "first shot" in refusing to be "victimized by manufacturers" any longer. Speaking from the floor, Eugene Amdahl, chairman of Amdahl Corp., questioned Lecht's opinions about the I/O interface standard. Amdahl said he was more interested in "the facts."

The user community's first shot in refusing to be victimized by manufacturers any longer.

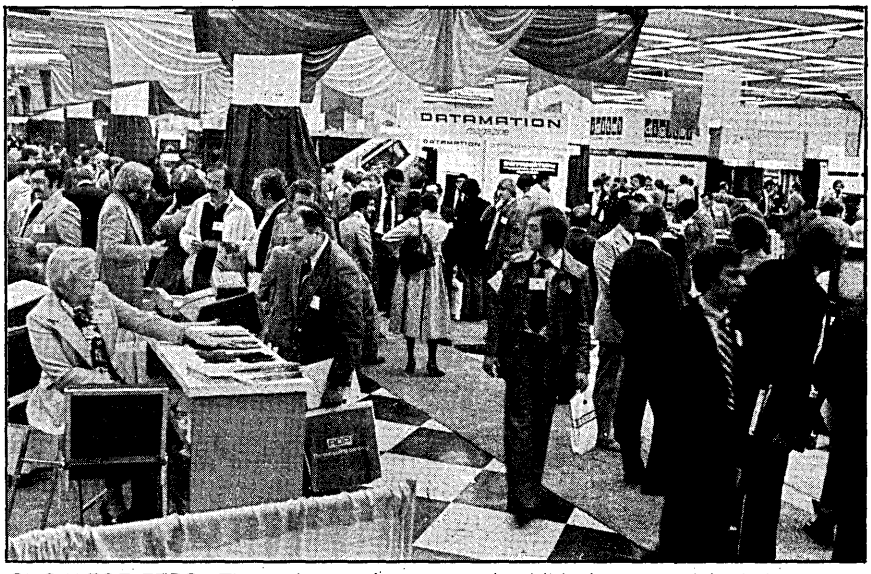
At a "Government Day" session, the keynoter, Richard M. Harden, Special Assistant to the President for Information Management, told of the new White House Office of Administration's office automation activities. Those plans include an electronic mail venture being worked on at MIT, and a system being developed for tracking legislative proposals, called CLASS (Congressional Liaison Activity Support System), which will tie in all Cabinet-level departments and some independent agencies. He said it should be operational by the time the new Congress convenes.

Keynoting the "Industry Day" luncheon on the second day was Gene Amdahl, who commented on how microprocessors are fueling the technological revolution. This microprocessor momentum, he claims, "feeds activity in the large system area as well." The reason for this, he said, was that "almost every transaction you might handle locally has some global significance."

In juggling between the minicomputer and maxicomputer environments, Amdahl urged federal users to follow two rules of thumb. One was rigid programming rules so that programming will be portable. This is suggested, he explained, because "applications almost always outgrow the minicomputer and its simple architecture." Such program portability, he further argued, can provide the flexibility to avoid complications that might arise in dealing with future architectural changes.

The second user rule of the road, according to Amdahl, is to maintain rigid control over file structure. That's necessary, he insisted, because the information in those files "is the lifeblood of the application." Tight control of file structure is also necessary, he said, because of the capacity limitations of the peripherals normally available on the mini or microprocessor.

Amdahl also cautioned that following this advice "won't eliminate all of the trauma of growth, but it will help to minimize it."

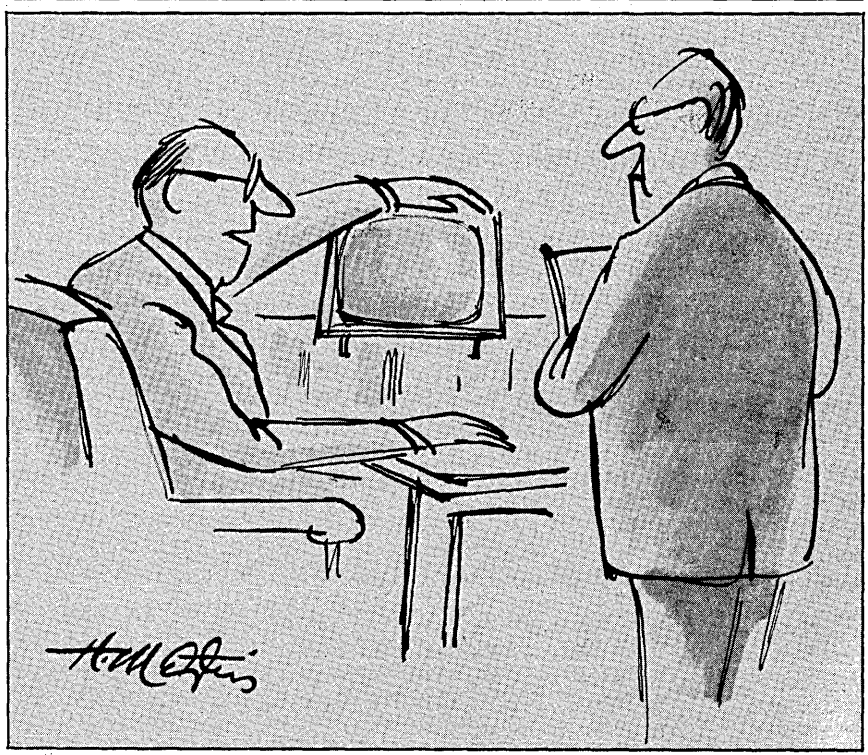


SHOW FOR FEDS—Three-day conference and exhibit drew surprisingly large turnout of 5,000 in Washington, D.C.

With respect to "improving the efficiency and effectiveness" of present systems, Amdahl cited programming as being "the most pressing, yet the most complex task in data processing." Two-thirds to three-quarters of programming hours on a large scale system are spent on program maintenance because, he said, the applications and the applications environment are continually changing. This is why he stresses the user must have the capability "to structure programs."

The dp revolution, said Amdahl, "is moving faster than we can conceptually keep up with." For users to keep pace with that revolution they will need "to keep things as orderly as possible in this day of transition."

—Sarah Rolph



"This? Oh, this is the display screen for my electronic junk mail." © DATAMATION®

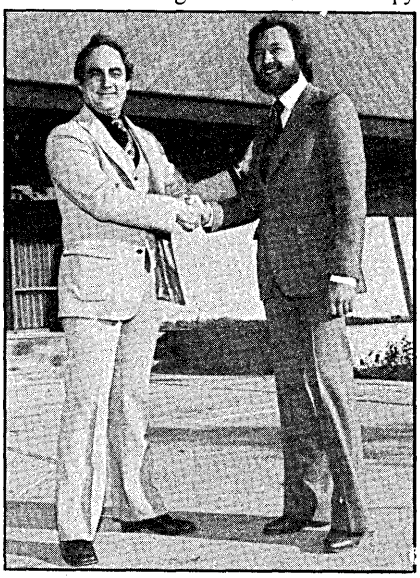
BENCHMARKS

MEMORY SALE: California Computer Products, which was reported to be asking as high as $45 million for its Memory Products Division, finally settled for $25 million in cash from Xerox Corp. for most of the division. Late in November, the company was negotiating with several firms for sale of its floppy disk operation, which Xerox didn't want, at a reported price of about $1.2 million. A major contender at the time for the floppy disk operation was Thomson-CSF of France. Calcomp, which was profitable in fiscal 1978 for the first time in four years, needed the money to reduce its huge long-term debt of about $37 million. It will keep its end user disk operation, which buys IBM 3350-compatible drives from Hitachi and Nippon Peripherals.

PERTEC AGREEMENTS: Pertec Computer Corp. sold its 16% interest in Tally Corp., the Kent, Wash., printer manufacturer, to the West German industrial concern, Mannesmann AG, for close to $4 million and agreed, separately, to acquire certain assets of North American Philips' small business computer operations in the U.S. Under the agreement with North American, Pertec will undertake service and software support of the 2,000 small business computers installed in the U.S. by Philips' Data Systems Div. and employ some 260 maintenance, sales and software people at Philips' 12 sales and service locations in the U.S. Pertec also will have nonexclusive rights to the company's existing and future software developments for the systems. The agreement is for seven years, but could be extended. Under the Tally agreement, both companies have agreed to discontinue existing and pending litigation. Pertec has been unsuccessful in persistent attempts to acquire the printer manufacturer.

SHEDDING AN IMAGE: Addressograph-Multigraph Corp., with a new chairman, new headquarters and a new name, offered to acquire Microdata Corp., the minicomputer manufacturer. The acquisition would involve an exchange of stock worth about $48 million. Microdata makes small computers and peripheral equipment. Addressograph-Multigraph, which moved earlier this year from Cleveland to Los Angeles, home of its new chairman Roy L. Ash, changed its name to AM International, Inc. at a stockholders meeting last month in Los Angeles.

TWO PI MOVES: Two Pi Corp., wholly owned by U.S. Philips Corp., moved to a 55,000 sq. ft. headquarters and manufacturing facility in Santa Clara's Marriott Industrial Park. The company, which has 70 employees but expects this to climb to 125 in the next eight months, will occupy



35,000 sq. ft., claiming the remaining 20,000 sq. ft. as it grows, said Dr. Jared A. Anderson, president. (In this photo, he is seen with Mark L. Siegel, left, vice president of operations in front of the new building.) Two Pi makes the first minicomputer that is compatible with the IBM 370, in terms of using such IBM peripherals as printers, data entry terminals, and disk drives. National CSS is among the service bureaus that are offering business systems based on the Two Pi computer. The company will maintain its Advanced Projects Group in Tustin, Calif., where expansion plans also are under way.

TERMINALS FOR AVIS: Avis Rent-a-Car System will be installing new terminals for its Wizard of Avis car rental telecommunications network. The company awarded a $4.5 million contract to Harris Corp.'s Data Communications Division to develop, manufacture and maintain the new terminals which will accept magnetically coded major credit cards and will have crt screens for operator prompting and response. They'll be called "Wizard II" terminals.

ISRAELI SUBSIDIARY: Israel's largest computer manufacturer, Elbit Computer Systems, Ltd., has formed Elrand, an Israeli subsidiary that will provide software services and develop software packages for export. The company will be owned jointly by Elbit and Rand Information Systems, Inc., a San Francisco software and services company. Elrand has acquired ILTAM, a data processing and information sciences company, which had been owned by the Israeli government.

TOP DEPARTMENTS: Stanford Univ., Carnegie-Mellon, and MIT have the No. 1, 2 and 3 top computer science departments, based on the results of a survey by assistant professor James Bitner of Univ. of Texas. He asked computer science department chairmen to rank the academic standing of 21 institutions in this field. Sixteen chairmen replied. The average ranking for the others were as follows: Cornell, Berkeley, Illinois, Texas, Purdue, UCLA, Yale, Michigan, Wisconsin, Maryland, Ohio State, Harvard, Penn State, USC, Washington, Penn, Northwestern, and Michigan State. Stanford achieved a 2.12 point standing, followed by 2.18 for Carnegie-Mellon and 2.87 for MIT. Michigan received a ranking of 17.87. ✲

THE PCM'S: IBM'S NEW COMPETITION—OR ARE THEY?

There just may be enough honey in the jar to satisfy both the bear and the bees.

by Ralph Emmett, European Editor

Today, IBM has a backlog of more than four times the computing power it has ever shipped. Or, put another way, IBM's backlog is greater than the total computing capacity ever used on this planet.

The hungry response of IBM's users to its new 303X family has left the company overwhelmed with production, marketing, and installation challenges. It has much to sell, and little it can install.

For once, IBM seems to have attracted more orders for a new series than it can comfortably handle. As a result, lead times quoted have been in excess of two years for the machines.

Current estimates indicate that IBM so far has received between 12,000 and 14,000 orders worldwide for the 303Xs. This colossal figure suggests not only that IBM's users are eager for more capacity, but that the market has been ready for some time. Once more, as with its minicomputers, IBM seems to have failed to adequately forecast the demand for its products.

So now the giant is seen to be moving with unseemly haste as it embarks on urgent programs to expand both its manufacturing capacity and field support. In addition IBM is looking outside the company to secure the extra memory it cannot build itself.

With a two to three year waiting period staring them in the face for 303Xs, IBM users are beginning to grumble. The long delivery schedules are endangering commissions and exposing on-order accounts to competitors. Such is the size of the IBM backlog that new plug-compatible mainframe (pcm) suppliers are emerging almost on a daily basis to capitalize on this remarkable opportunity.

As much to its own surprise as anybody else's, the industry's Topcat has been joined by an alley full of "copycats," blatantly and successfully duplicating its designs to offer IBM clones at cut prices.

Early this fall, a group of fervent IBM watchers gathered in London to discuss this new phenomenon. Against the assumption that Topcat didn't get where he was by sharing his milk, they looked to see how he would deal with the competition.

Though the experts did cover IBM's crucial hunt for new markets—word processing, data communications, and satellite systems—they seemed more interested in charting IBM's way ahead in the big machine area.

This was the second appearance this year of Infotech's State of the Art Conference, "IBM: The Next Five Years," and its predominantly American panel of experts. Indeed, IBM-watching is proving so popular with audiences that the Infotech event could turn into a touring roadshow, with Japan and the U.S. as added venues.

It will come as no surprise to anybody that our merry band of watchers were bullish about the computer industry, and particularly about the IBM bear, what with its honeyjar overflowing with a $multibillion backlog.

At the end of their deliberations one conclusion could be: "IBM plug-compatibility has become beautiful," a phrase coined by an ex-IBMer and Morgan Stanley analyst, Ulrich Weil.

During the last decade the computer business has largely been about IBM and the Seven Dwarfs, that is, Burroughs, Univac, Honeywell, and company. Now it looks like the arrival of some surprising fresh characters will lead to the probable decline of some old ones.

This is the good side of the copycat phenomenon as far as IBM is concerned. With the sudden flowering of so many IBM 370-compatible alternatives, a user will think twice before locking himself into another manufacturer's system.

Already the industry has gone some way to fulfilling Gene Amdahl's prophecy that all manufacturers will have to adopt IBM's MVS as an operating system standard in order to survive. The costs of developing alternative architectures to IBM-majority gauge can be prohibitive. An example is offered by the big German mainframer, Siemens, which has now abandoned its old software ideas and got together with Fujitsu of Japan to develop an IBM H Series and MVS equivalent for the 1980s.

The pcm erosion of IBM's large machine base by firms like Amdahl and Itel has forced IBM to respond with a spate of new and less staid products, as well as hefty price cutting. If the pcm's did not exist as a buffer, IBM's ferocity could be seen as directed purely at its traditional competition—i.e., the Seven Dwarfs. Perhaps with some justification, the Dwarfs could tackle IBM on monopoly abuse. But with the pcm's in the middle—competition IBM says it encouraged to enter the market—IBM has a defense against the charge of greedy monopolist. Like the classic film scene: the big bully swings his arm, his opponent ducks, and the guy behind gets slapped!

There have been persistent rumblings from sources that Control Data is finding things a bit hot at the big machine end and wants to pull out to concentrate on its services business.

Honeywell has scraped its top-end Series 60 Level 66/85, and its long-term earnings projections by analysts are gloomy enough to feed press speculation that it could pull out of the computer business altogether. This in turn has produced unforced and unsolicited statements from its French partner, Cii-Honeywell Bull, that it could continue on its own if necessary. But observers of the French company know that during recent months the company has been pushing hard to forge a merger with Europe's two other big machine suppliers, Britian's ICL and Siemens in West Germany.

One source says that the French are not adverse to a "little" political pressure. According to a private study circulating through Sperry Univac in France, ICL is going to need some $1.2 billion over the next five years to consolidate its recent growth impetus. ICL, which recently became a member of the $1 billion sales a year club, says privately that it is set for 15% to 20% a year growth and $2 billion in revenues by 1983.

The company can either go to the marketplace or the British government for the money to help it take off. Because of French government overtures, money ICL gets from the British government could be conditional on some sort of merger with Cii-Honeywell Bull.

ICL's new boss, Chris Wilson, told DATAMATION that ICL didn't need any partner to achieve its aims and wouldn't seek one.

The massive response to the 303X itself suggests a high demand for IBM's systems relative to competitors' alternatives. But the 303X line is "substantially devoid of significant new technology required to service the massive data bases coming in the next 5 to 10 years," accord-

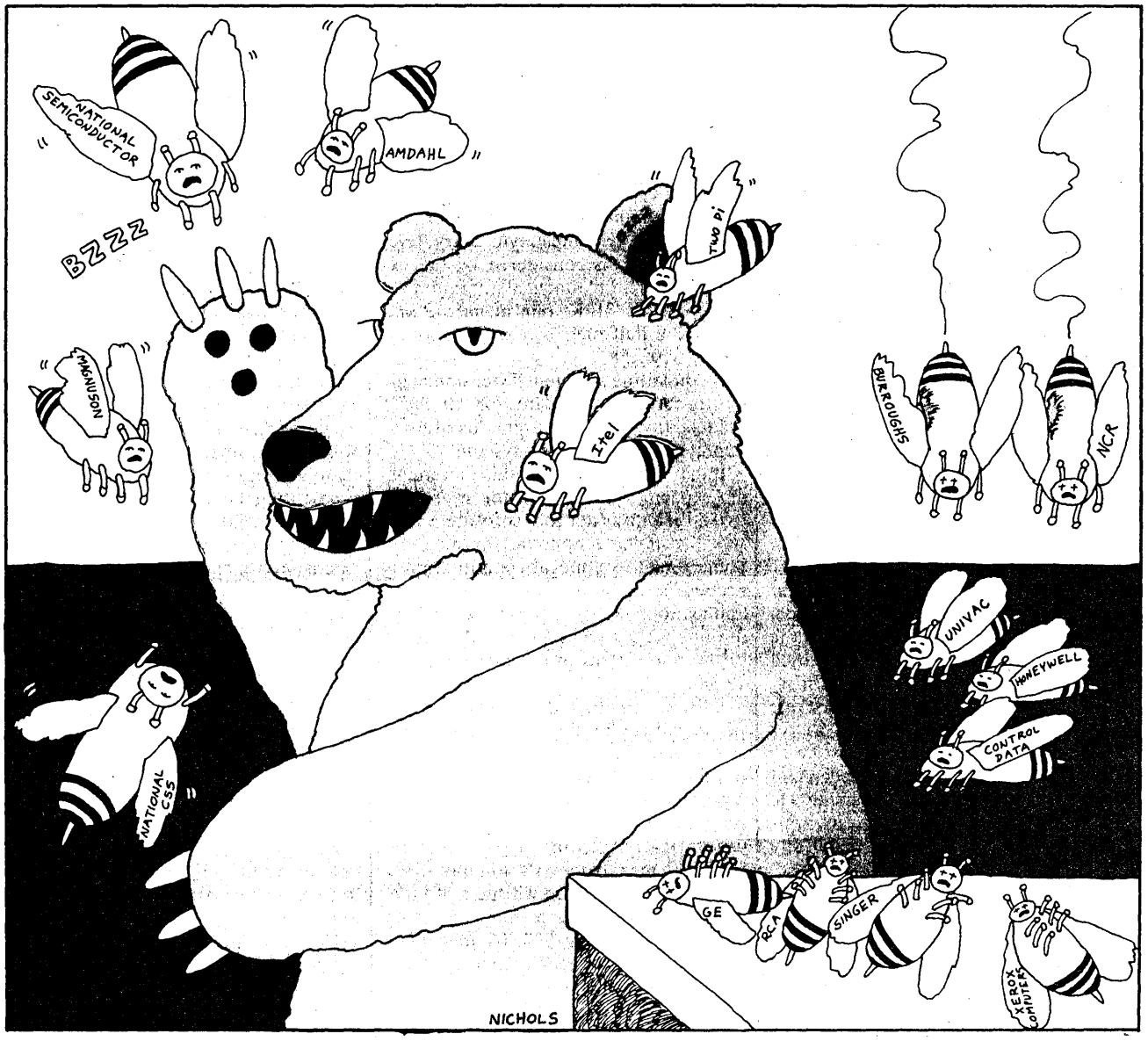


ILLUSTRATION: © MIKE NICHOLS 1978

ing to Bill Easterbrook, analyst and v.p. at Kidder, Peabody & Co.

One Infotech delegate described the 303X as: "An aging star on its last face lift." Put another way, the 303X seems to offer little more than a 370/158 or 168 with increased and more affordable programming.

So what's the attraction? For IBM the 303X family is a gapfiller and evolutionary bridge leading to its H Series (380?) systems of the 1980s. But to users it seems to signify an acceptance of, perhaps even a contentment with, the 370 architecture, and a hunger for more processing capacity now.

"Basically, all users crave more MIPS (millions of instructions per second) for the dollar. That's what it's all about. IBM's backlog tends to suggest that users prefer IBM's MIPS to anybody else's. And, what's more, IBM has just discovered that they've been ready for them for years," said another delegate.

According to a May 1978 *EDP Industry Report*, there are some 15,300 IBM installations of 370/138 level and above that are prospects for a 303X machine. If estimates of between 12,000 and 14,000 orders for the 303Xs are to be believed, IBM looks set to take much of this base with it into the 1980s.

Of these 15,000-plus prospects, around 50% aren't truly IBM accounts and IBM is anxious to get them back into the fold. IBM 360 users, and those with 370/145, 155, and 165 systems, either own their equipment or are in the latter stages of fulfilling third party leases. This is the sector that "copycats" like Amdahl are very keen to hit.

According to the experts, the three 303X systems—3031, 3032, and 3033—and attached processors will remain IBM's main thrust into large scale dp markets until 1981, when the H Series or IBM 380 will be announced.

By 1980 IBM will have turned over its 370 base completely, and users will have come off lease and rental.

The trend to buy machines outright, first noted at the end of the 370 era, has reached a climax with the 303Xs.

According to estimates, over 75% of the 303Xs will be purchased. This means that IBM has steady revenue coming in during the next three years, and need not fear obsoleting the 303Xs in 1981 when all purchases have been made.

Though IBM doesn't want to depress the morale of its sales force, which is pushing for increased production, IBM wants its 303X revenues spread out neatly over the next three years, and so is in no hurry to install the backlog.

According to Easterbrook, "Even if yield and production constraints could be overcome quickly, it would be dangerous to meet promptly the bubble-like demand for the 303Xs in 1978 and 1979 because user overcapacity could result by 1980, weakening the reception of new products expected to be introduced in 1981 and beyond."

Expert opinion tends to suggest that

IBM is becoming alarmed at the amount of capacity that users are buying. Some sources say IBM won't have caught up in production until 1980, and so, for the moment at least, IBM finds itself in the unusual position of needing the pcm's to suck up excess demand for MIPS. At least that way users stay within an IBM environment and can be enticed back at some later date.

The key to IBM's future product moves lies in its operating system for the 1980s, MVS. IBM is believed to have spent over $2 billion developing it over the past 10 years.

"From a total of nine 'official' IBM operating systems in place during the first generation of System/360 software, there are now only four in the second generation," National CSS v.p. R.U. Bayles explained. These four—DOS/VS, VSI, VM/370, and MVS—will by 1981 have been pruned down to just MVS.

DOS/VS currently has the largest installed base. One source estimates that 40,000 plus are running one or more forms of the software. IBM is committed to maintaining upward compatibility with MVS and reportedly has at least one task force working on automatic DOS/VS to MVS conversion, Bayles said.

Bayles thinks that VM/370 has been and continues to be a thorn in IBM's side. He says it has survived numerous attempts by IBM to relegate it to less than fully supported status.

Despite the fact that VM/370 is costly to run in conjunction with DOS/VS and MVS and is not completely compatible with them, it has a hard core of adherents.

Users of the software are very vocal in their praise of VM/370, which they say can do interactive program development and execution services at substantially better price/performance than MVS.

IBM is expected to remove the thorn by improving MVS capabilities. Currently only about 25% of IBM users at 370/158 level and above worldwide have MVS (some 35% in the U.S.). According to a private DATAMATION survey last year, around 65% of users worldwide (70% in the U.S.) will have MVS by the end of 1979.

Of 370/158 and 168 users polled in the same survey, 23% said that they were planning to implement the operating system with its microcode extension, MVS/SE. On a 370/168 the use of MVS/SE is claimed to improve performance by about 14% for about a 3% increase over the combined price of the central processor and memory.

Some 27% of users polled said they were considering MVS/SE. Only 13% said they weren't interested in using it.

According to Dan O'Brien, marketing manager at Memorex, IBM's installed cpu power expressed in MIPS has grown in excess of 30% a year. He said that 303X now offers almost a 50% reduction in monthly rental per unit of cpu speed, and projects another reduction of the same magnitude in the early 1980s.

One of the main advantages for 303X users of increased capacity for less cost is that they can now move comfortably to MVS. The smaller of the three models, the 3031, has a two megabyte entry level memory. This is considered by the experts to be a more practical minimum for MVS than the 512K, one megabyte and one and a half megabyte options found on the 370/158.

By providing a System Extension facility for MVS as standard for all 303X models, IBM is openly urging its users to migrate to the operating system.

It can be seen from all this that memory capacity is a major factor in productivity. Like IBM's network software, VTAM, MVS has a large appetite for memory. Some four to six megabyte minimum is needed to sustain heavy time-sharing applications. And according to reports, throughput can be as much as doubled if further increments of two megabytes are added.

O'Brien claimed that memory price per megabyte has been declining at 20% a year, and he expects it to be at a $70,000 per megabyte level by next summer. But reports indicate that IBM may be planning to slash its main memory prices dramatically from their current $110,000/megabyte mark to about $35,000. Already there are whispers of independents preparing to hawk memory around at as little as $20,000/megabyte.

Main memory capacity increased tenfold on the 370s, and O'Brien thinks it will double again on the initial H Series machines in 1981.

In case of sluggishness and lack of enthusiasm to migrate to the 303Xs by 370 users coming off lease and rental, IBM is expected to offer one other major inducement. O'Brien pointed out that IBM has traditionally utilized the attachment capabilities of new disk drives to encourage the migration of cpu users to IBM's latest cpu and software package. "IBM employed a tripling of capacity and doubling of data rate to encourage migration to its 370s . . . the new 100 megabyte disk drive announced for the 370s was precluded from attachment on the 360s," he explained.

He guessed that IBM would come up with a 635 megabyte, thin film head disk file, for use only on the 303Xs. He explained that IBM is also working hard on its 1,000 megabyte ("Apollo" disk file) thin film head on thin film media, for introduction as soon as it can.

One interesting aside from O'Brien was that by 1985 there would be 100 million megabytes of on-line storage in the U.S.—enough for every person on this planet to have 60,000 bytes on-line.

Most of the experts stressed that the pcm's would have something of a honeymoon period during the next three years, mostly by taking up the slack at a time of high dp demand.

But according to the panelists, IBM's increasing use of microcode and the eventual release of H Series will wipe out all but a few of the adaptable ones.

The pcms' 370 and 303X "copies" all run on IBM's software, which by American law is available to all comers. So as a counter IBM is gradually burying its functional interfaces and extensions to its operating software in the hardware and unbundling the rest. As was mentioned earlier, these microprogrammed extensions greatly improve processor availability to user application programs, and IBM is patenting them for all it it worth so they can't be copied.

IBM is expected to reveal microcode extensions on all parts of its 303X range: cpu, I/O channels, console, and storage control, as opposed to using fixed logic embodied in circuit chips.

According to A.D. Little consultant Frederick G. Withington, IBM will announce such microprograms for I/O channels next year. Even more crucially, Withington says that in 1980 users will be able to execute high level language statements in microcode. Then, gently, IBM's users will be induced to develop their programs in these languages and allow IBM to modify its 303X cpu's by subtle degrees which pcm's will find hard to duplicate.

Currently microcode is hardly used on big mainframes, but a forecast from Kidder, Peabody & Co., is that by 1987 IBM's big machines will be for the most part microcoded. IBM will continue to license all microcode releases and charge monthly fees. Unbundled systems programs overall will become a massive revenue earner for IBM.

Easterbrook said that at present IBM software product revenues account for about 3% of total sales. "We believe as much as 40% to 50% of IBM's revenue could be generated from software products, or from microcoded functions now performed by software, within the next 10 years," he estimated.

One other source puts IBM's software revenue for unbundled applications and system programs at $15 billion a year by 1986. However, in the short term, that is until 1981, Ulrich Weil of Morgan Stanley says, "We can expect H Series to follow the principles of the 370 architecture . . . but represent a major clean-up."

As well as the I/O and high level language microcoding features mentioned earlier for the "matured" 303X line, H Series is expected to get distributed microcoding of communications and data base-related functions: 32-bit addressing (versus 24 bits on the 370s) and better

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You can install MSI in only 10 minutes. Your production systems will not be interrupted since MSI installs just like any batch job (no modifications are made to your system). After MSI is installed, you execute an operator command ("S MSI") from the console of each system — MSI is now completely operational and is protecting your data with full integrity. It is completely transparent to your users.

To arrange for a *free trial*, simply call Rosemary at the number given below. She will send you either MSI BASIC, MSI or both (as you request), along with a set of straight-forward installation instructions. After you've tried MSI, I think you'll agree that $1,000,000 worth of software buyers know a good thing when they see it!

I would like to express my thanks to all of our customers and friends who have used our program products over the years. I can assure you that we will honor your trust by continuing to offer effective and price-worthy software products in the future. Allen Services Corporation appreciates your business.

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- **PROVIDES DATASET INTEGRITY ACROSS MULTIPLE SYSTEMS**
  Most importantly, MSI provides DATASET INTEGRITY across multiple systems in a manner consistent with "SYSDSN" within a single system. Previously, installations tried to minimize this integrity problem through complicated job scheduling rules, elaborate control schemes, or software changes that introduce additional RESERVE overhead. Generally all of these techniques are imperfect, and the burden of responsibility is placed on users, operators, programmers, or production control personnel. MSI returns this responsibility to the SYSTEM -- which is not prone to human slip-ups.
  MSI applies to all aspects of the system - including BATCH and TSO.
  By ensuring integrity, MSI gives installations more job scheduling flexibility. This permits the total workload to be balanced more evenly among the systems, thus IMPROVING OVERALL THROUGHPUT.
  YOUR DATA IS YOUR MOST VALUABLE COMMODITY. DON'T LEAVE ITS INTEGRITY TO CHANCE, LET MSI PROTECT IT.
- **ELIMINATES RESERVES**
  Based on installation specifications (which can be easily altered), MSI converts selected RESERVE requests (which lock out an entire device to all but one system) to multiple-system MSI requests (ie., to ENQUEUEs which are known to all associated systems). In this way, MSI protects data as surely as before, while allowing other systems continuing access to the volume.
  MSI is able to eliminate as many, or as few, RESERVES as an installation wishes. Thus, in addition to its integrity function, MSI actually improves overall system performance.
- **CAN BE INSTALLED IN 10 MINUTES — WITHOUT EVEN AN IPL**
  It is possible to implement and start MSI in an active system — insuring integrity from the moment it is started — in as little as 5 to 10 minutes. This 10 minute figure does not include the time necessary to absorb the documentation, which we estimate to require an additional 20 minutes.
  MSI installation requires NO MODIFICATION whatsoever to your existing system.
- **TYPICALLY MSI USES LESS THAN ½% ADDITIONAL OVERHEAD**
- **NO ADDITIONAL HARDWARE REQUIRED**
  MSI does not require a CTC or any other hardware paraphernalia. Your system, as it exists today, is sufficient.
- **THIS IS NOT A SECURITY PACKAGE**
  SECURITY AND INTEGRITY ARE NOT THE SAME
  A **security** package prevents unauthorized users from accessing sensitive data.
  MSI is basically an INTEGRITY package (actually even more) -- it prevents users (TSO, BATCH, or whatever) on different systems from clobbering data or using incompletely updated data due to inadvertant simultaneous access.
  REGARDLESS of whether or not you already have, or have a need for a SECURITY package (to prevent unauthorized access), you ALMOST CERTAINLY NEED THIS INTEGRITY package (to prevent data destruction or inadvertant mis-access).
- **PROVIDES FEEDBACK ABOUT ITS OWN PERFORMANCE AND BENEFITS**
  MSI includes a group of powerful subcommands that allow you to measure MSI's own performance and benefits, and to suggest ways of adjusting MSI control information to optimally suit your installation. FOR EXAMPLE, MSI will tell you how many times your data WOULD HAVE BEEN IN JEOPARDY WITHOUT MSI's control.
- **TRANSPARENT BOTH TO USERS AND OPERATIONS PERSONNEL**
- **SUPPORTS CONFIGURATIONS CONTAINING ANY MIXTURE OF MVS, SVS, MVT, VS1 OR MFT SYSTEMS**
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  This new, optional, component of MSI facilitates the ability of batch operators and TSO users to *determine* the (inter-system) *cause* of dataset conflicts when they occur.

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system design for privacy and security.

Weil says the key to both the H and lower E Series (IBM 370/115 to 138 replacements) is that IBM is "almost totally automating the manufacturing process for both through the use of very advanced, highly customized production equipment." This in turn will push manufacturing costs way down below 370 and 303X levels, he said.

With the use of advanced new "packaging" technology based on very dense multichip modules, H Series should be able to deliver from 6 MIPS to 10 MIPS internal performance compared to the 303X's top line 5 MIPS.

Also, thanks to denser, less costly RAM memory (Weil says 32K chips), anywhere from 2 million to 50 million bytes of directly addressable memory will be offered, probably at no more than $30,000 a megabyte, experts feel.

All of these goodies plus the high profit leverage IBM can expect from its software policy will see IBM growing contentedly at an average of 12% a year, the panelists felt. On top of this the level of investment in compatible operating systems will become too high for most pcm's (and some Dwarfs) to stay in the game.

What of users? Currently the pcm's are forcing IBM to offer them better for less. This is the first real break they have had.

Alan Duncan, an unusually outspoken computer expert from Britain's Barclays Bank—one of IBM's biggest European users—said the reverse has been true over the last 12 years: "We've been manipulated into paying more for less," he stressed. Duncan emphasized that "under most circumstances IBM's objectives and the user's objectives are diametrically opposed."

Duncan said that he, like other users, had been fooled by IBM, and that IBM's profit and growth had been achieved at the expense of the user. He said that 12 years ago most computer managers could confidently advise their employers that the cost of a commercial unit of work would be halved by 1978. "Investigation reveals that the cost of that same commercial unit of work is up 50% on its 1966 figure," he claimed. He went on to say that during the same period IBM had more than met its profit and growth estimates.

Duncan, technical advisor for the bank, said that IBM had forced its users down the big machine road. They need complex operating systems and spend a third of their time just processing IBM's systems software. He explained: "It is interesting that the processor today may spend one-third of its time not in the user's programs. Would you buy a car and give it back to the garage two days a week for the vendor's use?" ✲

IBM took a giant stride in computer technology to create the new System/32.

The result can be a giant stride in efficiency for your organization.

IBM System/32 is a new breed of small computer.

It's compact in size. Affordable in price. And as a general business computer, it's exceptionally well suited to a wide range of organizations. These include firms from about $5 million to $100 million in sales, as well as units of larger companies.

But that's where its smallness ends.

Because in creating System/32, IBM thought

Turn the page

on a very big scale.

And System/38 can have a large impact in stepping up the efficiency and profitability of the organizations which use it.

Big computer functions in a small system

System/38 is designed to let any organization enjoy the productivity advantages of online applications typical of large-scale computers.

Specifically, IBM sought to incorporate in a simple-to-operate smaller system advanced functions that make work station applications easy to design, install and maintain.

Functions like an integrated online data base with data base management. Single level storage. Simplified computer-aided programming. Total system management through a central control facility. Real-time inquiry and update. Online training capability. Data integrity and security.

A tall order, you'll agree.

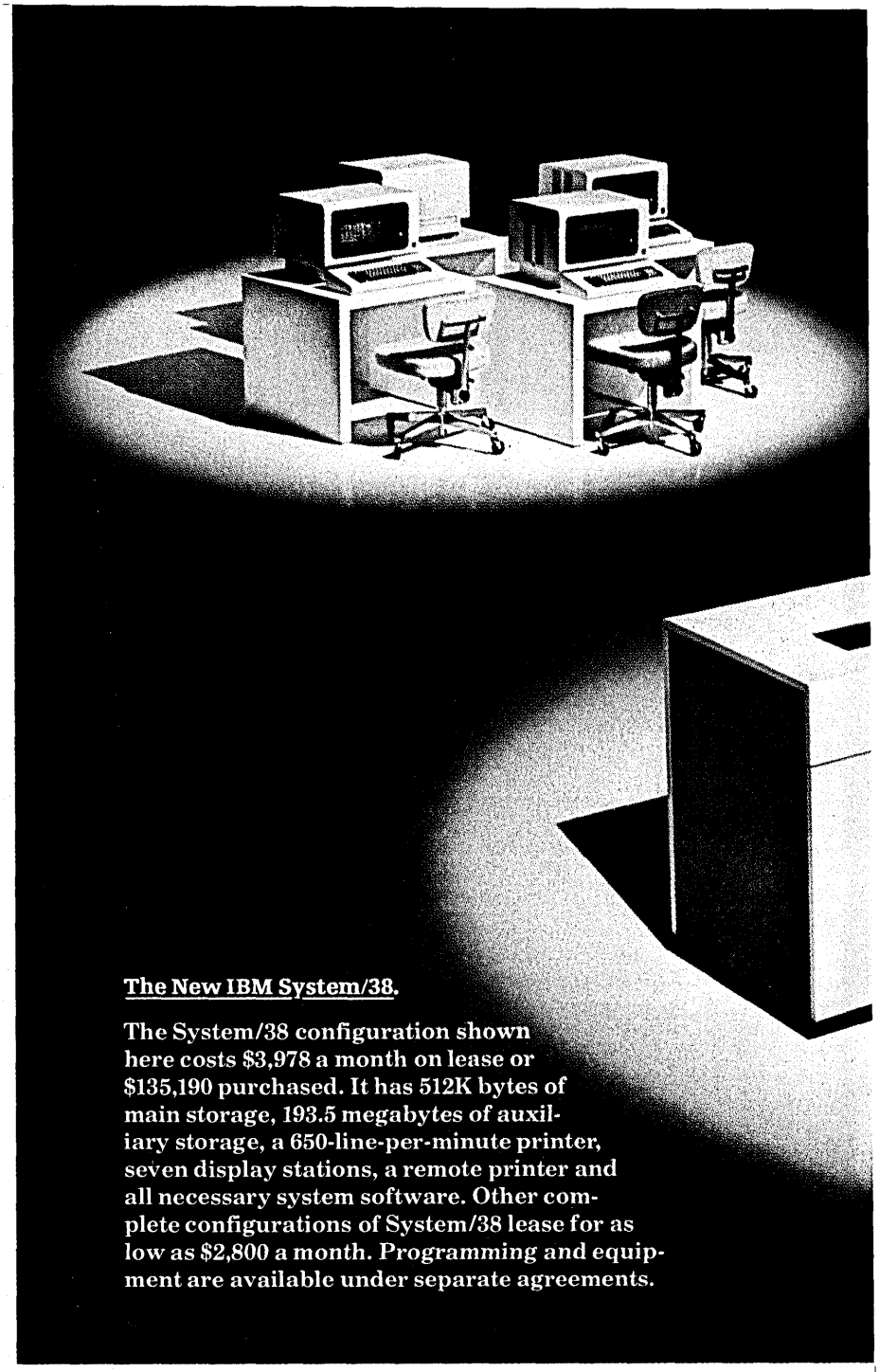
Especially for a system leasing for as little as $2,800 a month.

Yet IBM System/38 has *all* the features listed above – and more. Not just some of them. Every one of them.

Together, they provide what may be the most attractive package of computing benefits ever offered to business.

What can System/38's functions mean to your organization?

Let's review them briefly.



The New IBM System/38.

The System/38 configuration shown here costs $3,978 a month on lease or $135,190 purchased. It has 512K bytes of main storage, 193.5 megabytes of auxiliary storage, a 650-line-per-minute printer, seven display stations, a remote printer and all necessary system software. Other complete configurations of System/38 lease for as low as $2,800 a month. Programming and equipment are available under separate agreements.

Distributed online work stations

One of the biggest advantages of System/38 is that users don't have to come to the computer to get the vital information needed in their jobs. Instead, the computer comes to them where they work, by means of online display stations and printers called work stations.

As many as 40 local work stations – as well as additional remote work stations – can communicate with System/38 interactively. They can bring the power of the computer to people doing totally different jobs. At executive desks, in departments, plants and warehouses. Across the hall or across the country. And the same up-to-date information will be available concurrently to all authorized users for real-time inquiry, change or update.

The value of System/38 in keeping everyone up to date can scarcely be overestimated. It can mean hundreds of thousands of dollars saved in operating efficiencies.

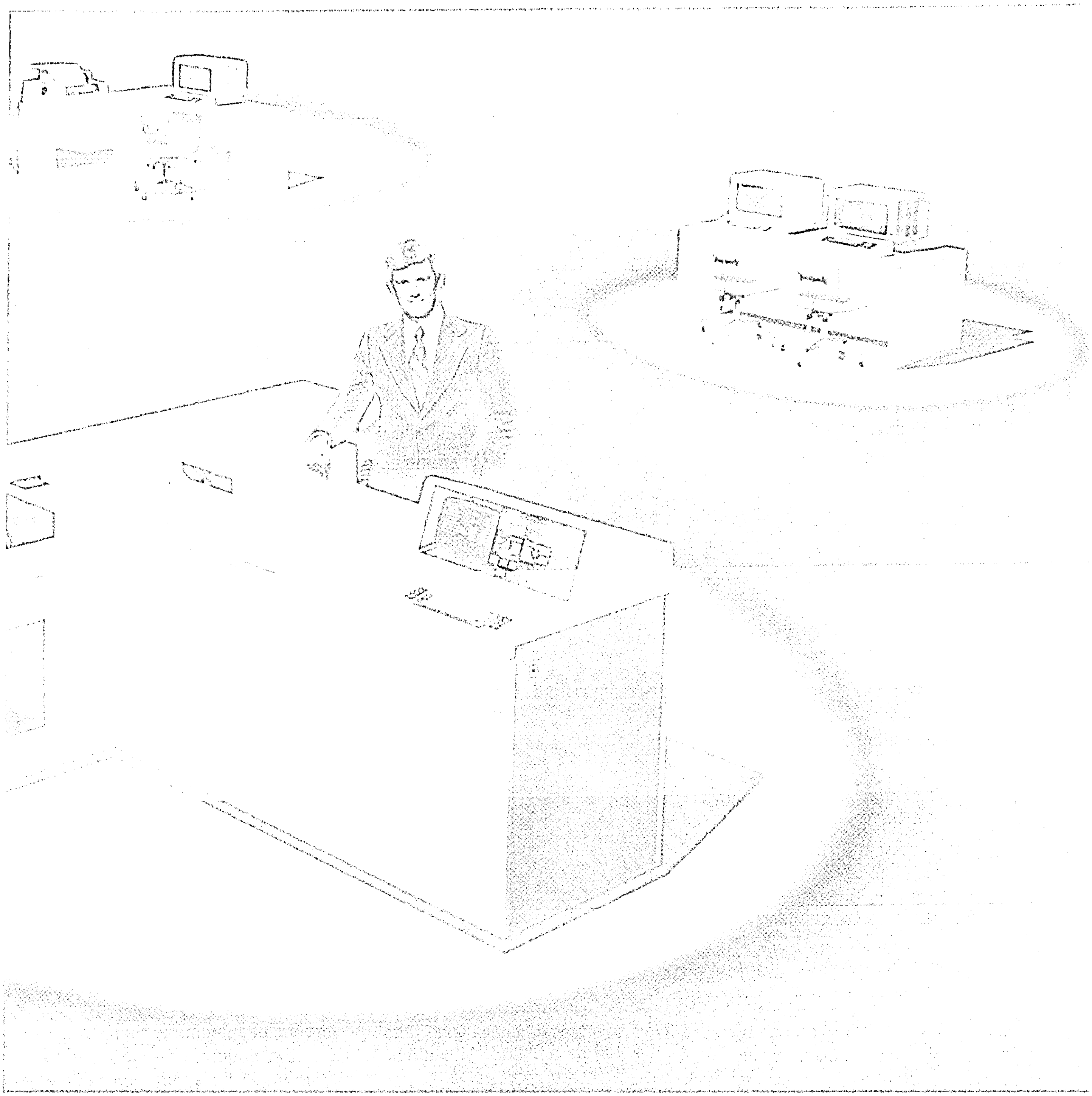
A self-managed system

There are two aspects to computing: processing the data itself and managing the system that processes the data. System management can consume a great deal of expensive time and talent.

System/38, however, has a remarkable internal facility that eliminates much of the complexity of system management. Called the Control Program Facility, it monitors and manages system activity – including the flow and processing of data. As a result, users and programmers are free to concentrate on their own jobs, rather than worrying about how the computer performs its tasks.

Central online data base

Instead of having separate data files for each application – one for or-



der entry, for example, and another for inventory – System 38 lets you combine data for related applications into a single data base.

agement facility presents data in whatever format and sequence is required by the user.

Every user can be in touch with the same central source of informa-

shipping, accounts receivable and inventory. Duplicated and conflicting data can be eliminated. Infor-

mation

plified and

Thanks to advanced

many functions

require programming

version of the

guage, programmers

freedom to tailor processing

and flow of logic to the

application.

affected. This means that a programmer is no longer burdened with manual coding, card punching and waiting for test time and results.

In short, System/38 can mean greater programmer productivity. Streamlined programming like this benefits both the programmer and the user who want results fast.

Single level storage

Another feature that makes for operating efficiency is an extension and simplification of the virtual storage used in larger computers. In System/38, IBM has taken this technique a big step further with the concept known as Single Level Storage Management.

It treats *all* storage – both main and auxiliary – as a single unit or level and automatically keeps track of everything stored in it. Users, particularly programmers, no longer need be concerned about program size or location or any other aspect of storage management.

Online training

As more employees become involved with the computer, training them in its operation becomes an important task. With System/38, your people can get "hands on" experience at live work stations, using actual data files – without fear of record destruction and without interfering with the use of the system by others.

And the prompting and guiding messages flashed on the screen can aid both trainees and regular users alike. There is even a "HELP" key for use whenever further assistance is needed.

Data integrity and security

System/38 provides an extensive range of security levels. They vary from simple basic precautions to an advanced plan which assigns a personal identification code to every user.

Under this plan, the information any individual can access, change or process is carefully designated and restricted according to a user "profile" stored in the data base. In a multiple work station environment, with large numbers of users, this kind of positive individual control can be particularly helpful in assuring the integrity and security of computer data.

Conversion from System/3

Conversion to System/38 from an IBM System/3 can be aided with conversion utility programs. They allow the user to do as much as possible of the conversion process on his System/3 prior to installation of System/38. These programs are designed to make conversion easier, faster and less expensive and protect the user's investment in software.

Growth with IBM support

Once installed, System/38 is designed to grow with your business. New capacity and components – such as added work stations or additional storage – can be attached quickly and easily, without recompiling existing programming to accommodate the new configuration. And most maintenance can be performed while the system continues to operate.

Moreover, wherever you're located – in midtown Manhattan or mid-Nevada – you know that IBM support is responsive. The IBM commitment to customer service goes far beyond simply supplying hardware. IBM *stays* with you.

With totally new architecture and dramatic advanced functions, System/38 can be an investment that will pay dividends for many years to come. To get the full story on System/38 and what it can do for you, call your nearby IBM General Systems Division office. Or write P.O. Box 2068, Atlanta, GA 30301.

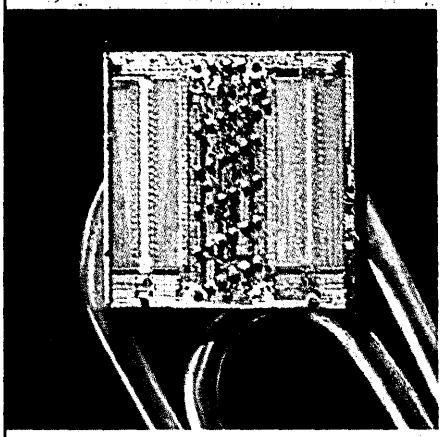
Behind System/38: a technological breakthrough

At the heart of the major price/performance improvements of IBM System/38 are two pace-setting technological advances.

The system's memory uses a new silicon chip technology with up to 64,000 "bits" or elements of information per chip. A speck of silicon less than one-tenth of a square inch in size, the 64K chip is the most densely packed chip yet employed as a standard computer component.

And in the processing section itself, System/38 uses a logic chip with up to 704 circuits – more than 25 times the capacity of the processor logic chips employed in IBM System/3.

But that's only part of the story. A totally new architecture, incorporating advanced features new in themselves, was developed for System/38. Through it, it became possible to shift some of the customary software of the computer operating system to internal handling by System/38 itself. In turn, the operating system took on functions that ordinarily call for programmers to write special instructions.



Shown about five times actual size, a 64K chip is depicted on a paper clip.

System/38 thereby relieves programmers of much tiresome and repetitive work. And the convenience of compiling, testing and "debugging" programs at work stations – interactively and in real time – can mean greater programmer productivity and faster computing results.

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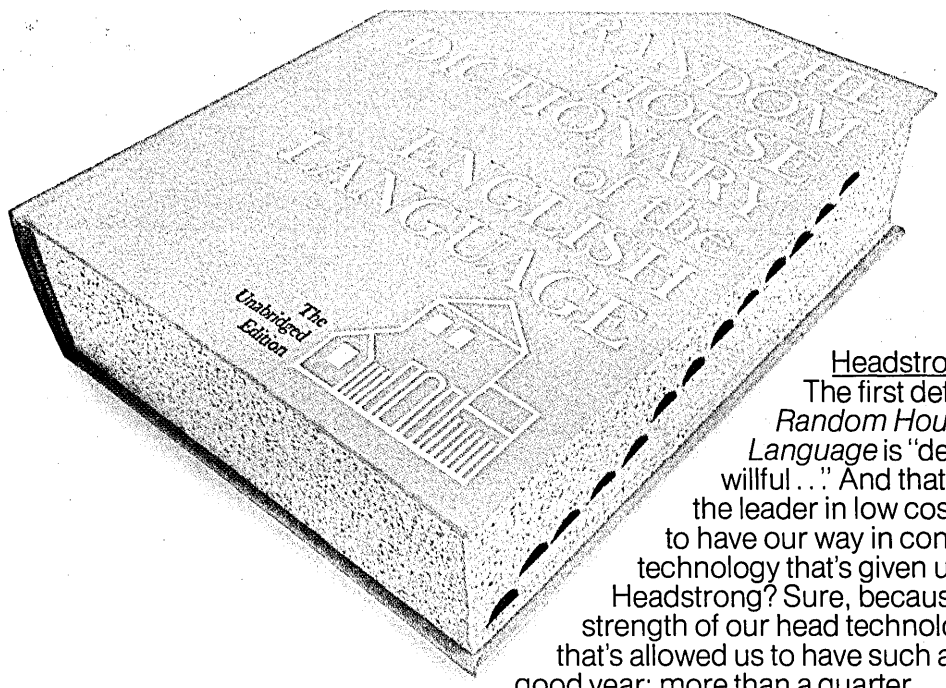

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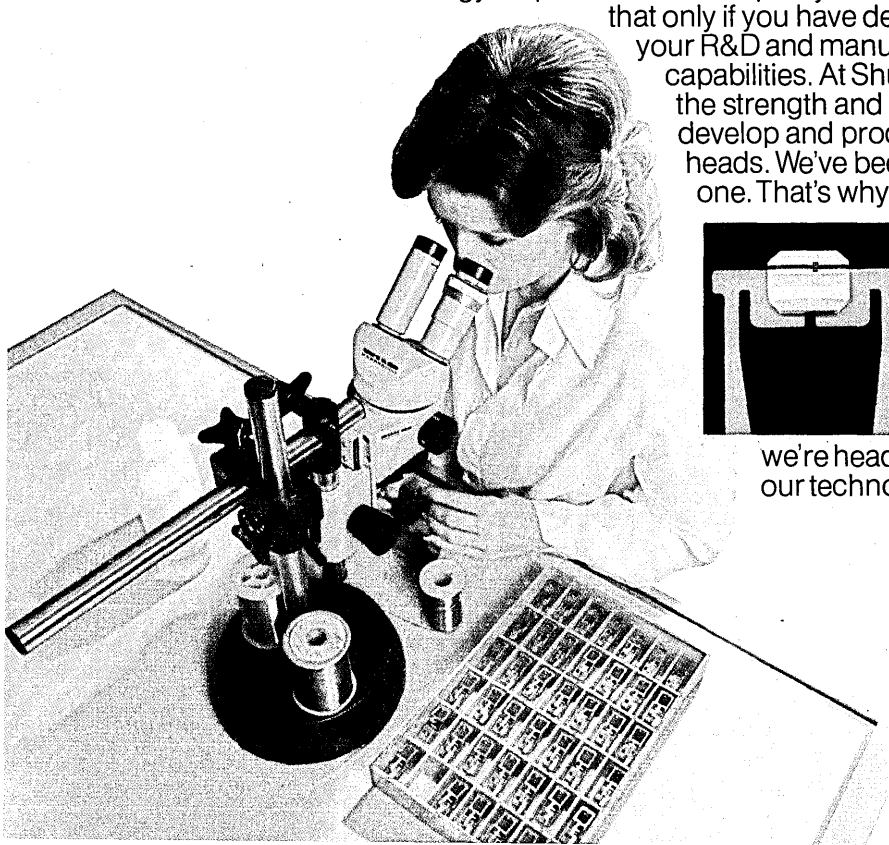
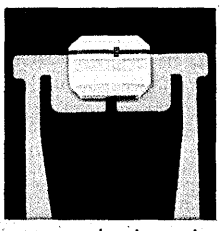
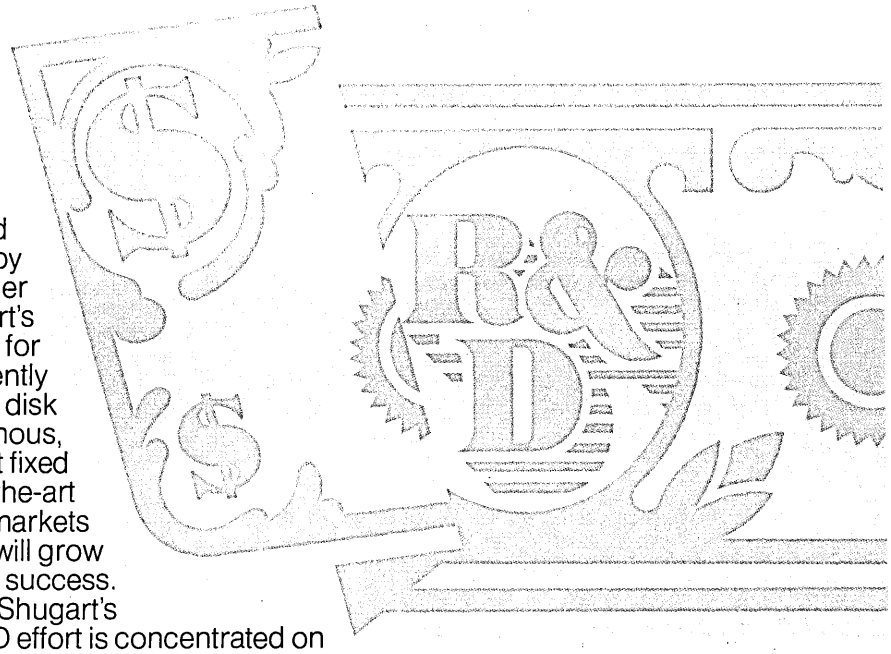
The first definition of headstrong in the *Random House Dictionary of the English Language* is "determined to have one's own way; willful . . ." And that's a fine explanation of why we're the leader in low cost disk storage. We're determined to have our way in controlling the read/write head technology that's given us our leadership position.
Headstrong? Sure, because it's the strength of our head technology that's allowed us to have such a good year: more than a quarter million floppy disk drives delivered. Proud of being headstrong? You bet. And proud of our heads-up OEM customers who specify Shugart products.

We headstrong of

Headstrong about technology.
The only sure way to control quality is to control the key technology responsible for that quality. You can do that only if you have depth in your R&D and manufacturing capabilities. At Shugart, we've got the strength and resources to develop and produce all our read/write heads. We've been doing it since day one. That's why Shugart read/write head technology extends media life to over 3.5 million passes per track, and gives you a head life that exceeds 15,000 hours. And it's one of the big reasons why heads-up OEM's demand Shugart. Because they know we're headstrong about controlling our technology.







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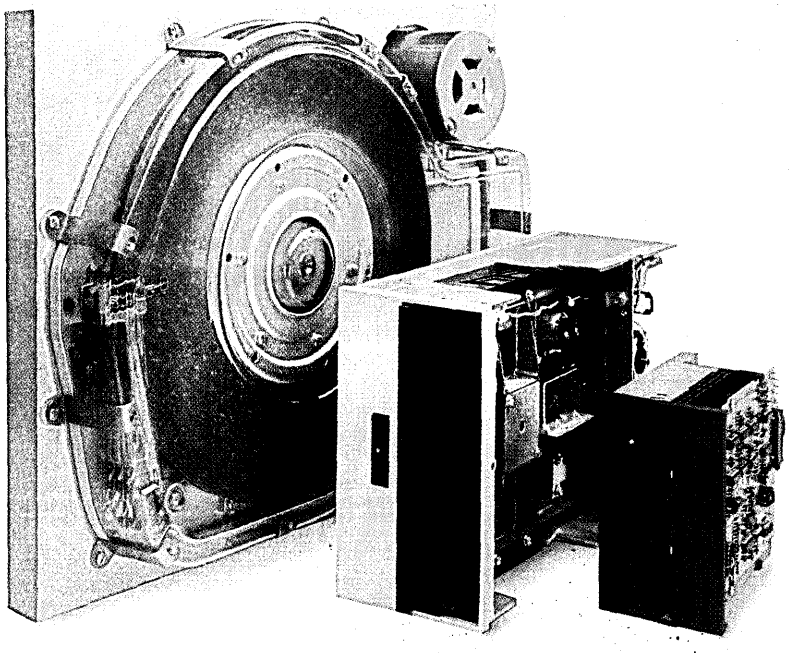

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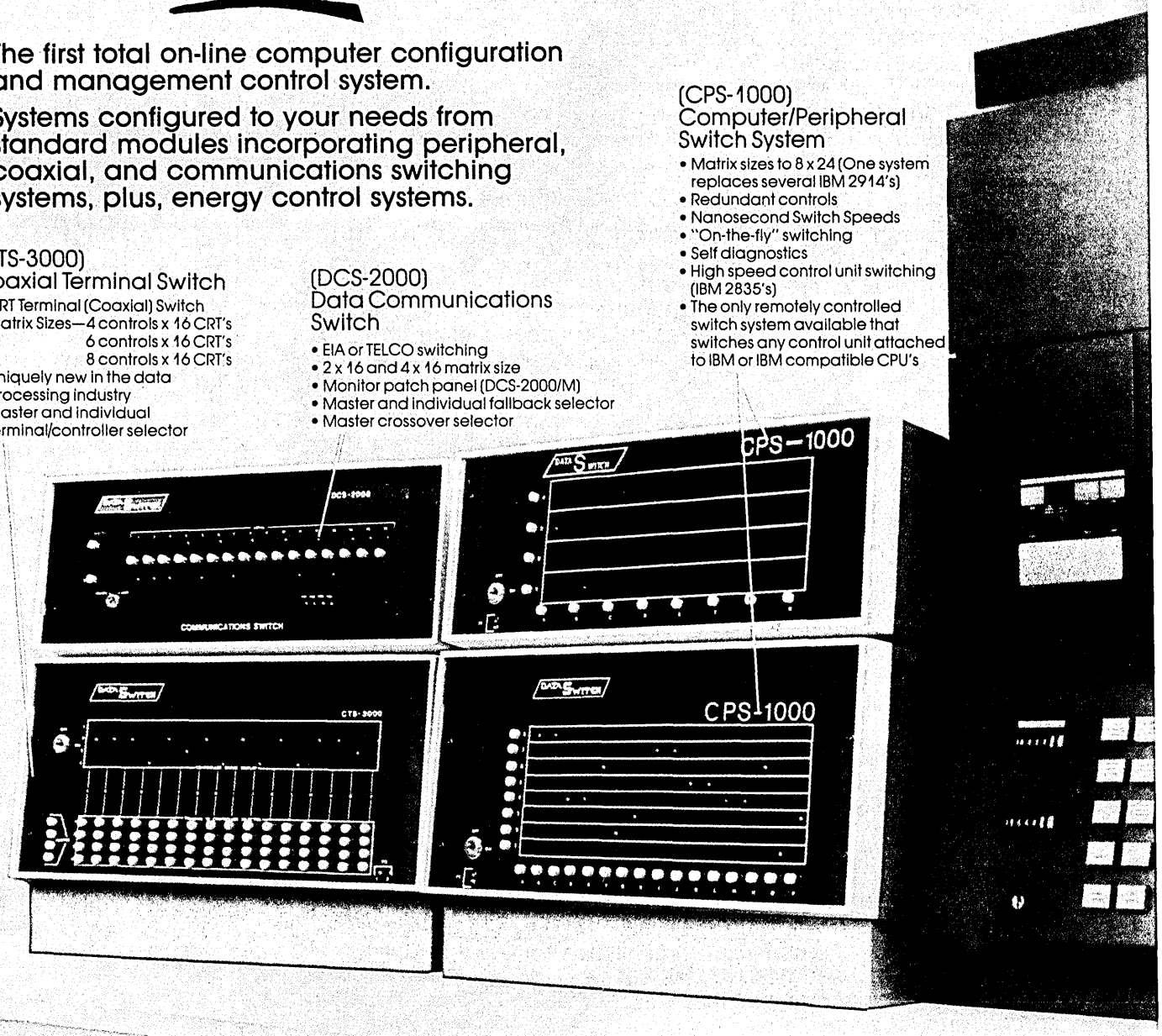

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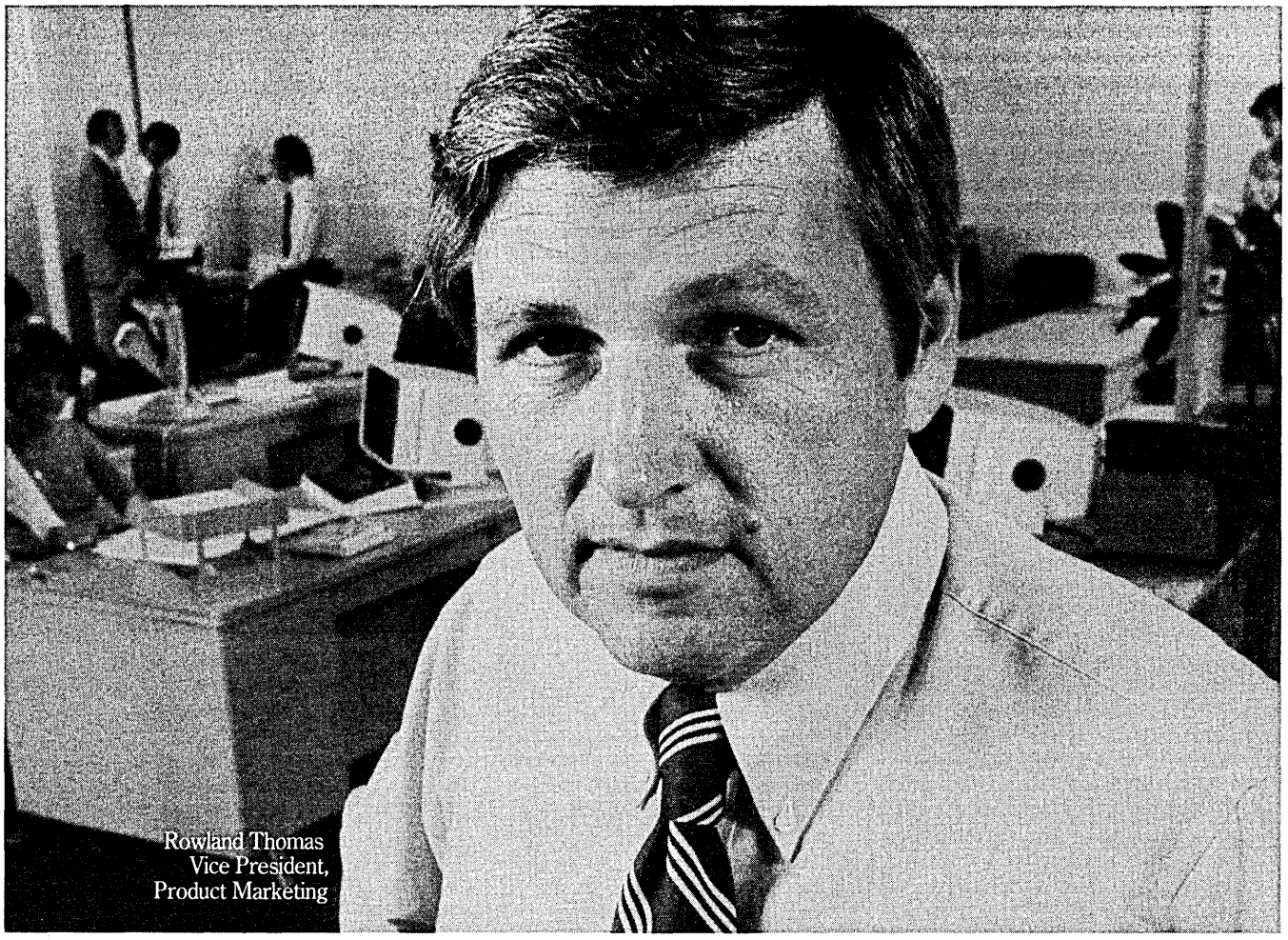

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It's going to impact the entire industry and some segments are going to be hurt—particularly companies connected with communications—even though its overall effect may be beneficent.

ACS IS COMING

by Robert Rinder

As information surfaces on AT&T's proposed Advanced Communications Service, it is becoming apparent that we are witnessing the emergence of a major development in the data processing industry. The scope of ACS is such that it stands to affect all segments of the industry. It will impact users, large businesses and small, not only within the firm, but also on an interfirm basis.

ACS is going to mean a large increase in applications, so the industry as a whole stands to gain from it. However, some industry segments are going to be hurt. Companies whose major products or services are connected with communications have real cause for alarm.

It must be understood that ACS is still in the planning stage. Therefore, what follows must be taken as tentative. Nevertheless, the broad outlines of ACS are not likely to change. It is these that we should focus on for the time being to discern how ACS is likely to impact the industry.

ACS is a shared, switched data communications network service. It provides for: (1) sharing communication facilities, (2) interfacing incompatible terminals and computers, (3) various data communications capabilities from which users can select as needed, and (4) the managing and reporting of network performance.

Sharing facilities. The advantages of shared facilities are reduced costs and ease of data exchange between system users. Lower costs make data communications possible for businesses previously too small to afford their own network. Large businesses that presently have communications networks will be able to add applications or enhance present ones. Also, all users in a shared system are capable of exchanging data with other users, and this is particularly significant for the exchange of data between different firms.

Interfirm data exchange opens a number of new generalized application areas: passing product information, product ordering, querying order status and delivery status are possible candidates. But the banking industry, the travel industry, the securities industry, to name a few, each have their own specialized needs for exchanging data between firms. In some cases this has resulted in specialized industry networks. ACS offers the possibility of cutting the costs of existing networks and providing new networks where previously costs were prohibitive.

Compatibility. This is a major problem for firms that have implemented various systems in a piecemeal fashion, application by application. Often the equipment used in different systems was selected without regard to compatibility, with the result that applications can't be integrated into a more efficient common system. This applies even more strongly with respect to the equipment of different firms. Additionally, firms attempting to develop a distributed processing system can't always use the most suitable equipment because of interfacing problems.

ACS, although it won't eliminate

The Message feature has possibilities for text transmission, electronic mail, orders and confirmations between firms, and office automation applications.

INITIAL TERMINAL PROTOCOLS

Terminal Class	Type	Options Supported	Protocols and Codes Supported
1	Asynchronous contention-character mode. Crt's, and teleprinters.	Bit rates in the 110 to 1800 range. For dial-in, 110 to 1200 and autobaud. Various numbers of information bits and stop bits. Parity mode.	Start/stop, ASCII code.
2	Asynchronous contention-block mode. These are buffered crt's and teleprinters using start/stop ASCII code.	Same as Class 1.	Same as Class 1.
3	Asynchronous polled buffered crt's and teleprinters on multipoint private lines.	110 to 1800bps.	Polled start/stop, papertape transmission code, EBCDIC.
4	Synchronous polled cluster or standalone terminals.	2400 to 9600bps.	Binary sync. polled as per ANSI X3.28-1976, sub. 2.4 & B2, plus RVI (Reverse Interrupt) and WACK (Wait Acknowledge).
5	Synchronous contention batch and remote job entry terminals.	2400 to 9600bps.	Binary sync. contention as per ANSI X3. 28-1976, sub. 2.3 & B2, plus RVI and WACK.

Table 1. AT&T has identified five basic classes of general purpose terminals, and will initially support one protocol from each class. In this way, Bell expects to support about 450 terminal models, roughly two-thirds of all general purpose terminals presently installed.

this problem, will greatly reduce it. Provision will be made for interfacing terminals and computers having different data rates, protocols, and character sets. Any terminal in ACS can talk to any other terminal or any computer.

Taken together, facilities sharing and compatibility provide for a nationwide communication facility that can serve data communication needs in a manner similar to the way the phone system serves voice communications. Network architecture and protocol is taken out of the hands of computer vendors, whose primary concern is the sale of their own hardware, and placed where it should be, in a service furnishing a shared, compatible communications system.

User selection. ACS will allow users to configure their own virtual subnetworks, selecting from all available features those applicable to their requirements. Thus, imbedded within the shared network feature is a degree of flexibility that can provide for the needs of large and small users, sophisticated applications and simple applications, high security messages and low security messages.

Medium-sized businesses stand to gain the most because sophisticated data processing will become "affordable." As AT&T puts it, ACS provides a low entry threshold by reducing the startup costs associated with data communications.

The impact on small business is harder to assess. One can envision ACS providing an interface between a small businessman's terminal and a service bureau operation, providing the small business with some of the on-line capability he could get from an on-site small business system, but with more computing power. But predictions of what will work in the small business environment are not noted for their accuracy. In any case, the small firm should benefit from ACS's ability to smooth interfirm transactions.

As for the large business, it probably can take full advantage of all the features ACS provides, as required by its needs. How well AT&T has planned for meeting the needs of sophisticated users remains to be seen, however.

Network Management and Reporting. As data communications have grown, network management has become a large overhead cost for users. In ACS the task of fault detection, isolation, and recovery will be performed, as they should be, by the network vendor, AT&T, rather than by the user. In addition, many of the reports that users require for monitoring performance will now be provided by ACS. Customers will receive billing numbers and summary breakouts by billing number will be made on billing records. Thus, if separate billing codes are assigned to users who share a subnetwork within a firm, costs can be allocated, so long as each user operates under the appropriate billing number.

Combining performance reporting with the ability of customers to create their own virtual subnetworks should significantly reduce design problems and the cost of change. Users can experiment with various priorities, dedicated or shared facilities, and message handling. Thus an evolutionary approach to optimization becomes possible. The ACS reporting functions will allow evaluation of alternative approaches, and indicate the proper direction for future changes.

WHAT THE USER MUST DO

How will ACS appear to the user? What will he have to do to use the system? What options will he have in terms of message type, speed, and distribution?

First to be answered is the question of conversion and the amount of effort required. Here, the situation is somewhat similar to that of moving to an upward compatible instruction set or an enhanced version of a language. One can apply minimum effort to become operational in

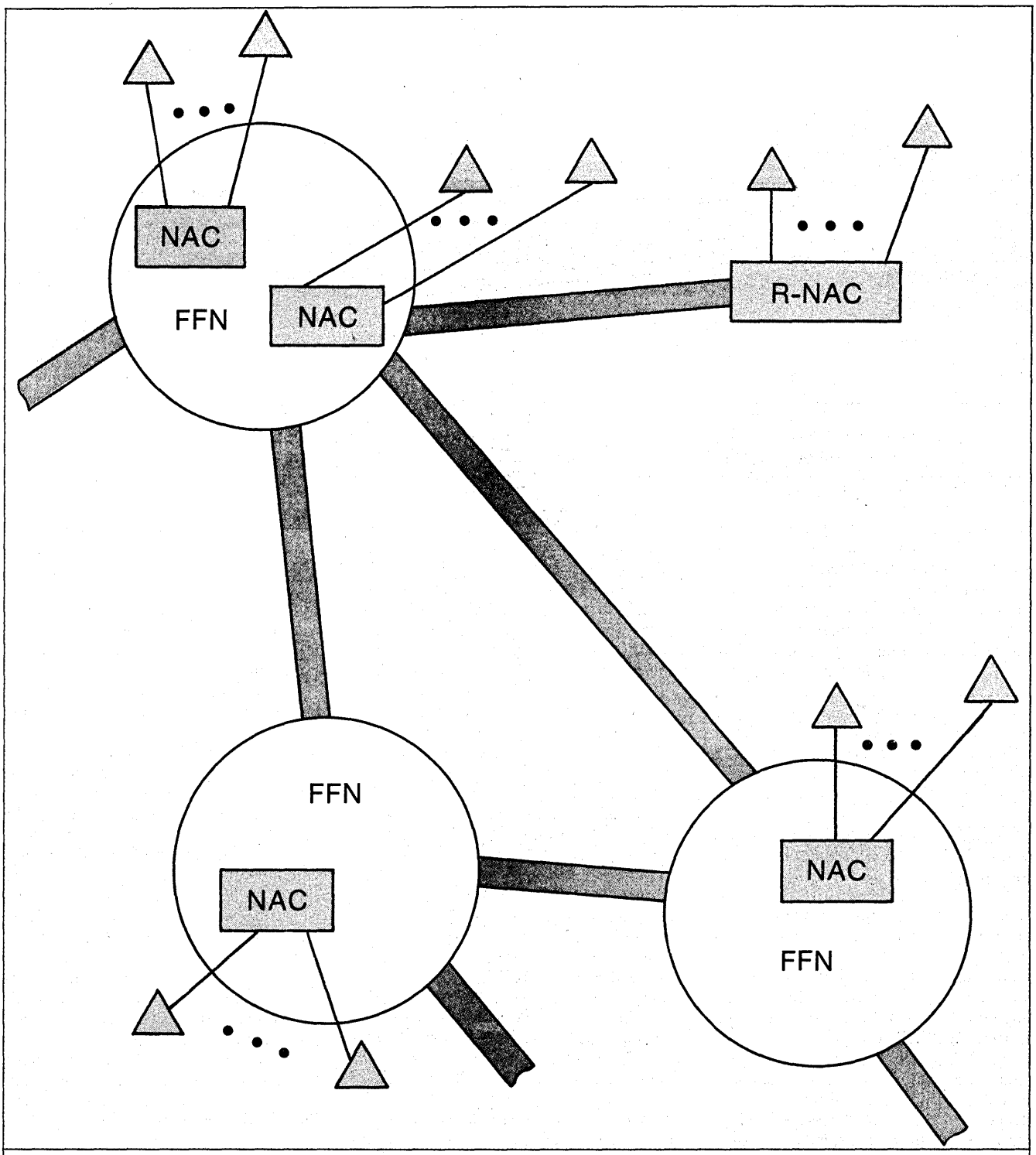

Fig. 1. Under ACS, Full Function Nodes (FFN) and Remote Network Access Controllers (R-NAC) are linked by shared 56KB trunks. Network Access Controllers (NAC) and R-NAC's connect to user equipment over ACS access lines, private lines, through Dataphone Digital Service, or through a special telephone company facility.

ACS. But if you want to take advantage of the system's full capabilities, design and programming effort will be required.

A key question for users with an existing equipment base is, of course, that of ACS's own compatability. AT&T has stated that it will provide interface support for a wide variety of terminals and computers, both large computers and minis. How wide this support should be is open to debate, but obviously there must be a cutoff point.

Initially, ACS will support protocols for what AT&T considers to be more than two-thirds of presently installed "general purpose terminals." General purpose terminals are considered to be teleprinters, crt's, and remote batch terminals. Special purpose terminals such as plotters and facsimile transceivers will not be supported initially.

AT&T states that it will establish a forum where views regarding additional protocols can be aired. Thus, it seems, new protocols will be added to the system on a competitive basis where it will be up to users and manufacturers to demonstrate sufficient need.

This procedure should result in the initial protocols becoming *de facto* standards of the type they represent. Their use will increase over time relative to all other protocols. "Nonstandard" protocols will

INITIAL HOST PROTOCOLS			
Mode	**Interface Type**	**Method**	**Terminals Emulated & Protocol Support**
1	Character oriented emulation	ASCII start/stop terminal emulation	Asynchronous teleprinters with start/stop contention protocol and ASCII code.
		Bisynchronous cluster controller emulation	Bisynchronous cluster controllers using ANSI protocol X3.28-1976 sub. 2.4 & B2.
		Bisynchronous batch emulation	Remote batch terminal using ANSI protocol X3.28-1976, sub. 2.3 & B2.
2	Character oriented interface message level		Link control consistent with ANSI X3.28-1976, sub. 2.3, 2.4 and B2.
3	Bit oriented interface (functionally similar to message level)		Bit oriented link level protocol consistent with CCITT Recommendation X.25, but with enhancements, and subject to definition with user participation.

Table 2. Three basic types of host computer protocols are planned for ACS, although methods of implementation may vary within each type.

have to satisfy some very special needs to survive. Similarly, to qualify for acceptance to ACS after the initial burn-in period, it would seem that a protocol will have to have a substantial lobby behind it.

Users who find themselves out in the cold with equipment not supported by ACS can get new equipment (not a pleasant prospect), stay out of ACS (not much better), or get their vendor or some third party to build a specialized interface to ACS. It would not be surprising to find ACS interfaces appearing on the market for terminals with any reasonable following.

PROTOCOLS AND FEATURES

For interfacing ACS with host computers, three protocols will be provided. One of these, emulation support, will be provided initially for ease of user entry to ACS. Emulation support makes the ACS network look to the computer as if it were interfacing directly with character oriented terminals. Thus, changes to application programs are minimized with this protocol.

The other two protocols provide enhanced capabilities that free the application programs from terminal dependence. Referred to as "message level interfaces," these protocols perform functions similar to those of communication software such as IBM's BTAM. How far AT&T will go in this direction remains to be seen, but the possibility of moving these functions out of the host into ACS gives some idea of the power inherent in what AT&T is proposing.

Two broad categories of communication modes will be available to users, corresponding to on-line and batch type operations. These are the Call feature for interactive processing, such as inquiry/response and time-sharing, and the Message feature, intended for such one-way transmission tasks as store and forward message switching, remote batch, and data entry.

The Call feature provides priority levels whereby users can trade off cost against speed of delivery: Priority 1 for fast transmissions, Priority 2 for less fast transmissions, and Fast Select for fast response times for short messages (data base inquiry, for example). Actual response times have not yet been set, but AT&T has stated that it will meet the needs of the marketplace in this respect. The needs of the marketplace are quite variable for this key parameter when one takes into account how time of day can affect costs. Hopefully, AT&T will provide the degree of choice needed by users so that off-peak operations will be reflected in lower charges.

One interesting aspect of the Call feature is the ability of terminals and computers to operate between one another in a bidirectional, fast response mode. Thus, terminal to terminal communication will be immediate, just as telephone conversations now are. We are used to thinking of message transmission between terminals as a store and forward operation. What advantages might there be in online terminal to terminal communication? Perhaps terminal calls can economically replace phone calls when the incremental cost is low because the network is there for other purposes anyway.

Or consider a user *A* who needs information from a data base but doesn't know the system. He calls *B* who does know the system and *B* calls the computer. *B* then searches the data base in response to *A*'s needs, communicating all the while with *A* on the suitability of the results or the need to proceed further.

It will be interesting to see what users do with the interactive Call feature. These calls can be manipulated by users in various ways:

—place call on hold at the terminal or at the destination
—receive a call
—forward a call to another station
—authorize the receipt of collect calls.

The Message feature, unlike the Call feature, is basically a store and forward operation with a good deal of flexibility for the timing of delivery and the use of multiple addresses.

Instead of the single storage area of the typical store and forward message switching system, ACS provides the option of two storage areas, one at the originator's location and one at the receiver's. Optionally, the sender may have a message storage area where whole messages or parts of messages are stored pending transmission. Here, the sender can build up messages, edit them, add to them and designate the time of transmission and grade of service. Grades of service are: Priority (seconds), Standard (minutes), and Deferred (hours).

When the time of transmission arrives, the message is sent from the sender's storage area to the receiver's. (Although the sender's storage area is optional, there must be an arrival area for the receiver.) Here the message is stored for delivery, as specified by the sender. Possible delivery options are:

—deliver as soon as possible
—don't deliver before a specified time
—deliver only upon demand
—deliver at a specified time
—deliver a copy of the message
—send a confirmation of arrival to the sender

In addition, messages can be journaled at either the send or receive locations. Also, they can be forwarded to another arrival area by the recipient.

Besides the functions of administrative message switching and remote batch input, one can discern in the Message feature possibilities for text transmissions, electronic mail, orders and

AT&T says the substantive content of messages will not be changed, and thus ACS is a communications service.

confirmations between firms, and electronic office applications. In the latter case, the sender and recipient frequently are the same person. In essence, the message storage area stores an in-process file. For example, a common requirement in business is the storage of a file pending the arrival of information needed to complete processing. If the file can be temporarily stored in a message arrival area of ACS, a good deal of paper shuffling can be avoided. So far as I know, AT&T has never suggested this type of operation or indicated that it is feasible. But it serves to illustrate that in a general purpose communication system such as ACS, applications will be found that were not anticipated by the original designers. Therefore, whether mentioned by AT&T or not, any vendor planning products for the automated office had better be aware of what ACS might do. And, in general, hardware and software vendors should watch the development of ACS closely and evaluate the implications for their current or planned products.

THE CONTROVERSIAL PARTS

AT&T has addressed itself to the problem of meeting the wide disparity of its customers' needs in a general purpose communication service. For this purpose, ACS will provide facilities whereby the user can customize his virtual subnetworks to his particular way of handling data. Customized services will be available in several areas:

- Formatting crt screens for data input and message preparation;
- validating data entered: tests can be performed for length, range, alpha/numeric, set membership, and structure;
- message preparation aids: these include cursor control, setting of tabs, defining repeated groups, operator, prompting, etc.;
- editing functions; and
- message handling: for example, store and recall messages, edit messages, send messages, build messages from records.

Customizing will be by customer programs via AT&T supplied high level languages.

Here we get into what is likely to be one of the more controversial areas of ACS. How much message preparation is legitimately connected with communication and how much should fall under data processing, word processing, etc.?

The key criterion which has been used to distinguish communication from processing, and which AT&T cites in its petition to the FCC is that the substantive content of the subscriber's message is not changed by the carrier. This seems reasonable and straightforward until it is realized that very little of what ordinarily passes for data processing involves changing the substantive content of anything, let alone a message. Editing, validation, record creation, record deletion, inquiry/response, report generation, sorting are all respectable dp functions that don't involve a substantive change of data. True, once in a while a record gets updated. Even here *substantive* change could be denied by, for example, labeling the update a mere field "correction." But without going to extremes, it seems clear that a communication facility such as ACS has plenty of leeway for "processing" data without making substantive changes to messages.

The user controls the security of his system through a combination of terminal address authorization, operator authorization by means of a billing number, and function set. (A function set specifies the functions allowable to a given billing number.) These controls can be instituted or changed through specially designated control terminals, through which the user also controls his subnetwork.

Finally, since AT&T states that it will make every practical effort to permit a broad range of interconnection opportunities between ACS and other networks and carriers, it may be anticipated that this applies also to user's non-ACS network. Thus, if you need special capability not available in ACS, or if you can do it cheaper, you probably will be able to interface non-ACS network with ACS to obtain the best of both worlds.

As stated at the outset, ACS is still in the planning stage. AT&T has submitted a petition to the FCC requesting a declaratory ruling with respect to ACS. If approved, AT&T plans to file a tariff for ACS in mid-1979. During this period changes in the system as described above, are quite possible, and in fact likely. For while AT&T bills ACS as simply an innovative and sophisticated data communications service, others in the industry see ACS as just another ploy by AT&T to free itself of the 1956 Consent Decree which bars it from the lucrative data processing market. Consequently there will be moves to precisely define and limit what ACS can and cannot do. And although ACS facilities will benefit the user public, legitimate concerns are being voiced about AT&T's encroachment into data processing.

AT&T can provide a commonality and economy of scale for ACS type functions not possible from any other industry source. Yet if ACS results in decreased competition, this could be detrimental to the innovative character of the industry as a whole. How the government resolves these questions will determine the ultimate form of ACS.

The bottom line for ACS will, of course, be the rate structure. Until this is known, a full evaluation of the proposed offering will have to wait. But since it must be assumed that AT&T will extend itself to make ACS financially viable, it is not too early for interested parties to assess the impact of ACS on their future. For it should be clear by now that:

1. AT&T has embarked on a major program that marks a distinct departure from past practices of exclusivity. AT&T is now planning to incorporate compatibility for a diversity of equipment and make this diversity the strength of ACS.

2. ACS is a major advance in data processing. It will help cut costs by sharing equipment, reducing overhead, providing for a diversity of equipment and opening new applications.

3. ACS is a challenge to the industry. It upsets the applecart for some vendors. At the same time it opens many new opportunities for others. Overall, it should result in the expansion of the industry with more applications, more equipment, and more programs. When the dust settles, we are likely to see a new configuration of the industry's stars, planets, and satellites. ✲

ROBERT RINDER

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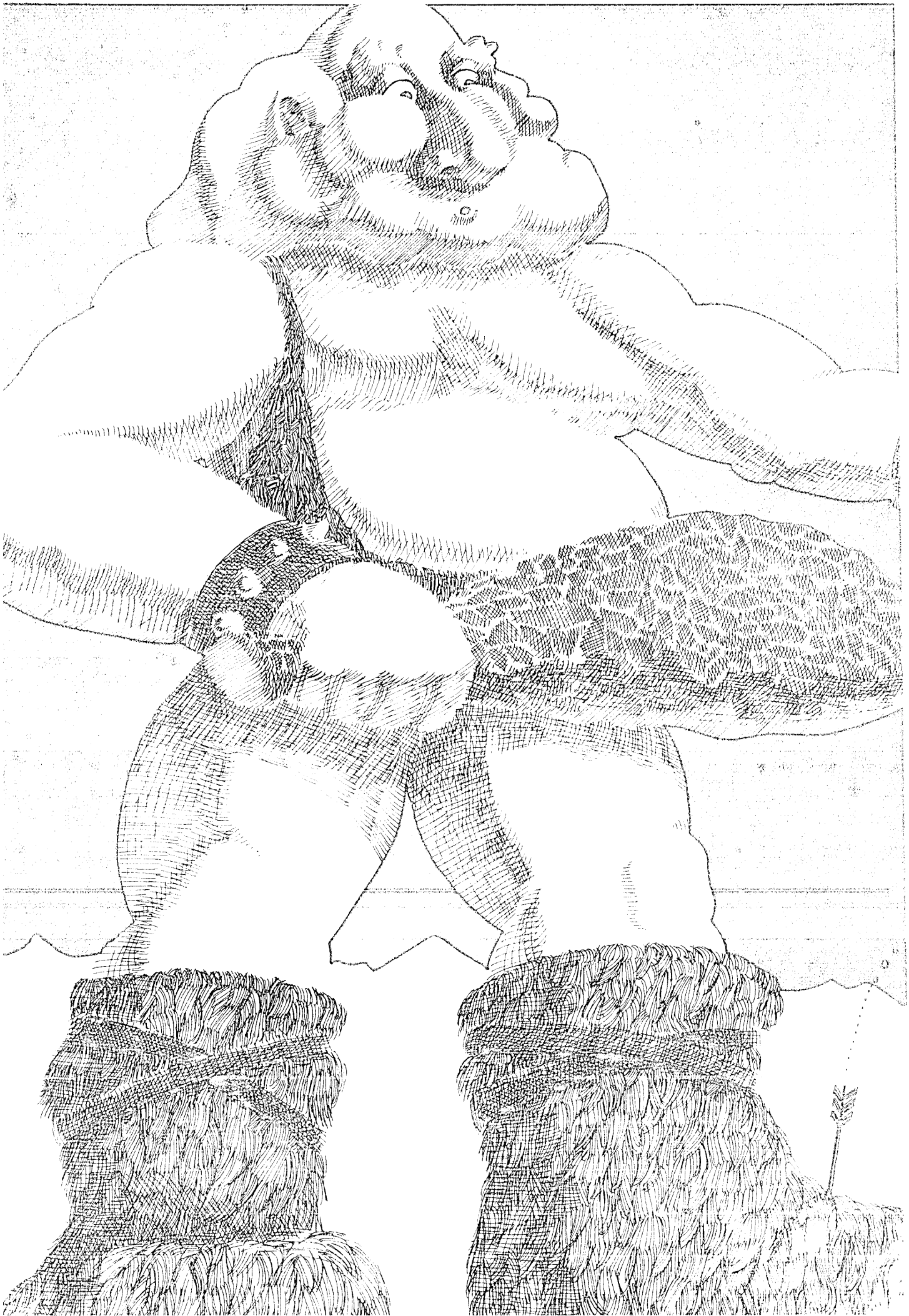
Prior to becoming an information processing consultant, he was a systems engineer and product planner at Bunker Ramo Corp., where he worked on several on-line computer systems for the banking, securities, and airline industries.



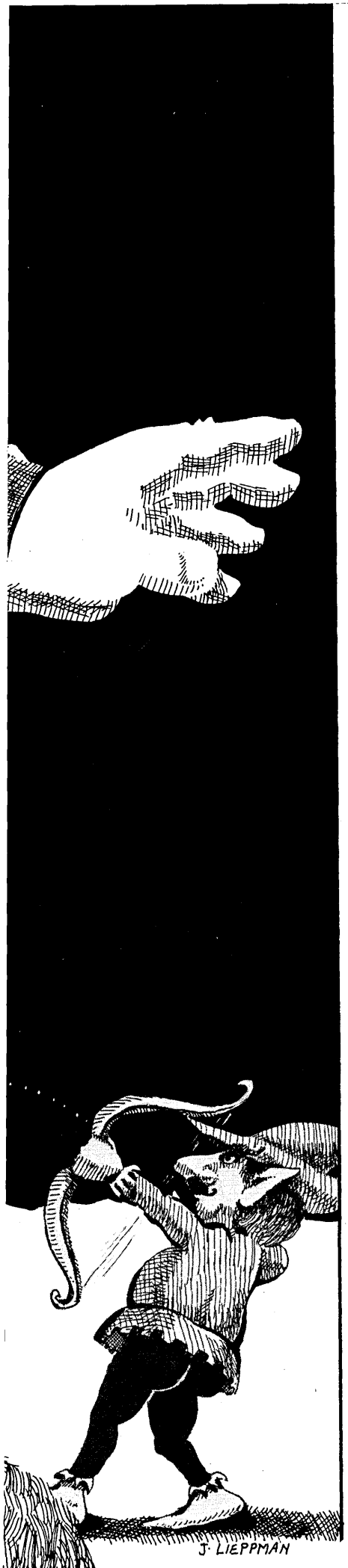


ILLUSTRATION: ©JEFFREY LIEPPMAN 1978

To cope with the tremendous growth of data storage and retrieval applications, systems designers must come up with architectures that are structured for the task.

FOUR APPROACHES TO A DATA BASE COMPUTER

by George A. Champine

Computer applications continue to expand at an ever increasing rate. Their current growth is thought to exceed even the historical rate of expansion in computer power, which roughly doubles on a per capita basis every five years. This applications growth is taking place in all segments of the industry, driven by the ever-widening gap between the cost of labor and the cost of computation.

The growth in the demand for high performance scientific systems has given recent impetus to a number of new product announcements in the number-crunching area. These new high performance systems have been of relatively conventional design because electronic computing had its origin in scientific computing—it was brought to life for calculating ballistics tables and solving systems of linear equations.

An even larger area of growth in computer applications is information storage and retrieval, including batch, transaction processing, and time-sharing. As an illustration of the magnitude of a modern transaction-oriented data base system, Sperry Univac has in use a system of this type for internal operations which processes 170,000 transactions per day on a data base of 300 million characters. Many other organizations have much larger systems in operation.

However, where current computers are well-suited to scientific applications, they are not well-suited to information storage and retrieval. This is because information storage and retrieval applications require addressing by content, while conventional computers are designed for referencing by physical address. This mismatch between conventional computer architecture and application requirements for information retrieval introduces inefficiencies in both the processor and storage areas, such that data access tends to become compute-bound, and tables required to locate data can consume more storage than the data itself.

This is leading to considerable interest in computer architectures that are more efficient in information storage and retrieval applications, specifically in data base computers. The data base computer can be incorporated into a system in one of four ways. These are, in order of decreasing coupling to the system:

- back-end processor for a host
- intelligent peripheral control unit
- storage hierarchy
- network node

Each of these approaches is independent and a system may include more than one of the architectures in the list. For example, a storage hierarchy could also use an intelligent peripheral controller. Also, the back-end processor may optionally include a storage hierarchy, and a network node may optionally include a back-end processor for the nodal host. (The network node itself is not a different kind of machine, but only a different placement of a data base computer.)

The *back-end processor* approach is usually thought of as a master-slave configuration where the host passes high level access requests to the back-end. The back-end is a general purpose computer

Much of the interest in the general purpose back-end approach to data base computers has arisen from the general attractions of the minicomputer.

which performs all of the data base activities including access validation, storage management, update lockout, response formatting, and I/O operations. When the back-end processor has completed the access, it passes the response back to the host. The communication link between the host and back-end is usually an I/O channel, but may be a telecommunications link. The mass storage controller attached to the back-end processor may or may not be an intelligent control unit.

In the *intelligent peripheral control unit* approach, the highly repetitive aspects of data access are moved out to a mass storage controller to avoid the high overhead of the general purpose host hardware and software. The basic functions of device scheduling, head positioning, data recovery, searching, sorting, and error correction are implemented at this level. In addition to the usual I/O functions, sequential associative access can also be implemented because of the close coupling between the intelligent control unit and the mass storage device. If the mass storage device is a disk, parallel read may be implemented to obtain storage search speeds. The mass storage can also be charge-coupled device (CCD) storage or bubble storage, depending on the size and speed required. The controller is connected to the general purpose host through the normal I/O channel.

The usual way to access a data base, from the user standpoint, is by value. For example, the user may want to obtain stored information related to "Jones, R.O." However, conventional computer architecture provides access by physical address only, not value. Therefore, a conventional computer obtains access to a data base through the use of pointers.

A pointer may be obtained from a key value by use of a hashing algorithm, so that the name "Jones" might be converted to physical sector address 542 on a disk. Pointers are also used to implement indices and to chain lists together. Their use normally entails a significant number of disk accesses per query, to get indicies, obtain data regions, get overflow areas, and to follow chains. The use of pointers also entails considerable processor utilization to look up indicies, perform logical to physical address transformation, and to manage the mass storage.

In contrast, associative computer architecture is able to access data directly by value without using the physical address. This provides a very efficient way to implement a data base system. Such storage units can be classified into two kinds: parallel associative and sequential associative storage.

A parallel associative store is able to locate data based on value in a single storage cycle, generally in a time on the order of a few microseconds. Unfortunately, the upper economic limit on the size of a parallel associative store is only a few hundreds or thousands of words, far too small to be useful in a data base application. The second storage type, sequential associative storage, performs comparisons on sequentially stored data at a high rate of speed to find the record in the data base containing the desired value. This yields the logical effect, if not the speed, of true parallel associative storage but at much lower cost.

A sequential associative store can be implemented using either solid state storage devices such as charge-coupled storage or bubble storage, or by using rotating magnetic storage, including fixed-head or moving-head disks. Research is in process in all of these combinations. The solid state storage gives higher performance, but is more expensive than disk in sizes over a megabyte, where disk is more economical. Either approach can be implemented in unlimited size, but is limited in search speed to about 10MB. Thus, a 200KB data base or portion thereof can be searched and accessed in about 20msec.

One of the most clear-cut advantages of an associative store over a conventional store is in searching data with incomplete keys. Examples of this include:

- searching a telephone directory with incomplete names or addresses
- searching motor vehicle files for partial license plate numbers or vehicle descriptions
- searching text where endings or embedded characters are to be ignored
- locating keys between numerical limits

A conventional approach to data access is almost useless for these applications because the number of possible combinations is too large. However, an associative store can handle these almost as easily as "normal" accesses by the use of truncated field search, arithmetic comparisons, and "don't care" characters. (A "don't care" character is treated as equal to any other character when doing a match.)

Another specialized architecture which can make data base operation more efficient is the *storage hierarchy*. The essence of this approach is that the same characteristic which makes a cache attractive for main storage access can also be used to improve access to mass storage.

It has been experimentally observed that a wide variety of applications exhibit considerable locality of data reference. This is true of data reference by a processor to main storage for many applications, and has been exploited in the form of a cache, or high speed buffer. When the processor needs a word from main storage, the request is first made to the cache. If the desired word is in the cache the access is completed typically in 50 to 150nsec. If the desired word is not in the cache, the access is then made to main storage and is completed typically in 800nsec.

The cache is managed on a least-recently-used basis; when new data must be brought into the cache, the least-recently-used data is deleted to make room for the new. The locality of access is such that data already used once or data near that used once is very likely to be accessed in the near future. For a cache size of 4K to 16K words, hit rates of 96% to 99% in accessing the cache are typical.

The same locality of data access is characteristic of many files and data bases. An industry rule of thumb is that 80% of the accesses go to 20% of the data. This characteristic can be used to accelerate access to a data base by using a mass storage hierarchy as shown in Fig. 1.

A data base cache is inserted in the system between main storage and disk. This cache should have an access time of something less than 1msec and typically would be implemented by a sequential access device such as CCD or bubble storage. References to the data base would first be made to the data base cache. If the data desired is located here, the request can be satisfied in about 1msec; this should happen about 80% of the time. Otherwise the request goes to the disk to be satisfied in a much longer time.

In a similar fashion, the disk pool can act as a cache for the slow access (typically 5sec) mass or archival store. As with the processor cache, data is managed on a least-recently-used basis. This insures that the most active data will reside in fast access CCD or bubble storage, while the least active data migrates to the low cost mass storage or disk.

The *network node*, still another approach to a data base computer, is a general purpose computer which communicates with several other nodes in the system, most frequently using data communications protocol and serial channels, but possibly using I/O channels. The benefit in this configuration is that several nodes (hosts) can access a single shared data base, thus avoiding replication of the data. The network node can be implemented using a general purpose system only (which is current practice), a general

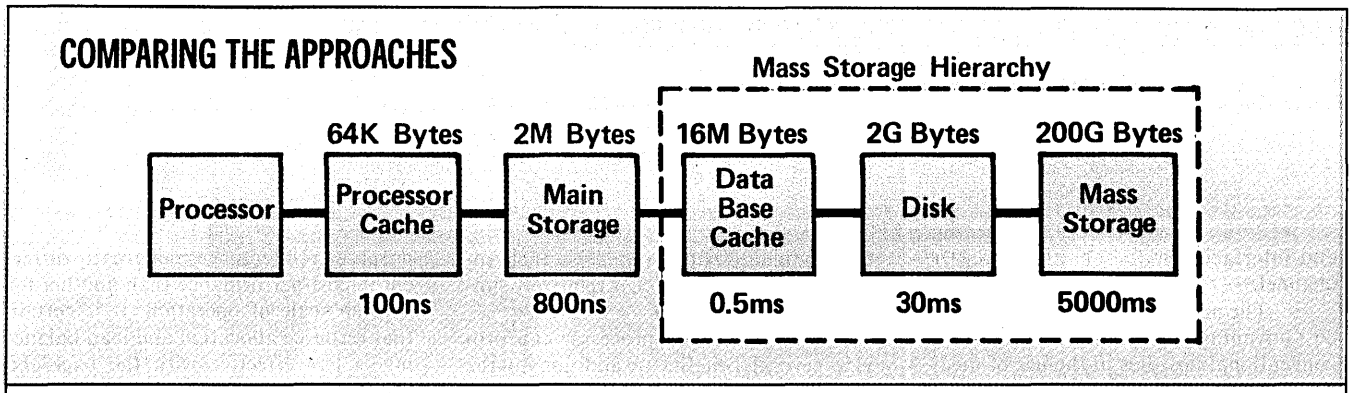


Fig. 1. Host with storage hierarchy.

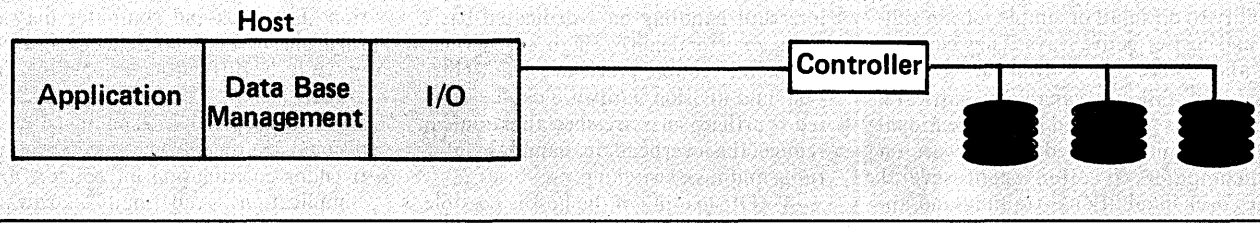


Fig. 2. Conventional general purpose data base system.

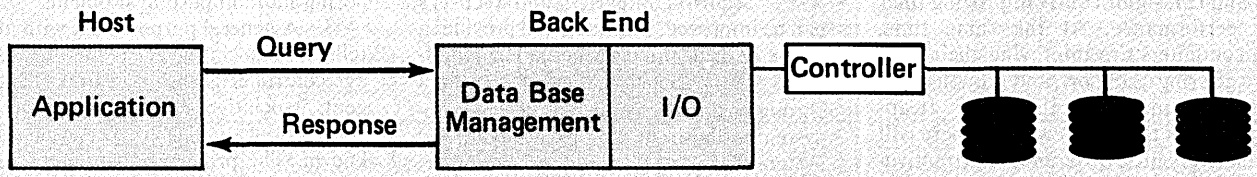


Fig. 3. Host with general purpose back-end.

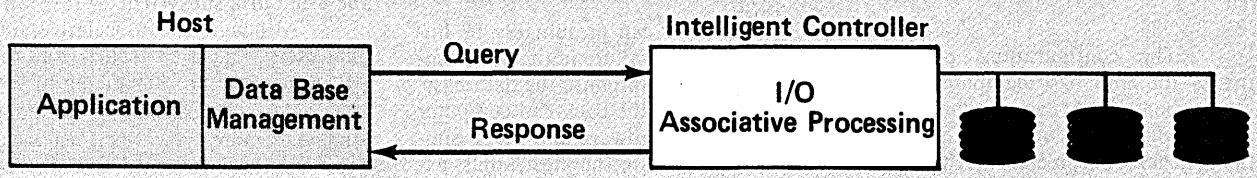


Fig. 4. Host with intelligent controller.

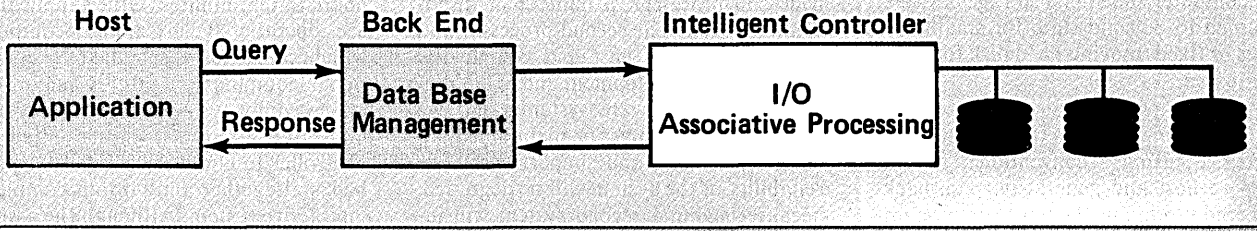


Fig. 5. Host with general purpose back-end and intelligent controller.

purpose host with a back-end processor, or a general purpose host with an intelligent control unit.

Much of the interest in the general purpose back-end approach to data base computers has arisen from the general attractions of the minicomputer. The minicomputer presently offers substantially better price/performance than conventional host computers (often better by a factor of three or more), both in mainframes and peripherals. It can provide up to medium scale performance, reaching into the one million instructions/second range. It also offers good modularity, plus the possibility of obtaining a hardware/software data base management package on an existing minicomputer,

The only back-end now available, the general purpose cpu, has little to offer for data base processing.

and interfacing it to a host over an I/O channel.

The primary reason for the present cost advantage of a minicomputer over a conventional host lies in the use of medium scale integrated and large scale integrated circuitry—which came earlier in minicomputers than in larger machines. Minicomputers have an outstanding capability to do small or simple jobs in simple and cost-effective ways. They currently also have very limited growth capability, fail soft capability, software, and support compared to conventional hosts. The money saved in hardware on minicomputers is often spent several times over in additional training and application software development costs.

However, things are changing. Conventional hosts are beginning to use MSI and LSI, significantly improving their cost/performance. At the same time, minicomputers are improving their software offerings, support, and growth capability, thus increasing their costs. It appears that in the next few years there will be relatively little difference in attractiveness between conventional hosts and minicomputers with respect to cost/ performance, software, support, and growth capabilities. The only decision to be made will be based on the performance level required.

THE TRADE-OFFS

The configurations possible for data base computers can be summarized as shown in Figs. 3 through 5. (The conventional general purpose host is shown in Fig. 2 and represents current technology; it serves as a base of reference.) In addition, each of these configurations can serve as a network node with the addition of communicators in the host or in a front-end computer. The mass storage device is assumed to be solid state for small data bases or fixed/moving head disk for large data bases.

Perhaps the first data base computer implemented was the configuration in Fig. 3, using a conventional general purpose host and general purpose back-end, and it remains the most common implementation today. In one early research study, this configuration was implemented using a minicomputer as a back-end to service several front-end hosts, which were from different manufacturers. The requests to the back-end were made at a high level, and data formats, access methods, and data structures were all handled by the back-end in a manner transparent to the hosts. The result was that the hosts were able to share a data base, with each using standard software plus suitable interface software—which is relatively simple.

The back-end processor can provide several benefits in addition to the sharing of a single data base without replication or conversion. Hardware specialization is possible in the back-end, for example, leading to more efficient data and interrupt handling on a dedicated basis. Long register lengths, high speed floating-point, double-precision, multiplication, and division hardware can be omitted. Further, software specialization can reduce the overhead in handling interrupts and task switching.

Off-loading of the host is possible, freeing resources to be used for application software and extending the performance of the host without conversion.

Security, integrity, and recovery can be improved. The back-end provides a single path to the data base. This eliminates "back door" paths to the data through using the same mass storage subsystem for both the data base and normal system files. Application programmers can be prevented from programming the back-end computer and thus possibly introducing "sneak" access paths. Integrity is also improved by a single access path because locks on updates can be strictly enforced.

Recovery can presumably be improved because a failure in the host computer will not compromise the data base. Also presumably the back-end computer has much less hardware and much simpler software than the host, thus extending the time between system failures. The host and back-end can check on each other's sanity, including each keeping separate audit trails.

In spite of the advantages of a back-end processor, a number of disadvantages exist. The second processor and software will add cost and complexity, both in initial development and in maintenance. Two hardware systems and two software systems must be maintained, increasing training and support cost. The reliability of the system will be degraded, because having a second system will increase the failure rate.

While some aspects of security may be improved, the largest single problem in security is the operating system, and this is not helped at all.

Although the back-end processor may increase performance of the system, upgrading the existing system to a larger host configuration may be cheaper in the long run, and therefore more cost-effective. It can be argued that one general purpose architecture is not greatly different in cost-performance than another for a given scale of operation. It is certain that resource allocation and load balancing is less effective with the back-end processor because of the dedication of resources. The host and back-end cannot off-load to each other as is possible in a conventional multiprocessor configuration. The back-end computer may even turn out to be a bottleneck, and could prove to be difficult or impossible to upgrade.

More, the back-end introduces additional overhead. The specter of multivendor coordination introduces further complications. And finally, hardware is getting very cheap, so a system which optimizes the use of hardware may be optimizing the least important part, while ignoring more important problems.

A general purpose host with an intelligent associative-accessing, mass storage controller is shown in Fig. 4. Intelligent associative controllers are not yet generally available, not yet even widely known. The principal advantage here is much higher performance at a relatively modest increase in cost. A typical cost increment for an intelligent associative controller is one to three times the cost of a disk controller in addition to the cost of the usual disk subsystem.

Although the associative intelligent mass storage controller can provide performance improvements up to several hundred times in certain highly unique instances, a more typical performance improvement is a factor of five where this approach is well suited.

Systems are now in the field in which an associative intelligent controller has reduced the run time to a complex batch data base application from six hours to ten minutes. Other applications are operational on similar equipment which could not be handled by conventional equipment at all. A major telephone company in the Far East is planning to use an associative intelligent controller to eliminate printed telephone books altogether and go to a completely interactive system. Although the associative intelligent controller can help both low level and high level data base access, the benefits to the higher level interface will be much greater because of the natural match of associative access to the high level interface.

The associative intelligent controller works best on applications with complex access requirements, multirecord responses, and partial keys. Complex access could include some or all of the following:

- Boolean expressions involving several fields in the same record (e.g., "list salesmen whose sales>quota and commission>salary")
- Boolean expressions involving several fields of the query and the records (e.g., "list engineers with Language = German and dependents = zero and experience>5")
- between-limits searchs on numeric fields (e.g., "list employees with experience>5 and experience<15")
- partial keys (e.g., "list automobiles where license = BR?1?6) (note: "?" is a don't care character)

It might seem that less storage would be required with the associative approach because of eliminating storage for pointers, which can exceed the size of the data base in some applications. This does not happen because key values must be stored redundantly (in every record) in place of the pointers, and will occupy approximately the same amount of storage.

The associative controller is neutral with respect to security, integrity, and recovery. On the positive side, multivendor support will presumably not be involved, and no additional software is involved from the user's point of view.

On the negative side, some of the same problems exist with the associative intelligent controller as with the back-end processor. Load balancing cannot be improved, and additional hardware exists to be maintained and to contribute to system failures.

Although the associative intelligent controller can provide a factor of five performance improvement where it is well suited for an application, it is in fact a somewhat limited-function subsystem. The host will be significantly off-loaded if (and only if) the data base activity constitutes a significant fraction of the total work load. This data base portion of the work load should exceed 40% (and preferrably 80%) for the intelligent controller to be able to off-load any significant amount of work. Obviously, if the data base activity is only 20% of the total work load, no variety of data base computer can off-load more than 20% and thus be economically attractive.

In addition to requiring that the data base activity be a significant fraction of the work load, an associative intelligent controller can be beneficial only if the access methods are complex. In the case of simple, direct access methods, the present pointer-based systems work very well and an associative intelligent controller would only slow things down. It is not known what fraction of applications use simple, direct access methods, but estimates have ranged as high as 50% to 70%. Conversely, there is some evidence that system designers have limited themselves to simple access methods in order to obtain acceptable response times, and that if cost-effective subsystems were available to support complex access queries, a large latent demand could be satisfied.

The storage hierarchy or data base cache approach, previously illustrated in Fig. 1, is functionally transparent to the system users. Therefore, on a functional basis it offers neither advantages nor disadvantages. Its principal benefits are substantially increasing performance while maintaining compatibility with existing file structures. Recent experiments with devices of this nature indicate that hit rates on the order of 80% can be obtained for a wide variety of file and data base applications, aided substantially by frequent references to indicies. The observed hit rate translates into cutting the access time in half. This reduction in access time is particularly beneficial now that disk modularity is approaching the one gigabyte level, offering few possibilities to use parallel I/O access to achieve high throughput.

The negative aspects of the storage hierarchy are recovery and cost. Recovery is made more difficult if the data base cache does not write all updates immediately back to mass storage, but only writes back when blocks are flushed out on a least-recently-used basis to make room for new data. This approach, called post-store, improves performance but holds the only copy of many updates in volatile storage. Therefore, if the cache fails, the updates are lost without the system being able to know what had or had not been written out to nonvolitile storage. The other approach, called store-through, writes all updates out to nonvolitile disk storage immediately, but sacrifices system performance in the process.

The cost of a data base cache for disk is highly dependent on the type of storage device used in its implementation. The RAM is probably too expensive unless it is part of main storage. Sequential access devices such as CCD and bubble are economically attractive only at 262Kbits per chip or higher; these are expected to be available in product in the early 1980s.

Finally, with respect to having the host processor with a back-end general purpose processor and an intelligent controller, as in Fig. 5, the advantages and disadvantages of the other configurations are all largely combined.

NOT YET, BUT SOON

Where does this leave us? To date, the general purpose back-end, the only data base computer generally available, has generated some interest, but has not emerged as a major trend in computer architecture. The reason appears to be that it offers little or nothing to the user, especially in the very important area of cost/performance. Its principal advantage appears to be the ability to decouple the data base from the host to ease conversion or to interface multiple, nonhomogeneous hosts.

It remains to be proved that as a system design strategy, a general purpose back-end (mini or not) is more cost-effective or fail-soft than using a larger conventional host. Most of the host processors now in use are reasonably good at character manipulation. The processor hardware is no longer a major cost element of the system, so omitting floating-point or other special characteristics will not significantly reduce hardware costs. The addition of special instructions to a processor to enhance a particular operation has rarely proven to improve performance significantly. Certainly support of a general purpose back-end in addition to a host is more costly for both hardware and software than is support of the host alone.

There can, of course, be administrative or financial advantages in using a back-end data base processor, such as to prolong the useful life of a purchased system or to obtain a turnkey hardware/software data management package with unique features.

The conclusion that seems to result from these considerations is that the system where data base activity constitutes a small part (10% to 20%) of the total load cannot benefit significantly from any of these approaches to a data base computer. Neither the back-end nor intelligent associative controller could off-load enough to justify their existence. Likewise, if the data base work load were small, a package or turnkey system might be hard to justify. So, improved host independence with a back-end processor is the only surviving benefit.

It may be that this lack of compelling motivation has been responsible for the relatively low rate of installation of data base computers to date. However, things look much different for the future.

Current trends in data base systems are toward higher transaction rates, larger data bases, and more complex queries to restrict the amount of data returned in the response. The Sperry Uni-

vac system mentioned earlier is growing in transaction rate at 17% per year. A recent survey of user data base applications showed an average growth rate of 3% per month in the size of the data base.

The intelligent associative controller, which should be generally available in the early 1980s, has the potential advantage of very much higher performance at a modest increase in cost. This is particularly true for high level interfaces to the data base and in an application environment of heavy data base activity. It appears quite likely that performance improvements on the order of a factor of five could be available for complex queries in an appropriate environment.

For the application mix where data base activity is a substantial part of the load (40% or more), either the mass storage hierarchy or the intelligent associative controller, with or without a general purpose back-end, should provide significant cost/performance improvements.

The data base computer used as a communications network node is applicable where it is not practical to replicate or partition the data. Replication of a data base is made infeasible by any of the following characteristics: large size, low access rate, security requirements, or high update frequency. Partitioning a data base, that is splitting one up among several geographically separated hosts connected by data communication links, is practical only if most (say, 80%) of the accesses to the data base partition are made by the local host. If replication and partitioning are not practical, the use of a data base node in a network is the only remaining approach.

Since the use of data base systems is growing rapidly, as is the need for remote access of data, it would appear that data base computers of some kind—intelligent controllers, back-end processors, or data base nodes on a network—are assured a significant role in future computer systems. Although we can argue that some of these are more easily justified for the general case, the ultimate success of each will be determined by that still-unpredictable growth in data retrieval applications. ✻

GEORGE A. CHAMPINE

Dr. Champine is the director of advanced systems for large scale commercial computer systems at Sperry Univac. In this position he is responsible for the technical planning, design and analysis of systems beyond those currently committed to production. He is also responsible for design and management of large special projects using commercial equipment. In his 20 years with Sperry Univac, he has held several technical and managerial positions in the software and system design fields. His most recent prior position was senior staff consultant, where he was responsible for managing the advanced technology program for large scale computer systems.

Dr. Champine is also an adjunct Professor at the Univ. of Minnesota, where he teaches courses in analysis of information systems and engineering project management.

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CIRCLE 11 ON CARD

ADDS REGENT

More and more demands will be made on systems software technicians, data base administrators, and data communication administrators who soon may wish for a helpful genii or two.

GETTING READY FOR IMS/VS

by Myles E. Walsh

A sophisticated data base management system like IMS/VS offers its users several potential benefits. Among these are a degree of data independence, an increase in the speed of data retrieval, and a reduction in data redundancy. Not so clear, at least at the outset, is what the user must do to achieve those benefits; and gaining this understanding may take a couple of years.

Having just gone through that exercise, CBS Inc. can share its findings as they relate to several specific issues: setting up IMS/VS; applications programming and the Application Development Facility (ADF); data base administration IMS/VS style; data dictionary; organization, staffing, and education.

SETTING UP IMS/VS

In a manner similar to generating an operating system, a system definition of IMS/VS must be performed. As is commonly known, a sysgen of an operating system requires the services of a skilled systems software technician. The same is true for IMS/VS. Just as for OS sysgens, IMS/VS generation is a process whereby parameters are specified for tailoring IMS/VS for one's own installation. Definitions are given for such items as IMS/VS libraries, data sets, buffer pool sizes, passwords, data base definitions, program control blocks, screen formats, and terminal device and network characteristics.

In an ideal setting, a complete IMS/VS gen would take place each time IBM issued a new release or version of the system. Partial gens, such as those required when new data bases or program control blocks are needed, must be scheduled to meet the demand of a particular installation. It is not unusual for these to be required on a monthly basis.

Then, in addition to its generation, the system must be thoroughly tested before being put into use. It is possible to develop a comprehensive test job stream for this. But with the gen itself, this development of a test vehicle also requires IMS/VS systems software expertise.

While all this is going on, it is also quite possible that some other software products, either IBM's or other vendors' designed to work in support of or in conjunction with IMS/VS, will also be installed. These products (which in our shop include Batch Terminal Simulator, Data Base Prototype, and Data Dictionary/Directory from IBM plus Control IMS/VS Realtime from Boole & Babbage) also require system software expertise to install, maintain, test, and use.

As applications are developed which use the facilities of IMS/VS and the associated software, still more demands are made on system software technicians to answer technical questions and to assist in troubleshooting. Bugs, which have made computer programming an interesting occupation since its inception, have become more exasperating as the technology has become more sophisticated. In a typical IMS/VS environment, a problem may take a substantial amount of time and talent to track down. Since there is so much software and hardware involved—IMS/VS itself, MVS (the operating system), VSAM, VTAM or other access methods, application programs, terminal control units, modems, communication lines, and terminals—a great deal of coordination of individuals with different technical expertise is required to pursue and isolate a problem.

How much skilled manpower is required? We have found that it is possible to begin the IMS/VS system software staff with two experienced systems software technicians. Within a year an additional one is required. After two years, depending upon the number of applications using the facility, it is necessary to add systems software technicians at the rate of one per major application.

APPLICATION PROGRAMMING

Application programming in an IMS/VS environment, using the conventional languages COBOL, PL/1, and assembler, is only slightly different from programming in a non-IMS/VS environment. The procedural portion of an application program, that is, the part which analyzes, processes, and changes data, is basically no different. Only the input/output operations change.

The I/O operations are different because transferring data between storage and peripherals is a more sophisticated process under IMS/VS. Data is transferred in the form of segments which are parts of records within hierarchical structures, rather than in the simpler form of records within files.

Hierarchical Sequential Access Method (HSAM), Hierarchical Indexed Sequential Access Method (HISAM), Hierarchical Direct Access Method

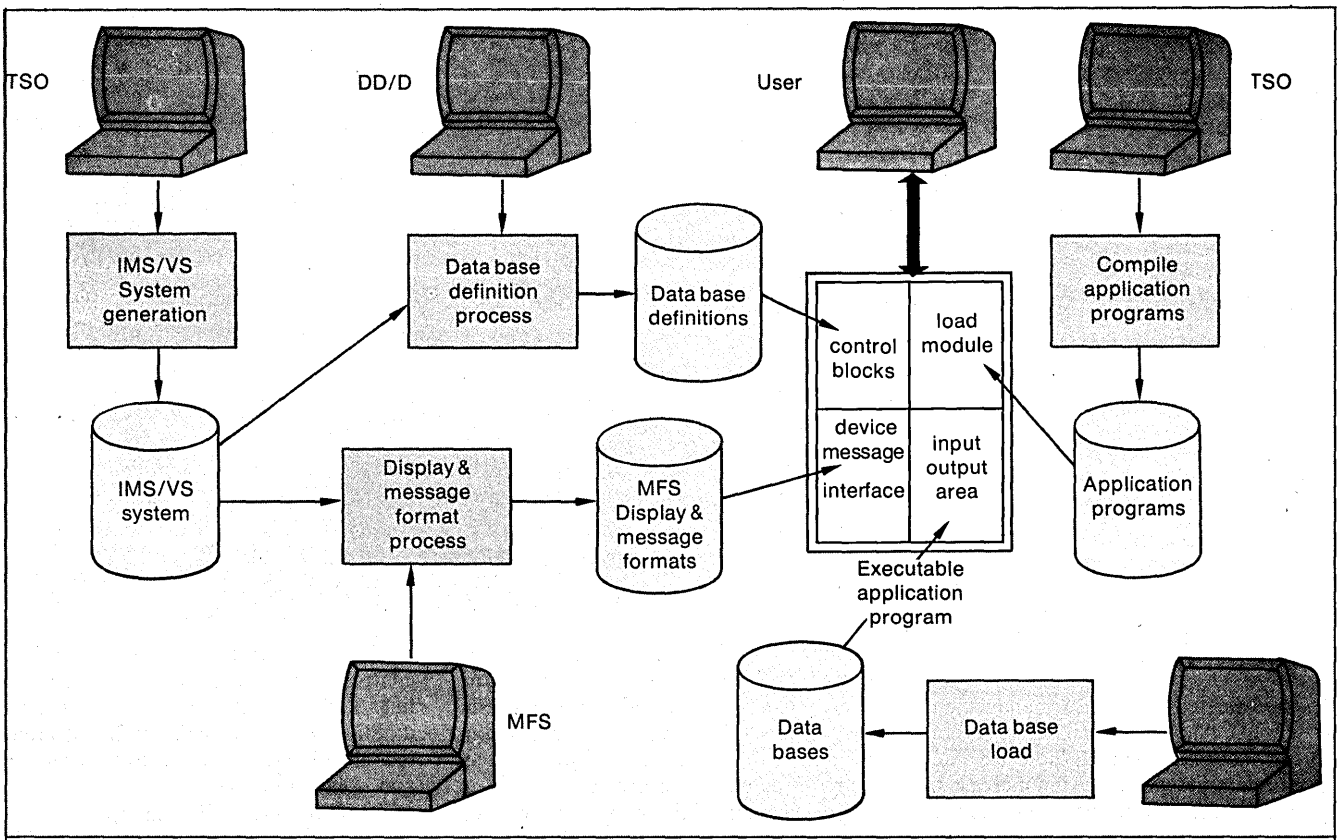

Fig. 1. There are four basic aspects of the use of IMS/VS: the sysgen function (upper left), data base administration (upper middle), data communication administration (labeled MFS, lower middle), and application programming.

(HDAM), and Hierarchical Indexed Direct Access Method (HIDAM) are supported by IMS/VS. Within them, records are composed of segments that are structured in an hierarchical format. Logically, the segments in an hierarchical structure are read as they are viewed, from top to bottom, left to right within the structure. Physically, the segments are stored contiguously within data sets in HSAM and HISAM structures, and related by means of pointers within HDAM and HIDAM.

Yet, from an application programming perspective, even the I/O operations are basically no more difficult because IMS/VS itself handles the increased complexities through its access methods. Theoretically, all the complexity and sophistication is transparent to the application programmer.

Assuming that they already possess experience with COBOL, PL/1, or assembler, applications programmers can take a three-day course in IMS/VS input/output language and Data Language/1 (DL/1). (The latter is an I/O language that interfaces conventional programming languages with IMS/VS data bases.) Completion of this course enables them to code in an IMS/VS-DB batch environment. Another two-day course equips them to handle the IMS/VS-DB/DC batch and telecommunications en- vironment.

The DL/1 repertoire of operation codes includes the basic I/O function codes GET (retrieve), ISRT (add), REPL (replace), DLET (delete), and others. The four named are generally sufficient to handle most application programming needs. The actual statements containing the function codes also contain other parameters required to qualify the specific operation to be executed, including control block identification, the name of a storage area to be used, and, sometimes, segment search arguments for speeding a look-up.

A further consideration of application programming in an IMS/VS environment is status codes. After an I/O operation executes, the control block contains, among other things, two characters of data called a status code, which indicates what has happened as a result of executing the function code. Following any I/O operation, the application program must interrogate the control block and take appropriate action based on the status code found.

In summary, there is relatively little impact on the application programming function when moving into IMS/VS. The courses mentioned earlier equip application programmers fairly well with the capabilities they need. As a matter of fact, the concerns of the application programmer are reduced somewhat under IMS/VS. Due to the creation of two specializations, Data Base Administration and Data Communication Administration, the application programmers need devote less time to developing file descriptions and specifying terminal device characteristics.

Also, there is an Installed User Program (IUP in IBMese) on the horizon that may have an impact on the way applications are developed under IMS/VS. The product, currently known as IMS Application Development Facility (ADF), is advertised as a means for quickly and efficiently developing application programs for IMS/VS. Included in the facility are

program modules which are able to execute DL/1 calls, edit input data, format displays for IBM 3270 crt's, provide a degree of security, and route messages between applications and system users.

Preliminary investigation reveals that the objective of the ADF package is the reduction, and eventually the elimination, of application programming. At this point, the ADF methodology is embryonic, that is, it can be used to replace application programming in only the most basic and straightforward of applications.

The package is composed of a number of functional program modules which are able to perform the basic tasks found in most applications. For example, among these functional modules are found a transaction driver, a segment handler, a screen controller, a message sender, and an auditor. In addition, there are other programs within the facility containing the logic required to combine the functional program modules into executable IMS application programs.

For those applications whose requirements exceed the current capabilities of ADF, exits are provided so the user can attach modules and subroutines of his own.

To specify what must be done in an application within the confines of ADF, the programmer (who actually may be the end user) defines parameters, called "rules," which are coded and entered into the system where they are stored in data tables. As the functional modules execute, they make use of the data in the data tables to tailor the application programs to the user's specific requirements.

DATA BASE ADMINISTRATION

The position of Data Base Administrator can vary from installation to installation since corporate organizations vary. Our corporation has a number of relatively autonomous divisions, each having its own systems and programming departments but using a corporate data center. IMS/VS is installed in the corporate center, and the IMS/VS system software support group resides there. Thus Data Base Administration exists as two functions, one divisional and one corporate.

The divisional DBA performs two basic services. One consists of interacting with end users, analysts, and programmers in designing and specifying IMS/VS data bases. The other is to specify display screen formats and message descriptions for individual programs. This latter function is known as message format services (MFS) in IMS/VS.

A new title, Data Communications Administrator (DCA), is beginning to appear in the MIS trade literature and may soon come into vogue to describe the individual(s) who performs the MFS function. This function, although not yet in our installation, is to be staffed by individuals who interface the application programmer and the communications network, similar in concept to the function of the division-level DBA's who act as an interface between the application programmer and the data bases. (Corporate-level DBA's retain the responsibility for developing data base definition and specifications in a form suitable for input into the system.)

DATA DICTIONARY

The precise nature of CBS's DBA function was determined partially by the corporate organization of the company and partially by the decision to employ a data dictionary package. The particular package chosen was the Data Dictionary/Directory package from IBM. It was selected for two reasons. First, since the whole idea of using a data base management system was new to the organization, it was considered wise to stay with a single vendor. Second, it was anticipated that there would be an eventual integration of the two products, DD/D and IMS/VS, into one.

As a result of conversation with other IMS/VS users, together with some observations of the surrounding situation, it became apparent that a data dictionary system was a "must," due to the magnitude of the data base administration job. Originally, the divisional data base administrator had performed the dictionary function by documenting data types, relationships, etc. in a notebook. However, this method was totally inadequate. A centralized source of data documentation was needed by a number of individuals who were located in several different locations, while the notebook could be in only one place at a time. The idea of making copies was dismissed as a logistical nightmare, since frequent changes were being made. Maintaining several notebooks in synchronization with one another was judged to be impossible. An on-line Data Dictionary was deemed imperative.

Concurrent with the placement of the order for DD/D was the formation of a subcommittee to formulate standards for both IMS/VS and DD/D; within 10 months a complete set was developed.

In addition to its use as a centralized repository of documentation, the Data Dictionary/Directory System has the capability of producing source input such as Data Base Definitions (DBD's) and Program Specification Blocks (PSB's) for the IMS/VS system. Since this was the case, all IMS/VS data base creations, additions, changes, and deletions had to be first entered into the Data Dictionary/Directory. The corporate DBA's were given the task of defining the input to the data dictionary system and insuring that the definitions and specifications subsequently found their way into IMS/VS.

Concurrent with designating the corporate DBA's as "guardians of the dictionary," was the development of forms to be used by divisional DBS's, system application analysts, and project leaders in specifying data base, data element, and index definitions. The corporate DBA's enter the definitions from the forms into the data dictionary through a crt. It is then possible to produce DBD and PSB source statements which become part of the IMS/VS configuration, as control blocks. To convert them from source to control block form requires a partial IMS/VS gen. After a successful DBD gen or PSB gen has taken place, and the control blocks have become part of the IMS/VS system, the forms are marked with the completion date and filed in alphabetical order in loose-leaf binders.

READYING THE STAFF

As can be seen from the preceeding, the IMS/VS-DD/D organization was put together at CBS to conform to the needs of a divisionalized organization. Basically, three departments, two corporate and one divisional, were added to the list of already existing MIS departments. In corporate, a data base systems software group and a data base administrations group were added; in the divisions, a data base/data communications administration group. Some additional education was provided to application programmers enabling them to combine DL/1 with their other programming skills.

Staffing took place in a relatively straightforward manner. The division positions were filled with individuals already employed there. Two individuals were appointed to handle the divisional DBA function. Their choice reflected a balance of technical and political considerations. One of them, the DBA, dealt primarily with users and divisional management. The other, a technician, dealt primarily with corporate DBA's and systems software specialists. This individual did much of the MFS work. Thus they complemented each other. Both worked closely with the application programming project managers.

Corporate staffing took a little longer. Having established the required functions, those of systems software specialists and DBA's, the reporting structure had to be established. After some discus-

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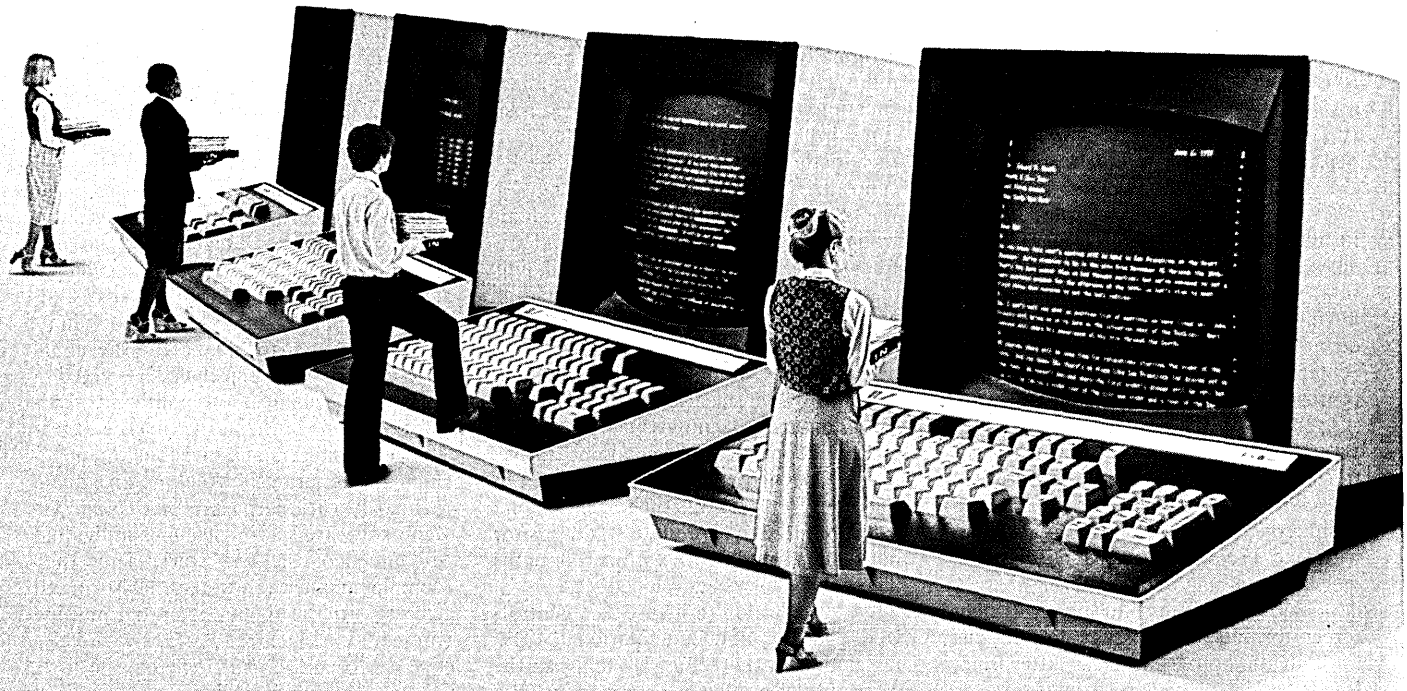

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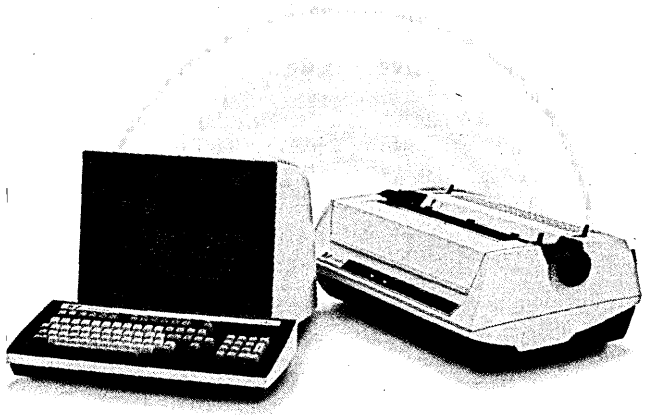

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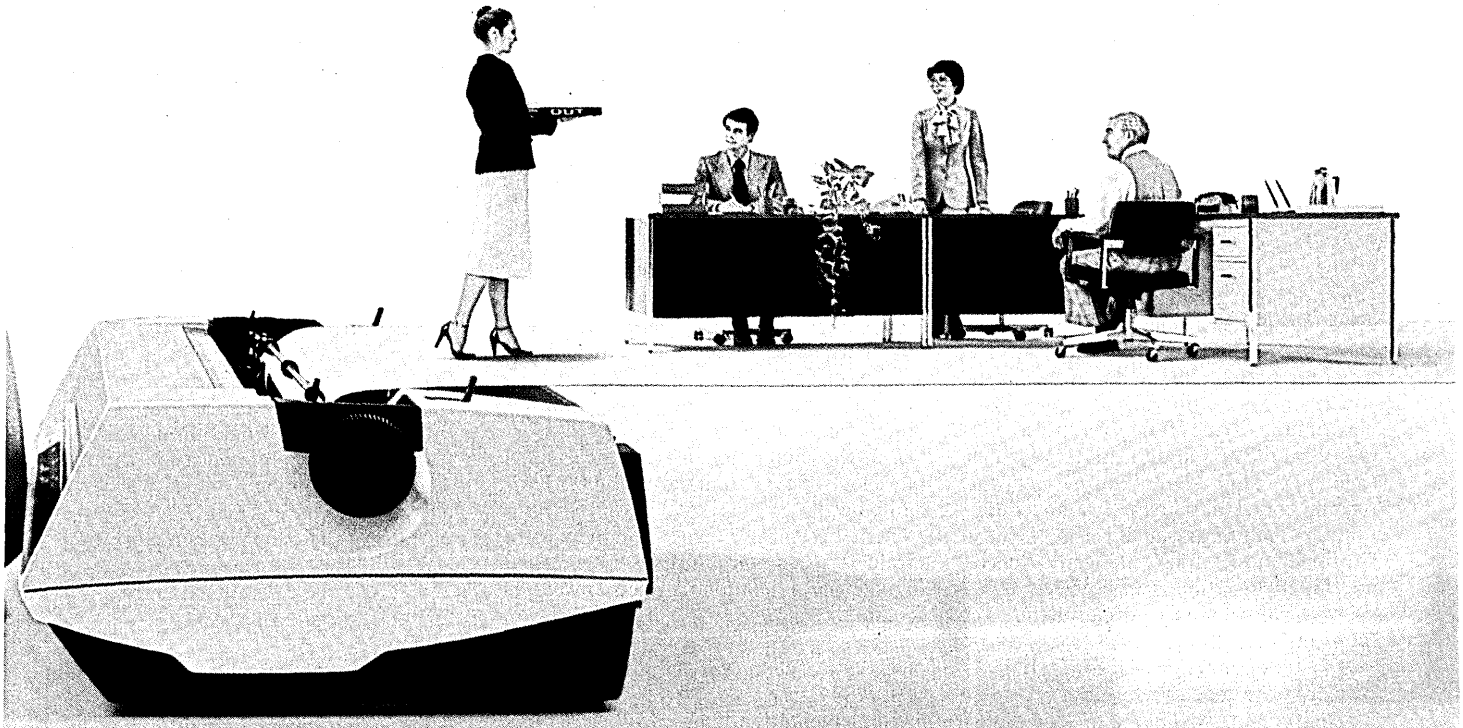

sion it was agreed that the systems software specialists function would be set up as a function of the data center systems software department and would report to the MIS corporate data center operations management; the DBA function would report to the corporate MIS staff management.

The IMS/VS systems software group was made up of two systems programmers, one of whom had four year's background in CICS, the other having a background in DOS. The third individual had a background in application programming. All three were trained in IMS/VS from the bottom up, and all three developed well. Three corporate DBA's came from a number of different areas, including two from divisions. Their backgrounds included file design, application programming, documentation, standards, and project management. They also were IMS/VS trained from scratch and they also developed well.

An additional position, sometimes initially overlooked, that should be specified is that of the Master Terminal Operator. This position, known as MTO, is similar in nature to the console operator in an operating system environment, and should not be staffed in a cavalier fashion. Every effort should be made to have this function integrated into existing data center operations at the outset and to find individuals who can begin to document the MTO operating procedures for the installation.

EDUCATION

One thing should be pointed out concerning education: it is going to be expensive. Assuming that you start from the beginning, training individuals in the various aspects of IMS/VS and DD/D could run to $100,000 over a two-year period. IBM lays out a plan of education for the individuals who are to perform the various functions required by IMS/VS and DD/D, and the material which follows is a slightly altered version of the recommended data base system education curriculum as set down in the IBM Customer Education Catalog and Schedule (G320-1244).

Education is required for the following individuals:

- Master Terminal Operator (MTO)
- Corporate DBA's
- Divisional DBA's
- Divisional programmer analysts
- Systems software specialists
- Data base systems management
- MIS management

Let's take care of the easy part first. After a preliminary introduction to data base systems, MIS management personnel can be educated by the managers of the data base systems functions. It is one of the responsibilities of these managers to present the concepts and techniques of IMS/VS both to MIS management and to user management. If MIS managers, directors, and vice presidents cannot understand the principles of data base systems and IMS/VS as presented by the managers of data base systems, then there is good reason to doubt the comprehension of the data base systems managers themselves. The expenditure of out of pocket dollars to educate MIS management and user management, therefore, should be nominal.

The education of data base system managers is another problem. The data base system manager may require some detailed data base theory course such as "Data Base Design and Administration," an IBM course in the Systems Science Inst. that costs about $1,000. In addition, he should attend the James Martin World Seminar and Leo Cohen's seminar; Martin's costs about $1,000 and Cohen's about $600 to $700. Martin's seminar opens to view the full panorama of the capabilities and possibilities of data base technology. The data base systems manager should be exposed to this so as to be aware of the potentials of data base technology. Cohen's seminar is somewhat more pragmatic in that it provides some guidelines for the manager to help him evaluate alternatives from among the various data base management systems in the marketplace. Another IBM course that gives an excellent overview of the fundamentals of IMS/VS is called DL/1 Application Analysis, costing $435.

In addition to the tuition costs, provision should be made for travel and living expenses, since some of the courses will be offered in remote localities. This is true not only for managers, but for other individuals as well.

So much for management; now let's look to educating those who work for a living.

The most expensive individual to train is the systems software specialist. His or her education can be itemized as follows:

IMS/VS Concepts & Facilities	-0-
IMS/VS Data Base Implementation I	$ 658
IMS/VS Data Base Implementation II	$ 660
IMS/VS Data Base Performance & Tuning	$1,005
VSAM Coding for OS/VS	$ 335
OS/VS VSAM for Systems Programming	$ 645
IMS/VS Data Communication Implementation	$1,391
DL/1 Application Programming	$ 357
IMS/VS Data Communication Application Programming	$ 262
IMS/VS Message Format Services (MFS)	$ 337
DB/DC Data Dictionary/Directory	$ 330
IMS/VS Data Communications Performance Analysis	$ 820
IMS/VS Data Base Design and Performance Workshop	$1,310
IMS/VS Data Base Systems Control & Flow	$ 485
IMS/VS-VTAM-SNA Implementation	$ 535

The collective cost for the above IBM courses is over $9,000. It is my considered opinion that this curriculum is necessary to develop a system software specialist who is up to the task of supporting a working IMS/VS system in an MVS environment.

The educational requirements for divisional programmer/analysts consists of a subset of the courses given to the systems software specialist and the data base systems manager. A suggested curriculum for these individuals is:

- IMS/VS Concepts and Facilities
- DL/1 Application Analysis
- DL/1 Application Programming
- IMS/VS Data Communications Application Programming
- IMS/VS Message Format Services (MFS)

The educational requirements for the divisional DBA include:

- James Martin World Seminar
- IMS/VS Concepts and Facilities
- Data Base Design and Administration
- DL/1 Application Analysis
- DL/1 Application Programming
- IMS/VS Data Communication Application Programming
- IMS/VS Message Format Services (MFS)
- DB/DC Data Dictionary/Directory

And the educational curriculum for the corporate DBA's:

- Data Base Design and Administration Leo Cohen Seminar
- IMS/VS Concepts and Facilities
- DL/1 Application Programming
- IMS/VS Data Base Implementation I
- IMS/VS Data Base Implementation II
- IMS/VS Data Communications Application Programming
- IMS/VS Message Format Services
- DB/DC Data Dictionary/Directory

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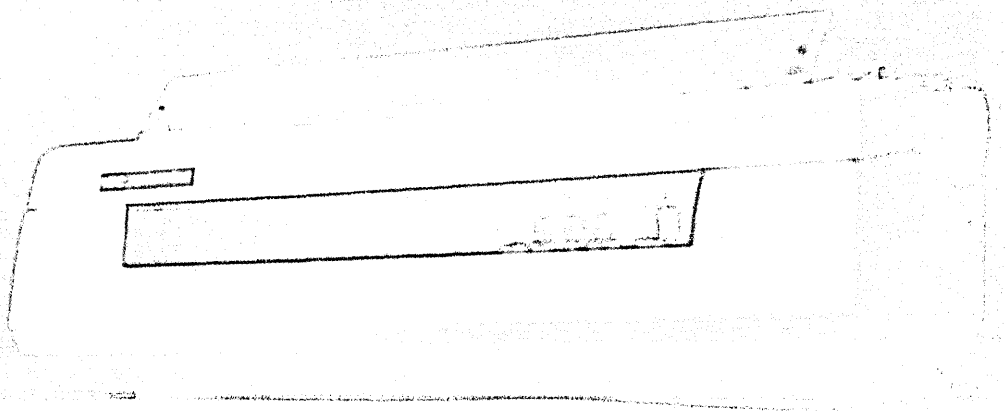

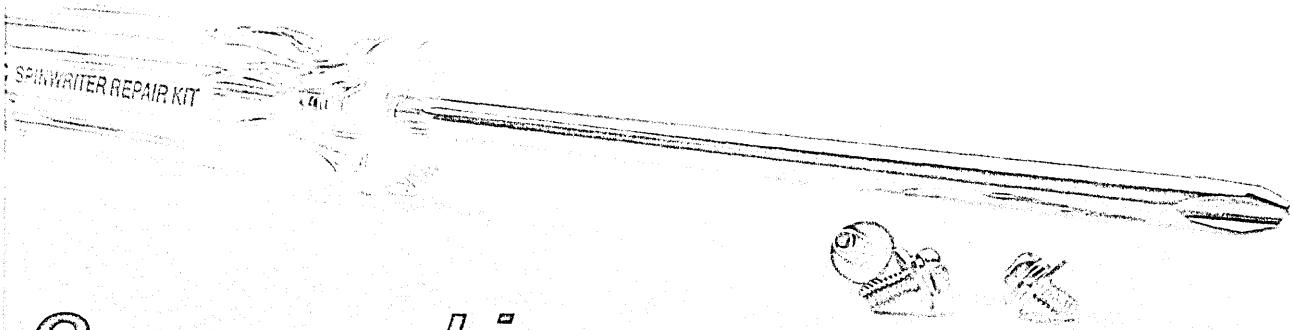

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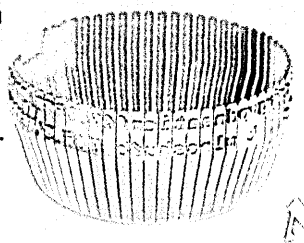

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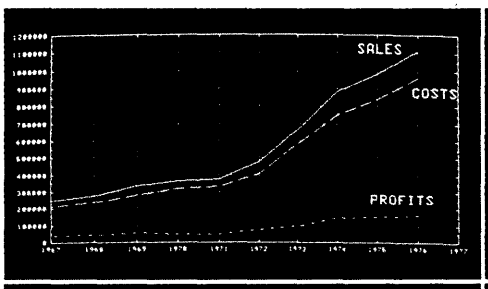

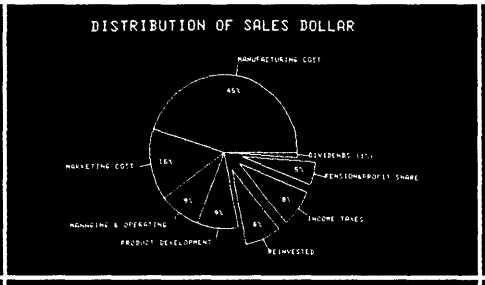

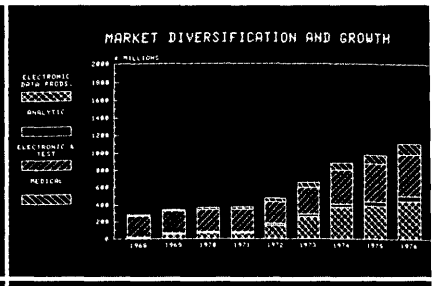

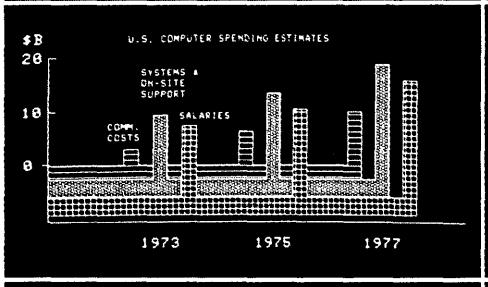

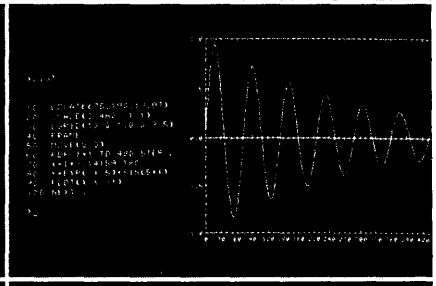

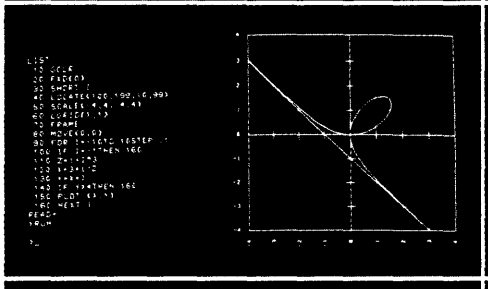

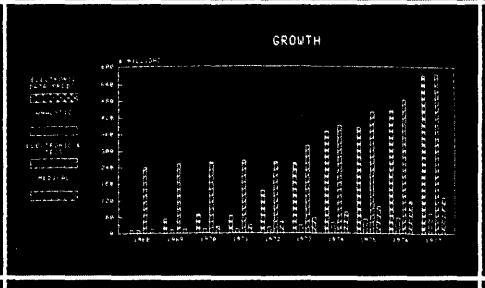

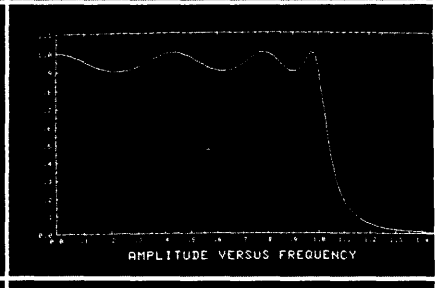

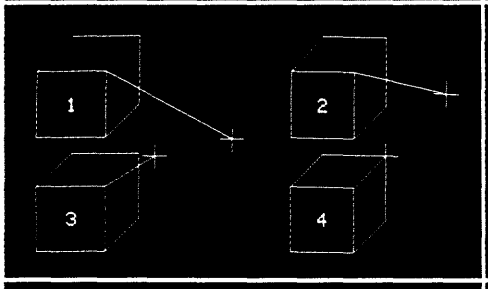

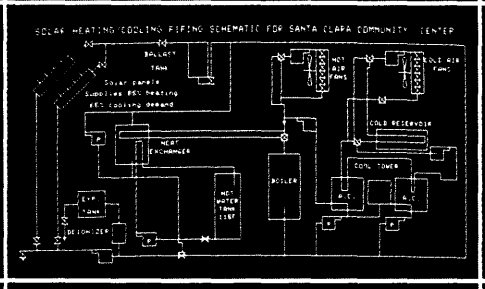

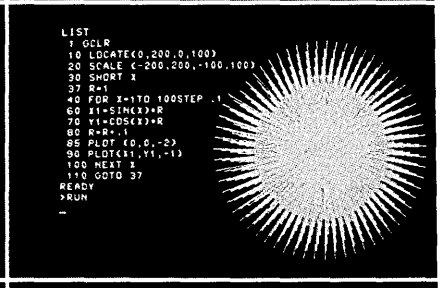

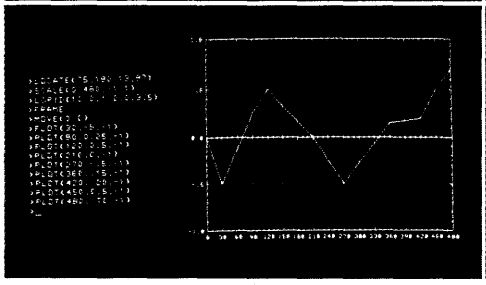

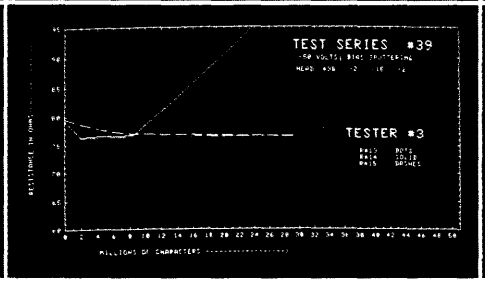

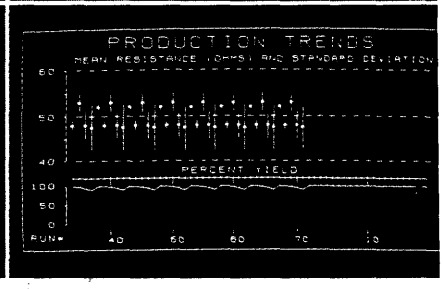

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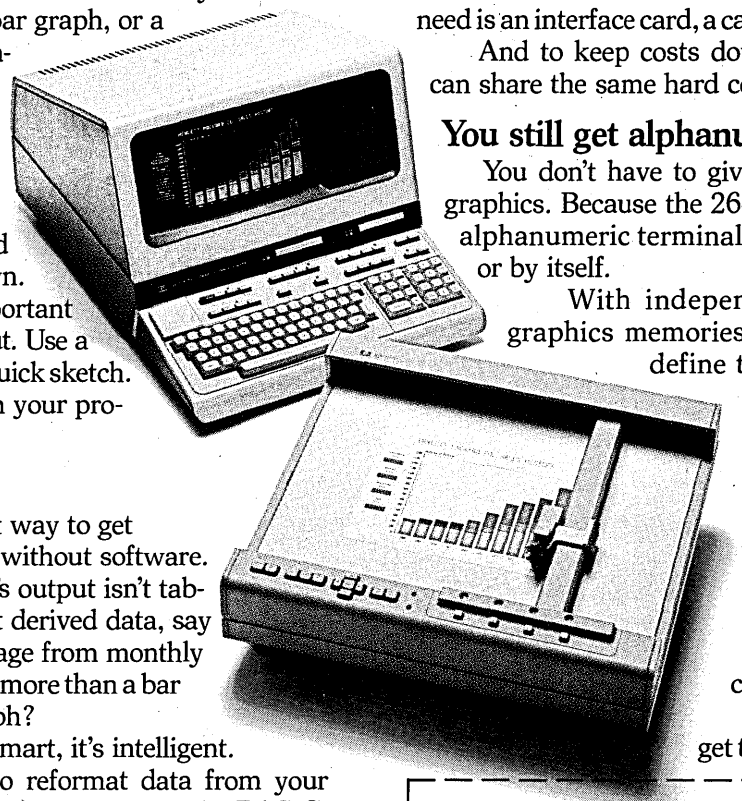
On an alphanumeric terminal, your data's just a screen full of numbers. But with the 2647A you can plot tabular data as a bar graph, or a pie chart, or a linear or logarithmic line graph. Quickly, with just a few keystrokes.

Now you can really see your data, not just look at it.

What's more, with the 2647A you can zoom in and out. Pan right, left, up, down. Selectively erase. Shade important areas to make them stand out. Use a rubber-band line to make a quick sketch.

Without any help from your programming department.



It's more than smart.

The 2647A's the smart way to get graphics from tabular data without software.

But what if your CPU's output isn't tabular? Or if you'd like to plot derived data, say a three-month moving average from monthly sales figures? Or if you need more than a bar graph, pie chart or line graph?

The 2647A's not just smart, it's intelligent.

You can program it to reformat data from your CPU, or to compute more data, in easy-to-write BASIC. And you can program it in AGL, our high-level graphics language extension of BASIC. Its powerful commands, such as FRAME, AXES, LABEL, LOCATE and PLOT, put sophisticated graphics at your fingertips.

Either way, your program runs on the 2647A without any help from your CPU.

Hard copy's easy.

How do you get graphics into your briefcase?

The 2647A makes graphics as portable as alphanumerics. It interfaces easily with our 9872A Four-Color Plotter (which can even make overhead transparencies), and with our 7245A Thermal Plotter-Printer. All you need is an interface card, a cable and the peripheral itself.

And to keep costs down, more than one 2647A can share the same hard copy peripheral.

You still get alphanumerics.

You don't have to give up alphanumerics to get graphics. Because the 2647A's also a programmable alphanumeric terminal for interactive use on-line or by itself.

With independent alphanumeric and graphics memories. Eight soft keys you can define to do several steps with a single keystroke. A bright, easy-to-use, high resolution display. And built-in dual cartridge tape drives for 220K bytes of mass storage.

Best of all, the 2647A with full memory and data communications interface costs only $8300.*

Which makes it easy to get the picture.

*U.S. domestic list price. Available on GSA contract number GSA-GS-006-01224.

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CIRCLE 99 ON READER CARD

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Marketing Manager, Data Terminals Division, Dept. 427,
19400 Homestead Road, Cupertino CA 95014.

The Master Terminal Operator must be chosen *very* carefully.

Last to be presented, but by no means last in importance, is that for the Master Terminal Operator (MTO):

IMS/VS Concepts and Facilities
IMS/VS Master Terminal Operations
On the job training with systems software specialists from the time of the first stable gen.

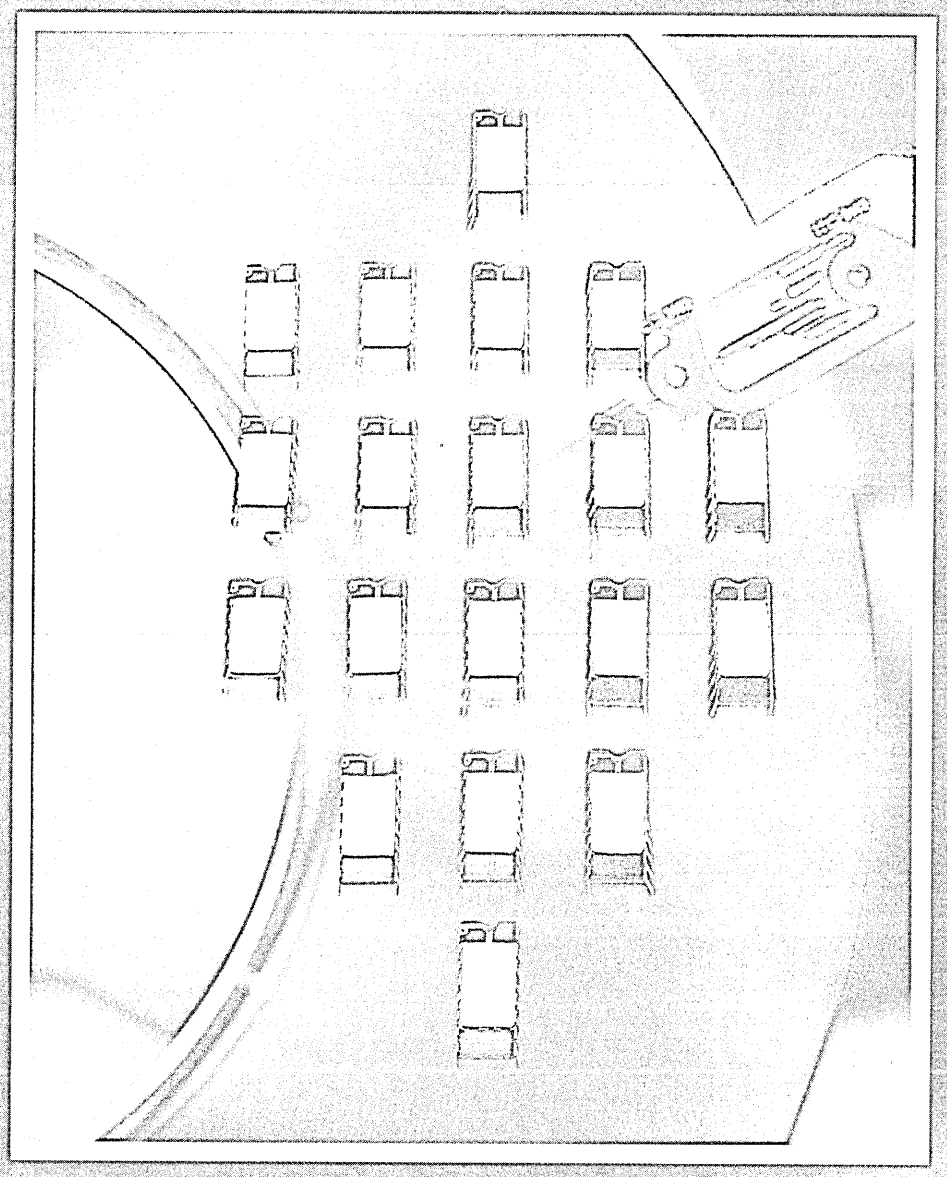
In addition to the courses just specified, there are also a number of courses devoted to instruction in the use of the various "Aids and Utilities" packages associated with IMS/VS. These courses can be added to the necessary curricula as the need for them arises.

PEOPLE ARE KEY These are our best suggestions for how to get the show on the road in support of an IMS/VS system. As always, people are the key to success. The individuals providing IMS/VS support should possess capabilities that are a cross between those of an application programmer/analyst and those of a systems software technician. In the immediate future, as the involvement with data base management systems becomes more nearly universal, these specializations will likely become as critical to data processing as the systems software specialization has become in the 10 years since operating systems were introduced. Preparing the persons involved with sufficient education, workable operating procedures, and an effective organizational environment to work in is more than half the battle. ❋

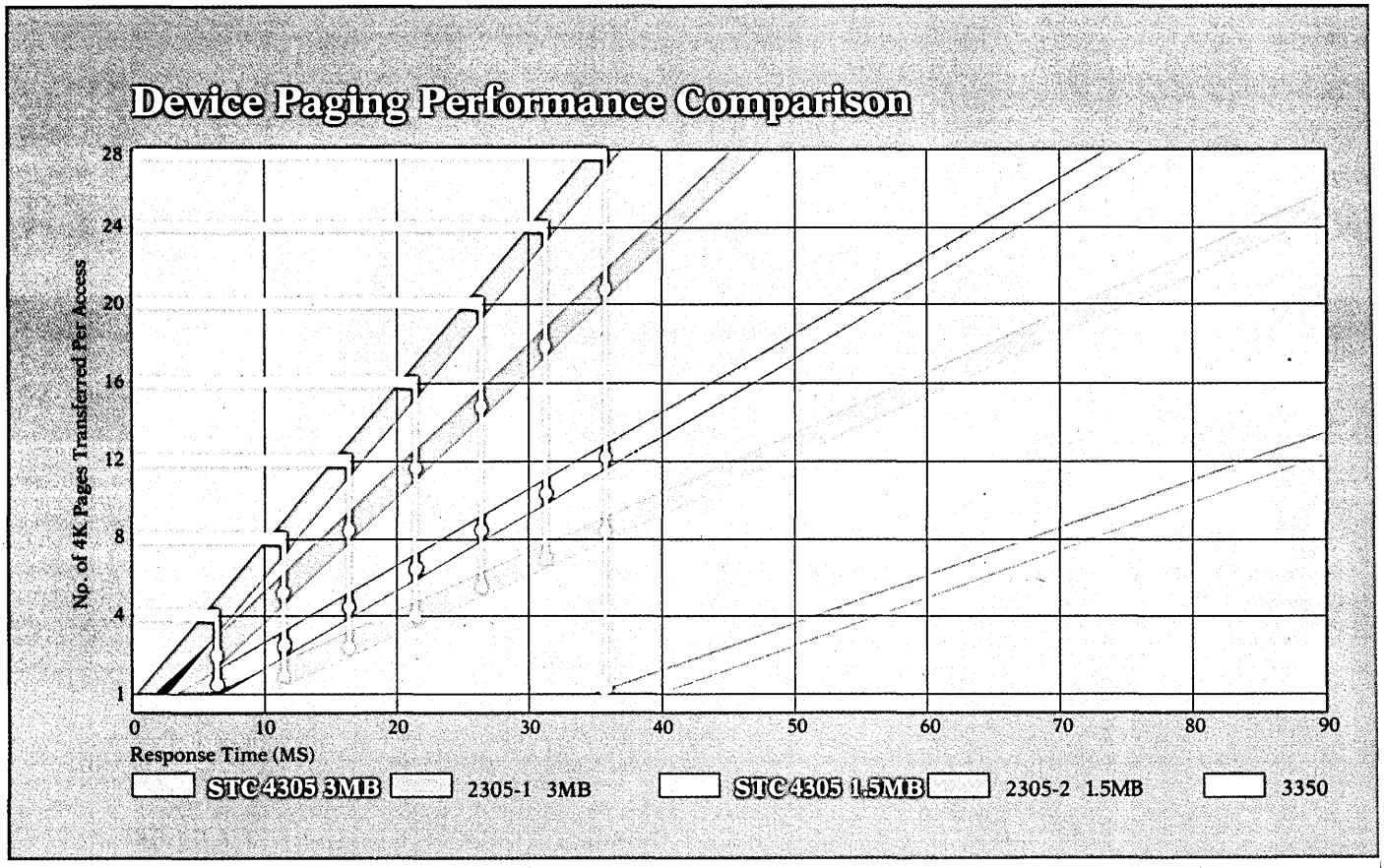
MYLES E. WALSH

Mr. Walsh is director of data base management systems at CBS, Inc. in New York City, where he directed the installation of IMS/VS. Prior to taking this position, he was a CBS general business consultant, director of computer systems for CBS news (where he put in the systems for elections broadcasts), manager of systems and programming for the Columbia House Div., and, further back, a programmer/analyst. His dp career began in 1959 with the use of EAM equipment at American Airlines.

Storage Technology's new disk system: Doesn't spin. Doesn't seek. Doesn't fly.



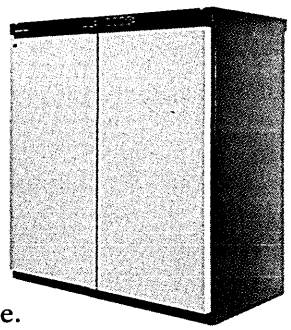
STC introduces the Solid State Disk: It gives you faster virtual storage paging for a fraction the price of the fastest drum.



Until now, you've had three options to improve virtual machine performance, all of which were expensive: upgrade the CPU, add memory, or add drum storage.

Today, there's a better answer: The STC 4305 Solid State Disk. In a basic configuration, it gives you 134% of the virtual paging rate for 50% of the cost of IBM's 2305 Fixed Head File. Better still, Solid State Disk's capability grows faster than its price. You can add options to increase its performance more than five times that of the 2305, yet still pay 20% less.

The best of both worlds: plug compatibility with superior performance.



Your CPU will think Solid State Disk is an IBM 2305 in every respect but performance. It runs with no software modifications under all releases of OS, VS1, VM and MVS operating systems. An STC field engineer simply plugs Solid State Disk into the block multiplexor channel of your 370 (135 or above), 303X or PCM equivalent CPU. They lead you through a straightforward conversion procedure. And you're ready to reap the performance benefits of the Solid State Disk's unique semiconductor, charge-coupled device (CCD) architecture.

For instance, with Solid State Disk, you get 0.7 millisecond access time vs. 5 milliseconds for the 2305. Storage capacities up to 45 Megabytes vs. 22.5 Mbytes. And selectable channel rates of 1.0, 1.5 and 3.0* Mbytes per second vs. a fixed 1.5 Mbyte rate.

This latter feature, when combined with dual channel option, lets you share your Solid State Disk among processors with different channel characteristics. Add the

* 3.0 Mbyte/second and 6.0 Mbyte/second (aggregate) transfer rates are options and require two byte wide interface from IBM.

powerful dual port capability, and you can attach to more processors, or gain concurrent access for a 2.0, 3.0, or 6.0* Mbyte/second aggregate transfer rate.

Lowest cost of ownership. When it comes to cost, Solid State Disk is a real penny-pincher. It costs less to buy, because it's easier to build. There are no critical mechanical parts to precision machine and assemble, just straightforward IC and PC board fabrication. In your data processing center, a typical Solid State Disk Configuration saves you 65% of the space required by the 2305, cuts power consumption by 60%, and reduces heat dissipation by a healthy 66%.

Extensive FE controls, coupled with a built-in microprocessor, enable STC field engineers to service your Solid State Disk in-line, off-line, or on-line. And because all components are modular and field replaceable to the module, board or chip level, you get the fastest time-to-repair at the lowest possible cost.

Solid State Disk: Just one of the ways STC helps you get more for less.

The Solid State Disk is just one of many STC products and services designed to help you get more productivity, and more useful life out of your IBM computer. And do it with significant cost savings in both purchase price and operating expenses.

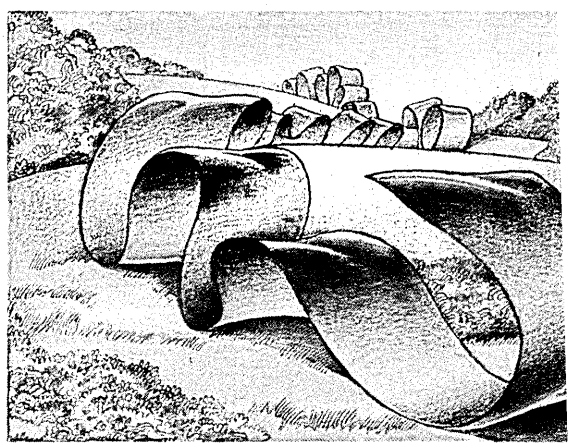
If you have the impression that one of every three tape drives is ours, it's more than an impression. If it's ever seemed to you that everywhere you see medium and large-scale computers, you see our name, it's not just an impression.

Over the past nine years we've installed 22,000 tape drives—or about 30% of all tape drives installed during that period of time. In fact, today STC makes more tape drives for medium and large scale systems than anyone else, including you know who.

The secret behind this success isn't any secret at all. STC tape drives deliver superior performance at a very attractive price.

For instance, only STC drives incorporate SPAR, a unique, built-in diagnostics system that took 16 man-years to develop, and that allows our field engineers to perform all diagnostics and maintenance off-line, on-line, or in-line. Which is just one reason why national reliability studies show STC drives outperform IBM equivalents. So when you choose Storage Technology, you get more than performance. You get availability, serviceability, and reliability.

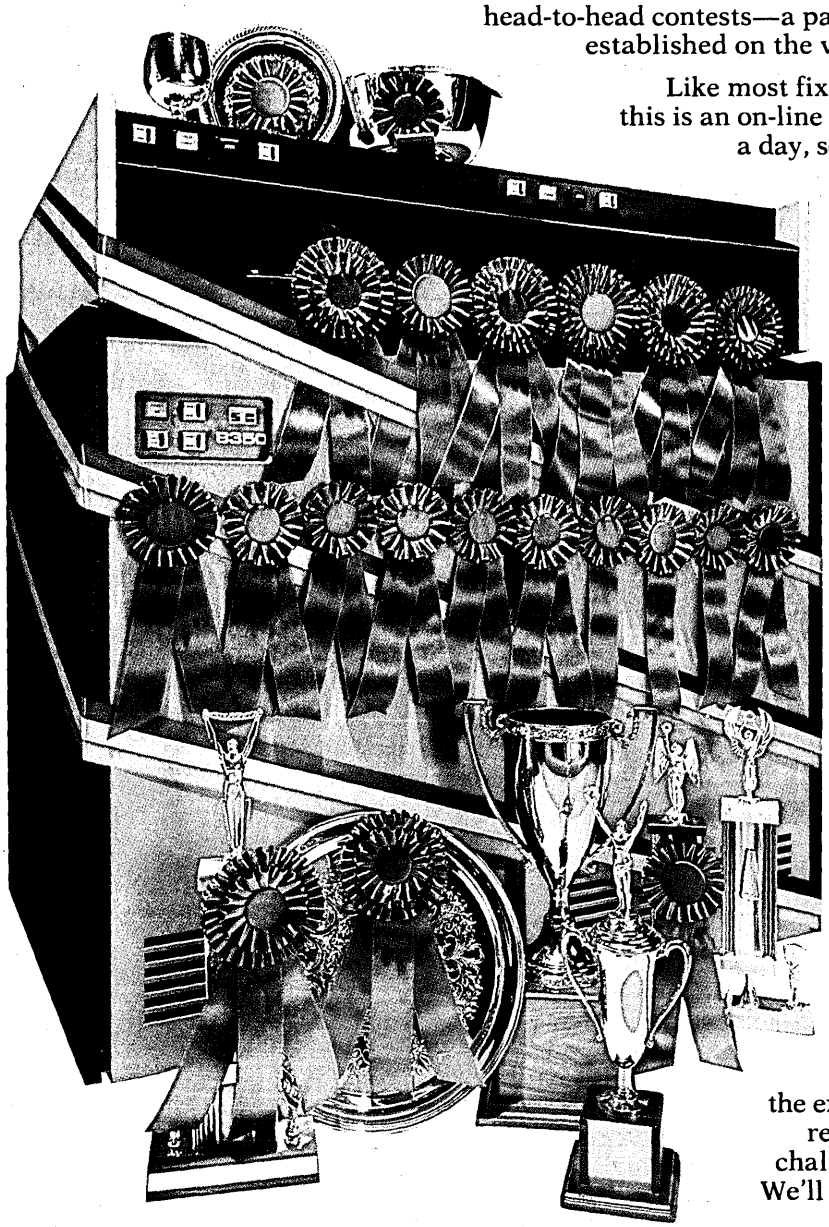
Now, to our customer (and you know who you are) who is still using STC tape drive 001: Come on. Give us a break. How long will a STC tape drive last? After 9 years, we still don't know. You see, the first engineering prototype we built back in 1969 is still being used by a California-based electronics firm. It hasn't had a service call in over two years. And our first production model, serial number 001, was field-converted from a 2450 to a 3470 (IBM 3420-7 equivalent) two years ago, and is also still being used heavily by one of America's largest retailers. So we're beginning to wonder if they'll ever buy a replacement. In the meantime, we'll keep giving them the same great service that's made our field engineers a legend in their own time.



Help, police! Creativity can sometimes make the difference between good service and great service. For example, can you imagine yourself asking the police to pick you up? That's what a couple of our field engineers did during Boston's driving moratorium last winter. An STC customer had a significant problem, and since the only legal way to drive was with a police escort, our people had to call for police assistance to reach the site.

Now, we obviously don't relish the image problems that might result from our FEs riding around in squad cars. So we're thankful that this was a rare event during the 3-day, 12-state storm. But it does underline why STC field engineers are popular enough with our customers to top the June **Datapro** report with a 3.6 rating.

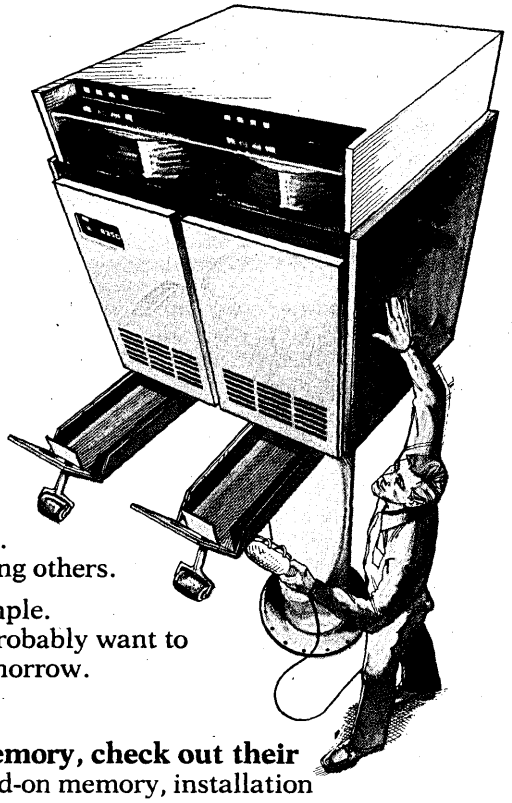
Why the 8350 has never lost a contest. Fixed media disk users are a very picky lot. Many of them demand vigorous benchmarks before buying a winchester drive. The STC 8350 is used to winning these head-to-head contests—a pattern of success established on the very first installation.



Like most fixed media disk applications this is an on-line system running 24 hours a day, seven days a week. Anticipating typical new product problems, we arranged for this customer to provide computer time for engineering work. As it turned out, we didn't need even a fraction of a CPU second. During the 90 day test period, there wasn't a single hardware failure.

That performance was designed into the 8350 from the outset with such features as fully redundant electronics and power supplies. Elimination of discrete components in favor of easily serviced PC boards. And MIDAR, STC's proprietary diagnostic package designed to quickly direct the field engineer to a problem component for fast repair.

How would the 8350 measure up in your environment? Why not put us to the test? As the leading independent supplier of high-performance fixed media disk drives, we can provide you with the product, the experience and the service resources to satisfy your most challenging requirements. We'll even guarantee it. In writing.



Tips and tools to tune up your storage subsystem performance. How many channel tries before you get a start I/O? Are catalog requests idling in the queue? What's the distribution of your data sets by size? By frequency of access?

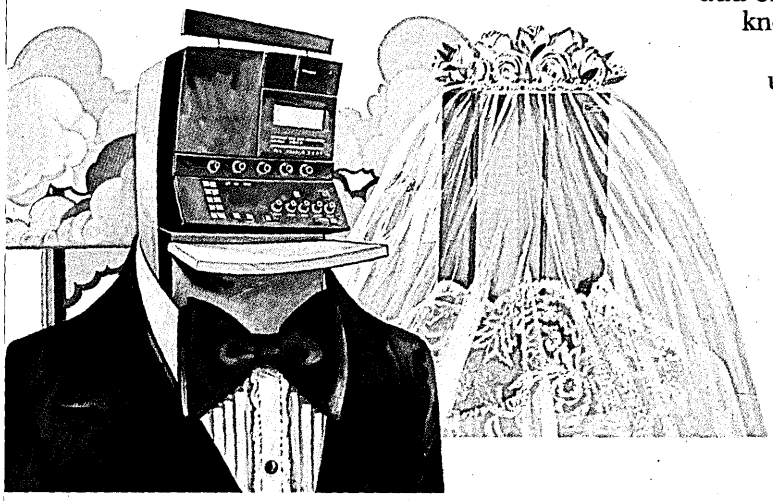
STC Systems Engineers can help with answers to questions like these to squeeze more mileage out of your existing storage equipment, and help you plan for more efficient system growth. They've helped our customers solve a wide range of storage problems under virtually every conceivable combination of CPU, operating system, and job mix. Their experience is now at your disposal in the form of free software packages.

Some of the tools you can put to work today include Configuration Planning Software with programs for evaluating tape and disk data set characteristics. High Speed Dump/Restore. And Performance Maximization, among others.

Our philosophy in providing these tools is simple. If we help you get more from what you have today, you'll probably want to do business with us when you're ready to grow tomorrow.

Before you wed your CPU to an add-on memory, check out their hand holding. You know that when it comes to add-on memory, installation and service are as important as hardware.

So you should know that our STC field engineers have over 250 Mbytes of large system memory experience (including more 168 add-on than any independent). So they know how to get you up and running fast. STC's new family of 158, 168 and 303X add-on memory uses the latest MOS technologies. They have fewer components for fewer failures, reduced power consumption and less heat dissipation. Their modular design makes for an easy growth path, too. All our people have to do to give you additional capability is plug in additional cards. This typically takes less than a shift, including the diagnostics. And if that's not enough to convince you, price and availability should be. Because STC add-on memory costs 30% to 50% less than IBM's. And it's available today.



For more details on STC data storage products and services, call your local STC sales office. Or clip and mail the coupon below to: Storage Technology Corporation, Mail Drop 3M, 2270 South 88th Street, Louisville, Colorado, 80027. Phone (303) 497-6262.

Yes. I'd like to know more about the following STC products:

Sales Call	Literature Only	CPU Make	Model	Operating System
☐	☐ 4305 Solid State Disk			
☐	☐ 8350 Disk Drive			
☐	☐ Add-on Memory			
☐	☐ STC tape storage products			

Name_____

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CIRCLE 22 ON READER CARD

It is time for management to step up and manage policy, not technology.

CHARGEOUTS: A PERSPECTIVE FOR CHANGE

by Christine Rizzuto and Ralph Rizzuto

The method by which data processing services have been charged out to the user community has traditionally not been satisfactory to managements at the user, corporate, or dp level. The problem, essentially, is that too many measurements have gone into these billing algorithms.

Well, the time has come for management to end the search for the Holy Grail—a billing algorithm that is repeatable, equitable, comprehensive, and accurate. Such an algorithm is a challenge for the systems programmer to develop, a source of pride for the dp manager to flaunt at the helpless user, and an irritant to the corporate executives who ask, "What is the cost and predicted life of this chargeout system?"

Nonetheless, it is possible to come up with a chargeout structure in which cost recovery and corporate policy enforcement are separate; where cost recovery is simplified through configuration-independent measurements of application activity, and yet in harmony with the goals of corporate management, dp management, and user management.

To gain insight into today's problems, let's trace briefly the technological evolution of computer chargeout. In the early 1960's, many large corporations adopted the policy of not charging for the cost of the computer, fearing that doing so would discourage computer use. Instead the cost of the computer was absorbed as overhead. The next several years were characterized by a rapid growth in computer applications and by increased budgets for hardware, software, and dp personnel. Then corporate policy changed. Chargeout became the mechanism to control this growth and distribute the cost of the computer. But multiprogramming made the chargeout more complex. The dp manager was faced with the need to distribute the cost of his installation among multiple and simultaneous users, and this sharing of resources was a problem in developing a chargeout system.

But in response to this perceived need, dp departments in the early '70s came up with the chargeout systems that were the delight only of systems programmers. They tried to account for every split microsecond of resource used, reflecting

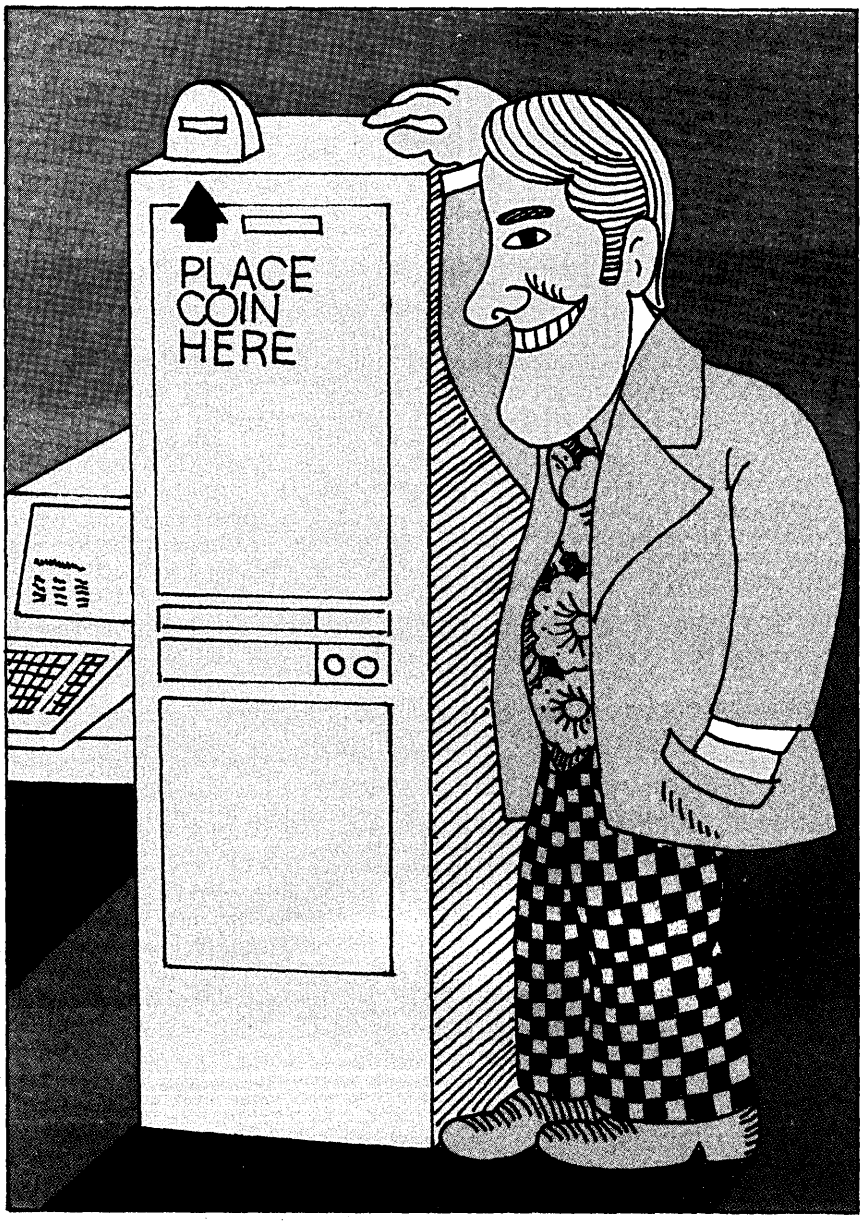


ILLUSTRATION © BARBARA BENSON 1978

Informed and knowledgeable users are dp's best customers.

the corporate directive that the cost of dp be recovered from the using departments.

User managements, meanwhile, found they were no closer to being able to forecast the cost of applications development or budget for their use of this corporate resource called dp. What user management wants is to be able to express his use of resources in business terms he understands—the number of policies updated, number of checks written, invoices prepared, or stocks transferred.

Although we have come a long way in software design and hardware technology in the last 10 years, our ability to effectively manage dp has not kept pace. It is time for management to step up and manage policy, not technology. We would all like to treat dp chargeout with standard accounting practices and foster goal congruence among corporate, user, and dp managements. But to do so, we must:

— Change our cost recovery measurement philosophy.

— Separate cost allocation from price.

— Define cost in applications terms, whenever possible.

— Identify and isolate management policy.

While there are no universal chargeout objectives, we will show that there can be a common chargeout structure that meets the common goals of corporate, the user, and dp.

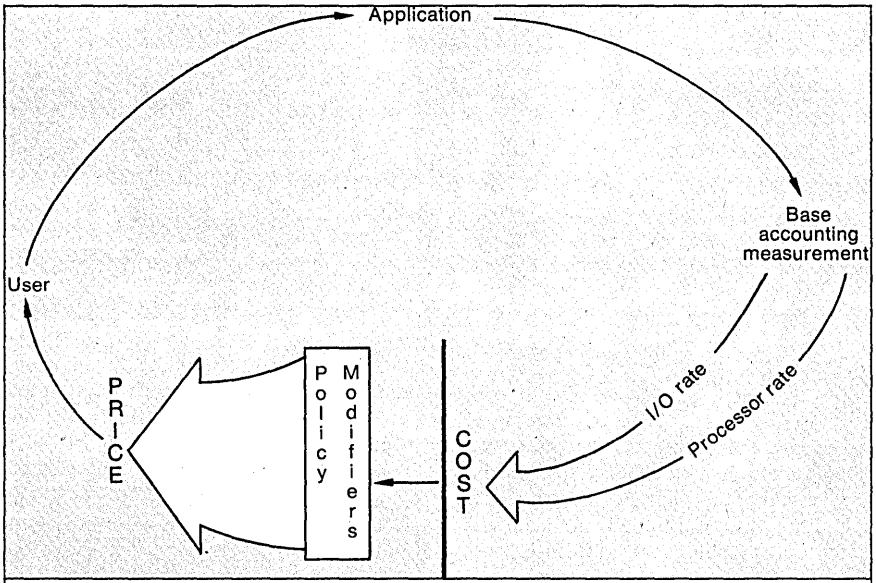


Fig. 1

THE STRATEGY

A resource utilization chargeout philosophy measures how much of each resource (cpu time, memory time, channel time, control unit time, device time, etc.) the application program used. The perspective is looking from the system in toward the application. Resource utilization is time dependent by definition. It is complex and locks you into a technology. It costs money, both in terms of constant overhead to run and the cost of development and redevelopment, and is difficult for the user to understand, thus making budgeting and estimating projects awkward, if not unmanageable.

But no matter how complex the computer system, it continues to perform two basic operations; executing instructions and moving data. And a work-oriented philosophy uses those two operations, executing instructions and moving data, to express how much work the application is doing. It looks at the application outward, independent of the environment. In today's world, cpu time is the measurement available to approximate instructions executed, and block counts can be used for I/O work. For our cost recovery purposes, then, all the resources of the system can fall into one of those categories. The result is a functional regression of all resource utilization into the two key items: processor work and I/O work.

Ideally, processor work would be instructions executed, weighted by memory references (to distinguish among different instruction types and control microcode). They would include problem program state instructions plus supervisor services requested—excluding any code due to multiprogramming functions. And I/O work would exclude control bytes, retries, and excess data manipulations due to data base organization.

A RESTRUCTURING

We have separated chargeout into two components: costing and pricing. Cost recovery is accomplished in the following way. The application user runs the application, and base accounting measurements (the processor and I/O work) are collected. A cost rate for the cpu memory, and channels is applied to the processor work and a cost rate for the peripheral devices is applied to the I/O work measure. The result is the cost of running the application. (See Fig. 1.)

For some applications a standard cost per functional unit can be developed. For example, in an IMS environment a standard cost for each transaction type is derived by collecting the base accounting measurements for that transaction and applying the cost coefficient. After the initial cost per transaction is derived, only a count by transaction type need be collected and the functional unit rate applied to that count. (See Fig. 2.) The overhead for counting a functional unit such as transaction type is minimal. That is, in a high performance system, such as IMS, the base measurements to cost need be taken only periodically for variance and adjustment.

Once the cost has been established, the price can be simple or complex depending on management policy. We have simplified cost recovery by elevating the measurement "problem" to pricing. The typical resource utilization chargeout system integrates tuning and performance data as well as overhead for such services as security, service, and availability into the billing algorithm. The result: the user cannot determine what to change to reduce his price. There is no goal congruence among the corporate management who shape the policy, the dp management who enforce it, and user management who make decisions based on it. However, what we have done is separate cost recovery from performance, service, stability and other policy decisions and have imposed these controls in a very direct, visible, and explainable way by applying them as policy modifiers to the cost.

Fixed costs can also be associated to user accounts, such as dedicated terminals for specific user groups. Before looking at the policy modifiers in more detail, let's first look at the measurement data characteristics.

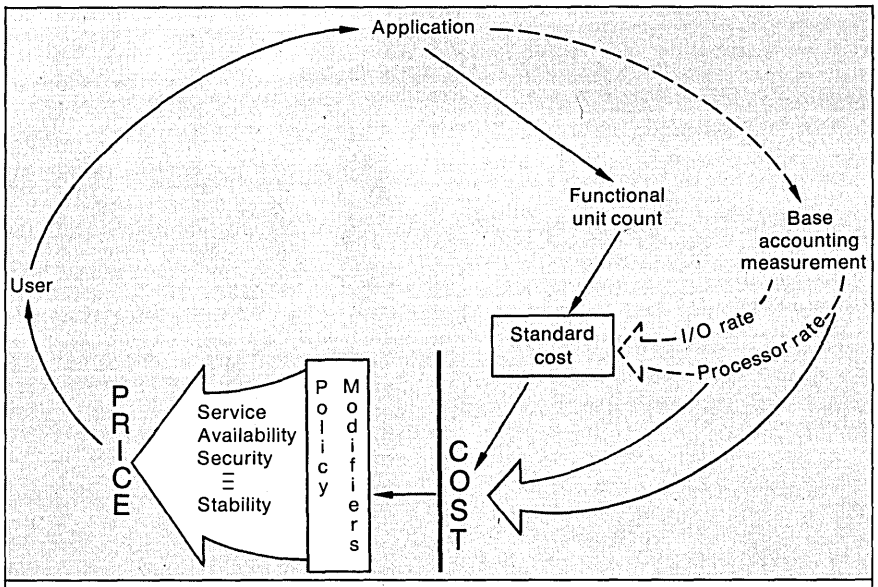


Fig. 2

LEVELS OF MEASUREMENT DATA

Typically, "accounting" data and performance / tuning data are intermixed. The accounting data can be used for tuning and performance, but the converse is not necessarily true. In doing capacity planning, performance studies, or application tuning, the objective is usually to measure the contention, load, and/or utilization of the system components, while accounting data tries to isolate the activity of one user from the environment and measure it without interference.

Let us now look at the full spectrum of measurement data and see how the data fulfills our objectives. We have categorized the data measurements in levels of detail. Level one is application oriented functional units, such as number of updates in an inventory system, number of policies written, number of claims serviced, and number of employees paid. Ideally this functional unit is the only data the end user ever sees. It is simple for the end user to understand, not subject to system load or contention problems, when applicable has a low overhead measurement cost, and has high face validity in the user community.

Level two, the ideal base measurements defined earlier, would provide a configuration-independent measure of work. With weighted instructions executed, we could run any job on any model and the measurement data would be the same; that is, it would not be subject to model speeds or cpu time variabilities. The I/O work would be the data bytes requested by the user.

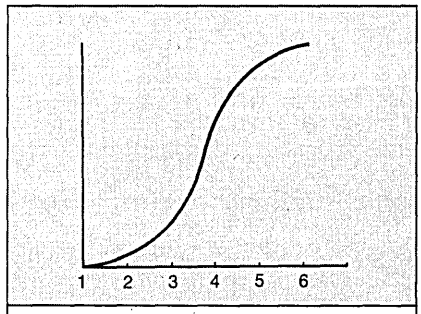


Fig. 3

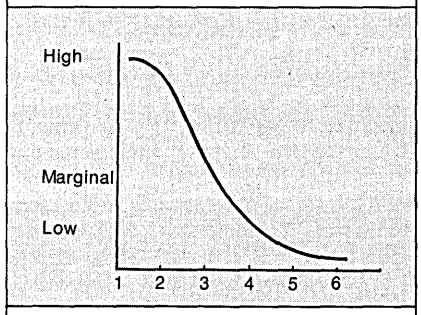


Fig. 4

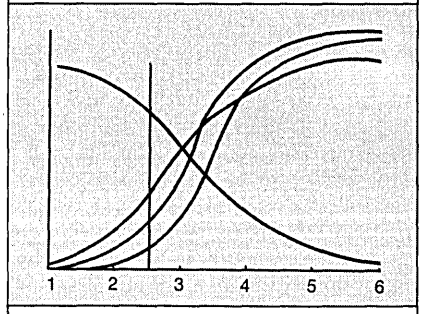


Fig. 5

Level three is the data currently available that we suggest using as the base accounting measurements. From level four through level six the data becomes more load dependent and more difficult and expensive to measure. These levels appear along the *x*-axis in the graphs. The *y*-axis is the authors' experience with the data characteristics.

Fig. 3 shows the data from level one to six, from the simple (to understand and to cost) to the complex. The same curve applies also to the variability of the data, the effect of the load on data repeatability, and the acceptable level would be about a third of the way up the *y*-axis. The curve applies as well to the overhead of data collection, what percent the user is paying to collect this data; here the 20% level is again about a third of the way up the *y*-axis.

Fig. 4 shows face validity of the data—user acceptance of the data as being fair and equitable to him in a charge-out system. Fig. 5 shows where we draw the line between accounting data and tuning data, where the data is simple to understand, repeatable, collected with little overhead, and has face validity with the user. If you move the line to the right, you may gain completeness by measuring everything, but know the tradeoffs you're making. The way to gain completeness is in the price, not the cost—by using policy modifiers.

POLICY MODIFIERS

Policy modifiers are the visible indicators that affect price. They can reflect system impact, both performance and function, management direction and certainly cost considerations. The way to gain goal congruence among corporate management, dp management, and user management is through policy modifiers.

Let's discuss those policies which could modify the price to the user. *Service level* is the most common. The requirements are set by business needs, possibly corporate management. The response time, scheduling deadline, or turnaround times to meet these business needs are known by user management. The resource required and mechanism for accomplishing the objectives are under dp management control. Therefore dp management can determine whether the price of running this application should be higher or in some cases lower than the base cost derived. Load, contention, and service indicators can be periodically collected to determine whether the service

With a simple restructuring, we can make chargeout the central point, not the bottleneck of the organization.

objectives have been met and whether a premium should be charged.

System impact is another consideration. Applications which are inefficient utilizers of system resources can be identified and specific recommendations made for corrective action to avoid a price adjustment to the base cost. Running an application under VM or emulation could also be reflected in a charge through tuning and performance threshold analysis.

Stability of an application can impact scheduling objectives and operational manpower. If an application is consistently being changed or is programmed poorly without data validation routines or if long-running without checkpoint/restart facilities, a price adjustment could be made.

Availability is another item that could impact the price. For example, if the application must be the first one up after a system crash, or if it must meet a window and the system is underutilized frequently just so it has sufficient power to meets its commitments. Backup hardware would also fall in this category.

Data status is another, i.e., whether the data is active, always on-line, or passive, how the data is structured, if multiple applications access it, and what device type the data is on.

Venture analysis is a way to encourage innovation and realize business potential. The cost can be charged to planned underutilization.

Project subsidy is a way of supporting the price of running an application until it reaches its expected level of utilization. Examples are the initial start-up costs of an online application or the staged transfer of work from an equalized system configuration to an underutilized one. *Security* and/or *compliance* may impact the entire installation and the cost may be substantial. A data base as a *capital asset* may be a way of encouraging many user departments to use a specific data base structure for many applications. This could result in a substantial saving to the enterprise, a saving that could be passed on as a price reduction adjustment to the base cost.

Once management policies have been established, application and subsystem (IMS, CICS, TSO, etc.) profiles can be developed. These profiles consist of typical performance and capacity planning data such as cpu utilization, paging, real storage usage, channel activity, device activity, response time, and turnaround time. Each profile should also include special requirements—policy considerations, such as service, priority, availability, and data status. Comparison to the average values and requirements for all users will provide the data for impact analysis of one application on the total environment. For example, "good" and "bad" applications can be identified and recommendations made for improvements that will result in price reductions.

MEASUREMENT DATA

1. Functional application unit
2. Instruction executed
   Bytes transfered
3. CPU time
   EXCP
   I/O requested
   Block sized
4. SRB time
   Memory integral
   Page in/out
   SIO
   PCI
   I/O time
5. Staging occupancy
   Virtual page references
   Voluntary wait
   Cylinders traveled
   Searches
   Seeks
   Page faults
6. Cache hits
   Dispatches
   Bus utilization
   I-cycles
   E-cycles

Fig. 6. The full spectrum of measurement data.

By applying policy modifiers to the base cost, we have communicated our objectives among corporate management, dp management, and user management in a very direct, visible, and explainable way. Informed and knowledgeable users are dp's best customers.

THE FUTURE

Small and large dp centers, whether cost or profit oriented, whether run by corporations, universities or service bureaus are all growing and changing, and plagued by the limitations of their current chargeout system. With a simple restructuring, we can make chargeout the control point, not the bottleneck of the organization.

Once we have structured our approach to charging out of the dp resource, we should look toward the improvements that can fall out of such a structure. Applications design criteria can be established with knowledge of the cost effect, users can be made aware of their effect on the system, performance guidelines can be developed and enforced, and the cost to the end user can be determined. Application proposals can be evaluated for their return on investment. The level of measurement can be controlled. User budgeting is facilitated.

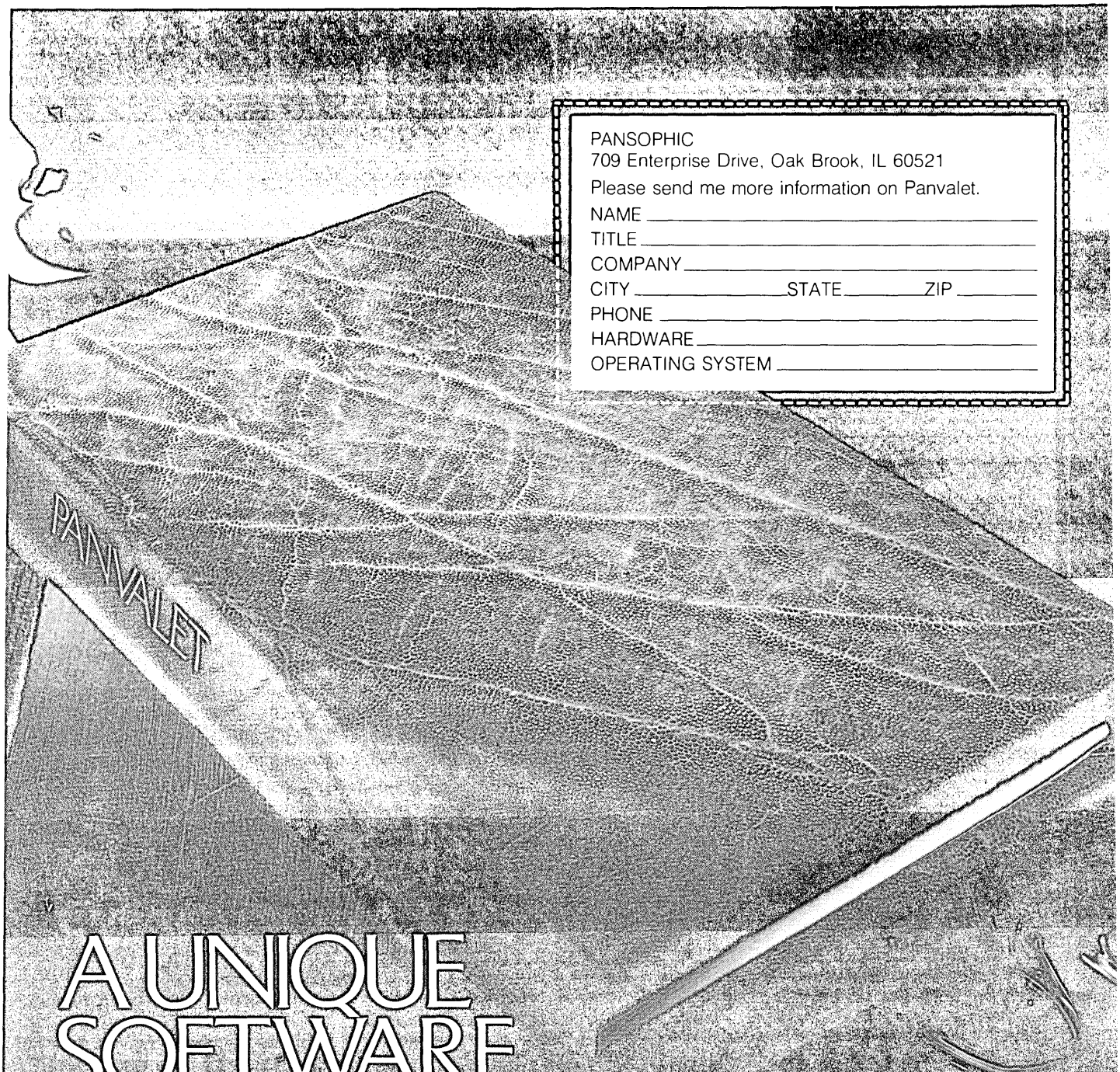
By changing our cost-recovery measurement philosophy, by separating cost allocation from price, by defining cost in application terms whenever possible and by identifying and isolating management policy, we can remove the communication barriers and foster goal congruence among the corporate management, the dp management, and the user management. ✻

CHRISTINE RIZZUTO

Ms. Rizzuto joined IBM's System Development Div. in 1974 and worked on operating systems design. She is currently a systems engineer with the Data Processing Div. In the field since 1970, she has also been a computer operator and an applications and systems programmer. She holds a B.S. in math from City College of New York.

RALPH RIZZUTO

Mr. Rizzuto is an advisory systems engineer with the IBM Data Processing Div. He joined that company in 1974, working on operating systems design in the System Development Div. He previously was affiliated with several large companies, working as an applications and systems programmer, and was also appointed to the adjunct faculty at Fordham Univ.'s graduate school of business. He holds a B.S. in math from the City College of New York and an M.S. in computer science from CUNY.



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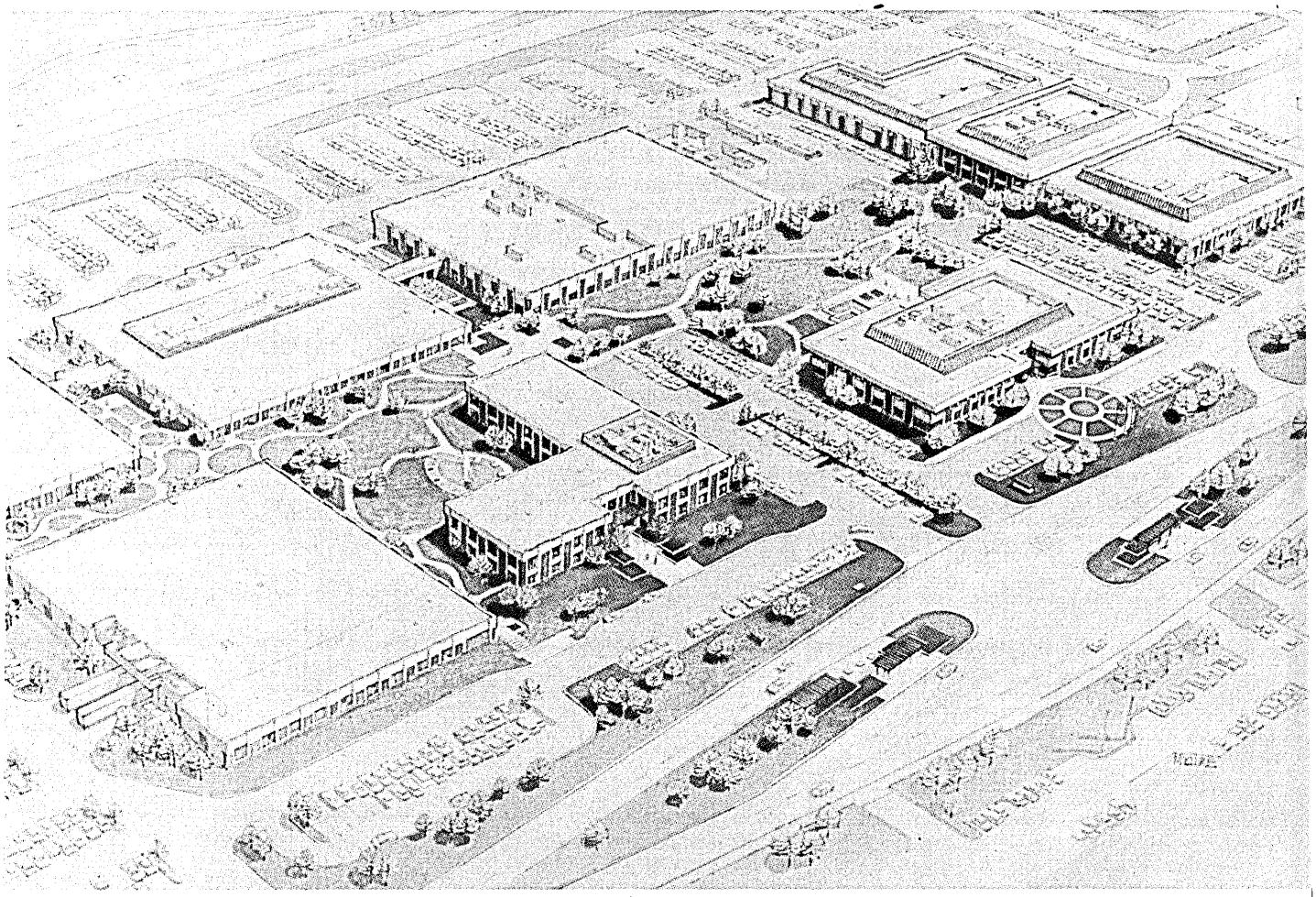

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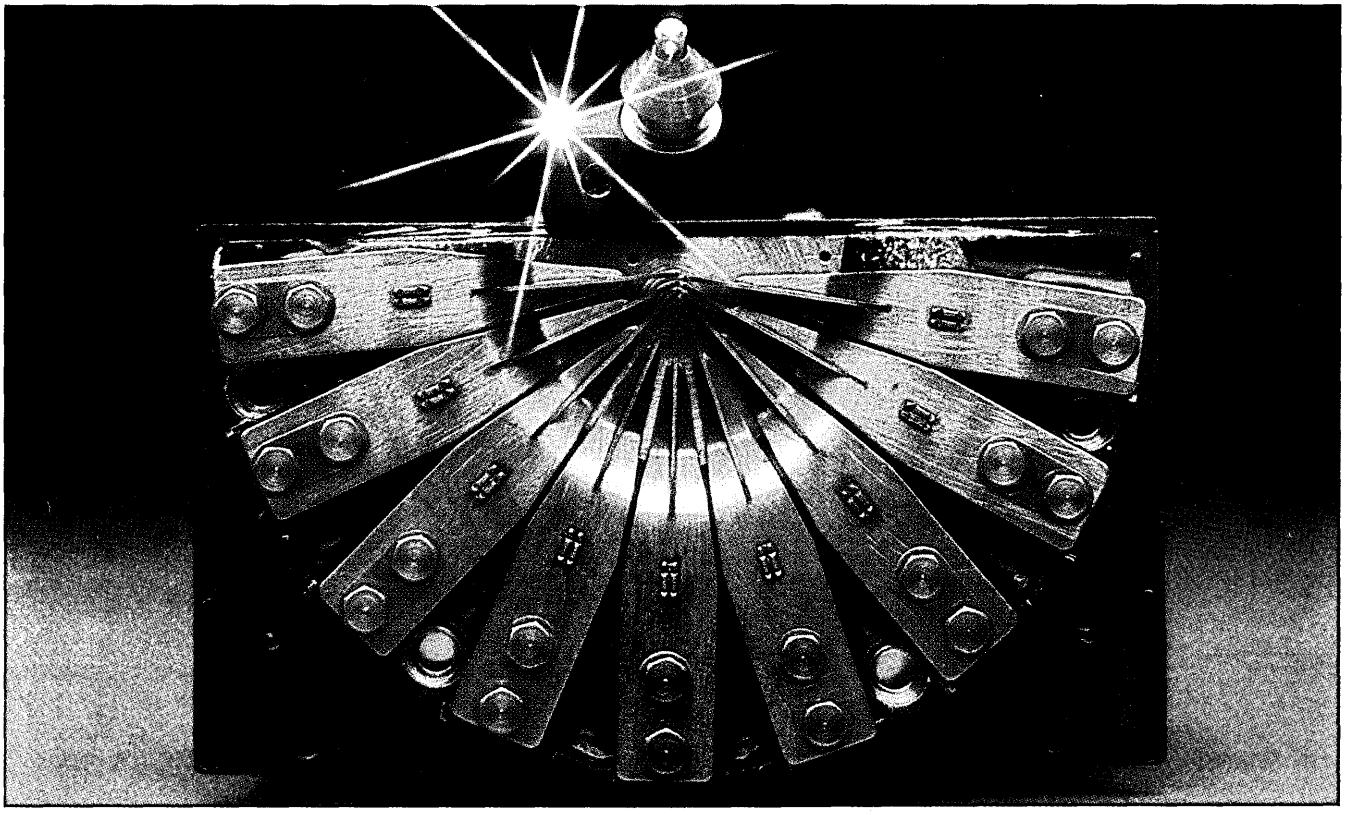

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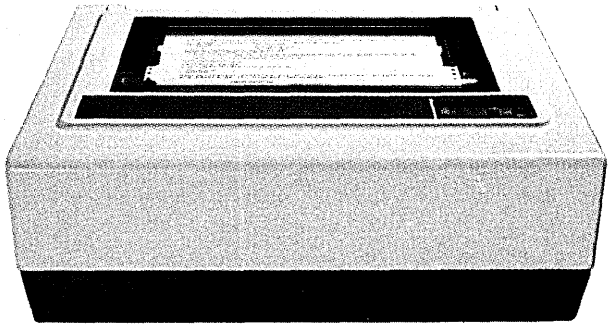

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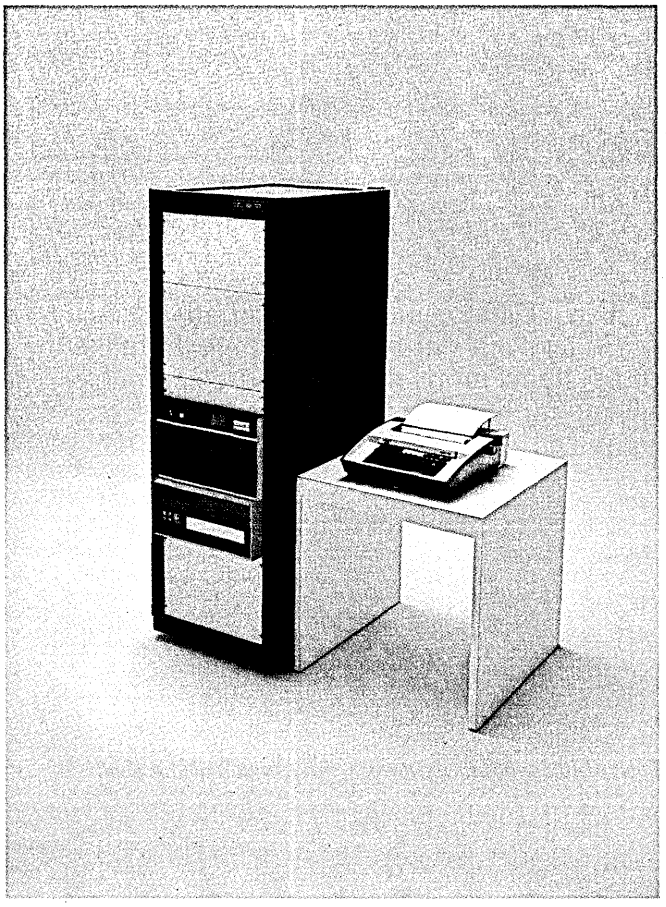

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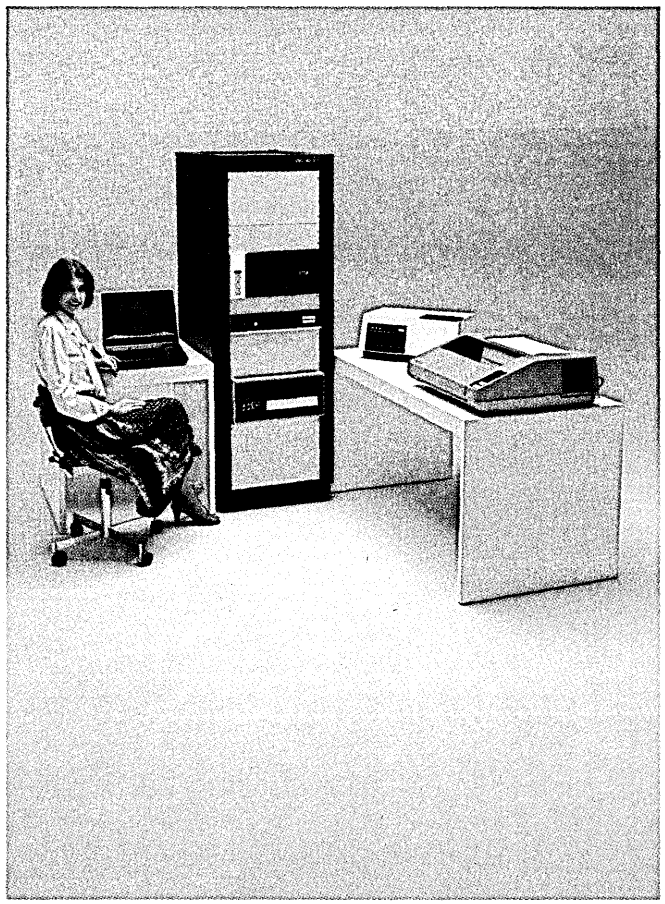

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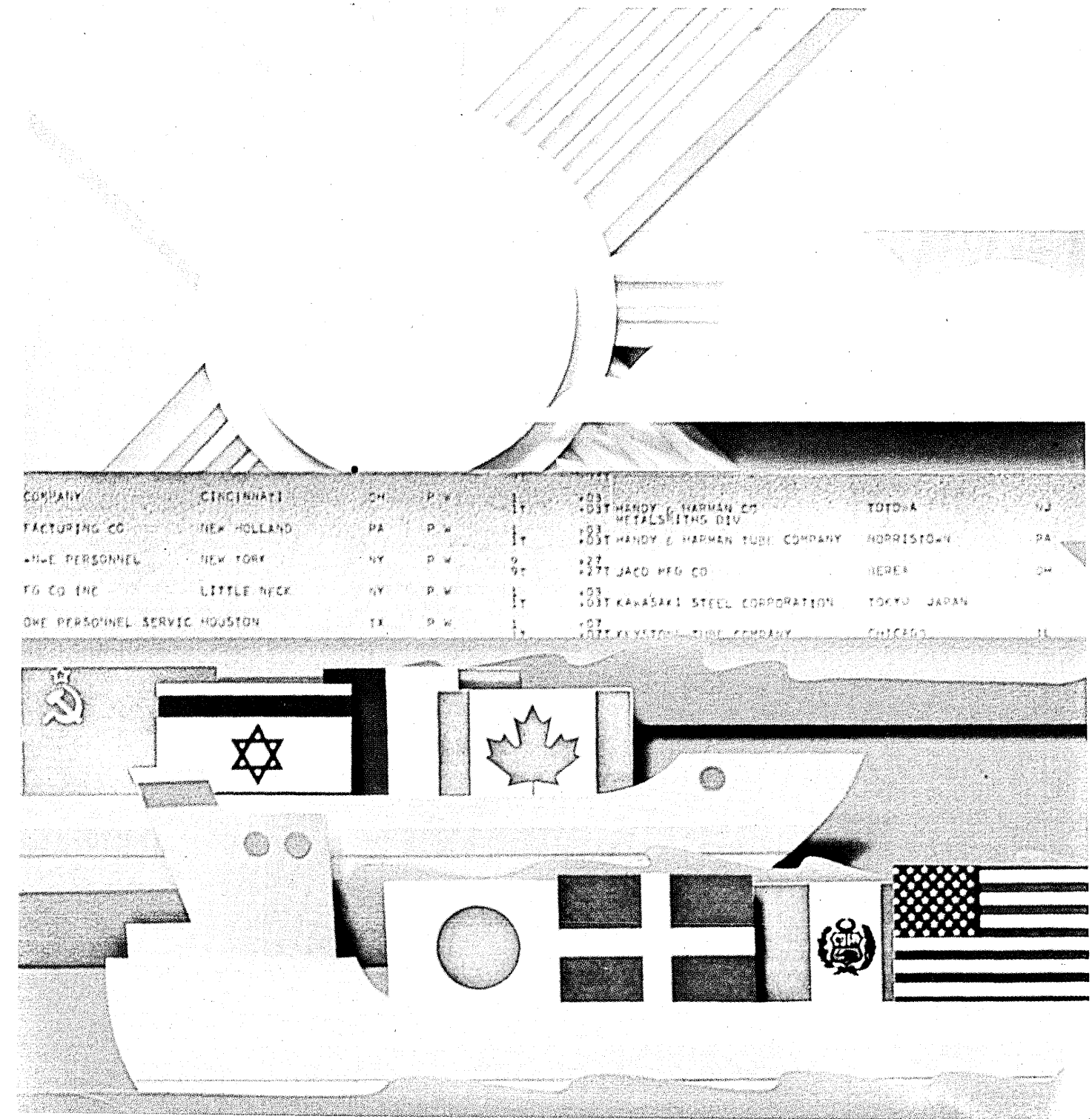
The U.S. may become the world's largest importer, Japan the largest distributor.

THE WORLD'S TOP 50 COMPUTER IMPORT MARKETS



By Bohdan O. Szuprowicz

Each fall the United Nations grinds out a mass of statistics on international trade throughout the world, including trade in such exotic and little known countries as Togo, Surinam, and Sri Lanka. These figures can be used to determine changes and trends in world computer and office equipment trade, and indirectly provide a measure of computer and office equipment *use*.

The data released in October 1978 provides comparative trade statistics through the end of 1976 and is the latest such data available for all the countries of the world. The trade data presented here is for the general Standard International Trade Classification (SITC) commodity code 714 which includes computers, peripherals, data communications, and office equipment such as typewriters. In general, dp hardware makes up about 85% of the total trade under that code, and thus the information is useful as an indicator of relative imports and exports of computer hardware in various countries.

Some computers that form integral parts of process control systems or

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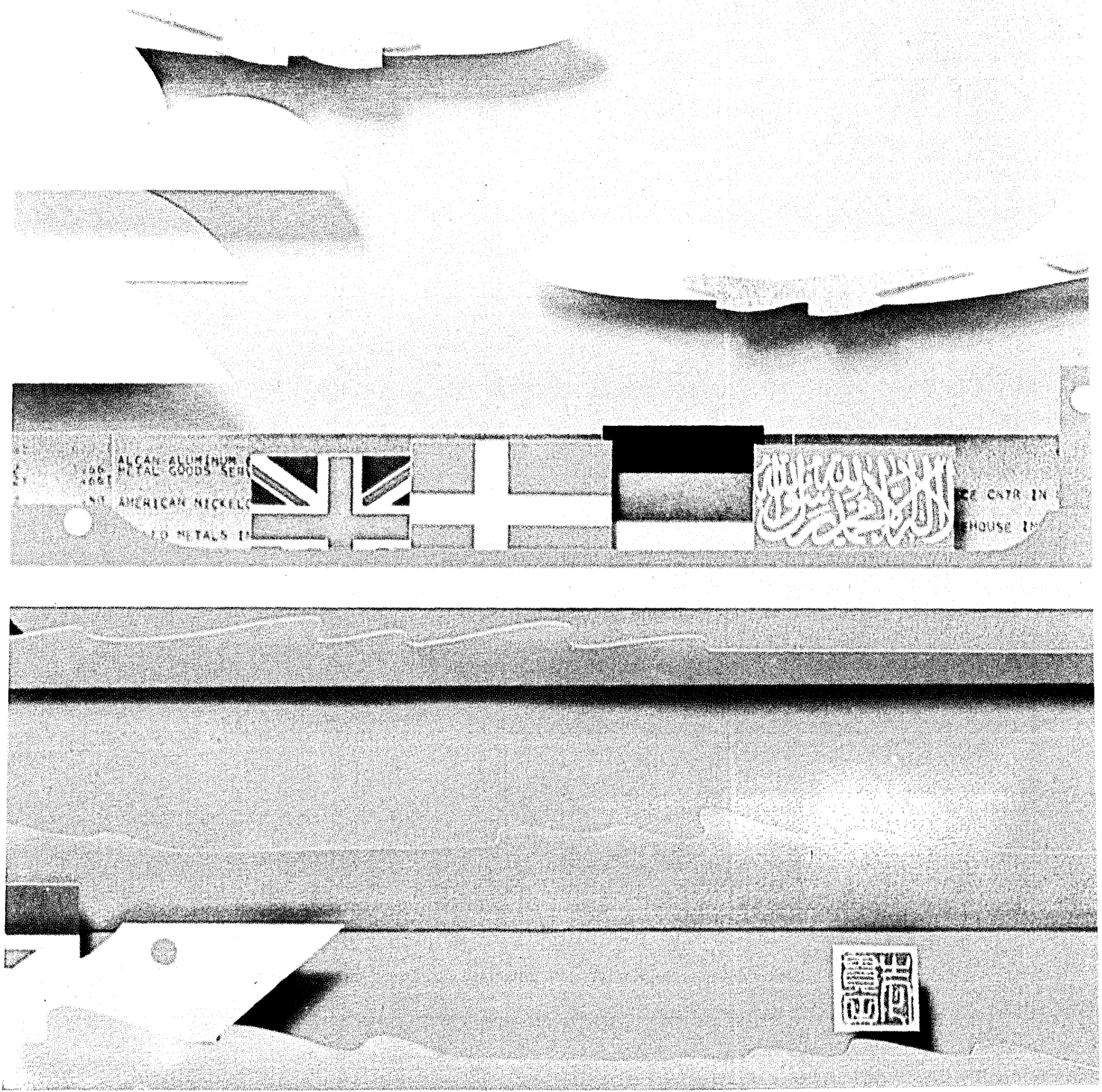
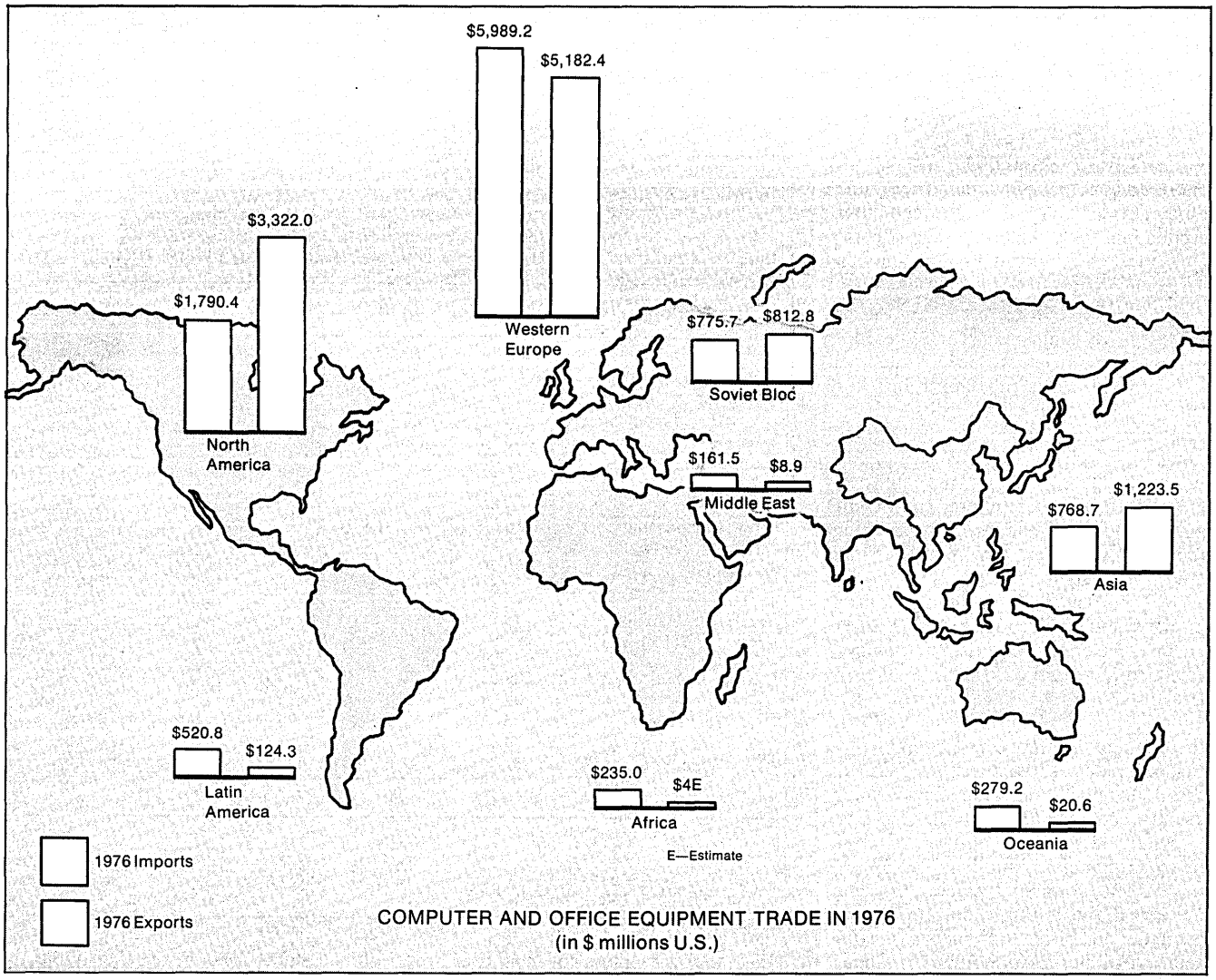


Only a few countries are net exporters, including the U.S., Japan, East and West Germany, Sweden, Singapore, South Korea, and Ireland.

TOP 50 COMPUTER AND OFFICE EQUIPMENT IMPORT MARKETS
(in $millions U.S.)

Country	1976 Rank	1976 Imports	1975 Rank	1975 Imports	Change 1975-1976	Change 1974-1975
World Total		**$10,520.8**		**$9,482.5**	**+10.95%**	**+5.1%**
France	1	1,199.7	2	1,024.4	+ 17.1 %	+ 5.5%
United States	2	1,181.1	3	932.0	+ 26.7 %	+ 0.6%
West Germany	3	1,171.9	1	1,082.0	+ 8.3 %	+11.8%
United Kingdom	4	977.9	4	828.3	+ 18.1 %	+ 1.5%
Canada	5	607.1	6	506.9	+ 19.8 %	- 0.5%
Italy	6	579.5	5	511.8	+ 13.2 %	- 4.5%
Japan	7	432.8	7	407.5	+ 6.2 %	-17.2%
Netherlands	8	410.4	8	356.4	+ 15.2 %	- 0.4%
Soviet Union	9	315.7	9	285.2	+ 10.7 %	+23.5%
Belgium/Lux.	10	263.6	11	230.6	+ 14.3 %	+10.4%
Sweden	11	262.8	13	212.1	+ 23.9 %	+17.1%
Spain	12	253.9	10	239.7	+ 5.9 %	+16.8%
Australia	13	231.5	12	220.9	+ 4.8 %	- 4.2%
Switzerland	14	224.8	15	193.3	+ 16.3 %	- 7.4%
Mexico	15	146.5	17	153.7	- 4.7 %	+ 4.3%
Poland	16	140.7	18	128.9	+ 9.2 %	+16.6%
Austria	17	140.5	21	118.7	+ 18.4 %	+ 7.6%
Brazil	18	134.0	14	195.4	- 31.4 %	- 5.1%
Denmark	19	129.3	20	119.1	+ 8.6 %	+19.3%
Czechoslovakia	20	126.6	16	182.8	- 30.7 %	+32.8%
South Africa	21	104.5	19	125.8	- 17.3 %	+23.8%
Hong Kong	22	100.7	24	76.6	+ 31.5 %	- 7.5%
Ireland	23	94.4	32	46.4	+103.4 %	+ 5.7%
Finland	24	84.4	23	85.3	- 1.1 %	+ 6.3%
Norway	25	82.4	25	68.1	+ 21.0 %	+22.9%
Hungary	26	78.0	22	88.7	- 12.1 %	+11.4%
Venezuela	27	69.4	27	60.0	+ 15.7 %	+29.6%
Yugoslavia	28	46.9	28	54.9	- 14.6 %	-20.2%
South Korea	29	45.7	37	29.4	+ 55.4 %	+ 0.7%
Iran	30	45.6	26	64.8	- 29.6 %	+65.3%
Bulgaria	31	44.1	30	50.8	- 13.2 %	+19.5%
East Germany	32	42.8	29	54.7	- 21.8 %	+65.7%
New Zealand	33	42.5	31	48.6	- 12.6 %	+30.3%
Israel	34	42.3	35	41.3	+ 2.4 %	+35.4%
Singapore	35	40.0	34	43.7	- 8.5 %	- 6.6%
Argentina	36	39.1	33	44.9	- 12.9 %	-10.2%
Philippines	37	30.7	38	26.6	+ 15.4 %	+35.7%
Romania	38	27.6	36	35.0	- 21.1 %	+ 3.5%
Saudi Arabia	39	25.8	46	16.5	+ 56.4 %	+63.4%
Portugal	40	25.2	39	23.3	+ 8.2 %	-36.3%
Nigeria	41	24.9	44	18.1	+ 37.6 %	+82.8%
Algeria	42	19.5	48	14.8	+ 31.8 %	+ 8.8%
Panama Canal Zone	43	17.6	NA	10.1	+ 74.0 %	NA
Colombia	44	16.8	47	16.4	+ 2.4 %	+18.8%
Indonesia	45	16.8	42	19.2	- 12.5 %	+66.9%
Greece	46	16.8	49	14.7	+ 14.3 %	+ 0.7%
Turkey	47	14.9	50	14.6	+ 2.1 %	-17.9%
Malaysia	48	14.6	43	18.8	- 22.3 %	- 9.3%
Peru	49	12.9	41	19.6	- 34.2 %	+55.5%
Egypt	50	12.8	53	9.2	+ 31.1 %	-17.1%

Source: Compiled by 21st Century Research from U.N. International Trade Statistics for category SITC 714 first published in Oct. 1978.



COMPUTER AND OFFICE EQUIPMENT TRADE IN 1976
(in $ millions U.S.)

that are built into complete turnkey plants are probably not recorded under the SITC code 714. However, such uncounted trade in dp hardware is believed to be relatively small compared with the total office equipment trade actually reported.

Total computer and office equipment trade in the world in 1976 was more than $10.5 billion and increased almost 11% over the $9.5 billion traded in 1975. Although this was almost twice the growth shown in global computer trade during 1974 to 1975, not all of the regions of the world experienced an increase in imports. Arab states, North America, Western Europe, and the Far East were definite computer imports growth areas. On the other hand, imports into Africa and Oceania (primarily Australia and New Zealand) stagnated at levels almost identical to those of 1975. In the case of the Soviet Bloc and Latin American countries, computer imports declined by 6% and 13% respectively even though those areas have shown strong long-term import growth in previous years.

In 1976 three office equipment import markets in the world exceeded $1 billion each, compared with only two such huge import markets in 1975. These were once again led by France, which imported almost $1.2 billion worth of equipment in 1976 and displaced West Germany from the top spot it occupied in 1975. The United States also moved up from third place to become the second largest import market while West Germany fell back to third. Nevertheless, all three top importing countries were running practically neck-and-neck with only about $28 million difference between France and West Germany.

The United Kingdom, which was the fourth largest import market, trailed by almost $200 million behind West Germany, having imported a total of $978 million in 1976. However, the U.K. is close to becoming a $1 billion import market also, and is ahead of the next largest market, Canada, by about 60% in volume of imports.

MIDDLE EAST

The Arab countries again have shown the fastest computer imports growth among all the world regions. Imports in 1976 were 24% higher than in the previous year, even though imports into troubled Lebanon decreased by a drastic 83%—down to about $2 million.

Syria more than doubled computer imports in 1976 leading all Arab countries in imports growth for that year. It also developed a national plan for computerizing its economy. Saudi Arabia, however, was by far the largest importer in the Arab world, accounting for almost 20% of the total Arab computer import market, which is estimated to have reached $135 million in 1976. With Algeria and Egypt, the next two largest Arab computer import markets, the three leading Arab importing countries account for 43% of the whole Arab computer market.

It is interesting to note here that—at least for the Western manufacturer—if Arab computer markets have grown at the same rate through 1978, they now are already 40% larger that the Western market share of the total COMECON (Soviet Bloc) computer market. The total COMECON computer import market is actually considerably larger than the Arab's and reached about $776 million in 1976; but at best only 24% of this total is estimated to be supplied by Western manufacturers, and that share appears to be on the decline.

Any U.S. protectionist measures may most hurt U.S. subsidiaries abroad.

Most Arab countries also have ample reserves of petrodollars. At the same time they lack any domestic computer production. Only Algeria so far is planning to start minicomputer production based on French MITRA designs.

SOVIET BLOC By comparison, the Soviet Bloc countries are deeply indebted to Western institutions for hard currency credits and as a result continue to experience shortages of funds for purchases in the West. In addition, all COMECON countries are now manufacturing computers, minicomputers, and even microprocessors, which they supply to their own industries and even try to export to the West.

The Soviet Bloc computer import markets actually declined in 1976 by over 6% on the average. Imports into the Soviet Union increased by over 10% and Poland also posted another 9% increase, but all other East European countries cut their computer imports in 1976. Czechoslovakia reduced its imports by as much as 31% to only $127 million, and even the usually buoyant import market of East Germany decreased by almost 22% from its 1975 high of $55 million.

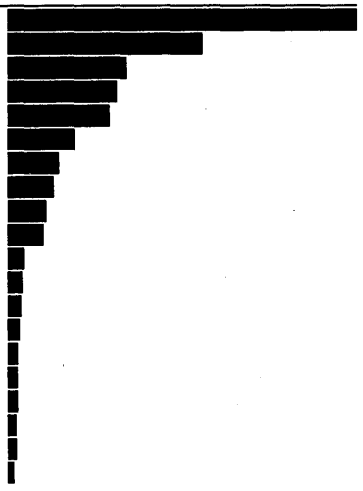
East Germany, however, is doing quite well and is the leading COMECON computer and office equipment *exporting* country. In fact East Germany is among the top 10 office equipment exporting countries in the world and its SITC code 714 exports in 1976 were over $436 million. This makes East Germany a considerably larger exporter of such products than Canada, which shipped only $385 million worth of such equipment to foreign clients in 1976.

East German exports make up about 4.1% of the world trade in office equipment, but at least 85% of its shipments are absorbed by other COMECON countries, of which the Soviet Union accounts for the largest market share. In 1976 East Germany exported almost $200 million of computing and office equipment to the Soviet Union. That's more than all the Western exports to all of the Soviet Bloc countries during the same period.

East Germany is also unique among computer and office equipment manufacturing countries because it exports about 10 times as much equipment as it imports. The U.S., which is the largest dp equipment exporter in the world, accounted for about 28% of the world exports but also imported over 11% of the total. As a result its export to import ratio is less than 3, and if the growth of imports continues at its present relatively fast rate this ratio will decrease rapidly.

TOP 20 COMPUTER EXPORTING COUNTRIES IN 1976

Rank	Country	Exports in $millions U.S.	Market Share of World Trade
	World Total	**$10,520.8**	**100.0%**
1	United States	2,937.4	27.9%
2	West Germany	1,642.5	15.6%
3	Japan	1,011.6	9.6%
4	United Kingdom	925.3	8.8%
5	France	858.1	8.2%
6	Italy	568.0	5.4%
7	East Germany	436.4	4.1%
8	Canada	384.6	3.7%
9	Netherlands	330.0	3.1%
10	Sweden	302.7	2.9%
11	Belgium/Lux.	140.2	1.3%
12	Ireland	126.2	1.2%
13	Switzerland	118.3	1.1%
14	Soviet Union	103.6	1.0%
15	Poland	86.0E	0.8%
16	Czechoslovakia	85.9	0.8%
17	Brazil	82.2	0.8%
18	Hong Kong	75.7	0.7%
19	Singapore	74.8	0.7%
20	South Korea	57.7	0.5%
		$10,347.2	98.2%



E = 21st Century Research estimate

Source: Compiled by 21st Century Research from U.N. International Trade Statistics for category SITC 714 first published in Oct. 1978.

THE EXPORTERS Only a few countries are net SITC code 714 products exporters. These also include West Germany, Japan, Sweden, and—believe it or not—Ireland, which in recent years has offered unique opportunities, including lower labor costs, for manufacture within the Common Market. Italy and the United Kingdom are about breaking even, each importing a little more than it exports every year. Canada in 1976 moved up to become the fifth largest importer and with $607 million it imported almost twice as much as it exported. It is clearly a country that offers market opportunities for significant additional domestic production of data processing equipment and many U.S.-based manufacturers are taking advantage of this situation. Canadian users are also enjoying choices of products designed by domestic systems houses with elements imported from the United States.

Singapore and South Korea are also net exporters of SITC code 714 products primarily because they are major offshore suppliers of parts and assemblies for Western and Japanese manufacturers. Hong Kong, on the other hand, is now a net importer of dp and office products, and absorbed as much as $100 million in imports in 1976. Despite being among the top 20 exporting countries in the world, Hong Kong imports run 30% ahead of its exports in these product categories. Taiwan, another Asian market, is relatively smaller than the other three although even there some computer peripherals manufacture is expected to begin by 1980.

Spain is another interesting computer equipment market whose imports have increased by almost 6% in 1976 to over $250 million, making it the 12th largest import market in the world. Actually Spain descended in rank from the 10th spot which it occupied in 1975. Here again this may have been the result of increasing domestic production. Trends in the Spanish computer market are also discernible on the export side, which increased by 10%, reaching almost $55 million in 1976. France, Italy, Japan, the U.S., and Brazil are important developing markets for Spanish-made office equipment products. Because of a relatively high 5 to 1 import to export ratio in the Spanish market, it is also reasonable to assume that an increase in dp equipment manufacture and exports will also continue in that country for some years to come. Spain is in fact on the borderline of becoming one of the top 20 dp exporting countries in the world.

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	200 x 200	322 secs	376 secs	263 secs
	400 x 400†	2555 secs	3774 secs	1840 secs
Sharable Development Software	editor	Yes	No	Yes
	linker	Yes	No	No
	assembler	Yes	No	No
	compiler	Yes	No	No
Small (under 40KB) Development Modules	editor	Yes	Yes	Yes
	linker	Yes	Yes	Yes
	assembler	Yes	No	No
	compiler	Yes	No	No
Fast Compiler	(over 1500 LPM)	Yes	Yes	Yes
Optimizing Computer Technology		Global	Block	Global
Custom Microcoding Development Software		Yes	No	No
Price		$89,900	$167,000+	$1,300,000+

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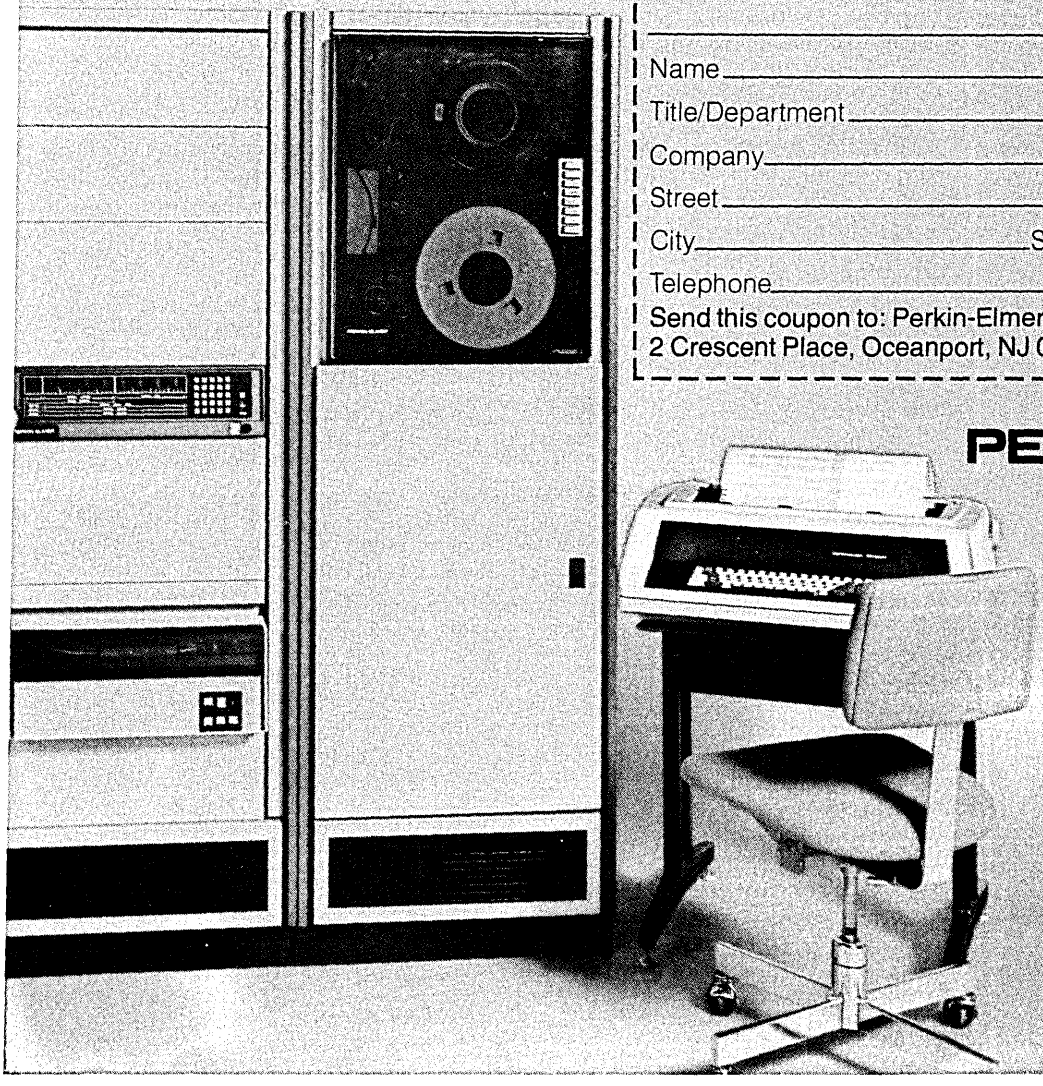

PERKIN-ELMER

Data Systems

CIRCLE 85 ON READER CARD

Brazil has ambitions to be a superpower, and is developing its own dp industry.

SOUTHERN HEMISPHERE Another area where local production is increasing is Australia and New Zealand, which jointly imported $274 million of dp hardware in 1976. During the same year Australia alone exported only about $20 million worth of similar products. This gives Australia and New Zealand an import to export ratio of almost 14, probably the highest among all the industralized countries in the world. Considering the size of the Australian market and the advanced state of its economy, it seems inevitable that the country should move vigorously into minicomputer, terminals, and peripherals manufacture. When this happens, the United States, United Kingdom, and Japan will be the major losers since those countries are Australia's largest dp equipment suppliers at present.

The decline in imports growth in Latin America is not unexpected. Both Mexico and Brazil, which are the largest Latin American dp markets, imported less in 1976 than in 1975. In Brazil imports declined by a whopping 31%, from $195 million in 1975 to only $134 million in 1976. This is a continuation of the trend already discernible in 1975 when imports to Brazil showed a modest decline of 5% from the previous year.

At the same time Brazilian SITC code 714 product *exports* also dropped from $109 million in 1975 to $82 million in 1976, but Brazil remains well entrenched among the top 20 dp exporting countries of the world. It was in fact the 17th largest exporter in 1976, behind Czechoslovakia and Poland but just ahead of Hong Kong, Singapore, and South Korea.

Japan, Mexico, Argentina, and the United States traditionally have been the largest export markets for Brazilian-made dp equipment, much of it from *IBM do Brasil*, but exports to Japan and the U.S. were considerably reduced in 1976. Also, Brazil now has embraced a national policy of reserving the fast growing minicomputer market for domestic manufacturers whose majority control is held by Brazilian interests. This policy, coupled with an increasing production of dp equipment in Brazil, has probably had the effect of reducing imports to Brazil. Simultaneous reduction of exports may also indicate diversion of some local production to satisfy part of the domestic market and possibly even a certain amount of retaliation by importing countries in response to Brazilian restrictions on the import of minicomputers and associated peripherals.

Brazil is the largest and most important Latin American market, although Mexico is momentarily a larger computer importing country. The importance of Brazil stems from the fact that it has superpower ambitions and is developing its economy to include basic industries such as metals production, agriculture, and energy high technology industries as well. Through licensing agreements with U.S., Japanese, and European manufacturers, Brazil established domestic production of aircraft, helicopters, automobiles, minicomputers, small business computers, and terminals. It has captured world headlines in recent years as a result of a $ multibillion deal with West Germany to develop Brazilian nuclear power plants and nuclear fuel reprocessing facilities.

Brazil's weakness in its quest of superpower status is an inadequate domestic supply of energy. As a result Brazil must spend several $ billions annually to import oil, and suffers a trade deficit. Since oil is a more strategic and vital import to industrialization than dp products, priority is given to oil. As a result Brazil is trying to reduce imports of *any* products that can be economically produced domestically and dp hardware is one such industry being developed.

What this means in the long run is that Brazilian end users are restricted to using a smaller selection of equipment than their counterparts in other countries. It also means that Brazil is committed to dp manufacture for the long run and that its government is supporting this policy and will probably financially help the fledgling industry if necessary. Because Brazil is a relatively large market, which is growing rapidly, it may succeed in developing several dp products that will satisfy basic needs of a majority of Brazilian end users. Given sufficient economies of scale, these may also be exported to neighboring countries in Latin America such as Argentina, Venezuela, Mexico, and others that may be glad to switch to Brazilian suppliers in order to save hard currencies themselves.

REGIONAL TRENDS IN COMPUTER IMPORTS
1975-1976
(in $ millions U.S.)

Region	Total imports in 1976	Total imports in 1975	Change 1975-1976
World Total	**$10,520.8**	**$9,482.5**	**+10.95%**
Western Europe	5,989.2	5,231.8	+14.48%
North America	1,790.4	1,441.7	+24.19%
Soviet Bloc	775.7	826.8	-6.18%
Asia (inc. Far East)	768.7	703.6	+9.25%
Latin America	520.8	601.7	-13.45%
Oceania	279.2	276.8	+0.87%
Africa	235.0	236.0	-0.42%
Arab States	134.5	108.1	+24.42%

Source: Compiled by 21st Century Research from U.N. International Trade Statistics for category SITC 714 first published in Oct. 1978.

THE U.S. AND JAPAN But the most significant and ominous trends in world computer trade are probably those with regard to the United States and Japan. Japanese imports declined by over 17% in 1975 and rebounded by only about 6% in 1976. In comparison, imports of computer and office equipment into the United States shot up by almost 27% in 1976, and the whole North American continent was the second fastest growing import market after the Arab states. But where the Arab markets are underdeveloped and are growing rapidly from a relatively small base, American imports increased by about $250 million in 1976 alone, to a record total of almost $1.2 billion. This makes the United States the second largest dp import market in the world. It is rapidly overtaking France and will probably become the largest importer again within a year or two.

Although U.S. dp exports also increased by almost $300 million in 1976, nevertheless America's market share of the global trade remained rather steady at about 28% of the total. During the same year, however, Japan increased its world market share of office equipment trade from 8.2% in 1975 to 9.6% in 1976 and for the first time joined West Germany and

DTC's TaskMaster with multi-user capability delivers more. For less. A lot less.

Since you're heading up a small business today, you're aware of the real-world benefits of the computer: speed, flexibility and accuracy. DTC's TaskMaster offers the small business owner all this and more: a *small business* price.

Our TaskMaster is the first small business computer delivered with *multi-user capability.* The TaskMaster can handle the work done on up to four separate terminals simultaneously. Which means that one person on the TaskMaster and up to three people on different terminals can do their jobs at the same time . . . even if they're in separate work areas. They no longer have to wait to "get into the system." So, you can use the TaskMaster while your manufacturing, accounting, and marketing people are hard at work, too.

TaskMaster is an extension of your business.

We found that one of the primary concerns of small business owners is that they'll have to restructure their business around the computer. But the TaskMaster computer doesn't change what you've established. Instead, it fits easily into any work environment, ranging from office to scientific and industrial areas. We designed the TaskMaster to be expandable, too, so it can grow as your business grows. Just add more applications packages when your company expands. That way, you won't need to buy new equipment or hire new people to do the work.

Proven hardware and software.

Our TaskMaster includes the most modern hardware: a flexible disk system or an optional hard disk for maximum data storage, plus a full-screen CRT and printer. (You can choose between two printers: a medium-speed, letter-quality printer or a high-speed matrix printer. What about applications? We provide a standard package we call the Accountmaster. This package contains *more than eighty* general business functions. And it's easy to learn. We thoroughly train your people, then check back to see that everything is running smoothly. And we'll be around when you need us.

DTC wants all your business, not all your money.

We've priced TaskMaster within easy reach of the small business owner. Even with multi-user capability and specialized functions, the price tag is under $20K the most cost-effective price around.

When you buy a TaskMaster, you get DTC.

With a TaskMaster computer, you also get our strong service organization, our strong dealer network, and our ten-year, ten-thousand terminal history of dependability. We're proud of our credentials. But the thing we're proudest of is our customers. Add *your* name to our list. Arrange to visit one of our dealers' offices for a demo. Write or call Data Terminals and Communications, 590 Division Street, Campbell, CA 95008. (408) 378-1112. TWX (910) 590-2436 to find the dealer nearest you. Or send in the coupon below.

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Accounting

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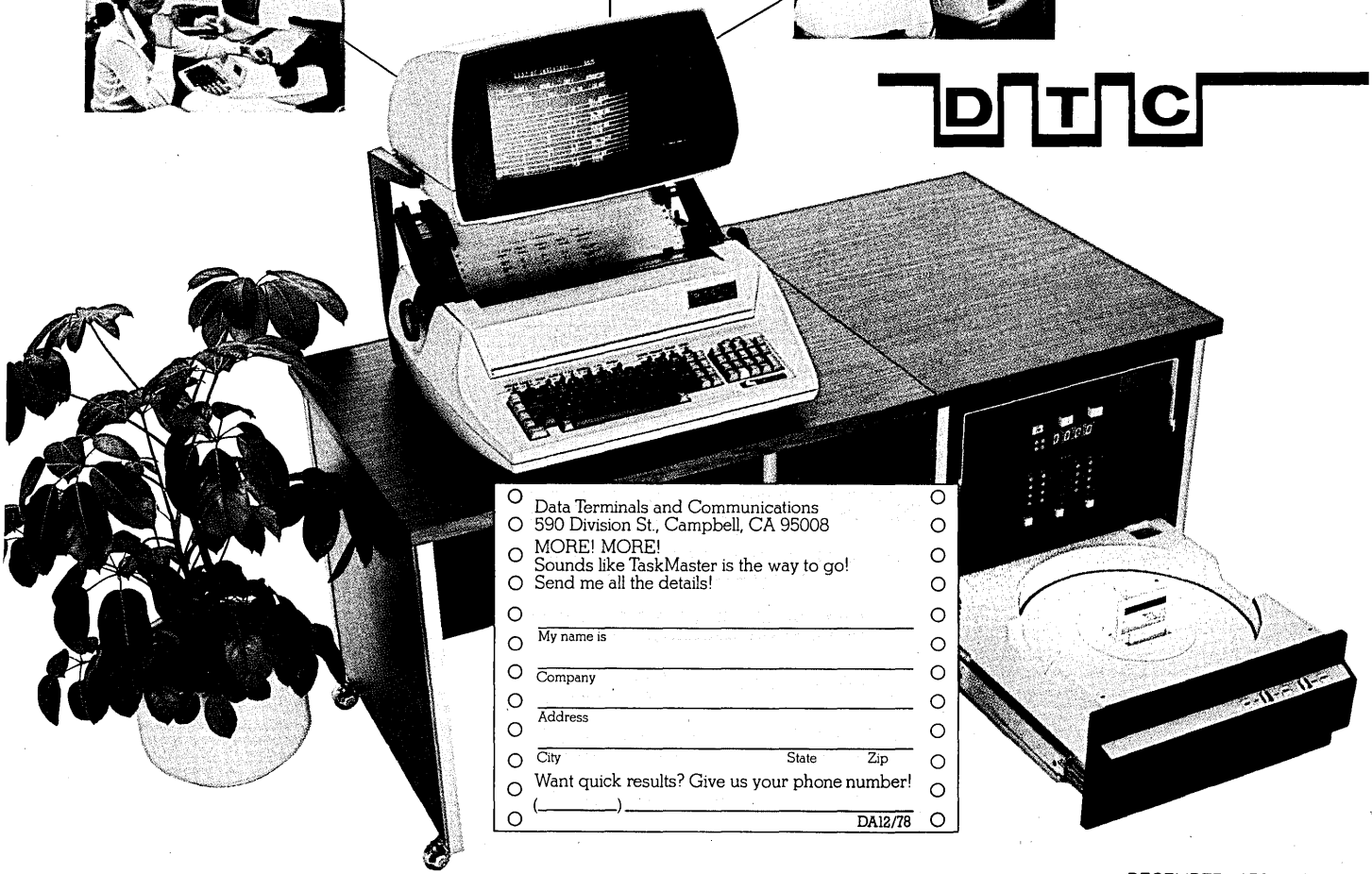

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Sounds like TaskMaster is the way to go!
Send me all the details!

My name is _____

Company _____

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Want quick results? Give us your phone number!

(_____) _____

DA12/78

the United States in the exclusive club of $1 billion exporters. The trend is unmistakable and trade figures clearly show that Japanese office equipment exports have grown by over 30% in 1976, almost three times as fast as the 11% growth in comparable exports of the United States.

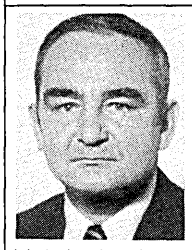
What this means is that if Japan maintains this annual 30% growth in its exports, then by the end of 1980 it will reach levels comparable to those of the United States today. If simultaneously the United States exports continue to grow only at 11% per year, by 1983 Japan will become the largest dp equipment exporter in the world. The "Japanese challenge" is not an empty phrase.

On the other hand, rapidly growing imports of dp products into the U.S. may soon eliminate trade surpluses enjoyed for so long by the American computer industry. Any protectionist measures taken against excessive imports, however, may also affect the performance of American computer manufacturing subsidiaries in several foreign countries where they take advantage of cheaper labor or tax breaks and rely on exports to the American market for profitability. As a result, declining import markets in the United States and other major countries may eventually slow down the growth of some dp firms and even eliminate some of the competition.

During the next 5 to 10 years all major electronics manufacturing countries will probably develop Very Large Scale Integrated (VLSI) circuits and a physical limit in microminiaturization of electronic components will be approached by all. At that time the cost of design and assembly of electronic equipment will be even more sensitive to the cost of labor, which is the major component in this industry. Clearly the country with the most productive labor force will then have the greatest advantage in world trade of electronic products.

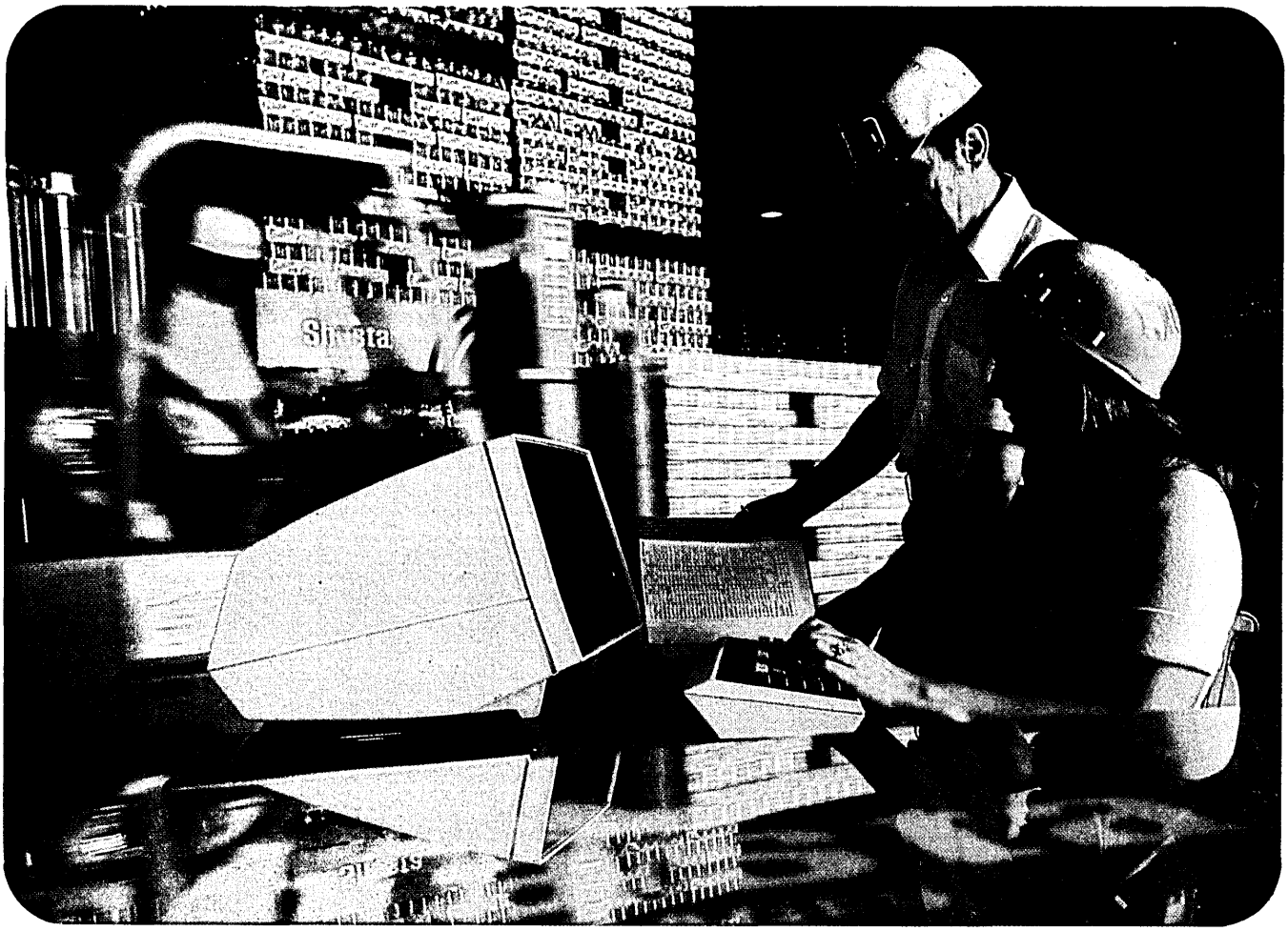
Under such market conditions China may emerge as the largest electronics manufacturer, and Japan as the world's largest exporter/distributor, while the United States continues as the world's top consumer of electronic and dp equipment and probably the largest computer importer as well. ✲

BOHDAN O. SZUPROWICZ



Mr. Szuprowicz is president of 21st Century Research, an international market research firm specializing in strategic materials and high technology trade. His past experience includes engineering and management posts at Boeing, General Dynamics, IBM, CEIR-Control Data, and High Technology West.

He recently completed a multiclient study on Arab Computer Markets, and prepared another on Electronic Markets in the People's Republic of China for the National Academy of Sciences. His book on *Doing Business With the People's Republic of China* was published by John Wiley & Sons in May.



Cool, clean information.

Shasta Beverages, one of the country's largest soft drink distributors, has learned that "clean" is just as important in processing data as it is in canning soft drinks. That's why Shasta uses Series 21 distributed processing systems from Mohawk Data Sciences in each of its twenty-one plants.

Sales, inventory, and accounting information is entered and validated at the source—before it is transmitted to the central computer. Clean data is processed faster, and that means tighter control and lower costs.

For nearly 15 years MDS has been developing, manufacturing, marketing, and supporting information handling systems for such applications as order entry, invoicing, sales analysis, accounting, and inventory management.

The new MDS Series 21 is a major advance in data entry, data communications, and distributed processing. With MDS, the information you need is processed and transmitted where you want it, when you want it.

From 300 locations in the United States, Canada and Europe, 3,800 MDS employees, together with a fast-growing distributor network, are helping more than 7,000 customers discover the benefits of clean information.

Phone your local Mohawk Data Sciences office for your free copy of "Distributed Data Processing—A Rational Approach" or call toll-free **(800) 223-0100.**

MDS.

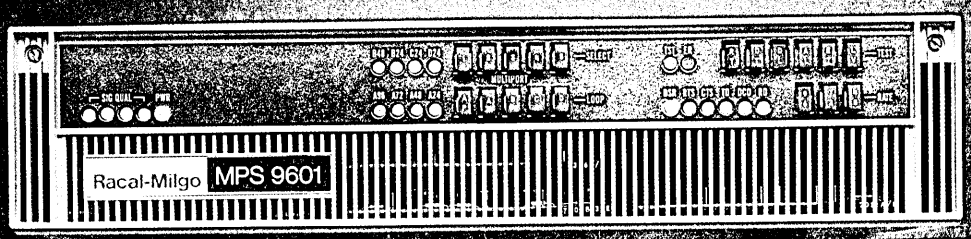
1599 Littleton Road, Parsippany, New Jersey 07054 • (201) 540-9080

Series 21 is a trademark of Mohawk Data Sciences

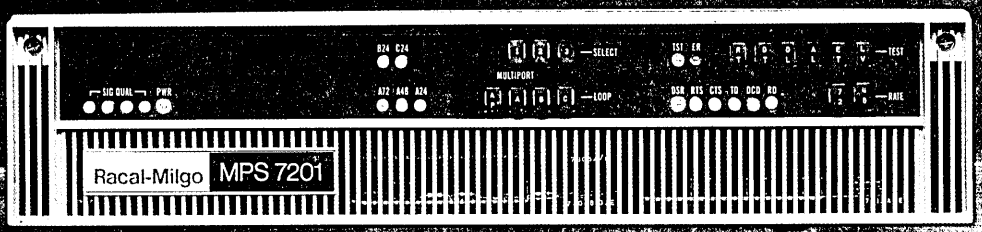
Mohawk Data Sciences

CIRCLE 54 ON READER CARD

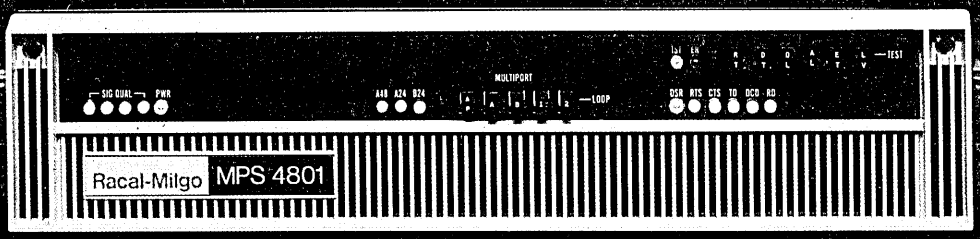
Racal-Milgo's new modems make sure you get every millisecond's worth from your data channels.



The MPS 9601 series includes 6 models of synchronous modems that deliver full 9600 bit-per-second data transmission in both point-to-point and multipoint networks. The modems offer unique cost saving advantages such as FASTRAN™ ultra-fast 30 millisecond response time and DYNAPORT™ automatic channel allocation as well as multiport operation and modem sharing. Models are available with CCITT/V.29 modulation.



The MPS 7201 modem series provides synchronous 7200 bps data communication over unconditioned lines in point-to-point or multipoint networks. Four models offer a selection of high efficiency features that include up to three independent ports, FASTRAN ultra-fast response time, diagnostics and DYNAPORT automatic channel allocation.



The MPS 4801 series offers optimum 4800 bps data communication over unconditioned lines in point-to-point or multipoint networks. Modems in this series are available with either a single 4800 bps data port, or with two 2400 bps ports. Cost-saving options, including DYNAPORT and FASTRAN, are available in this series.

The exceptional advantages offered in this new series of microprocessor-based modems are fully described in our 12-page brochure. We'll gladly rush you a copy.

Racal-Milgo™ – the new name for ICC

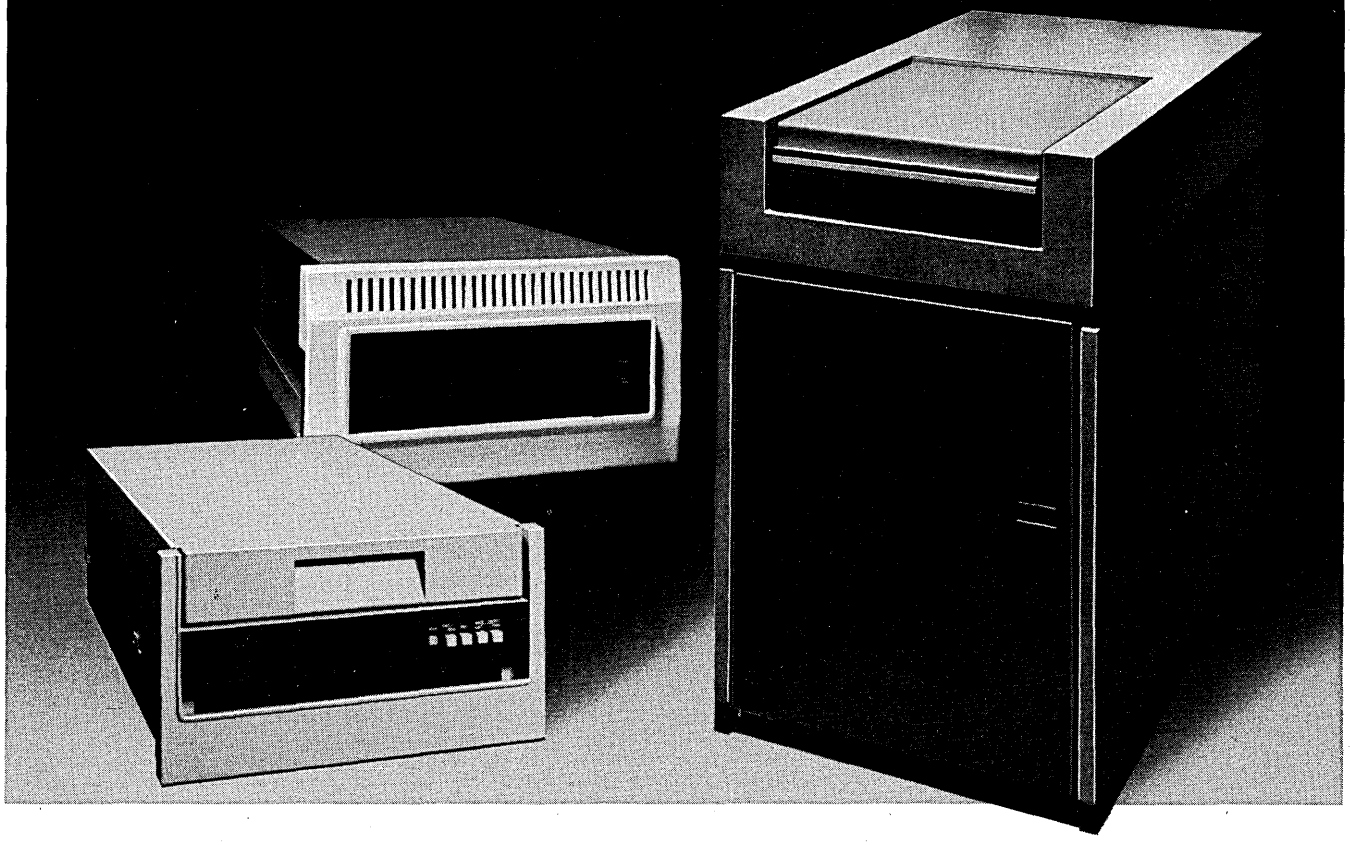
RACAL
The Electronics Group

Racal-Milgo Information Systems, Inc.
8600 N.W. 41st Street Miami, Florida 33166 Telephone (305) 592-8600 TWX: 810-848-6588
In Europe: Racal-Milgo Limited, Reading, Berks, England

member of IDCMA

CIRCLE 105 ON READER CARD

There are many measures of quality in an OEM module drive from Control Data.



Greater System Flexibility

Our Storage Module Drive (SMD) has removable media. Our Mini-Module Drive (MMD) has fixed media. And our Cartridge Module Drive (CMD) has both. Capacities start at 12 megabytes and range to 300 megabytes.

But all share compatible interface software and firmware. That means easy system integration, simple field upgrades. Without expensive modification of your design. It's the type of flexibility that saves money—for both you and your customer.

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Control Data has a reputation for building module drives that last. We're backing it up with continued testing and feedback. And we design and manufacture all critical components in-house. We can build reliability into our drives because we built it into our heads, servos and media.

Value That Matches Performance

We know we have the best and most reliable drive for your application. But we also have the competition beat on cost of ownership.

Send us the coupon below. We will help you compare our lower cost-per-bit and our lower entry costs with others.

Put quality behind your nameplate. Call us at 612/853-3399 or if in Europe, contact one of our European representatives. Or return coupon to:

D-128

D..C. Steiner,
OEM General Manager, Product Sales
Control Data Corporation
P.O. Box 0, Minneapolis, MN 55440

Please send info on your ☐SMD ☐CMD ☐MMD

Name _____ Title _____

Company _____ Address _____

City _____ State _____ Zip _____

Area Code _____ Phone _____

CONTROL DATA CORPORATION

More than a computer company

CONSIDER ONE THING BEFORE CHOOSING A COMPUTER COMPANY TODAY.

TOMORROW.

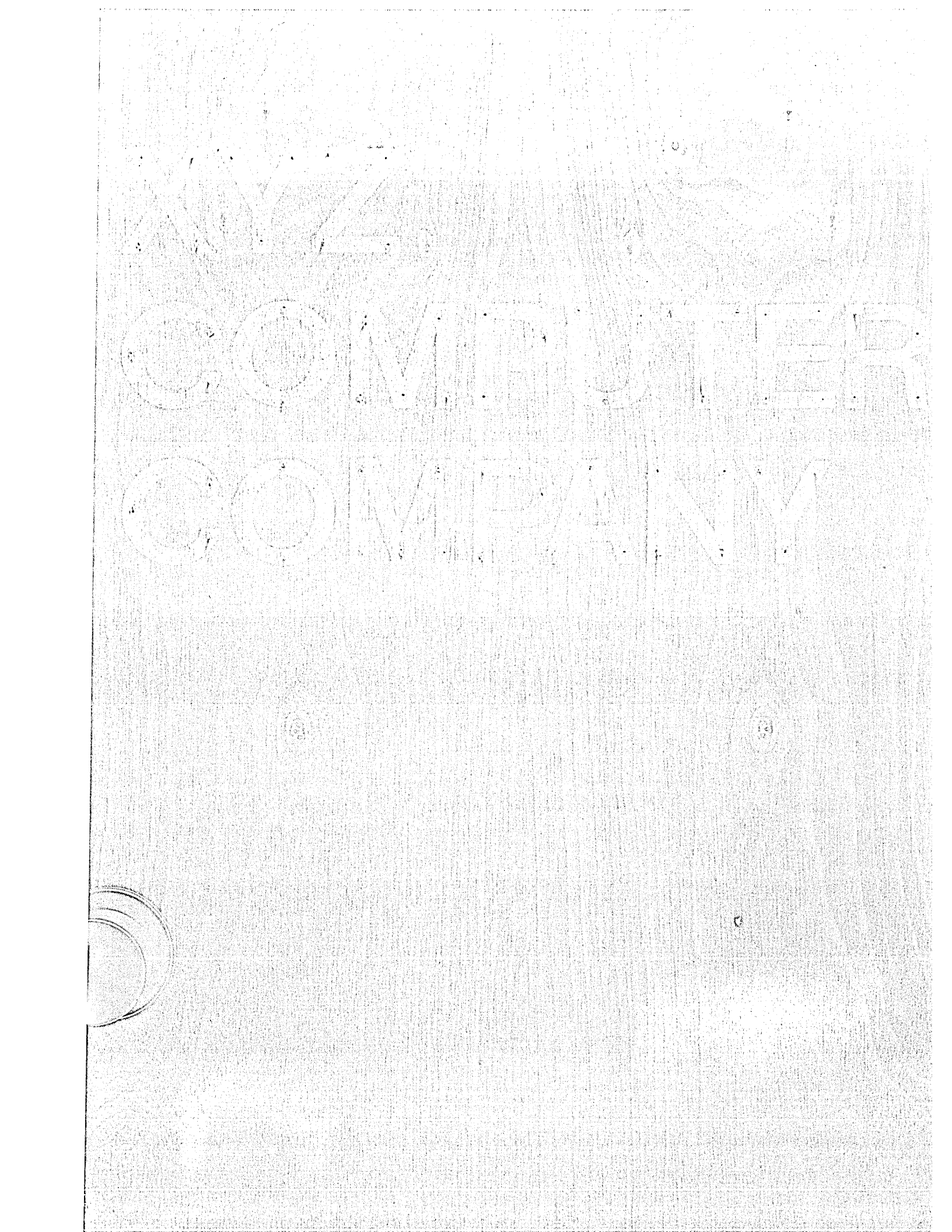
Choosing computer equipment can be difficult. Because you're not just investing in hardware—you're investing in the company that provides it. And more importantly, you're investing in your own future.

At Itel, we don't believe that providing reliable, 100% IBM-compatible mainframes and peripherals is enough. And we don't think superior price/performance is enough either. That's why we protect our customers' investment by backing all our computer equipment with full-service support. From our operational software enhancements and proprietary packages—to our worldwide team of field engineering specialists—to our virtually limitless number of financing programs—Itel delivers the kind of support capabilities that most computer companies can only promise.

In every aspect of data processing, Itel is committed to the future. So we can satisfy your needs today, as well as meet your growing needs tomorrow. Because at Itel, we know that the only way to protect our computer investment is to protect yours.

For further information, contact Itel Corporation, Data Products Group, One Embarcadero Center, San Francisco, California 94111, (415) 955-0278.

ITEL



THE REVENGE OF BB SIMP

by C.W. Petersen

GENERAL CHEMICAL CORPORATION
Resins Division
555 Bloomington Way
Minneapolis, MN 55420

June 23, 1978

L. B. Black
Vice President
General Chemical Corp.
420 Lexington Ave.
New York, NY 10017

Dear Len:

This is the first time I've made a request under your new procedure of submitting all promotion opportunities above Grade 16 to Central Data Processing for recommendation. This one is for a Grade 17 opening in Position 6141, Assistant Product Sales Manager, Polyvinyl Resins. Have three fellows, any of whom look good to me, and I'm anxiously awaiting the one your Personnel Analysis and Career Interpretation computer program selects.

Regards,

BB Simpson

B. B. Simpson
General Sales Manager
Resins Division

---

redi-letter.

TO
• BB SIMPSON
RES/DIV/MINN

FROM
LB BLACK
VP
GEMCHEM/NY

SUBJECT PROMO/GR17

DATE 6 / 26 / 78

MESSAGE

Received your letter of June 23. Have forwarded request to CDP. Any technical questions submit to W. L. Harris, Program Specialist, CDP. Keep me advised if anything unsatisfactory. Other divisions appear happy with new program.

LBB

SIGNED Black/New York

Sending Blank Western Union Mailgram U.S. Postal Service

ADDRESSEE'S NAME	B B SIMP
ADDRESSEE'S FIRM (IF APPLICABLE)	Resins Division
STREET ADDRESS	555 Bloomington Way
CITY, STATE AND ZIP CODE	Minneapolis, MN 55420

DATE 6/27/78

MESSAGE:
POSTN 61412 RECOMMEND ONE ENNIS, TWO LIVELY, THREE POTTSWORTH

WL HARRIS CDP/NY

---

redi-letter.

TO
• WL HARRIS
CDP
GENCHEM/NY

FROM
BB SIMPSON
RES/DIV/MINN

SUBJECT PROMO/GR17

DATE 6 / 28 / 78

MESSAGE

Re your wire, I do not know Ennis, Lively or Pottsworth. Position number is 6141, not 61412.

BBS

SIGNED Simpson/Resins

Sending Blank **Western Union Mailgram**

ADDRESSEE'S NAME: B B SIMP
ADDRESSEE'S FIRM (IF APPLICABLE): Resins Division
STREET ADDRESS: 555 Bloomington Way
CITY, STATE AND ZIP CODE: Minneapolis, MN 55420

DATE: 6/30/78

MESSAGE: SORRY, ASSUMED POSITION WANTED WAS 6141X WHICH WITH HASH TOTAL OF FIRST FOUR DIGITS YIELDS FIFTH DIGIT (CHECK DIGIT FOR ACCURACY IN PROCESSING) OF 2. APPARENTLY YOU OBTAINED POSITION NUMBER FROM SECTION IV-A-7 OF PERSONNEL ANALYSIS AND CARFER INTERPRETATION PROGRAM MANUAL WHICH LISTS POSITION NUMBERS WITH HASH TOTAL CHECK DIGIT PRE-FIGURED. RECOMMENDATION SHOULD READ ONE TUGWELL, TWO MERRIAM, THREE POTTSWORTH. ARE YOU SURE YOU DO NOT KNOW POTTSWORTH?

WL HARRIS CDP/NY

redi-letter:

TO
WL HARRIS
CDP
GENCHEM/NY

FROM
BB SIMPSON
RES/DIV/MINN

SUBJECT PROMO/GR17

DATE 7 / 5 / 78

MESSAGE

I do not know Merriam or Pottsworth. Tugwell was promoted to Product Manager, Styrene Resins, year and a half ago. I would have to cut his salary $2500 to put him into Position 6141.

SIGNED BBS Simpson/Resins

Sending Blank **Western Union Mailgram**

ADDRESSEE'S NAME: B B SIMP
ADDRESSEE'S FIRM (IF APPLICABLE): Resins Division
STREET ADDRESS: 555 Bloomington Way
CITY, STATE AND ZIP CODE: Minneapolis, MN 55420

DATE: 7/11/78

MESSAGE: REGRET TUGWELL SHOWING UP BUT THIS GIVES US OPPORTUNITY TO REPAIR OUR RECORDS. MEN PROMOTED LAST YEAR JANUARY WERE NOT PROCESSED BY DISGRUNTLED INPUT TERMINAL OPERATOR SINCE RELEASED. THIS SHOULD GIVE YOU CONFIDENCE IN PROGRAM HOWEVER AS TUGWELL WOULD PROBABLY BE YOUR FIRST CHOICE IF HE HAD NOT BEEN PROMOTED AT THE TIME. MERRIAM IS IN YOUR TECHNICAL DEPARTMENT AND YOU MIGHT GET TO KNOW HIM. HE CAME TO US HIGHLY RECOMMENDED FOR PRODUCT SALES AND SMALL BUG IN PROGRAM AT EARLY STAGE OF DEVELOPMENT PLACED HIM IN TECHNICAL DEPARTMENT. UPON PLACEMENT WE HAD A COMPLAINING LETTER FROM HIM AND FEEL YOU MIGHT LOOK HIM OVER CAREFULLY OR WE MAY LOSE HIM. WE DO NOT KNOW WHO POTTSWORTH IS EITHER, BUT TWO OF OUR PROGRAMMERS ARE CHECKING THIS ONE OUT. WE'VE RERUN THE PROGRAM AFTER CORRECTING FOR TUGWELL AND POTTSWORTH AND COME UP WITH ONE GAUVREAU, TWO MERRIAM AND THREE LASKY. HOPE THESE RECOMMENDATIONS MEET YOUR NEED.

WL HARRIS CDP/NY

July 12, 1978

GENERAL CHEMICAL CORPORATION
Resins Division
555 Bloomington Way
Minneapolis, MN 55420

L. B. Black
Vice President
General Chemical Corp.
420 Lexington Ave.
New York, NY 10017

Dear Len:

I wouldn't be writing you, except I've got to get this Product Manager job filled soon. The latest from CDP lists Gauvreau as number one, and you know I fired him cold six months ago, and where he is today I could care less, though I hope your program has not rehired him in the central office. Lasky is one of our very least important career salesmen who claims he didn't even bother to answer your various requests for information when you installed this confounded program. As for Merriam, he raves about your program, as it placed him in Technical which he never dreamed he'd like. He and his boss want him to stay right where he is. Why don't we forget the program and I will pick my own man and be done with it?

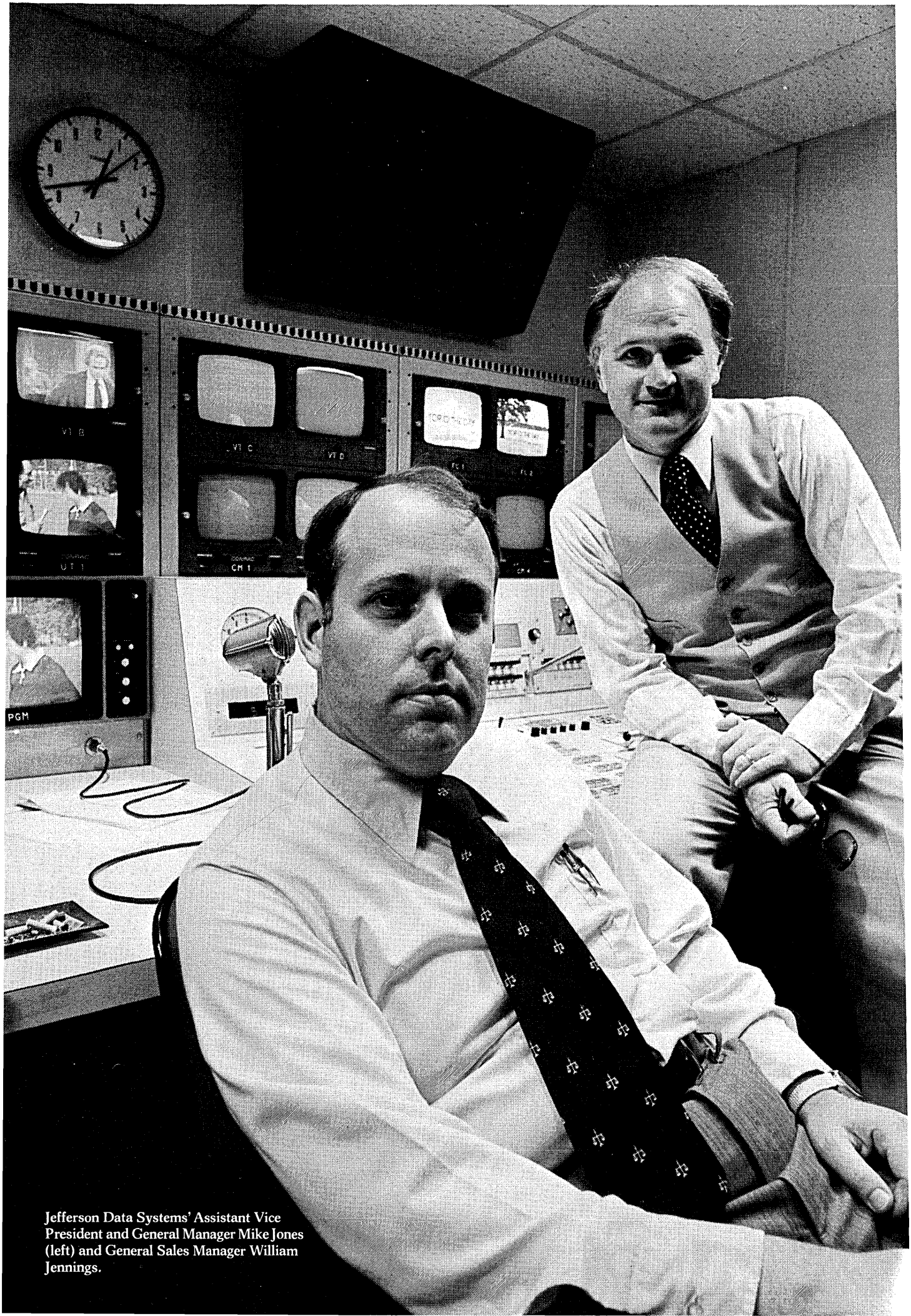
Regards,

B B Simpson

B. B. Simpson
General Sales Manager
Resins Division

Copy: W. L. Harris

P.S. Can you get CDP to stop addressing me as B B SIMP?



Jefferson Data Systems' Assistant Vice President and General Manager Mike Jones (left) and General Sales Manager William Jennings.

"For us, Sycor's total service is second to none."

Mike Jones
Assistant Vice President and General Manager
Jefferson Data Systems

The Sycor 400 family. All the power JDS needs to help major broadcasters get their programming together.

In 1969, Jefferson Pilot Broadcasting Corporation made a major decision.

Instead of seeking an existing corporate general accounting software package, they developed one themselves, using Sycor equipment and support.

The venture was so successful it quickly blossomed into a subsidiary, Jefferson Data Systems. Today, JDS provides distributive software programs to over 60 of America's largest radio and TV stations, as well as their own broadcast properties in North Carolina, Virginia, Georgia and Colorado.

Sycor has always played a key role at JDS. Initially, Sycor 340 and 350 systems formed the nucleus of each station's remote capability. As service demand grew, Sycor 440 systems were deployed. Now, Sycor's most powerful equipment, the new 445 with multifunctional operating software, has been successfully tested and is scheduled to be installed.

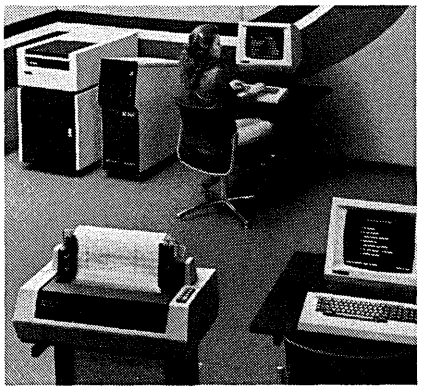
"We wanted to provide our clients with equipment that performed without making computer people out of them."

"It's a fill-in-the-blank type of system, which is very easy to handle," according to Bill Jennings, JDS general sales manager. Compact Sycor 440 systems are placed within the stations. Each is used for entry and retrieval of data pertaining to every aspect of the stations' operations, as well as for providing each station with its own data processing capability.

Information is then telecommunicated directly to Jefferson Data's central computer, where it is processed and stored. Processed information is periodically returned to each of the 440 systems over undedicated telephone lines, for generation of program scheduling, contracting, invoicing, and general accounting reports. In fact, the JDS System 80™ package produces over 100 reports for subscribers.

"People have been freed to perform additional tasks."

"Before Jefferson Broadcasting obtained the Sycor systems, at least three or four people per station were required for writing up contracts, and editing the log while moving commercials around. The Sycor systems have automated this entire process. In addition, they have allowed us to tighten operations. Before, six to ten percent of our annual billing was 'falling through the cracks.' And with 30-second commercials costing as much as $20,000, losing one was a very expensive proposition. Now, once data is entered into the system it is never lost.



One of the Sycor systems that helps Jefferson Data Systems' subscribers save time and organize work.

"We went to Sycor after evaluating several manufacturers. We feel they have one of the finest technical and service organizations in the world."

"We've never had anybody miss a processing day or lose a log," boasts Jennings. All JDS accounts have a toll-free number and access to Sycor's National Dispatch Service in Ann Arbor, Michigan. There, 20 operators and 13 Sycor terminals are available 24 hours a day to handle service calls. As calls are received, information is relayed to one of more than 110 service locations. "In all of the applications we're now performing, the Sycor equipment is fantastic," adds JDS Systems Engineer John Reidy.

Call Sycor toll-free at 800-521-2838.

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CIRCLE 60 ON READER CARD

REVENGE

July 18, 1979

GENERAL CHEMICAL CORPORATION
420 Lexington Avenue
New York, N.Y. 10017

B. B. Simpson
General Sales Manager
Resins Division
555 Bloomington Way
Minneapolis, MN 55420

My dear Ben:

It is certainly unfortunate that so many little things have come up to "stand you on your ear" with regards to filling the Product Manager position. Believe me when I say this is the weirdest set of coincidences we've come up against with the new PACI program. We've processed hundreds of them in the last year and a half with generally good results.

I have taken the trouble to check personally on the latest "goofs" and I think you are the type of big man who will get a chuckle out of the explanations.

It appears that Gauvreau is on our list from one of the top sales agencies in the country. (Our program is comprehensive enough to include inside promotables plus all good outside candidates.) He's got everything you want in the way of experience, as you might agree, although Harris admits they might consider correcting the program to reject all candidates who have been previously fired outright by the company.

Lasky, was the only one that didn't answer our questionnaire. We thought we had them all, but apparently we did miss him. However, the very fact he doesn't answer home office questionnaires gave him enough points on aggressiveness and self-reliance factors to put him in contention for your job opening. We are having a thorough search made to make sure this one doesn't happen again.

As for Merriam, we are of course very happy, as you must be, that the company has succeeded in placing a round peg happily in a square hole, although having it come through a big boffola in the computer program does take away some of the luster of the achievement.

Bill Harris has rerun the program and you should hear from him in a day or so on his findings.

Try to live with B B SIMP. That's the way your name is made to fit your computer cell with the least chance of confusing you with someone else in the organization.

Kind regards,

L. B. Black

L. B. Black
Vice President

Sending Blank

western union **Mailgram**

UNITED STATES POSTAL SERVICE — U.S. MAIL

ADDRESSEE'S NAME: B B SIMP
ADDRESSEE'S FIRM (IF APPLICABLE): Resins Division
STREET ADDRESS: 555 Bloomington Way
CITY, STATE AND ZIP CODE: Minneapolis, MN 55420

DATE: 8/20/78

MESSAGE:
OUR UPDATED RECOMMENDATION IS ONE ENNIS, TWO LIVELY, THREE POTTSWORTH.

WL HARRIS CDP/NY

GENERAL CHEMICAL CORPORATION
Resins Division
555 Bloomington Way
Minneapolis, MN 55420

July 21, 1978

Mr. L. B. Black
Vice President
General Chemical Corp.
420 Lexington Ave.
New York, NY 10017

Dear Mr. Black:

I feel I should advise you that Mr. Simpson will be gone for a few days, which may delay his answer to your latest recommendations (which, incidentally, appear quite similar to the ones you originally sent us). Mr. Simpson left hurriedly saying he was enrolled in a short, intensive course in computer logic.

Sincerely yours,

Ms. E. L. Kelly
Secretary to Mr. Simpson

Copy: Mr. W. L. Harris

---

redi-letter

TO
• BB SIMPSON
RES/DIV/MINN

FROM
LB BLACK
VP
GEMCHEM/NY

SUBJECT PROMO/CR17

DATE 8 / 31 / 78

MESSAGE

Much as I hate to authorize circumventing the new PACI procedure, I'm afraid the program must be taken off the computer for major modification. Bill Harris advises me that all requests during the past few days have been processed to recommend one Simpson, two Harris, and three Tilt. We are very anxious to get to the bottom of this current problem, and you may be sure, if it's human error, the person behind this will be dealt with summarily.

Incidentally, rumors have it that your Division has been inputting some garbled wires direct to the computer, which I trust has not adversely affected our output to you. SIGNED Black/New York L.B.B

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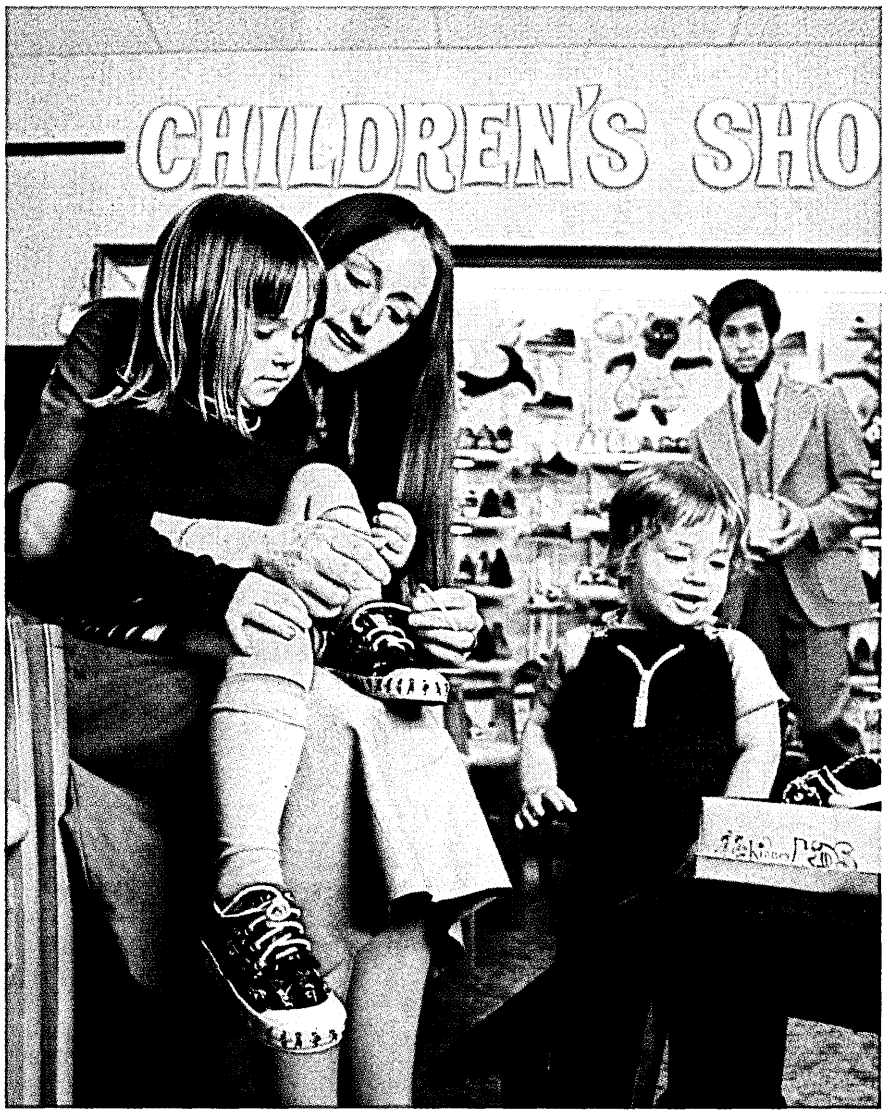
DP Dialogue

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



There are 1600 Kinney retail stores across the U.S. With 180 new stores opening each year, Kinney financial executives must make accurate forecasts of capital needs.

ADRS Helps Kinney® Plan 180 New Store Openings a Year

Financial planners at Kinney Shoe Corporation project capital requirements for the opening of 180 new stores a year. Each new store is a substantial capital venture in itself, involving interior design and construction, contracting for space, assembling an inventory, and adding or transferring a staff of people.

With the aid of an IBM program called A Departmental Reporting System (ADRS), Kinney planners can revise their projections quickly and as often as needed to accommodate schedule changes.

"We need to know what will happen to our capital requirements if we add a few stores to the schedule, or postpone one opening from the first to the third quarter," says Selig Adler, budget director for the major New York City-based shoe merchandiser, with 1600 retail stores across the U.S.

"To get the answers, we enter variable data through a computer terminal," Adler explains. "Ultimately the system will automatically pick up a large mass of basic fixed data, such as construction costs and pay rates, and perform the repetitive calculations. If we need to change the schedule of store openings – or just want to evaluate the effects of a proposed change – we can key in a new capital spending plan and get a revised printout of our financial plan in moments."

Adler and his fellow financial executives interact directly with an IBM System/370 Model 158 computer, using simple English-like commands to specify the desired reports and tables.

With ADRS, Adler is also able to develop detailed financial plans, weekly sales reports on Kinney and its competition, projections of sales and profit derived from past and present operating data, and other reports used by Kinney's top management in making operating decisions.

"Now I do a lot less pencil-pushing," Adler adds. "I can concentrate on what goes into a projection, and if something doesn't look right, I have time to decide which input needs changing. Often, I had to live with the first result because of time pressure. Now I can make last-minute revisions and get much better forecasts."

Says senior vice president Thomas E. Page: "We write these applications ourselves using ADRS, so we have them in days instead of months. Our planning documents are modified constantly as our needs change, or when management wants financial projections in more detail or differently organized. Now we can revise a format on the spot and obtain a new printed copy promptly. Kinney gets better information sooner and makes decisions on a more meaningful basis."

® Kinney is a registered trademark of Kinney Shoe Corporation.

Up-to-the-Second Orders, Inventory and Results at Fisher Scientific

Treading the fine line between lean inventory and consistently high-quality customer service is never easy. But when you're dealing with 100,000 transactions a day, and items ranging from expensive spectrophotometers to the very-much-alive denizens of a 327-acre Biology Resource Center, there's no room for compromise in either accuracy or time.

Fisher Scientific Company uses an online order processing and inventory management system called FASTBACK to literally keep up-to-the-second on what they need to know. FASTBACK runs on an IBM System/370 Model 158 computer located at the company's Pittsburgh headquarters.

Thomas W. Moran, vice president, data processing, for Fisher led the way in putting FASTBACK together. He says, "We wanted FASTBACK to be able to grow along with our business and it's done just that. Today we use it to keep on top of 80,000 different items in 650,000 stockkeeping units in 33 locations while we service 100,000 customers who order by telephone, mail and wire."

FASTBACK Meets the Test

The biggest test of FASTBACK was in 1976 when Fisher received an $8,759,000 order from the Nigerian Ministry of Education for science materials for each of that young country's 156 teaching colleges.

According to Moran: "Once the bid was in, FASTBACK helped us write purchase orders and allocate shipments on each item, over 95,000 pieces in all. To give you an idea of the magnitude of the order for Nigeria, it required 16 stretched DC8 freighters and represented the largest single-project in air freight history. FASTBACK helped us do it, door-to-door.

"FASTBACK has allowed us to reduce inventory in outlying locations in the U.S.A." Moran reports: "We stock fast-moving items, but if an order comes through for something out of the ordinary, it is automatically transferred to one of our giant regional distribution centers and filled from there. It's not important to the customer where the shipment comes from as long as he gets it on time."

Helping Other Departments

The system also helps other departments. Purchasing stays on top of special orders, back orders and stock availability. Finance keeps all financial operating reports and forecasts on the system. It keeps personnel records up to date. And marketing uses it for sales analyses and item-by-item sales tracking.

"FASTBACK has helped us come up with a unique service, LIVELINE, that's really helpful to our customers," adds Moran. "We're able to fill orders for live zoological, botanical and genetic specimens within 24 hours after we get the order. We get a kick out of the fact that computer specialists often talk about getting the bugs out of a computer program. Here at Fisher we've put some live 'bugs' into our system. And with FASTBACK, we can guarantee they'll arrive alive."

In Nigeria, 156 teachers colleges, like the one pictured here, use Fisher science materials for instruction aids. FASTBACK, Fisher's online order processing and inventory management system, helped handle the $8¾ million order.

Gigi Penn and Wausau Homes, Inc., which makes prefabricated houses, found each other through the Wisconsin Job Service.

Matching the Jobless to the Job in Rural Wisconsin

Unemployment is usually thought of as an urban problem, but there are people out of work in rural areas, too. Now computer-assisted job matching is helping rural Wisconsin residents find work.

This program is the first of its kind anywhere in the country outside of a major city. It matches the basic characteristics of a person – education and experience – with those of job openings, explains Hugh Kelly, a bureau director with the Wisconsin Department of Industry, Labor and Human Relations.

A state government computer in Madison, the capital, is online to state-operated Job Service Offices in Wausau and Merrill. When an employer places a job order in either office, the IBM System/370 reviews the entire file of applicants to identify those best suited to the opening. It provides fast attention to employers when they have a vacancy and lets them see the most qualified applicants available. The system also helps applicants by determining their unemployment benefits.

The program has implications for the nationwide systems now being implemented in 25 states, with additional states being added as they are funded. Since the Wisconsin Job Service is part of the national network of 2,800 offices, the project has a huge potential in helping tap the reservoir of unemployed who want to find work.

And – not least in importance – it will help cut down on paperwork, freeing professional people to work directly with applicants and employers.

At Hartford National Bank, users of data processing services now work closely with the application development staff. These managers are alumni of an IBM course in "Project Planning and Control for Users."

Users Take System Development Lead at Hartford National Bank

With competitive pressures and a volatile marketplace, the Hartford National Bank and Trust Company, Connecticut, must get new computer applications up and running fast. The involvement of users in the development process, and their ability to communicate with programmers and analysts, are both vital to meeting that need. Recently, managers of three departments at the bank that use DP services attended an IBM course, "Project Planning and Control for Users," that teaches users how to define and specify a computer application and share in control of its development.

Target Dates are Met

"Today we spend much more time in the design phase of a project," says James Lenehan. "At first, we were concerned because we were expending more manhours before actual coding started. But with clear definition of the problem and continuous user participation, we needed much less time for test and signoff at the end, and we've been meeting our target dates."

Lenehan is system development officer of the bank, the second largest in New England. Hartford National operates two IBM System/370 Model 158's, one with an Attached Processor. It has 65 applications scheduled for development this year.

One attendee, Richard Dennison, loan administration operations officer, reports: "We used the techniques taught in the course on a major online inquiry enhancement. In previous years, the first time we saw the programmer's interpretation of what was wanted was during quality assurance testing. Programs often needed twice the estimated amount of maintenance because we hadn't been able to define our requirements beforehand. With the IBM course under our belts, we users can participate in the design. We knew what we were getting before the system was installed, and we're pleased with it."

Philip Patrone, manager of trust accounting operations, agrees: "As a user who spends a great deal each year on development, I must take an active role in design. Today we speak the same language as the systems people. They meet their schedules, and the system we specify is the system they install."

According to Ken Klieback, manager of retail deposit operations, "when Marketing develops a new idea for a deposit account, we need the computer support for it installed fast, and the Project Planning course has been a big help. Recently we installed two new applications with only two or three days of testing.

"Among other things, the IBM course showed us how to communicate about systems. With the response I now get from the development people, I feel more like a customer in a business relationship."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

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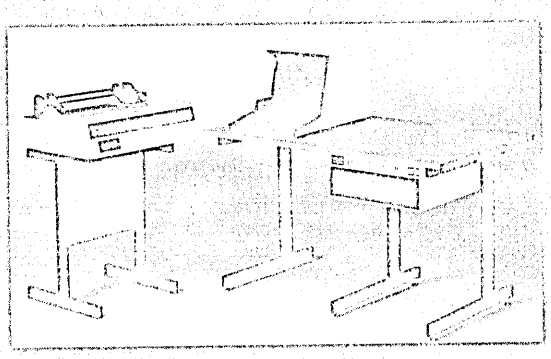

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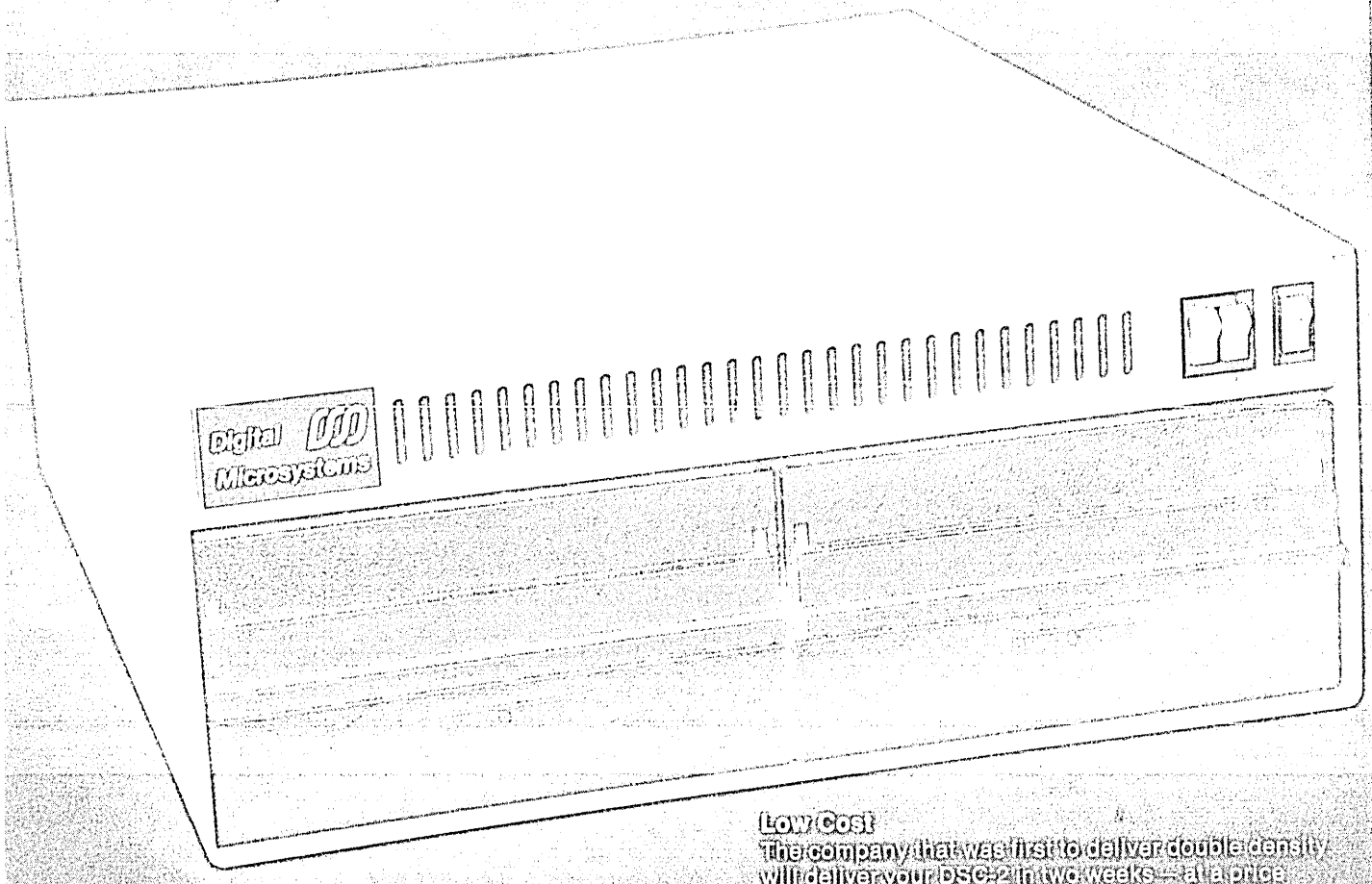

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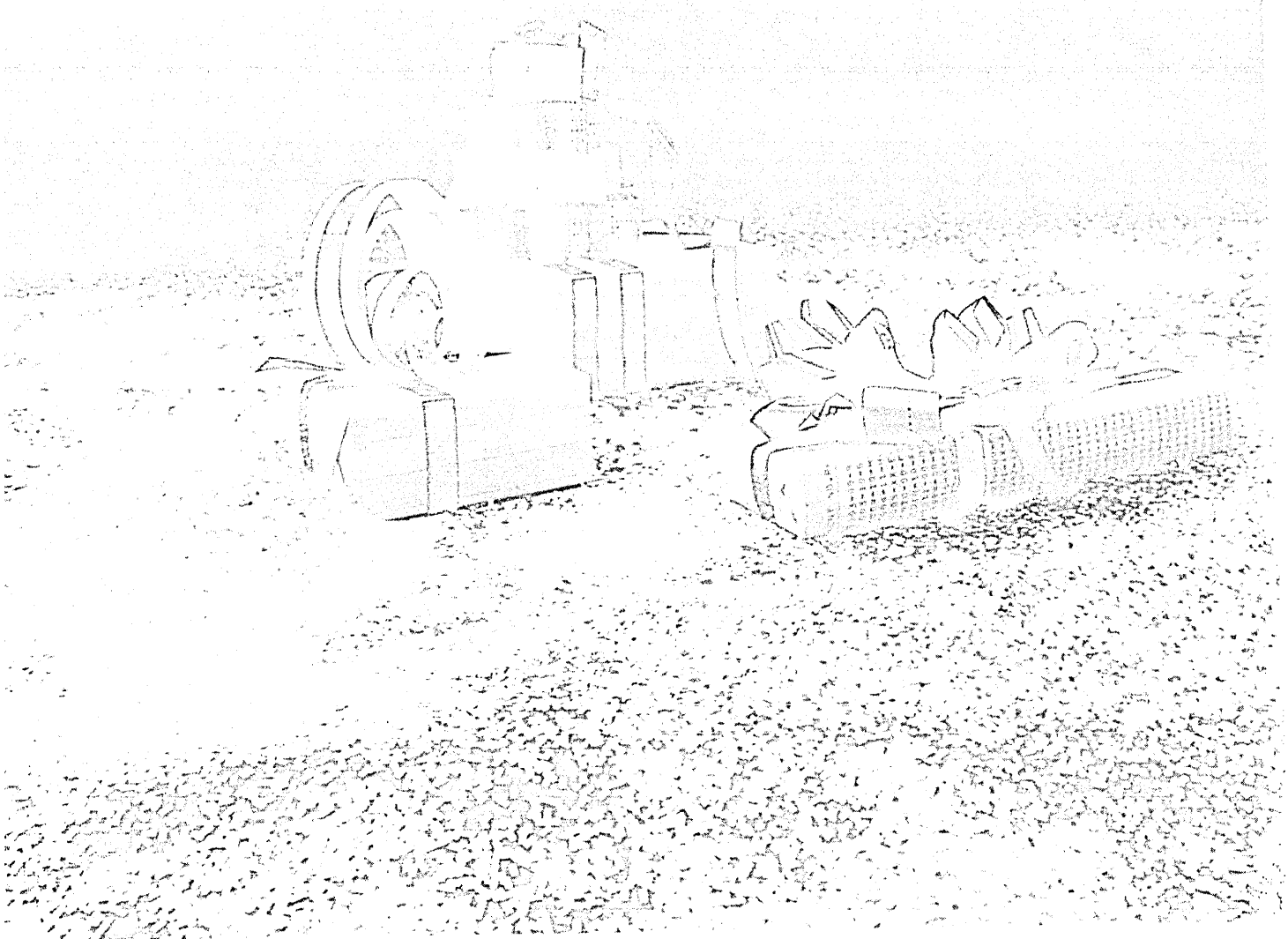

The software industry was in its infancy when IBM unbundled in 1969. That's no longer the case.

USER RATINGS OF SOFTWARE PACKAGES

by Herbert L. Gepner

How is the software industry doing? What is its near term growth potential? Are computer users turning more to proprietary software to do the job for them? How much of the average installation's budget is being earmarked for software acquisition? What role does the dp manager play in selecting and acquiring software for his shop and for user departments?

These and other questions were answered through responses received from nearly 6,000 dp executives in the fourth annual joint DATAMATION/ Datapro survey of proprietary software usage. Also, as in past years, users have rated the software packages they are now using or evaluating, along with those they have tested and rejected during the last 12 months. This year they have also indicated any major advantages or disadvantages discovered.

The results indicate that both the data processing community and dp applications are changing. Major changes are in the increasing emphasis on minicomputer usage, especially in distributed environments, and in the continuing conversion to data base management. The industry is constantly being challenged, and the resultant growth has been steady and consistent.

Other results indicate how much more important proprietary software is becoming to the typical installation. Software spending reported was increased 18% between 1977 and 1978, and an astounding increase of 39% is projected for 1979. Only an infant when IBM unbundled its software prices in 1969, the software industry is maturing rapidly. While the average installation reported spending $20,148 on packaged software in 1977, that number moved up sharply to $23,738 in 1978, and is projected to shoot to $32,450 next year.

MECHANICS OF THE SURVEY

The data quoted, as well as the package ratings, comes directly from dp user sites. The DATAMATION/Datapro software survey questionnaires are mailed to key executives of the dp user community—usually to the manager with overall responsibility for data processing—as identified on the DATAMATION subscriber file. They are not shipped out on any *n*th name basis; copies are shipped to *every* dp installation identified on the file. This year, 36,000 copies were mailed (a 20% increase over 1977), and nearly 6,000 were returned.

Of the number returned—actually 5,694—some 3,300 contained software rating information and 3,393 contained software budget data. The numbers are well up from last year; for example, there were 20% more software ratings, 31% more packages rated by five or more users. Some 2,000 individual software products were identified in all, but only 260 were mentioned by five or more users and thus listed on the following pages.

Users were asked to rate the software packages as either "excellent," "good," "fair," or "poor" in each of seven now-familiar rating categories: Overall Satisfaction, Throughput/Efficiency, Ease of Installation, Ease of Use, Documentation, Vendor Technical Support, and Training (if applicable). We then converted the users' ratings in each category into a weighted average by means of a straightforward technique similar to that used to calculate grade point averages: "excellent" was weighted as a 4, "good" as 3, "fair" as 2, and "poor" as 1. Then the weighted average for each of the seven categories was calculated by dividing the sum of the products by the number of responses in each category.

The resulting weighted average ratings for each of the 260 software packages rated by five or more respondents are

---

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, N.J. 08075; (609) 764-0100.

Five of the Honor Roll packages exclusively address the mini or small computer marketplace.

listed at the end of this article. By reviewing this list, the reader can learn something about the strengths and weaknesses of most of the widely used software products. What's more, in cases where two or more packages from the same vendor are listed, the reader has a chance to evaluate what users think of the general level of technical support, documentation, and training offered by the vendor.

THE TOP PRODUCTS

To bring attention to those packages receiving outstandingly high marks from their users, the software Honor Roll and Honorable Mention list have been established. To achieve Honor Roll status, a software product must be rated by at least 10 users and earn a weighted average rating of 3.5 or higher in the critical Overall Satisfaction category and 2.8 or higher in all other categories except Training (which is not considered in Honor Roll or Honorable Mention requirements because many software offerings neither include nor require formal training).

The packages on the Honorable Mention list have earned the same high ratings but have been judged by fewer users—from five to nine. (Information is not provided anywhere in the survey on packages with fewer than five mentions, since such a small sample size isn't considered reliable.)

A number of software products seem to continually reappear on the honors lists; this is a tribute to the quality of the products and to the efforts their vendors have put into marketing and maintaining them.

The 1978 Software Honor Roll includes 30 packages representing 24 different vendors. There are 16 products on the 1978 Honorable Mention list.

Special recognition should be given to the nine software packages that have achieved Honor Roll status for the fourth consecutive year of this joint survey: ALLTAX (the only nonsystems-type package on the list) from MSA; the Disk Utility System and WESTI from Westinghouse Corp.; EPAT from SDI; Fast/Dump/Restore from Innovation Data Processing; 1130/FORTRAN from DNA Systems; The LIBRARIAN from Applied Data Research; PANVALET from Pansophic; and SYNCSORT from Whitlow Computer Systems.

Six more products earned a place on the Honor Roll three times during that period: CA-SORT, DYL-260, EASYTRIEVE, FLEE/FLIM, IDMS, QUIKJOB, RPG, SAS, and SLICK. Seven others have made the list twice: ADABAS, DOS/MVT, EDOS, IMAGE/3000, ROSCOE, and both IBM's RPG II and Sort for the System/3. INQUIRE, SPF

1978 HONOR ROLL

ADABAS (2)* Software ag of North America, Inc.
ALLTAX (4) Management Science America, Inc.
BEM (Basic Editor Monitor) (1) Sperry Univac
CA-SORT (3) Computer Associates, Inc.
Disk Utility System (4) Westinghouse Electric Corp.
DOCS (1) CFS, Inc.
DOS/MVT (2) Software Pursuits, Inc.
DYL-260 (3) Dylakor Software Systems, Inc.
EASYTRIEVE (3) Pansophic Systems, Inc.
EDOS (2) The Computer Software Co.
EPAT (4) SDI
FAQS (1) Goal Systems
Fast/Dump/Restore (4) Innovation Data Processing, Inc.
FLEE/FLIM (3) Goal Systems
1130/FORTRAN (4) DNA Systems, Inc.
IDMS (3) Cullinane Corp.
IMAGE/3000 (2) Hewlett-Packard Co.
The Librarian (4) Applied Data Research, Inc.
PANVALET (4) Pansophic Systems, Inc.
QUIKJOB (3) Systems Support Software, Inc.
ROSCOE (1) Applied Data Research, Inc.
RPG (360/370) (4) IBM Corp., DPD
RPG II (System/3) (4) IBM Corp., GSD
SAS (3) SAS Institute, Inc.
SHADOW II (1) Altergo, Inc.
SLICK (3) NCI, Inc.
Sort (System/3) (2) IBM Corp., GSD
1130/Sort (4) DNA Systems, Inc.
SYNCSORT (4) Whitlow Computer Systems, Inc.
WESTI (4) Westinghouse Electric Corp.

*indicates number of times on Honor Roll during the last four years.

1978 HONORABLE MENTION

BLIS/COBOL (1)* Information Processing Inc.
COBOL (S/3/32/34) (1) IBM Corp., GSD
COMPAKTOR (1) Innovation Data Processing, Inc.
GIS (Guidance Information Systems) (1) Time Share Inc.
INQUIRE (2) Infodata Systems, Inc.
LOGOUT (1) Macro-4, Inc.
MEDPRO (1) HBO & Co.
RMF (1) IBM Corp., DPD
RPG II (32/34)(1) IBM Corp., GSD
SPF (2) IBM Corp., DPD
SPRINT (2) Jason Data Systems
SPSS (3) Northwestern University
SRI/Edit (1) Systems Research, Inc.
Student Records System (1) Information Associates, Inc.
VOLLIE (1) Applied Data Research, Inc.
X-REF (1) MICRO Systems, Inc.

*indicates number of times on Honorable Mention list during the last four years.

(Structured Programming Facility), SPRINT, and X-REF are the only repeaters on the Honorable Mention list: each has shown up twice.

Placing one package on the Software Honor Roll or Honorable Mention list is a significant accomplishment in itself, but placing two or more on the lists is a true testimonial to the achievements of the vendor. In this year's survey, eight vendors made it: Applied Data Research (3), DNA Systems (2), Goal Systems (2), IBM's General Systems Div. (4), IBM's Data Processing Div. (3), Innovation Data Processing (2), Pansophic Systems (2), and Westinghouse Corp. (2).

As to the make-up of the 1978 Honor Roll, only one package falls outside the realm of systems software: ALLTAX, a tax calculation subroutine marketed by Management Science America. There are three data base management systems on the list: ADABAS, IDMS, and IMAGE/3000; two library maintenance systems: The LIBRARIAN and PANVALET; three telecommunications monitors: ROSCOE, Shadow II, and WESTI; three replacement sort systems: CA-SORT, 1130/SORT, and SYNCSORT; two DOS replacement operating systems: EDOS and DOS/MVT; and a variety of utility-type products such as console support packages, query and report writing systems, and language compilers. A Sperry Univac software product earned a place on the Honor Roll for the first time: BEM is the Basic Editor Monitor for use under Univac's OS/3 operating system.

Several of the "old-timers" received impressive numbers of user responses. PANVALET again led the list with 145 ratings, and its major competitor, The LIBRARIAN, followed with 107. SYNCSORT received 94 ratings and was closely followed by its major competitor, CA-SORT, with 91 responses. EASYTRIEVE was the only other Honor Roll member that was rated by more than 60 users.

Five of the 30 Honor Roll packages exclusively address the minicomputer and/or small computer marketplace: IMAGE/3000 from Hewlett-Packard, 1130/FORTRAN and 1130/SORT from DNA, and IBM's RPG II and Sort for the System/3. In the same category are six of the 16 Honorable Mention packages: IBM's COBOL for the System/3, RPG II for the System/32 and /34, and RMF for the 370; BLIS/COBOL from Information Processing Inc. for use on the Data General Nova/Eclipse Systems; Time Share's Guidance Information System for Hewlett-Packard minis; HBO's MEDPRO hospital system for Four-Phase hardware; and MICRO System's X-REF, a System/3 RPG II cross-reference program.

	All 260 Packages		160 Systems Packages		100 Applications Packages	
	1977	1978	1977	1978	1977	1978
No modifications required	59%	65%	74%	77%	26%	25%
Modifications made by vendor	20%	17%	18%	12%	23%	23%
Modifications made by the user	24%	19%	10%	15%	51%	53%

Table 1. The increase in the number of users reporting no modifications were necessary to their packages suggests improvement in the quality and/or flexibility of proprietary software. Conversely, the increase in modifications to systems software suggests that such packages are increasingly being modified for use on different hardware and/or that users now have more confidence in their ability to modify systems software. (The columns may total more than 100% since the same software can be modified by both users and vendors.)

HOW USERS RATED THE POPULAR DATA BASE MANAGEMENT SYSTEMS

		Weighted Average User Ratings						
Package & Vendor	Number of users reporting	Overall Satisfaction	Throughput/Efficiency	Ease of Installation	Ease of Use	Documentation	Vendor Technical Support	Training
ADABAS, Software ag of N.A.	28	3.5	3.1	3.5	3.3	2.8	3.1	3.1
Datacom/DB, Applied Data Research	15	2.9	3.1	3.0	3.2	2.5	2.9	2.8
DBMS-10/20, Digital Equipment Corp.	6	2.8	2.5	3.0	2.8	2.5	2.2	2.7
DBOMP, IBM Corp., DPD	25	2.8	2.5	2.1	2.5	2.3	2.3	2.3
DL/1 DOS/VS, IBM Corp., DPD	36	2.8	2.5	2.5	2.5	2.5	2.7	2.8
DL/1 Entry, IBM Corp., DPD	8	3.0	2.6	2.6	3.1	2.5	3.0	2.8
DMS-II, Burroughs Corp.	30	3.4	3.3	3.4	3.4	2.5	2.6	2.5
DPL, National Information Systems	6	3.5	2.3	3.8	3.5	3.0	3.0	3.2
IDMS, Cullinane Corp.	42	3.5	3.3	3.5	3.4	3.1	3.5	3.3
IMAGE/1000, Hewlett-Packard Co.	9	3.0	2.9	3.4	3.0	2.5	2.7	3.3
IMAGE/3000, Hewlett-Packard Co.	30	3.5	3.3	3.7	3.6	3.2	3.0	2.7
IMS, IBM Corp., DPD	34	2.9	2.4	2.2	2.5	2.8	2.8	2.6
INQUIRE, Infodata Systems, Inc.	8	3.8	2.8	3.6	3.3	2.9	3.3	2.9
SYSTEM 2000, MRI Systems	24	3.3	2.9	3.1	3.2	2.8	2.8	3.0
TOTAL, Cincom Systems, Inc.	108	3.2	3.1	3.2	3.2	2.7	2.7	2.7

Table 2. This summarizes the ratings assigned to data base management systems. For the third consecutive year, Cullinane's IDMS achieved Honor Roll status, and it was joined for the second consecutive year by ADABAS from Software ag. Hewlett-Packard's IMAGE/3000 regained Honor Roll status in 1978 after narrowly missing the list in 1977. TOTAL, from Cincom, again received more than twice the number of user responses received by any other DBMS on the chart. INQUIRE, from Infodata, was elected to the Honorable Mention list a second time, missing the Honor Roll because only eight respondents rated the package.

As in the past, Documentation and Training received the lowest ratings from DBMS users, and IBM's products again drew comparatively low user ratings in most categories. The number of DBMS packages appearing in this table has grown to 15 from 10 in 1977, a strong indication that more users are getting involved in the use of data base techniques.

Users are becoming more critical of software packages and their support.

Just how do users feel about software products in general? To gain some insight into this question, we calculated the weighted averages of all the ratings supplied for all 260 packages represented in this year's survey, then compared the 1978 results with those of 1977:

	1978	1977
Overall Satisfaction	3.2	3.3
Throughput/Efficiency	3.0	3.1
Ease of Installation	3.0	3.1
Ease of Use	3.1	3.2
Documentation	2.9	2.9
Vendor Technical Support	2.8	2.9
Training	2.7	2.8

The results clearly indicate that users are judging software products more severely. In every category except Documentation, the 1978 weighted average ratings were one-tenth of a point lower than those calculated in 1977. In prior surveys, there had been virtually no changes from year to year.

As in all prior years, users found more fault with Documentation, Vendor Support, and Training than the other four categories.

In 1977, we introduced a survey question that asked whether software packages required modifications by the user and/or the vendor. The results appear in the individual listings. We found that this year's results were slightly different, overall, from those of 1977. The comparison is shown in Table 1.

The increase in users reporting no need for modifications suggests improvement in the quality and/or flexibility of available software. Conversely, the increase in user modifications to systems software may reflect the growing use of minicomputer systems software products that are being modified to run on different hardware, and may also reflect increased user confidence in their ability to modify that software. (The total for most of the columns exceeds 100% because a respondent could indicate that modifications were made by both the vendor and the user.)

THE DP MANAGER'S ROLE

This year we investigated the role played by the dp manager in the evaluation and acquisition of proprietary software. In a three-part question, we asked: (1) Does the dp manager determine which software will be acquired for the dp department only? (2) For user departments as well? (3) Works with the user departments to acquire applications software?

The users responded that the dp manager selects software for his department only (61.9%), for the user departments as well (57.5%), and participates in selection of user software (75.0%). It's clear, in spite of the wording of the question, that the dp department manager plays a very big role in the selection and acquisition of software for the user departments.

Fortunately, the questions regarding package ratings are well stated and the results are easily interpreted. Understanding the numerical scores is easy. A few more words ought to be said about the listings on Advantages, Disadvantages, Modifications Required, and Price. We used a simple rule for the first three: if more than half of the respondents mentioned an advantage, disadvantage, or that modifications were required, that particular item was listed.

Pricing data was the one item *not* solicited from the users. Phone calls were placed to every vendor; sometimes many calls were made. Thus the prices listed come from the source. Note, however, that the prices are intentionally rough. Some packages are available in many forms, with many options; their prices vary all over the lot, and the dollar figures listed are meant only to put the package into general perspective. The vendors themselves should be contacted for specific figures.

Also, in two cases the information supplied by users was not focused on a specific package. This occurred when users listed "utilities" and we agreed with the vendors that pricing data would not be helpful.

In only a few cases do vendors refuse to release pricing information. This may be because they expect to negotiate price with the user, or because they have charged some customers more than others and don't want the word to spread, or because they feel the pricing is too complicated for the reader to appreciate.

HOW USERS RATED 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	174	2.9	2.7	2.3	2.4	2.8	2.9	2.7
Com-plete, Software ag of N.A.	5	3.2	4.0	3.2	3.8	2.2	3.2	2.8
Datacom/DC, Applied Data Research	13	3.3	3.5	2.9	3.2	2.6	3.2	3.2
ENVIRON/1, Cincom Systems	16	3.0	3.3	3.2	3.1	2.5	2.8	2.7
ETSS, IBM Corp., DPD	19	3.3	3.2	2.4	3.2	2.4	2.2	2.4
GBASWIFT, GBA International	10	3.2	3.0	3.5	3.5	3.3	3.4	2.6
INTERCOMM, Informatics	11	2.8	3.0	2.3	2.7	2.3	2.6	2.4
MINICOMM, Informatics	9	3.6	3.8	3.6	3.7	2.6	2.9	2.9
MTCS, IBM Corp., DPD	13	2.7	2.6	2.5	2.2	1.4	2.4	1.7
NDL, Burroughs Corp.	35	3.4	3.2	3.3	3.4	2.5	2.5	2.6
ROSCOE, Applied Data Research	20	3.5	3.5	3.3	3.5	3.1	3.0	2.8
Shadow II, Altergo Software, Inc.	18	3.7	3.7	3.5	3.4	3.1	3.4	3.2
TASK/MASTER, Turnkey Systems	27	2.9	3.0	2.6	2.9	2.5	2.5	2.7
WESTI, Westinghouse Electric	46	3.7	3.6	3.5	3.4	3.2	3.2	3.1

Table 3. This lists the telecommunications monitors that were rated by five or more users. As with the DBMS table, the number of products included in 1978 is considerably larger than in 1977 (up from 9 to 14). Westinghouse's perennial winner, WESTI, is a member of the 1978 Honor Roll for the fourth consecutive year. ROSCOE, from Applied Data Research, made the Honor Roll for the second consecutive year. These two have been joined by Altergo Software's Shadow II monitor, a relative newcomer to the software market in the United States but well known in Europe; in only two years, Shadow II has captured a sizable and highly appreciative North American user base.
IBM's CICS received 174 responses—more than four times as many as any other monitor mentioned. Despite its widespread use, the ratings received by CICS do not reflect a high level of user satisfaction. Minicomm from Informatics received very high ratings but fell below the minimum honors level in the area of Documentation. Another product that came very close was GBASWIFT, which missed the Honor Roll by three-tenths of a point in Overall Satisfaction but met all the other criteria.

HOW USERS RATED THE POPULAR DATA 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
Batch Query (S/3), IBM Corp., GSD	12	2.5	2.1	2.3	2.6	2.5	2.3	2.0
CULPRIT, Cullinane Corp.	12	3.3	3.1	3.4	3.0	2.9	3.3	3.1
Data Analyzer, Program Products	10	3.2	3.0	2.9	3.2	2.8	3.0	2.9
DATATRIEVE, Digital Equipment Corp.	5	2.4	2.6	3.0	3.0	2.0	1.6	—
DYL-260, Dylakor Software Systems	46	3.6	3.4	3.7	3.4	2.9	3.2	3.0
EASYTRIEVE, Pansophic Systems	68	3.5	3.4	3.6	3.4	3.0	3.0	2.9
EXTRACTO, Optipro, Inc.	15	3.3	2.9	3.2	3.6	2.9	2.3	2.6
FORTE, Burroughs Corp.	14	3.3	2.9	3.3	3.4	2.6	2.6	2.7
GIS (GIS/VS), IBM Corp., DPD	6	2.5	2.3	3.0	3.0	2.3	2.3	2.3
MARK IV, Informatics	61	3.2	2.8	3.2	2.9	2.8	2.8	2.9
POISE, The Poise Company, Inc.	7	3.4	2.6	3.7	3.6	2.7	3.1	3.0
QDMS, Quodata Corp.	5	2.8	2.8	3.0	2.8	2.2	2.6	2.3
QUIKJOB, System Support Software	37	3.6	3.5	3.8	3.6	3.0	3.0	2.7
RAMIS II, Mathematica Products Group	5	3.0	2.4	2.5	3.0	2.4	2.4	3.0
SAS, SAS Institute, Inc.	22	3.5	3.1	3.3	3.3	3.0	3.3	2.9
SCORE, Informatics	5	2.6	3.0	2.8	3.0	2.6	2.8	2.7

Table 4. This compares the ratings of 16 data (or file) management systems that received five or more user responses in the survey. Although these packages have many functions in common, each addresses itself to slightly different user requirements and priorities. The reader would be well advised to fully investigate the features and functions of each product before eliminating any of them.

In 1978 four data management systems earned places on the Software Honor Roll: DYL-260 from Dylakor Software, EASYTRIEVE from Pansophic Systems, SAS from SAS Institute for the third consecutive year, plus QUIKJOB from System Support Software for the third nonconsecutive time. Cullinane's CULPRIT missed the Honor Roll by just two-tenths of a point in Overall Satisfaction.

Several minicomputer-oriented data management systems are included in this year's list. DATATRIEVE from DEC, QDMS from Quodata, and POISE from The Poise Company all support the DEC PDP-11 series minis; IBM is represented by its System/3 Batch Query System, and a version of CULPRIT is also available for the IBM System/3.

Whatever the reason, only a half a dozen or so products carry the admonition "Vendor will not release pricing."

We understand that not enough information is included in the listings to base a software purchase on, and thus two mechanisms are provided for obtaining more data. The user may either circle the appropriate number for a package on the reader service card bound into this issue, or may contact the vendor directly using the address and phone number in the Vendor Index on page 220.

On the other hand, the information given should be of help in assessing the strong and weak points of popular products—at least in suggesting what to look for and what questions to ask. We sincerely hope that the distilled user experience data presented here will aid you in selecting the most appropriate packages for your particular needs, and in getting the most for your software dollars. ✻

HERBERT L. GEPNER

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USER'S RATINGS OF SOFTWARE PACKAGES

The list that follows summarizes the survey results on the 260 proprietary software packages rated by five or more users. The rating in each category is expressed in terms of a weighted averge 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 by:✻

ABC
Insurance Systems of America, Inc.
Insurance company accounting, budgeting, and cost allocation system for IBM 360/370 computers.

Users reporting:	7
Overall satisfaction	3.1
Throughput/efficiency	2.2
Ease of installation	2.7
Ease of use	3.0
Documentation	2.2
Vendor technical support	3.4
Training	3.0

Advantages: Saves human resources. Modification required: Usually, by vendor or user. Price: $68,500 (DOS) 20-year lease with $1.00 renewal fee every 20 years thereafter. First year's maintenance included (10% of purchase price per year thereafter).
CIRCLE 435 ON READER CARD

ACCOUNTING IV
Informatics, Inc.
Multicompany general ledger and financial reporting system for use on IBM 360/370, Honeywell, Univac, and Burroughs computers.

Users reporting:	33
Overall satisfaction	2.7
Throughput/efficiency	2.3
Ease of installation	2.2
Ease of use	2.7
Documentation	2.3
Vendor technical support	2.1
Training	2.4

Advantages: Flexible; saves human resources. Modification required: Usually, by vendor. Price: $27,000.
CIRCLE 436 ON READER CARD

Accounts Payable
Honeywell Information Systems, Inc.
Accounts payable system for Honeywell Series 60, 600, and Level 6 computers.

Users reporting:	7
Overall satisfaction	3.0
Throughput/efficiency	2.3

USER RATINGS

Ease of installation 2.3
Ease of use 2.6
Documentation 1.7
Vendor technical support 2.2
Training 2.0
Advantages: Inexpensive.
Modification required: Usually, by user.
Price: $2,067-$4,000 initial license, plus $78-$133 monthly license fee.
CIRCLE 437 ON READER CARD

Accounts Payable
IBM Corp., GSD
Standard accounts payable system for IBM S/3.
Users reporting: 27
Overall satisfaction 2.7
Throughput/efficiency 2.5
Ease of installation 2.7
Ease of use 2.7
Documentation 3.0
Vendor technical support 2.4
Training 2.2
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $155/year.
CIRCLE 438 ON READER CARD

Accounts Payable
IBM Corp., GSD
Generalized accounts payable system for IBM S/32.
Users reporting: 9
Overall satisfaction 3.1
Throughput/efficiency 2.2
Ease of installation 3.0
Ease of use 2.9
Documentation 2.7
Vendor technical support 3.2
Training 2.8
Advantages: Saves human resources.
Modification required: Usually none.
Price: $29/month.
CIRCLE 439 ON READER CARD

Accounts Payable
Infonational
Multidivision, multicompany accounts payable system; for use on IBM 360/370 and most other comparable computers.
Users reporting: 9
Overall satisfaction 3.3
Throughput/efficiency 2.8
Ease of installation 2.9
Ease of use 3.0
Documentation 3.2
Vendor technical support 2.5
Training 3.0
Modification required: Usually, by user or vendor.
Price: $17,000, plus $2,000/year maintenance.
CIRCLE 440 ON READER CARD

Accounts Payable
Management Science America (MSA)
In ANSI COBOL for use on various mainframes.
Users reporting: 14
Overall satisfaction 2.5
Throughput/efficiency 2.1
Ease of installation 2.1
Ease of use 2.6
Documentation 2.7
Vendor technical support 2.4
Training 2.2
Advantages: Saves human resources.
Disadvantages: Uses excessive computer resources.
Modification required: Usually, by user.
Price: $20,000 perpetual license includes first year's maintenance (approx. 10%/year thereafter).
CIRCLE 441 ON READER CARD

Accounts Payable
McCormack & Dodge Corp.
For use in most business-oriented establishments; runs on IBM 360/370, Honeywell, and Burroughs computers.
Users reporting: 15
Overall satisfaction 3.3
Throughput/efficiency 2.5
Ease of installation 3.1
Ease of use 2.9
Documentation 3.1
Vendor technical support 2.9
Training 2.8
Advantages: Flexible; saves human resources.
Modification required: Usually, by user or vendor.
Price: $20,000, includes first year's maintenance ($2,000/year thereafter).
CIRCLE 442 ON READER CARD

Accounts Payable
NCR Corp.
Generalized accounts payable system for Century, Criterion, and mini series computers.
Users reporting: 13
Overall satisfaction 2.5
Throughput/efficiency 2.8
Ease of installation 2.5
Ease of use 2.8
Documentation 2.3
Vendor technical support 2.0
Training 2.0
Advantages: Inexpensive.
Modification required: Usually, by user.
Price: $730; monthly lease, $15.
CIRCLE 443 ON READER CARD

Accounts Payable
Software International Corp.
Data base-oriented system for any IBM 360/370 with 64KB and two disks.
Users reporting: 12
Overall satisfaction 2.3
Throughput/efficiency 2.0
Ease of installation 2.3
Ease of use 2.5
Documentation 2.2
Vendor technical support 2.6
Training 2.5
Modification required: Usually, by user.
Price: $13,000 - $23,000, includes first year's maintenance (10% of purchase price per year thereafter).
CIRCLE 444 ON READER CARD

Accounts Receivable
Bancroft Computer Systems
A multicompany accounts receivable package designed for IBM S/3s.
Users reporting: 5
Overall satisfaction 3.2
Throughput/efficiency 2.8
Ease of installation 3.4
Ease of use 3.2
Documentation 3.6
Vendor technical support 2.8
Training 3.0
Advantages: Flexible; inexpensive.
Modification required: Usually, by user.
Price: $1,595 perpetual license includes maintenance.
CIRCLE 445 ON READER CARD

Accounts Receivable
IBM Corp., GSD
Generalized system for use on IBM S/3.
Users reporting: 12
Overall satisfaction 2.9
Throughput/efficiency 3.1
Ease of installation 2.7
Ease of use 3.2
Documentation 2.8
Vendor technical support 3.0
Training 2.8
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $65/year.
CIRCLE 446 ON READER CARD

Accounts Receivable
NCR Corp.
Generalized system for most NCR Century and Criterion computers.
Users reporting: 8
Overall satisfaction 2.6
Throughput/efficiency 2.4
Ease of installation 2.5
Ease of use 2.6
Documentation 2.8
Vendor technical support 2.0
Training 2.4
Advantages: Inexpensive; saves human resources.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: $730; monthly lease, $15.
CIRCLE 447 ON READER CARD

Accounts Receivable
Software International Corp.
In ANSI COBOL for IBM 360/370.
Users reporting: 7
Overall satisfaction 2.7
Throughput/efficiency 2.1
Ease of installation 2.4
Ease of use 2.4
Documentation 2.3
Vendor technical support 3.1
Training 2.9
Advantages: Flexible; saves human and system resources.
Modification required: Usually, by vendor.
Price: DOS-$23,500 (25 year lease), plus on-line option $8,500; OS-$25,500, plus on-line option $10,000. Maintenance after first year, 10% of lease price.
CIRCLE 448 ON READER CARD

ADABAS *
Software ag of North America, Inc.
Data base management system for IBM 360/370 (any operating system), Univac 9000 (DOS), and Siemens; a PDP-11 version will soon be available.
Users reporting: 28
Overall satisfaction 3.5
Throughput/efficiency 3.1
Ease of installation 3.5
Ease of use 3.3
Documentation 2.8
Vendor technical support 3.1
Training 3.1
Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $88,000 (DOS), $132,000 (OS) perpetual license includes first year's maintenance ($6,600/year thereafter). Monthly lease $3,333 (DOS), $5,000 (OS).
CIRCLE 449 ON READER CARD

ADAS
Universal Software, Inc.
Disk space allocation system for IBM 360/370 DOS and DOS/VS systems.
Users reporting: 9
Overall satisfaction 3.3
Throughput/efficiency 3.1
Ease of installation 3.8
Ease of use 3.6
Documentation 3.1
Vendor technical support 3.6
Training 3.5
Advantages: Saves system and human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $4,550 perpetual license, includes first year's maintenance (7% of license per year thereafter). Monthly lease $175.
CIRCLE 450 ON READER CARD

Advanced Programming Functions
IBM Corp., DPD
IBM /370 DOS/VS programming enhancement features.
Users reporting: 5
Overall satisfaction 2.8
Throughput/efficiency 3.0
Ease of installation 2.6
Ease of use 3.0
Documentation 2.6
Vendor technical support 3.4
Training 3.0
Advantages: Saves system resources.
Modification required: Usually none.
Price: $200/month.
CIRCLE 451 ON READER CARD

The Codex 6010
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Our newest 6000 Intelligent Network Processor using multi-microprocessor technology. It features statistical concentration, error protection, X.25 compatibility and versatility.

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CIRCLE 17 ON READER CARD

USER RATINGS

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

Users reporting:	20
Overall satisfaction	3.7
Throughput/efficiency	3.4
Ease of installation	3.3
Ease of use	3.5
Documentation	3.4
Vendor technical support	3.3
Training	3.4

Advantages: Saves human resources.
Modification required: Usually none.
Price: $975-$2,850, plus $225-$650/year maintenance.
CIRCLE 452 ON READER CARD

APL
IBM Corp., DPD
High-level language for IBM 360/370 systems.

Users reporting:	8
Overall satisfaction	3.4
Throughput/efficiency	2.6
Ease of installation	3.0
Ease of use	3.4
Documentation	2.8
Vendor technical support	2.6
Training	3.0

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $400/month.
CIRCLE 453 ON READER CARD

Application Flowcharter (S/3)
IBM Corp., GSD
Produces standardized flowcharts using RPG II source decks and OCL job steams as input.

Users reporting:	6
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	2.8
Documentation	2.8
Vendor technical support	2.4
Training	2.0

Advantages: Inexpensive; saves human resources; flexible.
Modification required: Usually, by user.
Price: $335 one-time charge.
CIRCLE 454 ON READER CARD

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

Users reporting:	18
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.4
Ease of use	3.1
Documentation	2.7
Vendor technical support	2.8
Training	2.5

Advantages: Saves system and human resources; inexpensive.
Modification required: Usually none.
Price: $225-$325/month, includes first year's maintenance (7% thereafter). Perpetual license 26x monthly rental.
CIRCLE 455 ON READER CARD

ASM-2
Cambridge Systems Group, Inc.
An OS/VS disk space management system that can also monitor data set activity on DASD and Mass Storage System devices.

Users reporting:	6
Overall satisfaction	2.7
Throughput/efficiency	2.7
Ease of installation	2.2
Ease of use	3.3
Documentation	2.3
Vendor technical support	3.0
Training	3.0

Advantages: Saves human and system resources.
Modification required: Usually none.
Price: $12,750, includes first year's maintenance (12% of purchase price thereafter). Monthly lease $880, including maintenance.
CIRCLE 456 ON READER CARD

AUTOFLOW II
Applied Data Research, Inc. (ADR)
A system and program development tool for documenting whole systems and individual source programs.

Users reporting:	5
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.2
Documentation	3.0
Vendor technical support	2.6
Training	2.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $6,000-$15,000, includes first year's maintenance ($900-$1,200/year thereafter). Monthly lease $300-$750.
CIRCLE 457 ON READER CARD

BASIC
Digital Equipment Corp. (DEC)
Various versions to complement DEC operating systems.

Users reporting:	13
Overall satisfaction	2.4
Throughput/efficiency	2.2
Ease of installation	2.2
Ease of use	2.5
Documentation	2.4
Vendor technical support	1.8
Training	1.7

Modification required: Usually, by vendor.
Price: $830.
CIRCLE 458 ON READER CARD

BASIC
Microsoft
BASIC compiler for any Intel 8080- or Zilog Z-80-based microcomputer.

Users reporting:	5
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.2
Documentation	1.6
Vendor technical support	2.6
Training	4.0

Advantages: Inexpensive; flexible.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: $150-$350 for purchase; updates $25-$50/year.
CIRCLE 459 ON READER CARD

Batch Query
IBM Corp., GSD
Designed to selectively access disk data files for report and query preparation for IBM S/3.

Users reporting:	12
Overall satisfaction	2.5
Throughput/efficiency	2.1
Ease of installation	2.3
Ease of use	2.6
Documentation	2.5
Vendor technical support	2.3
Training	2.0

Advantages: Saves human resources.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: $48/year.
CIRCLE 460 ON READER CARD

BEM ✲
Sperry Univac
A Basic Editor Monitor for interactive programming under the OS/3 operating system.

Users reporting:	12
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.7
Ease of use	3.7
Documentation	3.2
Vendor technical support	3.1
Training	3.3

Advantages: Saves human resources; inexpensive.
Modification required: Usually none.
Price: $75/month.
CIRCLE 461 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:	10
Overall satisfaction	3.1
Throughput/efficiency	2.7
Ease of installation	2.6
Ease of use	2.7
Documentation	2.8
Vendor technical support	2.5
Training	2.3

Advantages: Flexible; saves human resources.
Modification required: Usually, by vendor.
Price: $15,000 (DOS), $18,000 (OS), plus $1,500/year maintenance.
CIRCLE 462 ON READER CARD

BLIS/COBOL ✲
Information Processing Inc.
Multiuser operating system and COBOL compiler for Data General Nova and Eclipse, and compatible minicomputers.

Users reporting:	9
Overall satisfaction	3.6
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.6
Documentation	2.9
Vendor technical support	2.9
Training	3.0

Advantages: Flexible; inexpensive.
Modification required: Usually none.
Price: $4,000, plus $40/month maintenance.
CIRCLE 463 ON READER CARD

BOMP
IBM Corp., GSD
Bill of material processor for IBM S/3.

Users reporting:	54
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	2.7
Ease of use	2.9
Documentation	3.0
Vendor technical support	2.9
Training	2.9

Advantages: Saves human resources; inexpensive.
Modification required: Usually, by user.
Price: $61/month.
CIRCLE 464 ON READER CARD

BMDP (or BioMed)
Univ. of California at Los Angeles (UCLA)
Statistical computing for medical and other applications.

Users reporting:	14
Overall satisfaction	3.1
Throughput/efficiency	2.9
Ease of installation	2.5
Ease of use	2.6
Documentation	2.8
Vendor technical support	2.4
Training	2.7

Modification required: Usually none.
Price: $1,500/year for commercial users, $1,000/year government, and $500/year for academic users.
CIRCLE 465 ON READER CARD

Bonds and Stocks System
Insurance Systems of America, Inc.
Stocks and bonds portfolio system that runs on IBM 360/370, Univac, and Honeywell systems.

Users reporting:	8
Overall satisfaction	2.9
Throughput/efficiency	2.4
Ease of installation	2.5
Ease of use	2.8
Documentation	2.0
Vendor technical support	3.1
Training	3.1

Advantages: Saves human resources.
Modification required: Usually none.

Our new line of 80-column, dot-matrix line printers – the Anadex DP-8000 Series – combines high performance and operating convenience with a price that's causing OEM's to take a closer look.

Looking for Performance?
All models feature a precision engineered, continuous duty printer mechanism that can print the complete 96 ASCII character set, bi-directionally, at 84 LPM actual throughput. And three lines of internal FIFO buffer storage (optionally, 2K character FIFO buffer for CRT dump, etc.) allow faster external system operation.

A 9 x 7 character font provides virtually half-dot resolution for superior print quality.

For flexible interfacing, the DP-8000 is available with three standard interfaces: EIA-RS232C, with selectable BAUD rates up to 9600 BAUD; Current Loop; or Parallel Bit, Serial Character.

Precise positioning of single or multiple-part paper is ensured by sprocket-feed paper advance, user-programmable Top of Form Control, and up to 8 Vertical Tabs.

Looking for Convenience?
For operating ease, the DP-8000 Series accepts paper through the rear or bottom of the unit, provides programmable Skip Over Perforation control, and Out of Paper indication and signal.

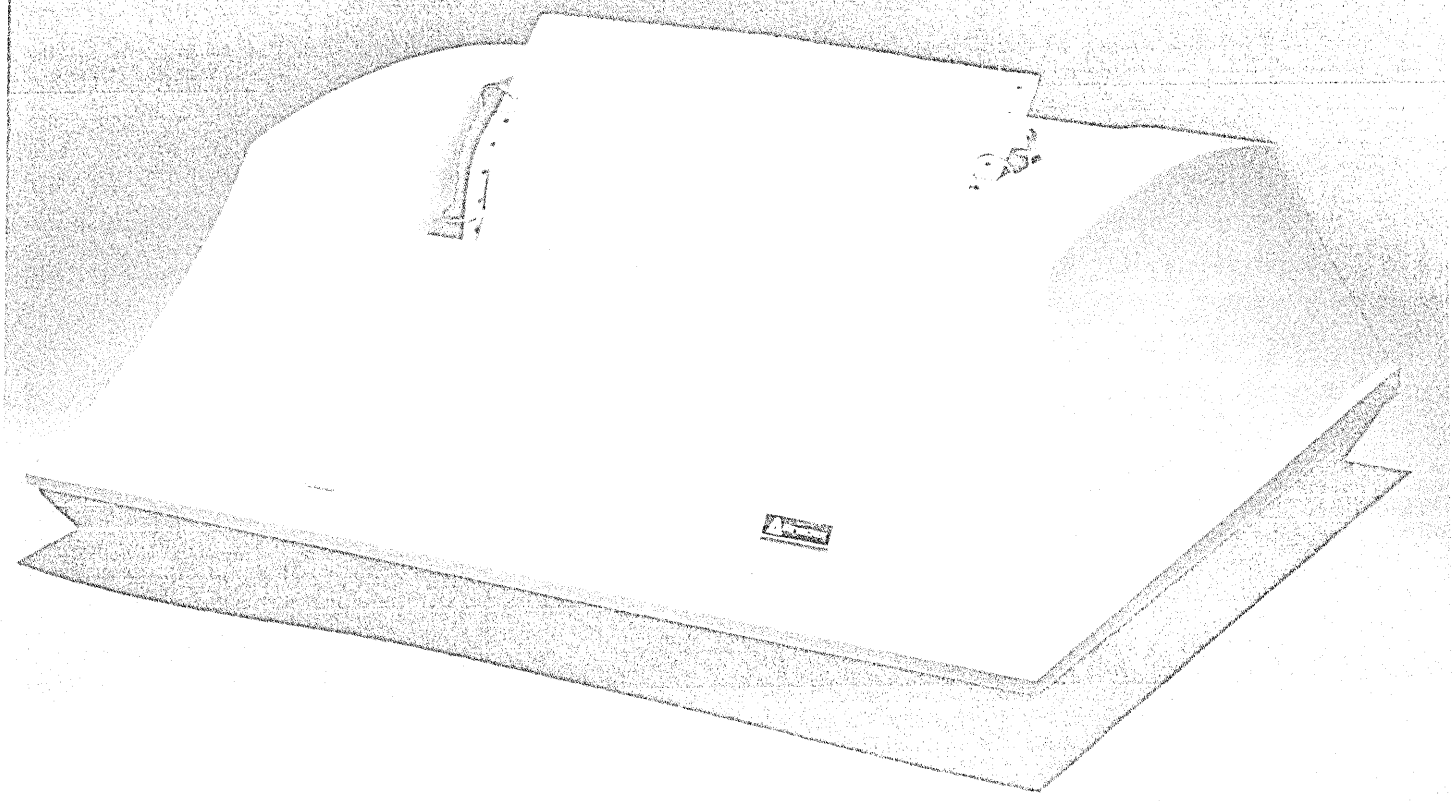
Looking for Low Cost?
The best news is the price. A complete DP-8000, including case, is priced under $600 in OEM quantities.

Printer Price/Performance never looked better.

Once you've examined the specifications and seen the printer in operation, we think you'll agree, "Printer Price/Performance never looked better."

For complete details, contact DP-8000 Marketing Dept., Anadex, Inc., 9825 DeSoto Ave., Chatsworth, CA 91311. Phone (213) 998-8010. TWX 910-494-2761.

Anadex




NCR

NCR's new high– the V-8600.

NCR can compare computers with anybody – and win.

Now, with the introduction of this new V-8600 Family, NCR offers systems all across the business computer range. The V-8600 is the next step up in the total enhancement of the NCR Computer line. And it is more than just an alternative system. Two years after the announcement of the first Criterion, NCR continues to provide the most conceptually advanced architecture and circuitry.

Even better, NCR offers the smoothest system-to-system path in the industry.

Bus Architecture

These NCR V-8600 Systems are the first systems in their power range with bus architecture, the architecture of the future. They introduce a greater degree of internal efficiency at the power level where it is most needed.

Bus Architecture lets the system split up the workload. The Internal Transfer Bus is an ultra-high-speed data path that channels information between the several processing elements distributed through the system, without central monitoring. To provide concurrent processing and greater efficiency.

Migration Path Engineering

From NCR minicomputers up to the new V-8600 maxi systems, NCR hardware and software elements are designed with the changing needs of the user in mind. As your volume increases, you can move to the system that handles your larger workload smoothly without a costly, time-consuming conversion. The step from an I-8100 to a V-8600 is consistent and logical. Your software moves with you. Only the available power changes.

The NCR V-8600 Family

The NCR V-8600 Family includes the V-8650 Single Processor System and the V- 8670 Dual-Processor System. They are the fastest business computers in the industry with cycle times of just 28 nanoseconds. Both have cache memory to increase productivity. Both have the built-in ability to automatically side-step problems and continue processing. Even to ride through power fluctuation or momentary failure.

The NCR V-8600 systems are ideally suited for large online multiprogramming applications that take full advantage of virtual memory. Both systems offer VRX (Virtual Resource Executive), NCR's most sophisticated operating system software. Both use TRAN-PRO, NCR's transaction processing software to interface readily with a communications network. Both use TOTAL to manage a data base. And both mesh easily with NCR's Distributed Network Architecture.

For a personal introduction to NCR's V-8650 and V-8670, call your local NCR representative. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

NCR
Complete Computer Systems

USER RATINGS

Price: $24,000 for 20-year lease, includes first 60 days maintenance ($3,000-$4,000 per year thereafter).
CIRCLE 466 ON READER CARD

CalComp Plot Libraries
California Computer Products, Inc. (CalComp)
A library of plotting subroutines for use with host computers and CalComp plotters.

Users reporting:	7
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.3
Ease of use	2.9
Documentation	2.7
Vendor technical support	2.7
Training	2.6

Advantages: Flexible.
Modification required: Usually, by user.
Price: 30 packages ranging from $375 to $17,500.
CIRCLE 467 ON READER CARD

CANDE
Burroughs Corp.
A command and edit message control system for use with Burroughs' large-scale B-series computers.

Users reporting:	6
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	3.2
Documentation	2.8
Vendor technical support	2.8
Training	2.5

Advantages: Flexible; inexpensive; saves human resources.
Modification required: Usually none.
Price: $1,800, plus $180/year license fee.
CIRCLE 468 ON READER CARD

CA-SORT *
Computer Associates, Inc.
Replacement sort/merge facility for IBM 360/370s.

Users reporting:	91
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.7
Ease of use	3.8
Documentation	3.3
Vendor technical support	3.2
Training	3.1

Advantages: Saves system resources.
Modification required: Usually none.
Price: $3,900 (DOS or DOS-VS), $5,050 (OS) perpetual license, includes first year's maintenance ($600 or $750/year thereafter). Monthly lease $125 (DOS or DOS-VS), $160 (OS) including maintenance.
CIRCLE 469 ON READER CARD

CCP On-line Screen Design Facility
IBM Corp., GSD
CCP 3270 screen development and documentation aid for IBM S/3 computers.

Users reporting:	23
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.2
Ease of use	3.4
Documentation	2.9
Vendor technical support	3.0
Training	2.7

Advantages: Saves human resources.
Modification required: Usually none.
Price: $22/month.
CIRCLE 470 ON READER CARD

CCP On-line Source Library Maintenance Facility
IBM Corp., GSD
Library maintenance routine for use on IBM S/3 computers.

Users reporting:	27
Overall satisfaction	3.4
Throughput/efficiency	3.0
Ease of installation	3.2
Ease of use	3.4
Documentation	2.9
Vendor technical support	2.8
Training	2.8

Advantages: Saves human resources.
Modification required: Usually none.
Price: No charge, covered in Systems Control Program.
CIRCLE 471 ON READER CARD

Certificate of Deposit
Florida Software Services, Inc.
General-purpose system for IBM 360/370, Burroughs, and Honeywell computers.

Users reporting	6
Overall satisfaction	2.5
Throughput/efficiency	2.8
Ease of installation	2.5
Ease of use	2.8
Documentation	2.7
Vendor technical support	2.8
Training	0

Advantages: Flexible.
Modification required: Usually, by user.
Price: $16,800, includes first 6 months maintenance ($2,160/year thereafter).
CIRCLE 472 ON READER CARD

CFO II
IBM Corp., DPD
Insurance contract maintenance system for IBM 360/370 DOS or OS systems.

Users reporting	5
Overall satisfaction	3.0
Throughput/efficiency	2.4
Ease of installation	2.8
Ease of use	2.8
Documentation	2.6
Vendor technical support	2.8
Training	3.0

Advantages: Flexible; saves human resources.
Disadvantages: Complex.
Modification required: Usually, by user.
Price: $380/month.
CIRCLE 473 ON READER CARD

CICS
IBM Corp., DPD
Data communications monitor version for entry-level and most other DOS users of IBM 360/370 computers.

Users reporting	174
Overall satisfaction	2.9
Throughput/efficiency	2.7
Ease of installation	2.3
Ease of use	2.4
Documentation	2.8
Vendor technical support	2.9
Training	2.7

Advantages: Flexible.
Disadvantages: Complex.
Modification required: Usually none.
Price: $475-$1,000/month.
CIRCLE 474 ON READER CARD

CIF
NCR Corp.
Central information file system for banks; runs on Century and Criterion series computers.

Users reporting:	11
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	2.5
Ease of use	3.0
Documentation	2.9
Vendor technical support	2.5
Training	2.4

Advantages: Flexible; inexpensive; saves human resources.
Modification required: Usually, by user.
Price: Batch CIF $34,000, plus $1,700/year maintenance or $850 monthly license. On-line FCS $16,000, plus $850/year maintenance or $425 monthly license.
CIRCLE 475 ON READER CARD

CIMS
BMS Computer, Inc.
Computer information management system that supports job accounting for DOS and DOS/VS systems on IBM 360/370 computers.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.6
Ease of installation	1.8
Ease of use	2.4
Documentation	1.8
Vendor technical support	1.8
Training	2.0

Advantages: Inexpensive.
Modification required: Usually, by user.
Price: $3,000, plus source code $1,000. Maintenance optional at 10% of purchase price per year. Monthly lease $110.
CIRCLE 476 ON READER CARD

CMAS
IBM Corp., GSD
Construction Management Accounting System for IBM S/32 and S/34 computers.

Users reporting:	5
Overall satisfaction	2.2
Throughput/efficiency	2.0
Ease of installation	2.4
Ease of use	2.2
Documentation	4.0
Vendor technical support	3.2
Training	2.3

Advantages: Inexpensive.
Disadvantages: Uses excessive resources; inflexible; complex.
Modification required: Usually, by user.
Price: $170/month for 4-module S/32 package; $34-$59/month per module. $182/month per 4-module S/34 package; $36-$63/month per module.
CIRCLE 477 ON READER CARD

CIMS
NCR Corp.
An inventory management system for most NCR computers.

Users reporting:	5
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.8
Ease of use	3.4
Documentation	3.0
Vendor technical support	3.8
Training	3.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $15,000, includes 5 modules ranging from $2,000-$4,000 each.
CIRCLE 478 ON READER CARD

COBOL
Burroughs Corp.
Standard Burroughs COBOL compiler.

Users reporting:	8
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.5
Ease of use	3.5
Documentation	2.7
Vendor technical support	2.8
Training	3.2

Modification required: Usually none.
Price: $50/month license fee.
CIRCLE 479 ON READER CARD

COBOL
Digital Equipment Corp. (DEC)
Several versions to complement DEC operating systems.

Users reporting:	6
Overall satisfaction	3.5
Throughput/efficiency	2.2
Ease of installation	3.5
Ease of use	3.7
Documentation	3.5
Vendor technical support	2.4
Training	3.5

Modification required: Usually none.
Price: $4,730.
CIRCLE 480 ON READER CARD

COBOL
Honeywell Information Systems, Inc.
Standard COBOL compiler for most medium to large-scale HIS computers.

Users reporting:	13

Solving data comm problems doesn't have to be expensive.

Until now, identifying data comm problems has been reserved for the specialists.

Introducing...the trim, 11-lb 832 Data Comm Tester from Tektronix. It helps identify and solve most data comm problems the first time without calling the specialist.

Take this new 832 Data Comm Tester to the field and use it in either the passive monitor or active simulation modes. In the monitor mode, capture data and control line status to identify problems.

Once you've identified the problem, the 832 allows you to stimulate the suspected equipment off-line to troubleshoot or verify performance without the use of expensive CPU time. "The quick brown fox..." and six other messages are stored in the 832. Or, tailor the stimulus pattern to your own needs with a user-definable PROM or a front panel entry.

The 832 is also easy to operate and learn. Since it doesn't require extensive data comm knowledge to operate, service people require less training time.

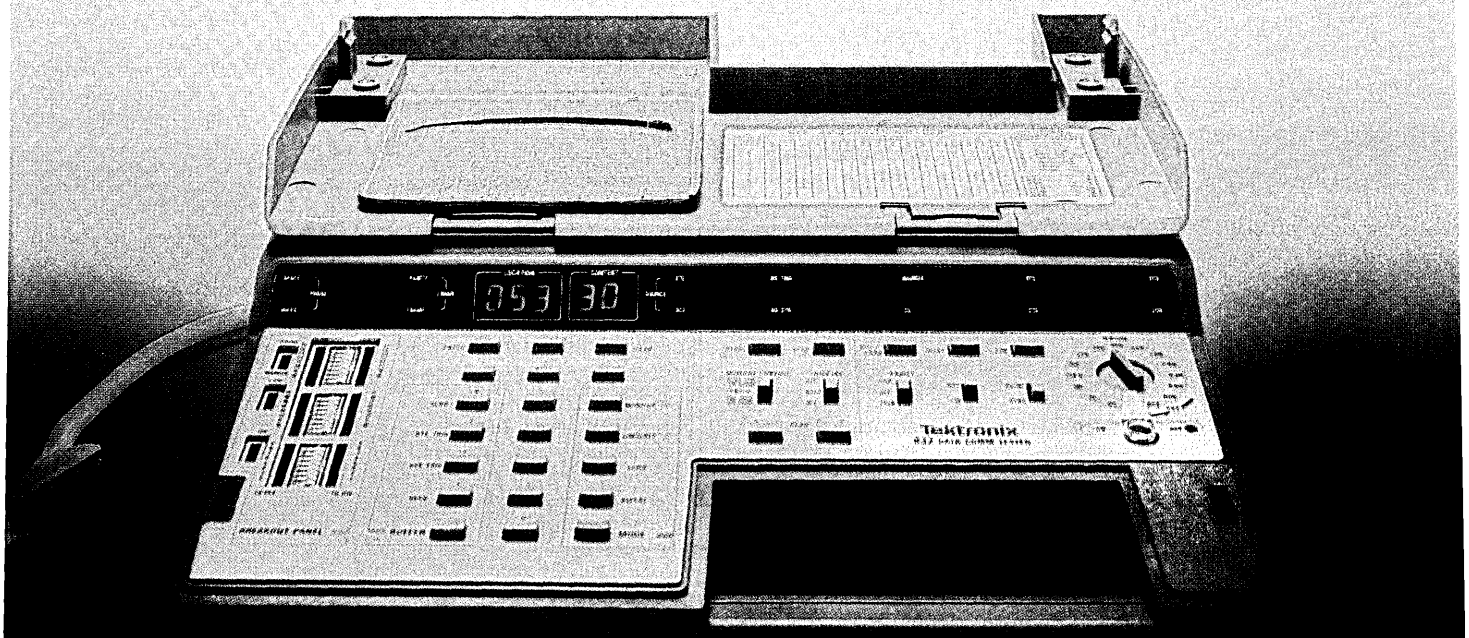
For under $2000, it costs only a fraction as much as the equipment you've had to buy in the past to perform similar functions.

For more information about the 832 Data Comm Tester, call your nearest Tektronix office or call our automatic answering service toll free on 1-800-547-1512. Oregon residents call collect on 644-9051.

For availability outside the U.S., please contact the nearest Tektronix Field Office, Distributor or Representative.

CIRCLE 86 ON READER CARD

Tektronix®
COMMITTED TO EXCELLENCE



THE 832 DATA COMM TESTER

USER RATINGS

Overall satisfaction	3.2
Throughput/efficiency	3
Ease of installation	3.4
Ease of use	3.2
Documentation	3.1
Vendor technical support	2.5
Training	2.6

Modification required: Usually none.
Price: $91-$212/month.
CIRCLE 481 ON READER CARD

COBOL ✲
IBM Corp., GSD
Supports both IBM S/3 and S/32 computers.

Users reporting:	8
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.5
Documentation	3.4
Vendor technical support	2.8
Training	2.8

Advantages: Flexible.
Modification required: Usually none.
Price: $97/month (S/3), $85/month (S/32).
CIRCLE 482 ON READER CARD

COBOL
IBM Corp., DPD
Includes DOS, OS, and VS counterparts versions, for IBM 360/370 computers.

Users reporting:	82
Overall satisfaction	3.2
Throughput/efficiency	2.9
Ease of installation	3.2
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.0
Training	3.1

Modification required: Usually none.
Price: $141-$236/month.
CIRCLE 483 ON READER CARD

COBOL
IBM Corp., DPD
Subset version for IBM 1130.

Users reporting:	17
Overall satisfaction	3.2
Throughput/efficiency	3.1
Ease of installation	3.1
Ease of use	3.5
Documentation	2.9
Vendor technical support	2.1
Training	1.8

Modification required: Usually none.
Price: $86/month.
CIRCLE 484 ON READER CARD

Commercial Loan System
Florida Software Services, Inc.
Generalized system for IBM 360/370, Burroughs, and Honeywell computers.

Users reporting:	6
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.8
Ease of use	2.4
Documentation	3.7
Vendor technical support	3.2
Training	2.8

Advantages: Saves human resources; inexpensive.
Modification required: Usually, by user.
Price: $16,400 includes first 6 months maintenance ($2,100/year thereafter).
CIRCLE 485 ON READER CARD

COMPAKTOR ✲
Innovation Data Processing, Inc.
An OS or OS/VS disk management utility program designed to be used with vendor's FDR system.

Users reporting:	7
Overall satisfaction	3.9
Throughput/efficiency	3.7
Ease of installation	4.0
Ease of use	3.9
Documentation	3.4
Vendor technical support	3.4
Training	-

Advantages: Saves system and human resources; inexpensive.
Modification required: None reported.
Price: $3,000 per cpu, plus $250/year maintenance.
CIRCLE 486 ON READER CARD

Com-plete
Software ag of North America, Inc.
A general-purpose data communications monitor that interfaces with ADABAS and other DBMS's; operates on the IBM 360/370 with OS and OS/VS.

Users reporting:	5
Overall satisfaction	3.2
Throughput/efficiency	4.0
Ease of installation	3.2
Ease of use	3.8
Documentation	2.2
Vendor technical support	3.2
Training	2.8

Advantages: Saves human and system resources; flexible.
Modification required: Usually none.
Price: $60,000; monthly lease $2,500. Both include first year's maintenance ($6,000/year thereafter).
CIRCLE 487 ON READER CARD

Comput-A-Charge
Value Computing, Inc.
Job accounting and billing, written in ANSI COBOL; runs on most mainframes.

Users reporting:	14
Overall satisfaction	3.0
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	2.7
Documentation	2.6
Vendor technical support	2.6
Training	2.8

Modification required: Usually, by vendor or user.
Price: $6,500 (DOS), maintenance $780/year; $9,500 (OS), plus $1,140/year maintenance.
CIRCLE 488 ON READER CARD

CP/M
Digital Research
Disk-based operating system for most Intel 8080, 8085, or Zilog Z-80 type microcomputers.

Users reporting:	6
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.2
Ease of use	3.0
Documentation	2.7
Vendor technical support	2.8
Training	-

Advantages: Inexpensive; flexible.
Modification required: Usually, by user.
Price: $100.
CIRCLE 489 ON READER CARD

CUE
Boole & Babbage, Inc.
System hardware resource utilization analyzer and report generation system.

Users reporting:	6
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	3.7
Ease of use	3.2
Documentation	3.2
Vendor technical support	2.5
Training	2.8

Advantages: Saves system resources.
Modification required: Usually none.
Price: $11,500, includes first year's maintenance ($1,380/year thereafter).
CIRCLE 490 ON READER CARD

CULPRIT
Cullinane Corp.
Output processor and report creation system for IBM 360/370 and Sperry Univac Series 70 and 9000.

Users reporting:	12
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.4
Ease of use	3.0
Documentation	2.9
Vendor technical support	3.3
Training	3.1

Advantages: Flexible; saves human resources.
Modification required: None reported.
Price: $20,000 license fee, plus $2,000 annual renewal, includes maintenance.
CIRCLE 491 ON READER CARD

Data Analyzer
Program Products, Inc.
Information retrieval and reporting system for any IBM 360/370; interfaces with several DBMS's.

Users reporting:	10
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	2.9
Ease of use	3.2
Documentation	2.8
Vendor technical support	3.0
Training	2.9

Advantages: Saves human resources; flexible.
Modification required: Usually, by vendor or user.
Price: $16,000 (DOS), $18,000 (OS), includes first year's maintenance ($1,000 plus 5% of features/options price per year thereafter). Monthly lease $640 (DOS), $720 (OS), plus $1,000 installation.
CIRCLE 492 ON READER CARD

Data Base Techniques
IBM Corp., GSD
Provides a series of performance reports with a variety of cross-referenced information for analysis; runs on IBM S/3, S/32, or S/34.

Users reporting:	13
Overall satisfaction	3.0
Throughput/efficiency	2.7
Ease of installation	2.8
Ease of use	2.7
Documentation	2.8
Vendor technical support	2.5
Training	2.6

Advantages: Saves human resources; inexpensive.
Modification required: Usually, by user.
Price: $100 for 6 months (S/3); $90 for 6 months (S/32).
CIRCLE 493 ON READER CARD

Datacom/DB
Applied Data Research Inc. (ADR)
Data base management system for the IBM 360/370 using inverted file structures.

Users reporting:	15
Overall satisfaction	2.9
Throughput/efficiency	3.1
Ease of installation	3.0
Ease of use	3.2
Documentation	2.5
Vendor technical support	2.9
Training	2.8

Advantages: Flexible; saves human resources.
Modification required: Sometimes, by vendor.
Price: $34,000-$50,000, includes first year's maintenance ($3,400-$5,000 thereafter). Monthly lease $900-$1,500.
CIRCLE 494 ON READER CARD

Datacom/DC
Applied Data Research Inc. (ADR)
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	2.9
Ease of use	3.2
Documentation	2.6
Vendor technical support	3.2
Training	3.2

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $30,000-$37,000, includes first year's maintenance ($3,000-$3,700/year thereafter). Monthly lease $800-$1,200.
CIRCLE 495 ON READER CARD

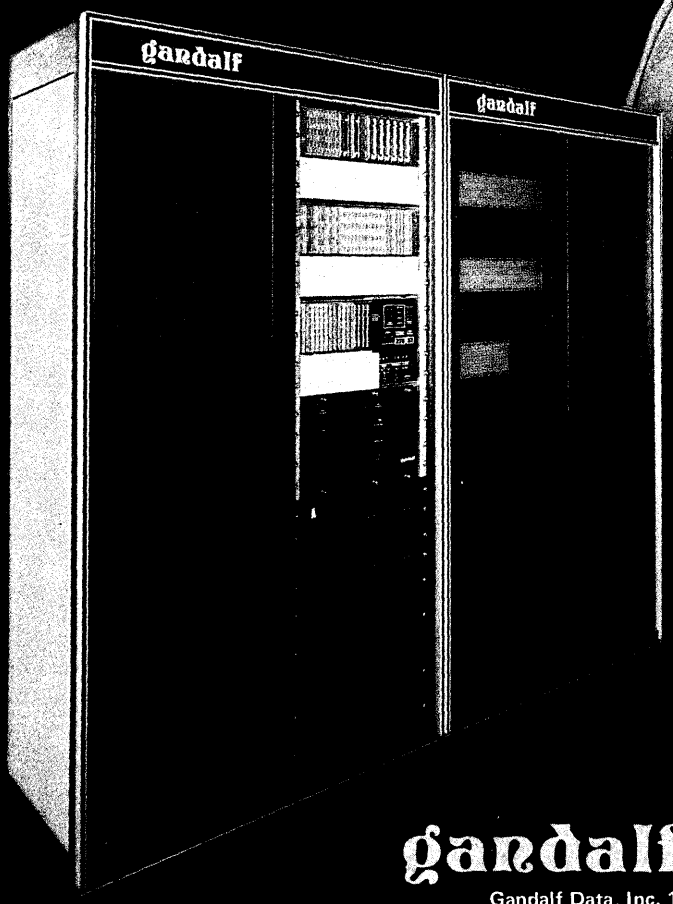
the user's choice

several hundred in operation

PACX (Private Automatic Computer eXchange) is a sophisticated high speed data switching and port contention system designed to optimise the allocation and use of your resources.

PACX continuously scans all terminal channels. When a service request is received, the user is connected to an appropriate port in less than one second.

Plug-in port and terminal modules (some with integral short haul data sets) offer system expansion or reconfiguration without high cost or delay. As many as 510 terminals can contend for service from up to 254 ports.



Regardless of system loading, all channels remain completely transparent to speed, code and data format up to 9600 bps asynchronous or 19.2 Kbps synchronous. Ports on both local and remotely located computers can be assigned up to 64 different class designations, accessible on request from the terminal keyboard. Reallocation of resources, at any time, is achieved by reassigning port classes via the control panel. Complete system status is seen at a glance. Data suitable for statistical analysis is continuously generated. PACX puts control over data communications back where it belongs.

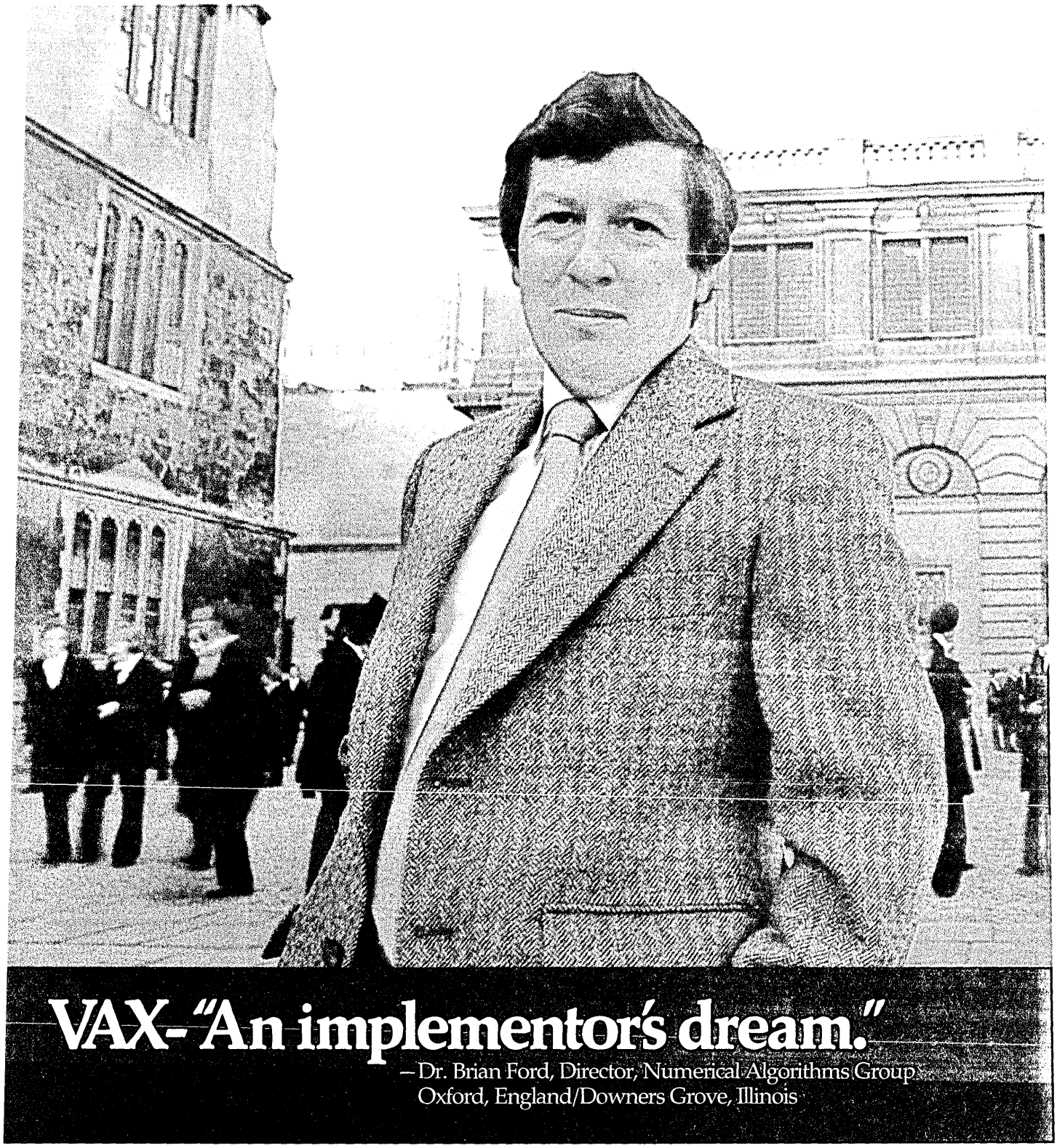
Shown here is Dual-PACX (up to 510 terminals and 254 ports). Standard PACX (up to 254 terminals and 126 ports). Mini-PACX (up to 48 terminals and 32 ports). Complete data is available upon request.

gandalf

Gandalf Data, Inc. 1019 S. Noel, Wheeling, Illinois 60090 (312) 541-6060
Canada: Gandalf Data Communications Ltd., Gandalf Plaza, 9 Slack Road, Ottawa Ontario, Canada K2G 0B7 (613) 225-0565
U.K.: Gandalf Digital Communications Ltd., 4 Cranford Court, Hardwick Grange, Cheshire, England

#103

CIRCLE 47 ON READER CARD



For the Numerical Algorithms Group, the plain fact is this: "Software implementation was faster on the VAX-11/780 than on 25 other major machines."

Before VAX, Dr. Ford's staff had implemented NAG's complex FORTRAN Mark 6 Library on 25 major machines ranging from minis to mainframes, including the Burroughs 6700, CDC 7600, Univac 1100, and IBM 370. The average implementation time was 13 man-weeks.

VAX took five.

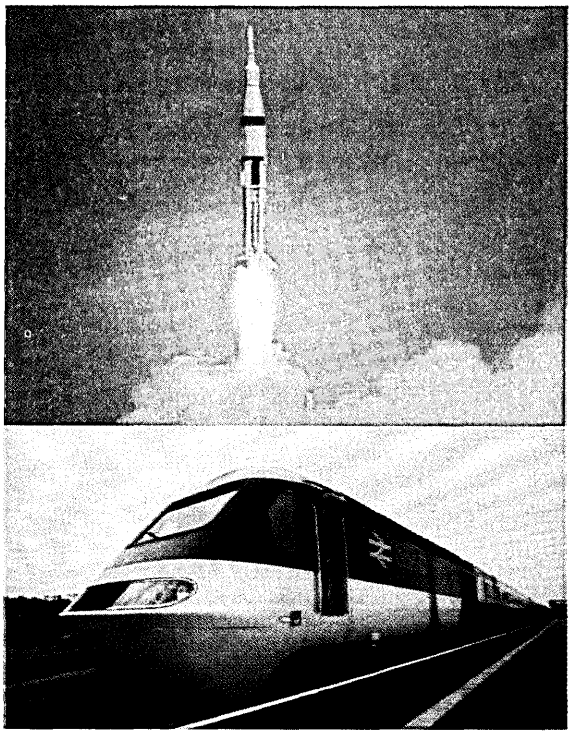
In Dr. Ford's words, "The NAG FORTRAN Mark 6 Library consists of 345 subroutines covering the major areas of numerical mathematics and statistics. It's used in applications such

as structural design, nuclear physics, economic modeling, and academic research.

"A successful implementation requires the correct functioning of the 345 library routines to a prescribed accuracy and efficiency in execution of NAG's suite of 620 test programs. Whilst the activity is a significant examination of a machine's conformity to the ANSI standard of the FORTRAN compiler, its main technical features are file creation, file comparison, file manipulation and file maintenance."

And then there was the record of VAX reliability: "No problems were encountered in the VAX/VMS software even though approximately 3000 files were being handled. The operational availability time for the machine was close to 100%, an outstanding statistic for new hardware and a new operating system."

•What all this demonstrates is that some of the most sophisticated FORTRAN routines in the world implement easily on VAX. That VAX capability exceeds that of many machines far more expensive. That the VAX-11/780 is more



than the most powerful 32-bit computer in its price range. That VAX is truly "an implementor's dream."

For more information, simply clip the coupon.

☐ Please send me your new VAX-11/780 color brochure.
☐ Please send me your detailed Technical Summary.
☐ Please contact me.

Name _____ Title _____

Company _____

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My application is:

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USER RATINGS

Data Dictionary
IBM Corp., DPD
Support dictionary for IBM IMS data base management system.

Users reporting:	6
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	2.7
Ease of use	3.0
Documentation	3.0
Vendor technical support	2.5
Training	3.0

Advantages: Saves human resources.
Disadvantages: Complex.
Modification required: Usually none.
Price: $580/month.
CIRCLE 496 ON READER CARD

DATAMACS
Management and Computer Services, Inc. (MACS)
Creates test files for COBOL programs on IBM 360/370.

Users reporting:	7
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	3.1
Ease of use	2.7
Documentation	2.7
Vendor technical support	2.4
Training	2.4

Advantages: Flexible; saves system and human resources.
Modification required: Usually none.
Price: $6,500 (DOS), $8,500 (OS), includes first year's maintenance (10% of current purchase price thereafter).
CIRCLE 497 ON READER CARD

DATAMANAGER
MSP, Inc.
Data dictionary system for DBMS or standard file organizations; runs on IBM 360/370, with optional interfaces to most popular DBMS and data management systems.

Users reporting:	7
Overall satisfaction	3.4
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	3.3
Documentation	3.1
Vendor technical support	2.9
Training	2.8

Advantages: Flexible; saves human resources.
Modification required: None reported.
Price: $12,000, plus 10% for maintenance.
CIRCLE 498 ON READER CARD

DATATRIEVE
Digital Equipment Corp. (DEC)
High-level interactive query and report system designed primarily for use with PDP-11 series minicomputers.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.6
Ease of installation	3.0
Ease of use	3.0
Documentation	2.0
Vendor technical support	1.6
Training	-

Advantages: Saves human resources; flexible.
Modification required: Usually, by vendor.
Price: Perpetual license $4,500 (supported), $2,700 (unsupported), $2,160 license only.
CIRCLE 499 ON READER CARD

DBMS-10/20
Digital Equipment Corp. (DEC)
Data base management systems designed to support DECsystem-10 and DECsystem-20 computers running under the TOPS operating systems.

Users reporting:	6
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	3.0
Ease of use	2.8
Documentation	2.5
Vendor technical support	2.2
Training	2.7

Advantages: Saves human resources.
Modification required: Usually none.
Price: DBMS 10 $27,500, DBMS 20 $27,500.
CIRCLE 500 ON READER CARD

DBOMP
IBM Corp., DPD
Data base organization and maintenance processor utility for IBM 360/370.

Users reporting:	25
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	2.1
Ease of use	2.5
Documentation	2.3
Vendor technical support	2.3
Training	2.3

Advantages: Inexpensive.
Disadvantages: Slow.
Modification required: Usually none or by user.
Price: $115-$305/month.
CIRCLE 501 ON READER CARD

DEC Business Applications
Mini-Computer Business Applications, Inc. (MCBA)
A package of accounting routines designed to operate with a variety of Digital Equipment Corp. (DEC) computers.

Users reporting:	18
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.1
Ease of use	3.3
Documentation	2.8
Vendor technical support	2.6
Training	2.0

Advantages: Flexible; inexpensive.
Modification required: Usually, by user.
Price: 20-year license $1,000, includes first year's maintenance (thereafter optional at $200/year).
CIRCLE 502 ON READER CARD

DECNET
Digital Equipment Corp. (DEC)
A series of communications tools for use on the PDP-11 series under most operating systems.

Users reporting:	6
Overall satisfaction	2.7
Throughput/efficiency	2.3
Ease of installation	2.3
Ease of use	2.8
Documentation	2.3
Vendor technical support	2.7
Training	2.0

Advantages: Saves human resources.
Modification required: Usually, by vendor.
Price: $1,500-$3,000.
CIRCLE 503 ON READER CARD

Demand Deposit Accounting
Florida Software Services, Inc.
General-purpose system for IBM 360/370, Burroughs, and Honeywell computers.

Users reporting:	5
Overall satisfaction	3.2
Throughput/efficiency	2.8
Ease of installation	2.8
Ease of use	3.6
Documentation	3.8
Vendor technical support	3.2
Training	-

Advantages: Flexible.
Modification required: Usually, by user.
Price: $18,800, includes first 6 months maintenance ($2,400/year thereafter).
CIRCLE 504 ON READER CARD

Demand Deposit Accounting Systems
Weiland Computer Group, Inc.
Performs demand deposit, credit reserve, and commercial account analysis; runs on IBM 360/370.

Users reporting:	7
Overall satisfaction	2.9
Throughput/efficiency	3.1
Ease of installation	1.9
Ease of use	2.6
Documentation	1.9
Vendor technical support	2.1
Training	1.8

Advantages: Flexible.
Modification required: Usually, by user.
Price: $45,000 (DOS), $59,000 (OS), plus 10% per year maintenance.
CIRCLE 505 ON READER CARD

DFAST & DFAST/VS
Oxford Software Corp.
Allows IBM 360/370 DOS and DOS-VS users to automatically allocate and share disk space.

Users reporting:	11
Overall satisfaction	3.2
Throughput/efficiency	3.3
Ease of installation	3.4
Ease of use	3.3
Documentation	2.5
Vendor technical support	2.5
Training	1.8

Advantages: Saves human resources.
Modification required: Usually none.
Price: $5,000 (plus $500 additional each for device independent version and spare management options), includes first year maintenance (10% of purchase price per year thereafter).
CIRCLE 506 ON READER CARD

DI-OPEN
IBM Corp., DPD
Disk file utility for IBM 360/370.

Users reporting:	5
Overall satisfaction	4.0
Throughput/efficiency	3.8
Ease of installation	3.6
Ease of use	4.0
Documentation	2.6
Vendor technical support	2.8
Training	4.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $54 for 24 months.
CIRCLE 507 ON READER CARD

Disk Space Manager
Westinghouse Electric Corp.
IBM 370 DOS/VS disk space management system.

Users reporting:	10
Overall satisfaction	3.1
Throughput/efficiency	3.4
Ease of installation	3.3
Ease of use	2.8
Documentation	2.7
Vendor technical support	2.7
Training	-

Advantages: Saves system and human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $4,000, plus $400/year maintenance.
CIRCLE 508 ON READER CARD

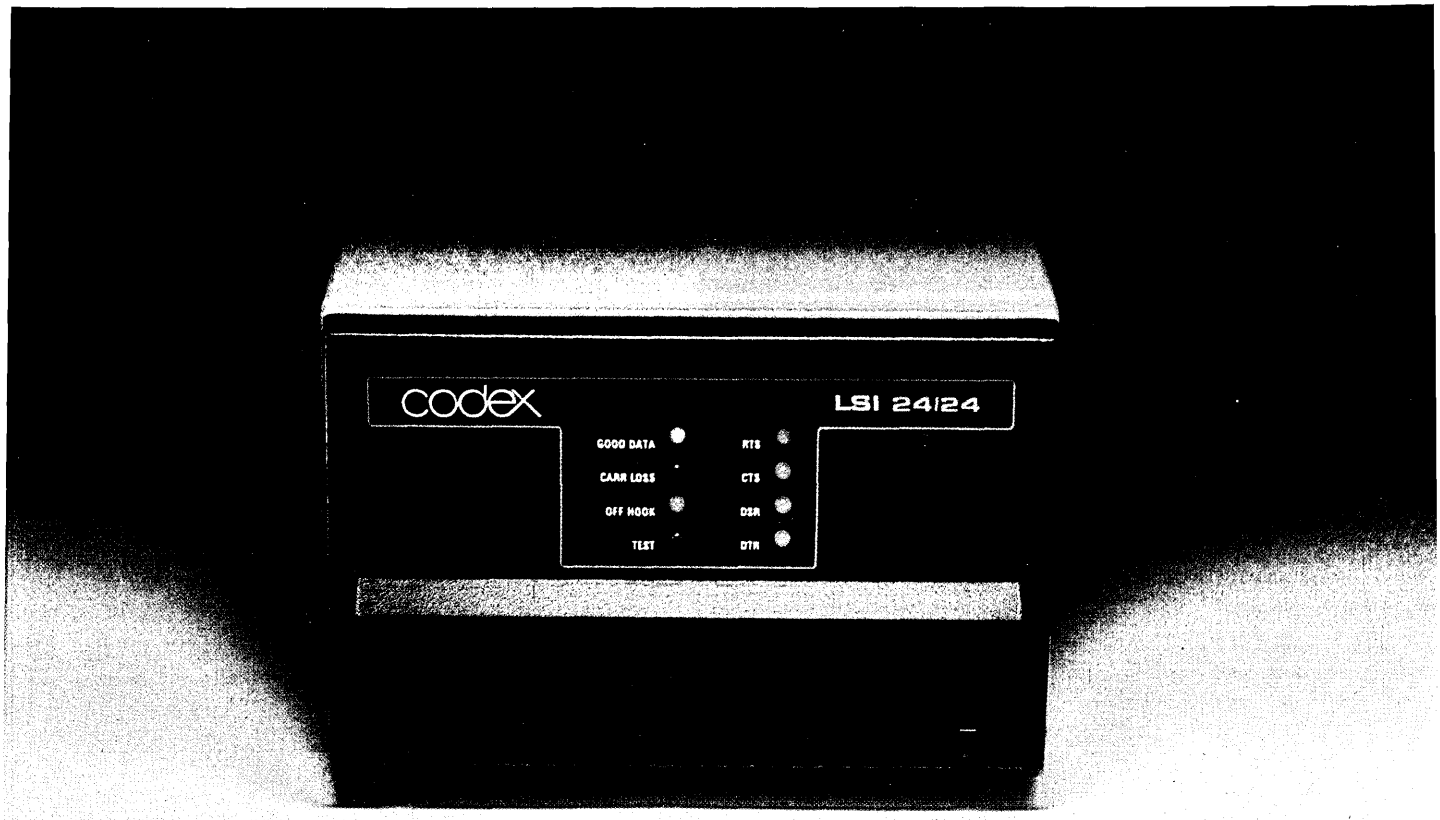
Disk Utility System *
Westinghouse Electric Corp.
Disk-to-tape, etc., utility for use with IBM 360/370 DOS and DOS/VS.

Users reporting:	58
Overall satisfaction	3.8
Throughput/efficiency	3.8
Ease of installation	3.7
Ease of use	3.7
Documentation	3.4
Vendor technical support	3.3
Training	2.6

Advantages: Saves system resources; flexible.
Modification required: Usually none.
Price: $2,500, plus $250/year maintenance.
CIRCLE 509 ON READER CARD

DITTO
IBM Corp., DPD
File copy/file management utility for IBM 360/370.

Users reporting:	22
Overall satisfaction	3.4
Throughput/efficiency	3.4



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CIRCLE 26 ON READER CARD

USER RATINGS

Ease of installation 3.3
Ease of use 3.4
Documentation 2.7
Vendor technical support 3.0
Training 3.0
Advantages: Flexible; inexpensive.
Modification required: Usually none.
Price: $71, plus $50 for extentions for 12 months.
CIRCLE 510 ON READER CARD

DL/1 DOS/VS
IBM Corp., DPD
Data base management system for IBM 370 DOS/VS.
Users reporting 36
Overall satisfaction 2.8
Throughput/efficiency 2.5
Ease of installation 2.5
Ease of use 2.5
Documentation 2.5
Vendor technical support 2.7
Training 2.8
Disadvantages: Complex; uses excessive resources.
Modification required: Usually none.
Price: $395/month.
CIRCLE 511 ON READER CARD

DL/1-Entry
IBM Corp., DPD
Data base management system for entry-level DOS users.
Users reporting 8
Overall satisfaction 3.0
Throughput/efficiency 2.6
Ease of installation 2.6
Ease of use 3.1
Documentation 2.5
Vendor technical support 3.0
Training 2.8
Modification required: Usually none.
Price: $315/month.
CIRCLE 512 ON READER CARD

DMS
IBM Corp., DPD
IBM 3270 display management systems for use with IBM 360/370.
Users reporting 13
Overall satisfaction 2.2
Throughput/efficiency 2.4
Ease of installation 2.3
Ease of use 2.6
Documentation 2.0
Vendor technical support 1.9
Training 2.5
Advantages: Saves human resources.
Disadvantages: Inflexible.
Modification required: Usually none.
Price: $360-$475/month.
CIRCLE 513 ON READER CARD

DMS-II
Burroughs Corp.
Burrough's full-blown data base management system.
Users reporting 30
Overall satisfaction 3.4
Throughput/efficiency 3.3
Ease of installation 3.4
Ease of use 3.4
Documentation 2.5
Vendor technical support 2.6
Training 2.5
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $17,000, plus $1,700/year license fee.
CIRCLE 514 ON READER CARD

DOS/RS
Dearborn Computer Co.
A replacement operating system for IBM DOS users; contains many DOS/VS-like features.
Users reporting: 10
Overall satisfaction 3.3
Throughput/efficiency 3.6
Ease of installation 3.0
Ease of use 3.3
Documentation 2.8
Vendor technical support 3.6
Training 2.8
Advantages: Saves system and human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $5,500-19,750 perpetual license, includes first year's maintenance (10% of license on $1,200 per year whichever is lowest thereafter). Lease $230-$850/year, includes maintenance.
CIRCLE 518 ON READER CARD

DOS/VS Performance Tool
IBM Corp., DPD
An installed user program that provides the ability to measure and report on many DOS/VS-related performance factors.
Users reporting: 8
Overall satisfaction 3.3
Throughput/efficiency 2.9
Ease of installation 3.1
Ease of use 3.3
Documentation 2.6
Vendor technical support 3.1
Training 2.8
Advantages: Saves human resources.
Modification required: Usually none.
Price: $175/month.
CIRCLE 519 ON READER CARD

DPL
National Information Systems, Inc.
A comprehensive DBMS and data management system for the DECsystem-10 and -20 computers.
Users reporting: 6
Overall satisfaction 3.5
Throughput/efficiency 2.3
Ease of installation 3.8
Ease of use 3.5
Documentation 3.0
Vendor technical support 3.0
Training 3.2
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $25,000-$50,000, includes first year's maintenance ($2,400/year thereafter).
CIRCLE 520 ON READER CARD

DOCS ✲
C F S, Inc.
A display operator console support program which allows the direction of SYSLOG input and output to one or more display units.
Users reporting: 14
Overall satisfaction 3.9
Throughput/efficiency 3.9
Ease of installation 3.8
Ease of use 3.8
Documentation 3.0
Vendor technical support 3.5
Training 2.0
Advantages: Saves system and human resources; inexpensive.
Modification required: Usually none, or by vendor.
Price: $5,670 perpetual license. Monthly lease $175. Maintenance is free.
CIRCLE 515 ON READER CARD

DOS
Datapoint Corp.
Full-facility disk operating system for Datapoint 1100 and larger minicomputers.
Users reporting: 5
Overall satisfaction 3.4
Throughput/efficiency 3.2
Ease of installation 3.0
Ease of use 3.6
Documentation 1.8
Vendor technical support 2.2
Training 2.5
Advantages: Inexpensive.
Modification required: Usually none.
Price: Bundled.
CIRCLE 516 ON READER CARD

DOS/MVT ✲
Software Pursuits Inc.
Replacement operating system for IBM DOS users; incorporates several OS capabilities.
Users reporting: 10
Overall satisfaction 3.8
Throughput/efficiency 3.8
Ease of installation 3.3
Ease of use 3.7
Documentation 3.2
Vendor technical support 3.7
Training 3.3
Advantages: Saves system and human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $700/month, includes maintenance.
CIRCLE 517 ON READER CARD

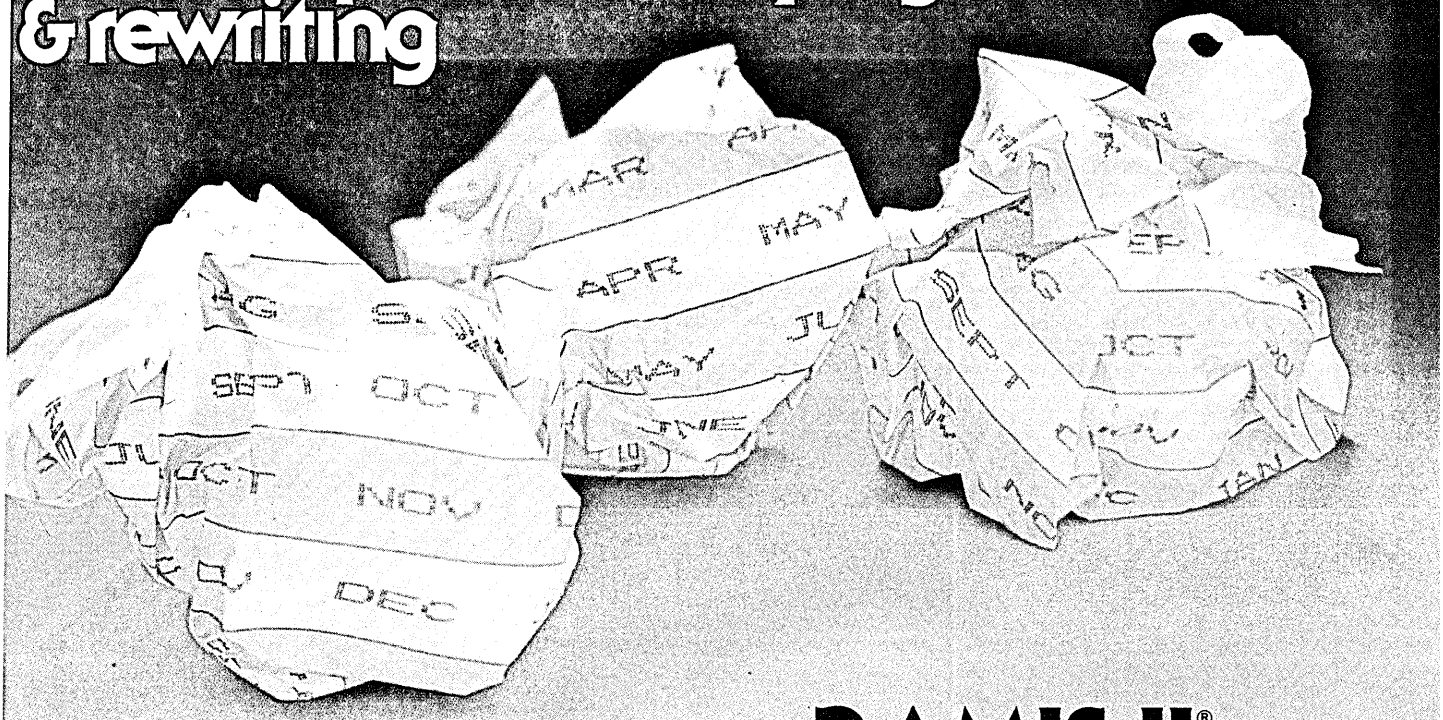
DYL-250
Dylakor Software Systems, Inc.
File maintenance and label printing utility for IBM 360/370.
Users reporting: 9
Overall satisfaction 3.2
Throughput/efficiency 3.1
Ease of installation 3.6
Ease of use 3.1
Documentation 2.8
Vendor technical support 3.3
Training 3.0
Advantages: Inexpensive; saves human resources.
Modification required: None reported.
Price: $31/month on 3-year lease, includes maintenance.
CIRCLE 521 ON READER CARD

DYL-260 ✲
Dylakor Software Systems, Inc.
Data management and report writing system for IBM 360/370.
Users reporting: 46
Overall satisfaction 3.6
Throughput/efficiency 3.4
Ease of installation 3.7
Ease of use 3.4
Documentation 2.9
Vendor technical support 3.2
Training 3.0
Advantages: Saves human resources; flexible; inexpensive.
Modification required: None usually.
Price: $8,000 perpetual license, includes first year's maintenance ($225/year thereafter); one-year lease $148/month, including maintenance; 3-year lease $96/month.
CIRCLE 522 ON READER CARD

DYNAM/D
Computer Associates, Inc.
A DOS and DOS/VS disk space and catalog management system
Users reporting: 27
Overall satisfaction 3.2
Throughput/efficiency 3.4
Ease of installation 3.3
Ease of use 3.2
Documentation 2.5
Vendor technical support 2.9
Training 2.3
Advantages: Saves system and human resources; flexible.
Modification required: Usually none.
Price: $3,800-$6,500 perpetual license, includes first year's maintenance (12% of fee per year thereafter). Monthly lease $170-$260, including maintenance.
CIRCLE 523 ON READER CARD

DYNAM/T
Computer Associates, Inc.
A DOS and DOS/VS tape library maintenance system.
Users reporting: 7
Overall satisfaction 3.3
Throughput/efficiency 3.0
Ease of installation 2.7
Ease of use 2.9
Documentation 2.3
Vendor technical support 2.4
Training 1.5
Advantages: Inexpensive; saves human resources.
Modification required: Usually none.

70% of programming time is spent modifying & rewriting



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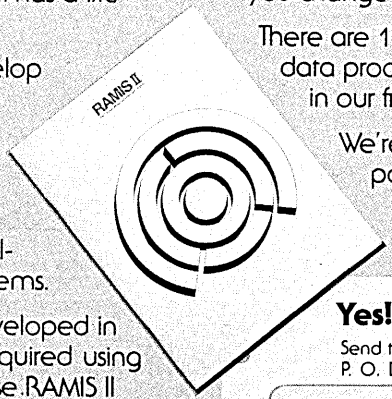

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CIRCLE 7 ON READER CARD

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INFOTON

CIRCLE 72 ON READER CARD

USER RATINGS

Price: $5,300 perpetual license, includes first year's maintenance (12% of license fee per year thereafter). Monthly maintenance $215, including maintenance.
CIRCLE 524 ON READER CARD

EASYTRIEVE ✲
Pansophic Systems, Inc.
Information retrieval and reporting system for IBM 360/370 and Univac Series 70.

Users reporting:	68
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.6
Ease of use	3.4
Documentation	3.0
Vendor technical support	3.0
Training	2.9

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $12,500 (DOS), $15,000 (OS), includes first year's maintenance (10% of purchase price thereafter).
CIRCLE 525 ON READER CARD

EDOS ✲
The Computer Software Company
A replacement operating system for IBM DOS users with extended operating system features, including many DOS/VS facilities.

Users reporting:	40
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.1
Ease of use	3.3
Documentation	3.0
Vendor technical support	3.0
Training	2.6

Advantages: Saves system resources; flexible.
Modification required: Usually none.
Price: $8,500 perpetual license, includes first 2-years maintenance (optional at 10% of fee thereafter). Monthly lease $315, including maintenance.
CIRCLE 526 ON READER CARD

Environ/1
Cincom Systems, Inc.
A general-purpose data communications monitor for multiple on-line user terminals and applications; runs on IBM 360/370s.

Users reporting:	16
Overall satisfaction	3.0
Throughput/efficiency	3.3
Ease of installation	3.2
Ease of use	3.1
Documentation	2.5
Vendor technical support	2.8
Training	2.7

Advantages: Saves system and human resources.
Modification required: Usually none.
Price: $28,500 (DOS), $38,500 (OS), includes first year's maintenance ($2,750 or $3,250 per year thereafter). Monthly lease $650 (DOS), $900 (OS), including maintenance.
CIRCLE 527 ON READER CARD

EPAT ✲
SDI
Keeps track of physical tape volumes on IBM 360/370 under DOS or DOS/VS.

Users reporting:	42
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.4
Documentation	3.3
Vendor technical support	3.1
Training	3.1

Advantages: Saves human and system resources.
Modification required: Usually none.
Price: Vendor will not release pricing.
CIRCLE 528 ON READER CARD

EPIC System
IBM Corp., DPD or GSD
A series of program products for schools that run on IBM 360, 370 S/3, and 1130 systems.

Users reporting:	23
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	2.2
Ease of use	2.7
Documentation	2.6
Vendor technical support	2.6
Training	2.4

Advantages: Saves human resources; flexible.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: $87-$192/month.
CIRCLE 529 ON READER CARD

ETSS
IBM Corp., DPD
DOS/VS Entry Time-Sharing System for IBM 370 users.

Users reporting:	19
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	2.4
Ease of use	3.2
Documentation	2.4
Vendor technical support	2.2
Training	2.4

Advantages: Saves human resources; flexible.
Modification required: Usually none, or by user.
Price: $250 for 24 months.
CIRCLE 530 ON READER CARD

EXTRACTO
Optipro, Inc.
Data management information and retrieval system with multiple file handling capabilities.

Users reporting:	15
Overall satisfaction	3.3
Throughput/efficiency	2.9
Ease of installation	3.2
Ease of use	3.6
Documentation	2.9
Vendor technical support	2.3
Training	2.6

Advantages: Saves human resources.
Modification required: Usually none.
Price: $15,000, includes first year's maintenance ($500/year thereafter).
CIRCLE 531 ON READER CARD

FAQS ✲
Goal Systems Corp.
Partition balancer and DASD I/O scheduling aid for DOS/VS systems.

Users reporting:	11
Overall satisfaction	3.9
Throughput/efficiency	3.9
Ease of installation	3.8
Ease of use	3.8
Documentation	3.9
Vendor technical support	4.0
Training	4.0

Advantages: Saves system and human resources; inexpensive; flexible.
Modification required: Usually none.
Price: $1,620, includes first 3-years maintenance ($135/year thereafter). Monthly lease $50 or $540/year, including maintenance.
CIRCLE 532 ON READER CARD

Fast/Dump/Restore (FDR) ✲
Innovation Data Processing, Inc.
Disk-to-tape dump/restore utility for IBM 360/370 OS or OS/VS systems.

Users reporting:	34
Overall satisfaction	3.7
Throughput/efficiency	3.7
Ease of installation	3.6
Ease of use	3.7
Documentation	3.2
Vendor technical support	3.2
Training	2.9

Advantages: Saves system resources.
Modification required: Usually none.
Price: $4,000 (with 50% discount for first cpu), plus $500/year maintenance.
CIRCLE 533 ON READER CARD

FATS/FATAR
Innovation Data Processing, Inc.
Tape surface verification and copy program for use on IBM 360/370 systems

Users reporting:	5
Overall satisfaction	3.4
Throughput/efficiency	3.0
Ease of installation	3.6
Ease of use	3.6
Documentation	2.8
Vendor technical support	2.5
Training	-

Advantages: Inexpensive.
Modification required: None reported.
Price: $3,000, plus $250/year maintenance.
CIRCLE 534 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:	20
Overall satisfaction	2.9
Throughput/efficiency	2.5
Ease of installation	2.7
Ease of use	2.8
Documentation	2.9
Vendor technical support	2.4
Training	2.8

Advantages: Flexible; saves human resources.
Disadvantages: Complex.
Modification required: Usually none.
Price: $27,000 (DOS), $45,000 (OS). Maintenance 12% or $4,800 maximum.
CIRCLE 535 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:	17
Overall satisfaction	2.8
Throughput/efficiency	2.2
Ease of installation	2.1
Ease of use	2.4
Documentation	2.8
Vendor technical support	2.2
Training	2.6

Advantages: Flexible.
Disadvantages: Complex.
Modification required: Usually, by user.
Price: $60,000 perpetual license, includes first year's maintenance (approx. 10%/year thereafter).
CIRCLE 536 ON READER CARD

Financial Accounting Systems
Information Associates, Inc.
College, university, and hospital financial accounting system; runs on a variety of medium to large-scale computers.

Users reporting:	10
Overall satisfaction	3.3
Throughput/efficiency	3.3
Ease of installation	3.3
Ease of use	3.2
Documentation	2.9
Vendor technical support	3.4
Training	3.4

Advantages: Flexible; saves human resources.
Modification required: Usually, by vendor.
Price: $40,000. No maintenance offered.
CIRCLE 537 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:	8
Overall satisfaction	3.1
Throughput/efficiency	2.8

USER RATINGS

Ease of installation 3.1
Ease of use 3.0
Documentation 2.9
Vendor technical support 3.3
Training 3.2
Advantages: Flexible; inexpensive.
Modification required: Usually none.
Price: $13,500-$26,500 perpetual license, includes first year's maintenance (10% of license fee per year thereafter).
CIRCLE 538 ON READER CARD

Fixed Assets Accounting
McCormack & Dodge Corp.
Specialized accounting system for use on IBM 360/370, Honeywell, and Burroughs computers.
Users reporting: 19
Overall satisfaction 3.1
Throughput/efficiency 2.6
Ease of installation 2.4
Ease of use 2.7
Documentation 2.8
Vendor technical support 2.6
Training 2.4
Modification required: Usually by user.
Price: $17,000-$23,000, includes first year's maintenance ($1,850/year thereafter).
CIRCLE 539 ON READER CARD

Fixed Assets
IBM Corp., GSD
Versions for IBM S/3, S/32, and S/34 computers.
Users reporting: 7
Overall satisfaction 3.0
Throughput/efficiency 3.0
Ease of installation 3.1
Ease of use 3.3
Documentation 3.0
Vendor technical support 2.3
Training 2.3
Advantages: Saves human resources; inexpensive.
Modification required: Usually, by user.
Price: $138 for 12 months (S/3), $140 for 12 months (S/32 &/34).
CIRCLE 540 ON READER CARD

Fixed Assets
Infonational
Multidivision, multicompany fixed assets system; for use with IBM 360/370 and most comparable computers.
Users reporting: 5
Overall satisfaction 3.0
Throughput/efficiency 3.0
Ease of installation 3.3
Ease of use 2.6
Documentation 2.8
Vendor technical support 2.6
Training 2.4
Advantages: Flexible.
Modification required: Usually none.
Price: $17,000, plus $2,000/year maintenance.
CIRCLE 301 ON READER CARD

Fixed Assets
Management Science America (MSA)
General-purpose fixed assets system for a variety of mainframes with ANSI COBOL.
Users reporting: 7
Overall satisfaction 2.7
Throughput/efficiency 2.4
Ease of installation 2.3
Ease of use 2.6
Documentation 2.3
Vendor technical support 2.1
Training 2.2
Advantages: Saves human resources.
Modification required: Usually none.
Price: $20,000, includes first year's maintenance (approx. 10%/year thereafter).
CIRCLE 302 ON READER CARD

FLEE/FLIM *
Goal Systems Corp.
Replacment linkage editor and MAINT utility for IBM 370 DOS/VS systems.
Users reporting: 35
Overall satisfaction 4.0
Throughput/efficiency 3.9
Ease of installation 3.8
Ease of use 3.8
Documentation 3.7
Vendor technical support 3.1
Training 3.8
Advantages: Saves system resources; flexible; inexpensive.
Modification required: Usually none.
Price: $29,160, includes first 3-years maintenance ($243/year thereafter). Monthly lease $90 or $972/year, including maintenance.
CIRCLE 303 ON READER CARD

FORESIGHT
Foresight Systems, Inc.
Financial planning package written in FORTRAN.
Users reporting: 11
Overall satisfaction 3.2
Throughput/efficiency 2.6
Ease of installation 3.1
Ease of use 3.0
Documentation 2.7
Vendor technical support 2.6
Training 2.9
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $30,000.
CIRCLE 304 ON READER CARD

FORTE
Burroughs Corp.
Disk file management system for Burroughs B 1700 and up.
Users reporting: 14
Overall satisfaction 3.3
Throughput/efficiency 2.9
Ease of installation 3.3
Ease of use 3.4
Documentation 2.6
Vendor technical support 2.6

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USER RATINGS

Training 2.7
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $12,000, plus $1,200/year license fee.
CIRCLE 305 ON READER CARD

FORTRAN
Digital Equipment Corp. (DEC)
Available in various versions to support DEC computers.

Users reporting:	29
Overall satisfaction	3.1
Throughput/efficiency	3.2
Ease of installation	3.0
Ease of use	3.2
Documentation	3.0
Vendor technical support	2.4
Training	2.0

Modification required: Usually none.
Price: $9,000.
CIRCLE 306 ON READER CARD

FORTRAN
IBM Corp., GSD
Subset FORTRAN compiler for IBM S/3.

Users reporting:	6
Overall satisfaction	3.2
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	3.2
Documentation	3.5
Vendor technical support	3.0
Training	-

Modification required: Usually none.
Price: $129/month.
CIRCLE 307 ON READER CARD

FORTRAN
IBM Corp., DPD
Versions for IBM 360/370 DOS, OS, and their VS counterpart systems.

Users reporting:	7
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.3
Ease of use	3.3
Documentation	3.3
Vendor technical support	3.3
Training	-

Modification required: Usually none.
Price: $402/month.
CIRCLE 308 ON READER CARD

1130/FORTRAN *
DNA Systems Inc.
For IBM 1130 and compatible systems.

Users reporting:	17
Overall satisfaction	3.8
Throughput/efficiency	3.6
Ease of installation	3.3
Ease of use	3.7
Documentation	3.1
Vendor technical support	3.3
Training	3.0

Advantages: Inexpensive; flexible.
Modification required: Usually none.
Price: $1,495, includes first year's maintenance (10% per year thereafter).
CIRCLE 309 ON READER CARD

FRS
Price Waterhouse & Co.
An advanced financial reporting system that can be installed on IBM 360/370, NCR, Univac, and Burroughs computers.

Users reporting:	5
Overall satisfaction	2.6
Throughput/efficiency	1.6
Ease of installation	2.2
Ease of use	2.8
Documentation	2.4
Vendor technical support	2.4
Training	2.5

Advantages: Saves human resources.
Disadvantages: Slow
Modification required: Usually, by vendor or user.
Price: $15,000-$30,000 including periodic updates.
CIRCLE 310 ON READER CARD

GBASWIFT
GBA International
Data communications monitor for IBM 360/370 DOS and DOS/VS systems.

Users reporting:	10
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.5
Ease of use	3.5
Documentation	3.3
Vendor technical support	3.4
Training	2.6

Advantages: Saves system and human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $7,500-25,000, plus options, includes first year's maintenance (5% of purchase price up to $1,200 thereafter).
CIRCLE 311 ON READER CARD

GEMCOS
Burroughs Corp.
Generalized message control system for the Burroughs B 1800 Series.

Users reporting:	7
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	2.9
Ease of use	3.0
Documentation	2.4
Vendor technical support	2.3
Training	2.0

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $6,000-$14,000, plus 10% of purchase price per year license fee.
CIRCLE 312 ON READER CARD

General Ledger
Arthur Andersen & Co.
A general ledger package designed to run on the IBM S/3.

Users reporting:	5
Overall satisfaction	2.0
Throughput/efficiency	1.5
Ease of installation	2.0
Ease of use	2.0
Documentation	2.6
Vendor technical support	1.6
Training	2.0

Modification required: Usually, by user.
Price: $1,000, plus $1,000-$2,000 installation fee.
CIRCLE 313 ON READER CARD

General Ledger
Bancroft Computer Systems
A multicompany general ledger systems designed to run on the IBM S/3.

Users reporting:	6
Overall satisfaction	3.3
Throughput/efficiency	3.2
Ease of installation	2.8
Ease of use	3.3
Documentation	3.3
Vendor technical support	3.0
Training	2.0

Advantages: Inexpensive.
Modification required: Usually, by user.
Price: $1,995 perpetual license fee, includes maintenance.
CIRCLE 314 ON READER CARD

General Ledger
Burroughs Corp.
Generalized general ledger accounting system.

Users reporting:	6
Overall satisfaction	2.2
Throughput/efficiency	2.0
Ease of installation	1.8
Ease of use	2.5
Documentation	1.7
Vendor technical support	1.8
Training	1.4

Advantages: Inexpensive.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: $900-$1,700, plus $40-$155/year license fee.
CIRCLE 315 ON READER CARD

General Ledger
Financial Technology, Inc.
General ledger and financial information system for banks; can be installed on most systems with an ANSI COBOL compiler.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.6
Ease of installation	2.2
Ease of use	2.8
Documentation	1.8
Vendor technical support	2.0
Training	2.0

Modification required: Usually, by user.
Price: $22,000 (with financial planning system and financial information system), includes first year's maintenance (10% of current purchase price thereafter).
CIRCLE 316 ON READER CARD

General Ledger
Honeywell Information Systems, Inc.
Standard general ledger system for HIS Series 60, 600, 6000, and Level 6 computers.

Users reporting:	11
Overall satisfaction	2.5
Throughput/efficiency	2.2
Ease of installation	2.0
Ease of use	2.4
Documentation	1.8
Vendor technical support	1.6
Training	1.4

Advantages: Inexpensive; saves human resources.
Modification required: Usually, by user.
Price: $2,067-$4,000 initial license, plus $78-$133 monthly license fee.
CIRCLE 317 ON READER CARD

General Ledger
Infonational
In ANSI COBOL for most mainframes.

Users reporting:	9
Overall satisfaction	3.0
Throughput/efficiency	2.2
Ease of installation	2.4
Ease of use	2.7
Documentation	2.9
Vendor technical support	2.1
Training	2.3

Advantages: Flexible.
Modification required: Usually, by vendor or user.
Price: $33,500, plus $3,000/year maintenance.
CIRCLE 318 ON READER CARD

General Ledger
IBM Corp., GSD
Generalized package to run on IBM S/3.

Users reporting:	20
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	2.3
Ease of use	2.6
Documentation	2.6
Vendor technical support	2.6
Training	2.6

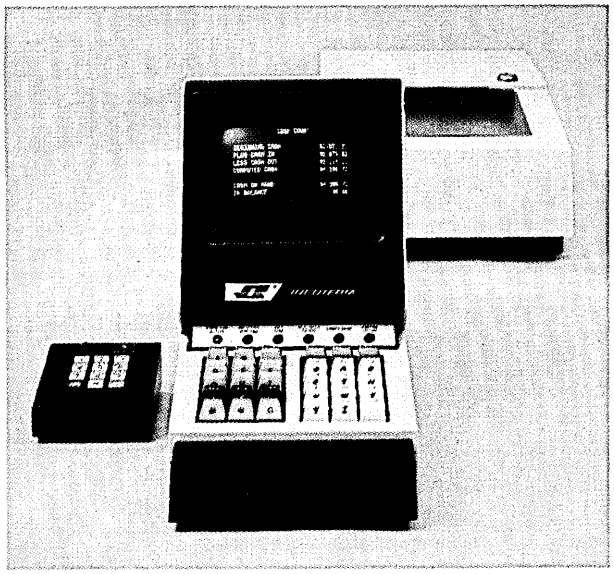
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $85 for 12 months.
CIRCLE 319 ON READER CARD

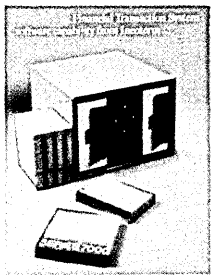
General Ledger
IBM Corp., GSD
Version to run on IBM S/32.

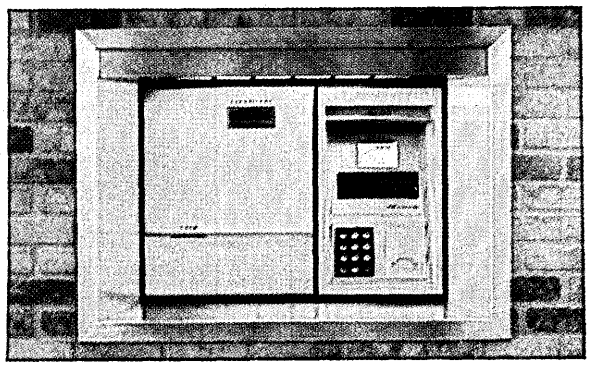
Users reporting:	8
Overall satisfaction	3.1
Throughput/efficiency	2.8
Ease of installation	3.1
Ease of use	3.0
Documentation	2.8
Vendor technical support	3.3
Training	2.7

Advantages: Saves human resources.
Modification required: Usually none.
Price: $29/month.
CIRCLE 320 ON READER CARD

Comprehensive software capability for financial transaction systems:







SERIES 7400.

INCOTERM offers "total solution" hardware and software for financial transaction systems. Series 7400 Cash Control System is the standard software component which supports tellers, administrative and automatic teller machine devices offered as part of Series 7000. It makes comprehensive automatic data capture and teller cash control possible in branch automation. It is a first.

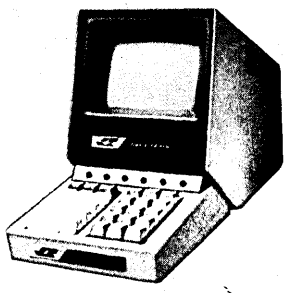
First . . . because it is a standard software product — a complete set of transaction, reporting, and control programs. First . . . because it's a software package that doesn't "box you in", but lets you tailor transactions to your needs in a high level language. First . . . because it's proven in on-line and off-line use by tellers, administrative officers, and branch management.

You'll find it improves teller efficiency and customer service with interactive access to account information, and improves bank operations by providing electronic journaling for paper truncation.

The Series 7400 Cash Control System not only includes the transaction routines, control programs, and reporting features necessary for full cash control; but also includes a comprehensive set of software tools for documentation maintenance, system modification, and new transaction development.

Series 7400 software — and the complete line of Series 7000 hardware — can take the risk out of branch automation. Why not get the "total solution" story? Write or call today.

More power to your terminal.



INCOTERM® CORPORATION

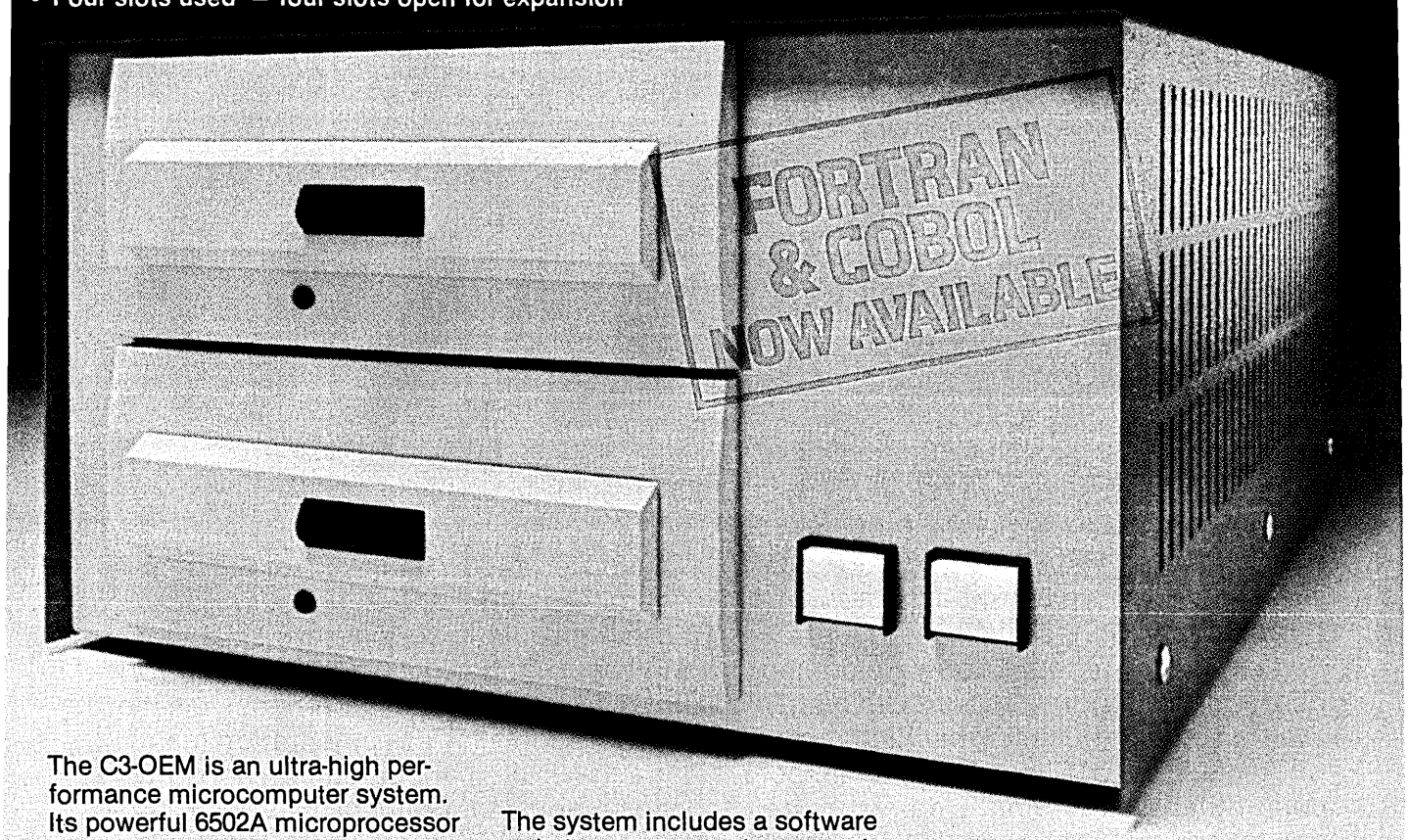
A Subsidiary of Honeywell Inc.
65 Walnut Street, Wellesley Hills, Massachusetts 02181
Telephone: (617) 237-2100

CIRCLE 21 ON READER CARD

A 32K byte dual floppy microcomputer system for only $2900* complete.

Standard Features:

- Dual 8" floppys store 500,000 characters on line
- 32K bytes of static RAM
- RS-232 C at 75 to 19,200 baud
- 16 line parallel I/O
- Rack or tabletop mounting
- UL-recognized power supplies
- BUS oriented computer architecture
- Four slots used — four slots open for expansion
- Comes complete with disk BASIC
- Includes Interactive Assembler/Editor
- Main processor is an ultra-fast 6502A
- Has auxiliary Z-80 and 6800 micros which allow execution of virtually all 6502, 6800, 8080 and Z-80 code!
- User programmable interrupt vectors on all three micros



The C3-OEM is an ultra-high performance microcomputer system. Its powerful 6502A microprocessor (now triple sourced) outbenchmarks all 6800- and 8080-based computers in BASIC and machine code using the BASIC and assembler provided standard with this system.

In fact, the C3-OEM executes standard BASIC language programs at speed comparable to small 16 bit minicomputers.

Ohio Scientific has a vast library of low cost software for the high performance 6502A including an on-line debugger, a disassembler, several specialized disk operating systems and applications programs such as our word processor package and a data base management system. However, the C3-OEM is not just limited to 6502 based software. This remarkable machine also has a 6800 and a Z-80 microprocessor.

The system includes a software switch so that machine operation can be switched from one processor to another under software control!

So, one can start with existing 6800, 8080 or Z-80 programs while developing new software for the ultra-high performance 6502A.

The C3-OEM isn't cheap. It's a quality product with mechanical features like UL-recognized power supplies, a three-stage baked-on enamel finish and totally modular construction.

It is the product of Ohio Scientific's thousands of microcomputer systems experience. In fact, all the electronics of the C3-OEM have been in production for nearly a year and have field proven reliability. And, best of all, this machine is available now in quantity for immediate delivery!

A full spectrum of add-ons are now available including more memory, up to 16 serial ports, 96 parallel I/O lines, a video display, a parallel line printer interface and a 74 million byte Winchester disk drive.

*25-49 unit price

1-4	$3590.
5-9	$3300.
10-24	$3100.

Phone (216) 562-3101
or write for more information
and the C3-OEM representative
in your area.

OHIO SCIENTIFIC

1333 S. Chillicothe Rd.
Aurora, OH 44202

CIRCLE 123 ON READER CARD

USER RATINGS

General Ledger
Management Science America (MSA)
In ANSI COBOL to run on most mainframes.

Users reporting:	36
Overall satisfaction	2.8
Throughput/efficiency	2.3
Ease of installation	2.3
Ease of use	2.4
Documentation	2.8
Vendor technical support	2.6
Training	2.7

Advantages: Flexible.
Disadvantages: Complex; uses excessive resources.
Modification required: Usually, by user.
Price: $40,000, includes first year's maintenance (approx. 10%/year thereafter).
CIRCLE 321 ON READER CARD

General Ledger
NCR Corp.
Generalized system for use on most NCR computeres.

Users reporting:	9
Overall satisfaction	3.0
Throughput/efficiency	2.9
Ease of installation	2.7
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.4
Training	2.1

Advantages: Inexpensive; saves human resources.
Modification required: Usually, by user.
Price: $490. Monthly lease $10.
CIRCLE 322 ON READER CARD

General Ledger
Software International Corp.
In ANSI COBOL to run on most mainframes and minis.

Users reporting:	36
Overall satisfaction	2.8
Throughput/efficiency	2.5
Ease of installation	2.4
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.5
Training	2.6

Advantages: Flexible; saves human resources.
Modification required: Usually, by user.
Price: $15,000-$52,500, includes first year's maintenance (10% of purchase price per year thereafter).
CIRCLE 323 ON READER CARD

GIS
IBM Corp., DPD
Information inquiry and retrieval system.

Users reporting:	6
Overall satisfaction	2.5
Throughput/efficiency	2.3
Ease of installation	3.0
Ease of use	3.0
Documentation	2.3
Vendor technical support	2.3
Training	2.3

Advantages: Saves human resources.
Modification required: Usually none.
Price: $907-$1,926/month.
CIRCLE 324 ON READER CARD

GIS (Guidance Info. System) ✲
Time Share Corp.
School curriculum guidance system; runs on Hewlett-Packard 2000 series.

Users reporting:	5
Overall satisfaction	3.8
Throughput/efficiency	3.0
Ease of installation	3.8
Ease of use	3.0
Documentation	3.2
Vendor technical support	3.4
Training	3.5

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $2,200-$9,900, includes first year's maintenance.
CIRCLE 325 ON READER CARD

GRASP
SDI
Spooling enhancement to IBM 360/370 DOS and DOS/VS; two versions available.

Users reporting:	36
Overall satisfaction	3.3
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.4
Documentation	3.0
Vendor technical support	2.8
Training	2.8

Advantages: Saves system resources.
Disadvantages: Costly.
Modification required: Usually none.
Price: Vendor will not release pricing.
CIRCLE 326 ON READER CARD

Health Care System (HCS)
IBM Corp., DPD
A specialized hospital-oriented accounting system for DOS/VS installations.

Users reporting:	6
Overall satisfaction	2.2
Throughput/efficiency	2.0
Ease of installation	2.2
Ease of use	2.2
Documentation	2.2
Vendor technical support	2.2
Training	2.2

Disadvantages: Complex; uses excessive resources.
Modification required: Usually, by user.
Price: $109/month.
CIRCLE 327 ON READER CARD

HFMS
IBM Corp., GSD
Hospital Financial Management System for IBM S/32.

Users reporting:	7
Overall satisfaction	3.0
Throughput/efficiency	2.4
Ease of installation	2.9
Ease of use	3.1
Documentation	3.6
Vendor technical support	3.4
Training	2.6

Advantages: Saves human resources; flexible.
Modification required: All reported user modification.
Price: $156/month for 4-module package; $27-55/month for each module.
CIRCLE 328 ON READER CARD

Human Resource System
Information Science Inc. (InSci)
Human resource system for IBM 360/370 computers.

Users reporting:	8
Overall satisfaction	3.0
Throughput/efficiency	2.9
Ease of installation	2.5
Ease of use	3.0
Documentation	3.1
Vendor technical support	2.4
Training	2.8

Advantages: Saves human resources; flexible.
Modification required: Usually, by vendor or user.
Price: $50,000 plus (depending on modifications, options, and expansions), includes first year's maintenance (approx. 10% of purchase price per year thereafter).
CIRCLE 329 ON READER CARD

ICS/90
Sperry Univac
Data collection system for use on Series 90; data transfer functions also available.

Users reporting:	6
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	3.5
Documentation	3.0
Vendor technical support	2.0
Training	2.3

Advantages: Inexpensive; saves human resources.
Modification required: Usually, by vendor or user.
Price: $80/month.
CIRCLE 330 ON READER CARD

IDMS ✲
Cullinane Corp.
Data base management system for IBM 360/370 and Univac computers.

Users reporting:	42
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.5
Ease of use	3.4
Documentation	3.1
Vendor technical support	3.5
Training	3.3

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $45,000 license fee, plus $4,500 annual renewal, includes maintenance.
CIRCLE 331 ON READER CARD

I.G.A.S.
NCR Corp.
Interactive generalized accounting system for use on small to medium-scale NCR computers.

Users reporting:	6
Overall satisfaction	2.7
Throughput/efficiency	2.2
Ease of installation	3.0
Ease of use	3.2
Documentation	1.7
Vendor technical support	2.0
Training	1.5

Advantages: Inexpensive; saves human resources.
Disadvantages: Slow.
Modification required: Usually, by user.
Price: Consists of 4 modules $720-$2,160, plus $30-$90 per year maintenance. Monthly lease $18-$53.
CIRCLE 332 ON READER CARD

IMAGE/1000
Hewlett-Packard Co.
Data base management system for the HP 1000 series computers.

Users reporting:	9
Overall satisfaction	3.0
Throughput/efficiency	2.9
Ease of installation	3.4
Ease of use	3.0
Documentation	2.5
Vendor technical support	2.7
Training	3.3

Advantages: Flexible, inexpensive.
Disadvantages: Lacks key capabilities.
Modification required: Usually none.
Price: $2,500, plus $125/month maintenance.
CIRCLE 333 ON READER CARD

IMAGE/3000 ✲
Hewlett-Packard Co.
Data base management system for the HP 3000 series computers.

Users reporting:	30
Overall satisfaction	3.5
Throughput/efficiency	3.3
Ease of installation	3.7
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.0
Training	2.7

Advantages: Flexible.
Modification required: Usually none.
Price: $3,000, plus $125/month maintenance.
CIRCLE 334 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 most medium to large-scale HIS computers.

Users reporting:	16
Overall satisfaction	3.2
Throughput/efficiency	2.9
Ease of installation	2.6

To whom does your computer report?

Top-management across the country asks the same question in different words.* They wonder who will assume ultimate responsibility for the validity of data. They believe that the benefits of EDP outweigh the costs. But they want their reports better organized and more timely. Significantly, a "language" barrier seems the biggest obstacle to progress.

There are no instant answers. But there's a good place to start.

Send for our two new booklets. We suggest sound management principles for dealing with your computer resource. We identify 5 crucial areas in which to apply them. And we provide 5 sets of questions designed to help you get the right answers.

*Based upon 1978 survey conducted by McGraw-Hill for Sun Information Services.

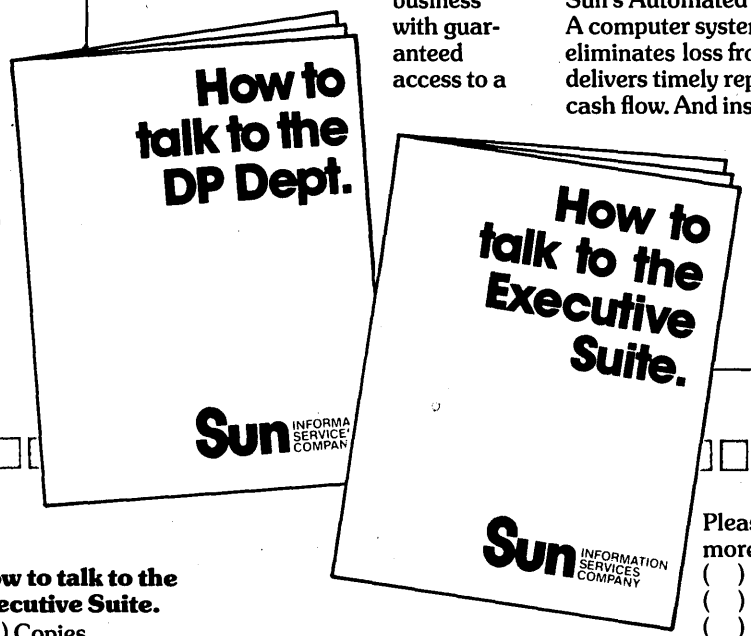
Security and cost control. Two critical areas of concern. Two examples of what Sun can do.

Security. What if disaster struck? Of the 5 important areas of concern we identify in our booklets, security is paramount. For without effective back-up and recovery, many computer dependent companies risk millions of dollars in losses, weeks of downtime — maybe everything. Yet, until we developed Sungard, there simply were no acceptable alternatives.

Sungard. The first fully effective plan for back-up and recovery.

Fire. Sabotage. Tornado. Your computer goes down. Hard. Within 24 hours, Sungard puts you back in business with guaranteed access to a fully operational site, with your pre-tested programs. Your personnel in charge. Small wonder many of the country's largest companies and leading financial institutions already subscribe to Sungard. If you have the slightest doubt about your computer recovery plans, talk to us. Soon.

Cost control. The nickel and dime problems that add up to thousands. They're typical in many companies. And certainly in bulk petroleum distribution centers. So whether you manage one or not, consider the business and operational knowledge it took to develop Sun's Automated Bulk Terminals. A computer system that virtually eliminates loss from theft. That delivers timely reports. Improved cash flow. And installs in easily budgeted modules. That kind of expertise is available to you now from Sun.



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How to talk to the Executive Suite.
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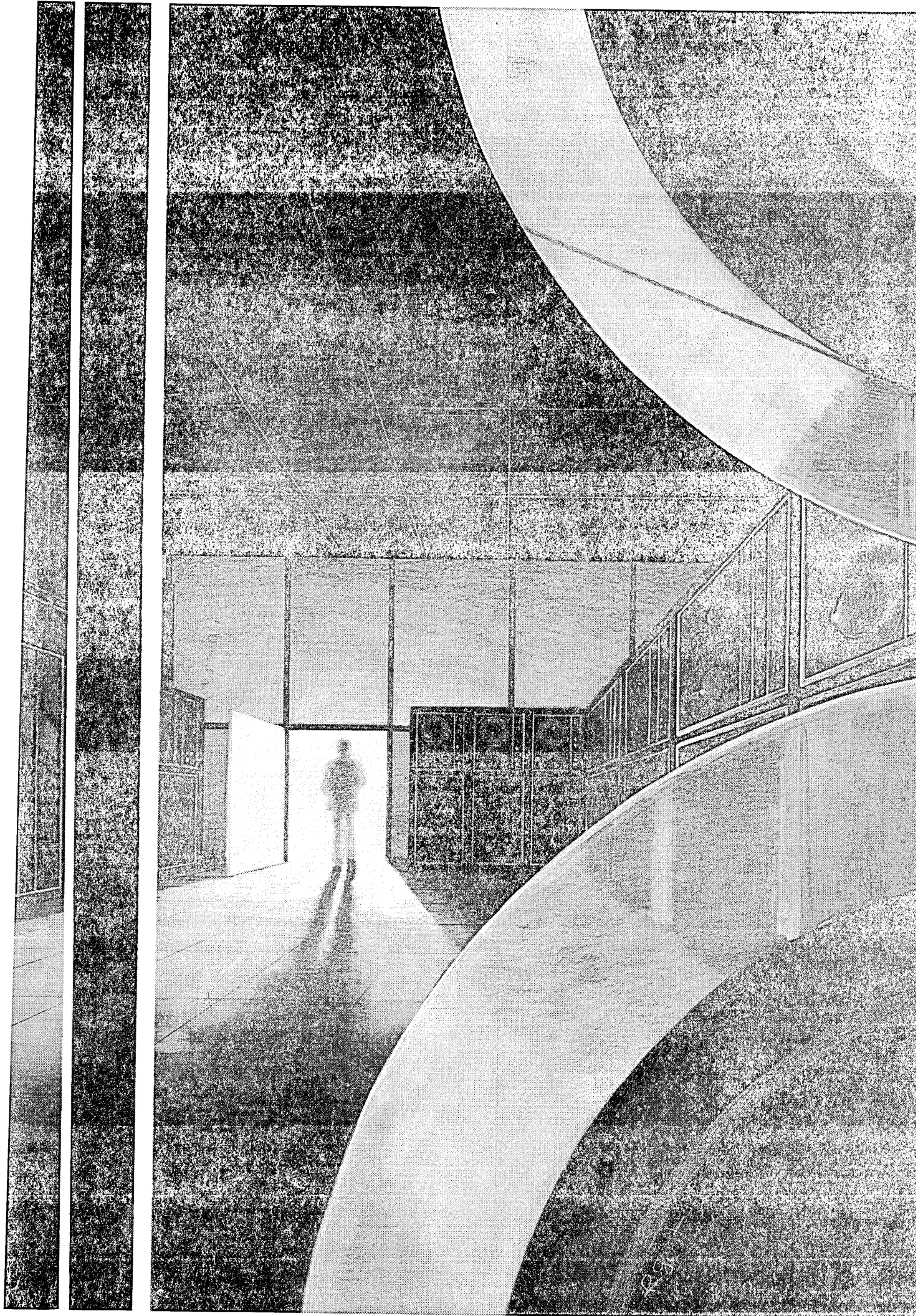


Ease of use 2.6
Documentation 2.6
Vendor technical support 2.7
Training 2.8
Advantages: Saves human resources; flexible; inexpensive.
Modification required: Usually, by user.
Price: $1,661-$19,928 initial license, plus $45-$441 monthly license.
CIRCLE 335 ON READER CARD

IMS
IBM Corp., DPD
Data base management system for IBM 360/370 OS and OS/VS.
Users reporting: 34
Overall satisfaction 2.9
Throughput/efficiency 2.4
Ease of installation 2.2
Ease of use 2.5
Documentation 2.8
Vendor technical support 2.8
Training 2.6
Advantages: Flexible; saves human resources.
Disadvantages: Complex; uses excessive resources; costly.
Modification required: Usually none.
Price: $646-$1,346/month (360), $950-$4,225/month VS.
CIRCLE 336 ON READER CARD

IMSL Library
IMSL, Inc.
Math and statistical subroutines, available for most general-purpose computing systems.
Users reporting: 17
Overall satisfaction 3.4
Throughput/efficiency 3.2
Ease of installation 3.1
Ease of use 3.1
Documentation 3.2
Vendor technical support 3.2
Training 4.0
Advantages: Saves human resources.
Modification required: Usually none.
Price: $1,220/year, including maintenance; for universities $980/year, including maintenance.
CIRCLE 337 ON READER CARD

Installment Loan
Florida Software Services, Inc.
General-purpose loan system for IBM 360/370, Burroughs, and Honeywell computers.
Users reporting: 11
Overall satisfaction 3.1
Throughput/efficiency 2.5
Ease of installation 2.5
Ease of use 2.9
Documentation 2.6
Vendor technical support 2.2
Training 1.5
Advantages: Flexible; inexpensive.
Modification required: Usually, by user.
Price: $15,800, includes first year's maintenance ($1,980/year thereafter).
CIRCLE 338 ON READER CARD

Intercomm
Informatics Inc.
Data communications monitor for IBM 360/370 OS and OS/VS systems.
Users reporting: 11
Overall satisfaction 2.8
Throughput/efficiency 3.0
Ease of installation 2.3
Ease of use 2.7
Documentation 2.3
Vendor technical support 2.6
Training 2.4
Advantages: Flexible.
Disadvantages: Complex.
Modification required: Usually none.
Price: From $38,000.
CIRCLE 339 ON READER CARD

InterTest
On-Line Software International
Interactive CICS testing program for any version of CICS.
Users reporting: 10
Overall satisfaction 3.3
Throughput/efficiency 3.2
Ease of installation 3.1
Ease of use 3.0
Documentation 2.9
Vendor technical support 3.3
Training 3.5
Advantages: Saves human resources.
Modification required: Usually none.
Price: $9,000, includes first year's maintenance (10% of price per year thereafter).
CIRCLE 340 ON READER CARD

INQUIRE ✱
Infodata Systems, Inc.
Fully integrated data base management system for IBM 360/370 OS and OS/VS systems.
Users reporting: 8
Overall satisfaction 3.8
Throughput/efficiency 2.8
Ease of installation 3.6
Ease of use 3.3
Documentation 2.9
Vendor technical support 3.3
Training 2.9
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $65,000-$130,000, includes first year's maintenance ($500-$700/month thereafter).
CIRCLE 341 ON READER CARD

INVEN/3
IBM Corp., GSD
Inventory management system for IBM S/3.
Users reporting: 13
Overall satisfaction 3.0
Throughput/efficiency 2.5
Ease of installation 2.8
Ease of use 2.8
Documentation 2.8
Vendor technical support 2.7
Training 2.4
Advantages: Saves human resources; inexpensive.
Modification required: Usually, by user.
Price: $300 for 12 months.
CIRCLE 342 ON READER CARD

IPICS
IBM Corp., GSD
Initial production inventory control system for IBM S/3.
Users reporting: 56
Overall satisfaction 3.0
Throughput/efficiency 2.6
Ease of installation 2.5
Ease of use 2.7
Documentation 2.4
Vendor technical support 2.6
Training 2.5
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $100 for 12 months (engineering and production data control), plus $110 for 12 months (product costing).
CIRCLE 343 ON READER CARD

IPS
Burroughs Corp.
Commercial bank item processing system.
Users reporting: 5
Overall satisfaction 2.8
Throughput/efficiency 3.0
Ease of installation 2.6
Ease of use 2.8
Documentation 2.4
Vendor technical support 2.2
Training 2.0
Advantages: Saves human resources.
Disadvantages: Complex.
Modification required: Usually, by user.
Price: $17,000-$24,000, plus $850-$1,200/year license fee.
CIRCLE 344 ON READER CARD

IRP
IBM Corp., GSD
Inventory and requirements planning for IBM S/3.
Users reporting: 13
Overall satisfaction 2.9
Throughput/efficiency 2.9
Ease of installation 2.5
Ease of use 2.7
Documentation 2.4
Vendor technical support 2.7
Training 2.8
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $94/month.
CIRCLE 345 ON READER CARD

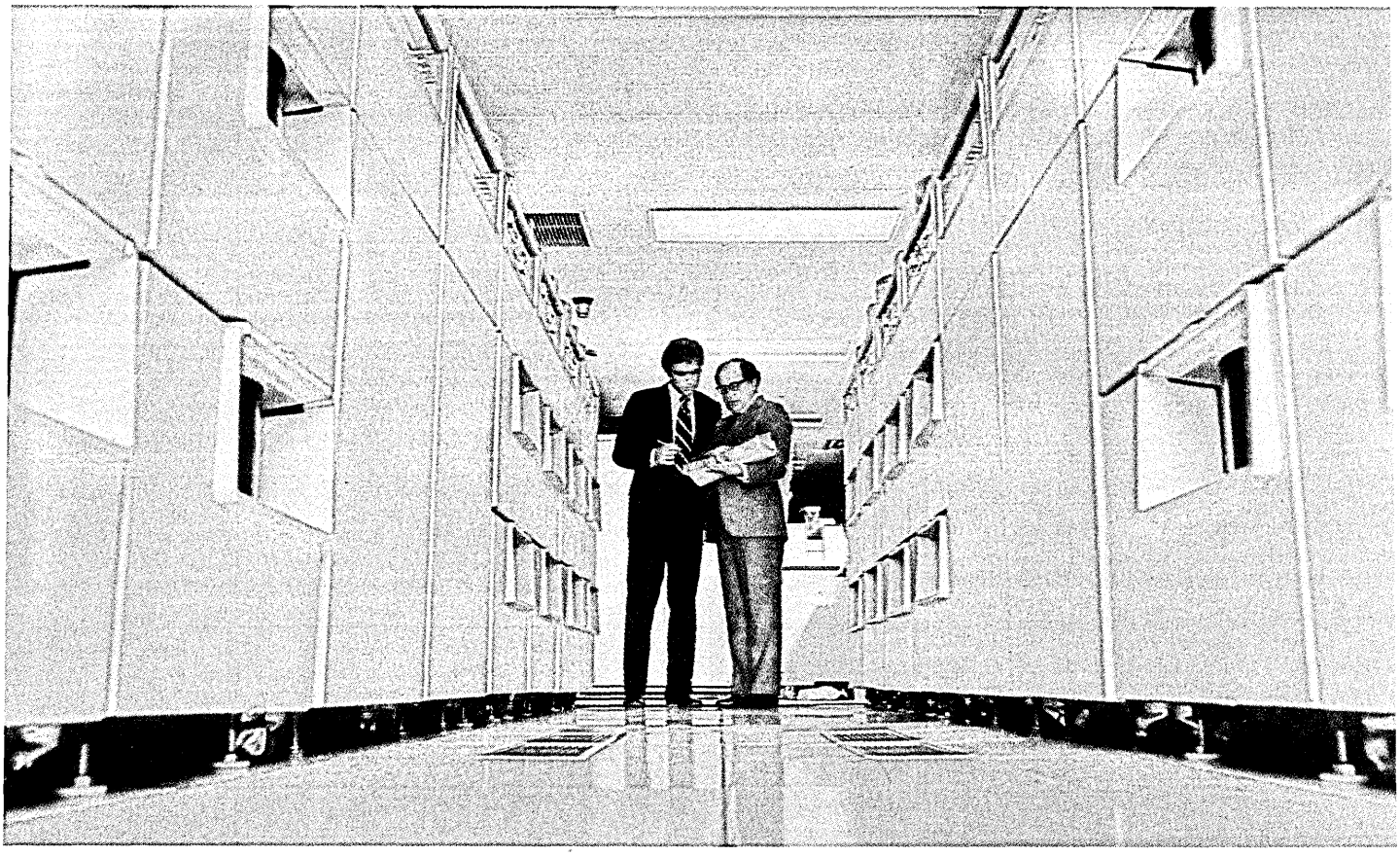
JAS/3
IBM Corp., GSD
Critical path method project planning and supervising for disk IBM S/3.
Users reporting: 12
Overall satisfaction 2.8
Throughput/efficiency 2.9
Ease of installation 2.3
Ease of use 1.9
Documentation 2.0
Vendor technical support 1.8
Training 1.3
Modification required: Usually none.
Price: $90/month.
CIRCLE 346 ON READER CARD

JASPER
Datachron Corp.
Job accounting and performance analysis for IBM 360/370 DOS, OS, and VS, or EDOS operating systems.
Users reporting: 9
Overall satisfaction 2.9
Throughput/efficiency 3.0
Ease of installation 3.7
Ease of use 3.1
Documentation 2.8
Vendor technical support 3.0
Training 2.6
Advantages: Flexible; inexpensive.
Modification required: Usually none; sometimes by vendor.
Price: $6,000, includes first year's maintenance (12% of purchase price per year thereafter). Monthly lease $410.
CIRCLE 347 ON READER CARD

Job Accounting (DOS)
Johnson Systems, Inc.
Job accounting and resource measurement for IBM 360/370 DOS or DOS/VS; CICS measurement optional.
Users reporting: 28
Overall satisfaction 3.1
Throughput/efficiency 2.7
Ease of installation 3.1
Ease of use 2.7
Documentation 2.8
Vendor technical support 2.9
Training 2.7
Advantages: Flexible.
Modification required: Usually none.
Price: $4,000, includes first year's maintenance (10% thereafter). Monthly lease 10%. CICS $3,000; 4 additional options at $1,500 each.
CIRCLE 348 ON READER CARD

Job Accounting (OS)
Johnson Systems, Inc.
Same functions as product listed above, but for use with OS or OS/VS systems. CICS measurement optional.
Users reporting: 12
Overall satisfaction 3.1
Throughput/efficiency 2.9
Ease of installation 3.3
Ease of use 2.8
Documentation 2.7
Vendor technical support 2.8
Training 2.9
Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $8,000, includes first year's maintenance (10% per year thereafter). Monthly lease 10%. CICS $4,000; 4 additional options $1,500 each.
CIRCLE 349 ON READER CARD

"Who wins when we choose Digital's TRAX over IBM's CICS?"*



It's today's most important question in transaction processing.

You win—with the first mini-based transaction processing system designed exclusively to meet today's transaction processing needs.

You win time. TRAX lets you get your applications up faster. All of its systems programs are built in.

And you save money. Big money.

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And still you get mainframe transaction processing functionality including journaling, staging, record locking and automatic application recovery, and more.

Yes, TRAX can talk to your mainframe. And it lets your mainframe do what it does best. While you leave the transaction processing to TRAX.

*CICS is a trademark of International Business Machines Corporation.

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☐ Please have a representative call.
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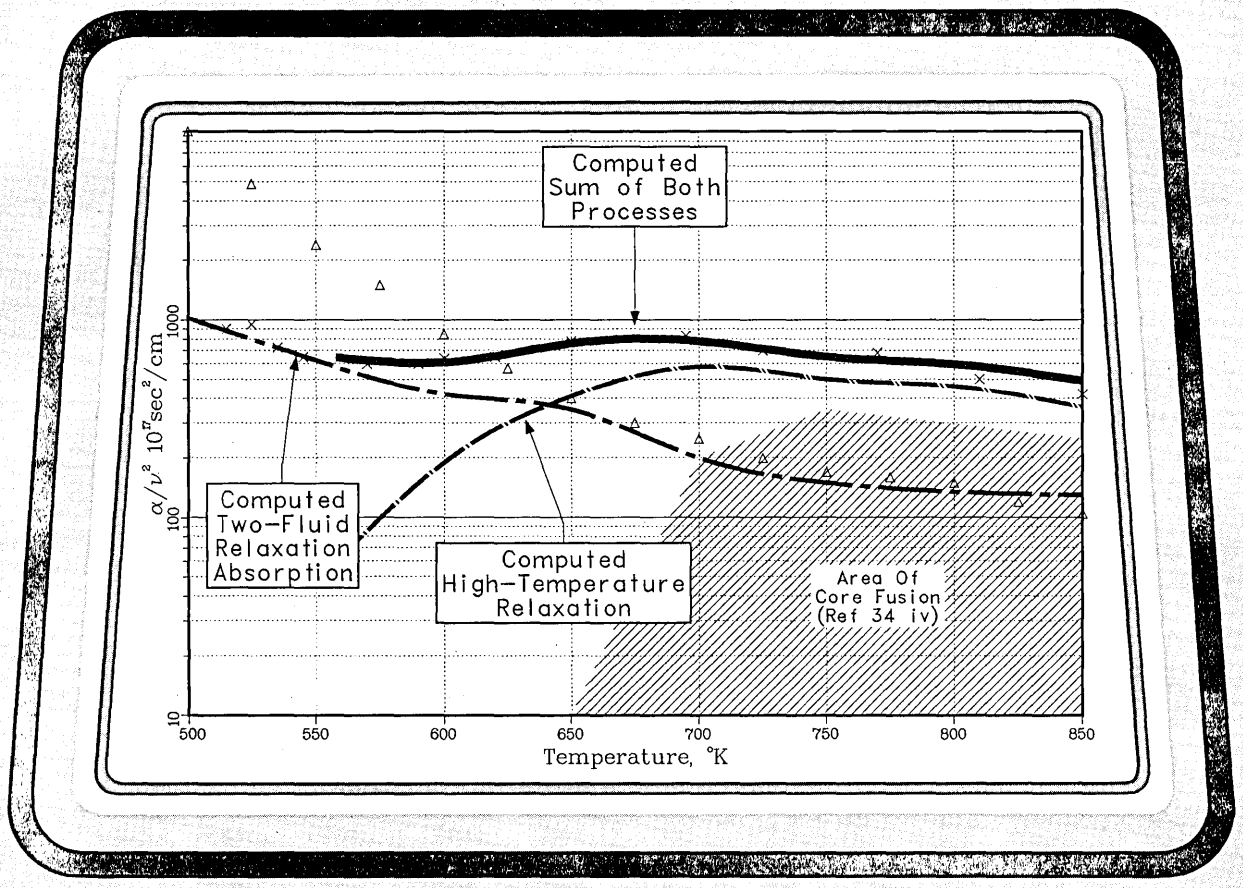

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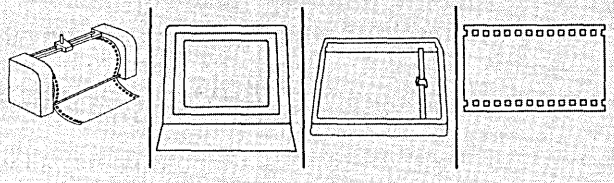
DISSPLA can drive any graphics device whatsoever; our users have Broomall, CalComp, Gerber, Hewlett Packard, Houston Instrument, Xynetics and Zeta pen plotters; Gould, Varian and Versatec electrostatic plotters; DatagraphiX, DICOMED, III, Singer and 3M microfilm recorders; Chromatics, Computek, Tektronix, and Vector General CRT's; and many others. If it can draw a straight line, DISSPLA can plot on it.



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CIRCLE 57 ON READER CARD

USER RATINGS

Job Monitor/Job Accounting
Westinghouse Electric Corp.
Job accounting for IBM 360/370 DOS or DOS/VS.

Users reporting:	9
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	3.3
Documentation	3.0
Vendor technical support	2.8
Training	3.0

Advantages: Inexpensive.
Modification required: Usually none.
Price: $3,500, plus $350/year maintenance.
CIRCLE 350 ON READER CARD

The LIBRARIAN ✲
Applied Data Research Corp. (ADR)
A source program management system with batch and on-line retrieval capabilities.

Users reporting:	107
Overall satisfaction	3.6
Throughput/efficiency	3.5
Ease of installation	3.6
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.1
Training	3.1

Advantages: Saves human resources.
Modification required: Usually none.
Price: $3,000-$12,000, includes first year's maintenance ($450-$1,800 thereafter). Monthly lease $150-$500
CIRCLE 351 ON READER CARD

Life-comm
Informatics Inc.
Life and health insurance administration system for IBM 360/370 computers.

Users reporting:	6
Overall satisfaction	2.8
Throughput/efficiency	2.7
Ease of installation	2.2
Ease of use	2.4
Documentation	3.0
Vendor technical support	2.6
Training	2.4

Advantages: Saves human resources; flexible.
Disadvantages: Complex.
Modification required: Usually, by user.
Price: Vendor will not release pricing.
CIRCLE 352 ON READER CARD

LOGOUT ✲
Macro 4 Inc.
DOS and DOS/VS console message analysis system.

Users reporting:	7
Overall satisfaction	3.9
Throughput/efficiency	3.7
Ease of installation	3.3
Ease of use	3.7
Documentation	3.0
Vendor technical support	3.3
Training	3.5

Advantages: Inexpensive; saves human resources.
Modification required: Usually none.
Price: $90/month, includes maintenance.
CIRCLE 353 ON READER CARD

LOOK
Applied Data Research Corp. (ADR)
A performance measurement tool for measuring cpu usage, I/O and paging activity, and core utilization.

Users reporting:	8
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.5
Ease of use	3.9
Documentation	3.3
Vendor technical support	3.3
Training	3.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $5,000-$10,000, includes first year's maintenance ($750-$1,500/year thereafter). Monthly lease $250-$500.
CIRCLE 354 ON READER CARD

MARK IV
Informatics Inc.
Data management system for any IBM 360/370; optional interfaces to a wide range of data base management systems.

Users reporting:	61
Overall satisfaction	3.2
Throughput/efficiency	2.8
Ease of installation	3.2
Ease of use	2.9
Documentation	2.8
Vendor technical support	2.8
Training	2.9

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $12,000-$44,000, plus options.
CIRCLE 355 ON READER CARD

MAS Systems
Martin Marietta Data Systems
A collection of manufacturing control systems for use on IBM 360/370, Honeywell, and Univac computers.

Users reporting:	8
Overall satisfaction	2.3
Throughput/efficiency	2.0
Ease of installation	2.1
Ease of use	2.1
Documentation	2.3
Vendor technical support	2.1
Training	2.2

Advantages: Flexible; saves human resources.
Disadvantages: Complex.
Modification required: Usually, by vendor.
Price: Vendor will not release pricing.
CIRCLE 356 ON READER CARD

MEDPRO ✲
HBO & Co.
In-patient/out-patient, emergency room admittance and billing system; also supports intra-hospital communications; runs on Four-Phase 470 and 490 computers.

Users reporting:	8
Overall satisfaction	3.9
Throughput/efficiency	3.9
Ease of installation	3.6
Ease of use	4.0
Documentation	2.9
Vendor technical support	3.6
Training	3.0

Advantages: Flexible; saves human resources.
Modification required: Usually, by vendor.
Price: $7,000-$25,000.
CIRCLE 357 ON READER CARD

MIIS Operating System
Medical Information Technology, Inc. (MEDITECH)
Time-sharing executive and interpretive information system; runs on DEC PDP-11, Data General complete line, and IBM Series/1; written in dialect of MUMPS.

Users reporting:	5
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.8
Ease of use	3.6
Documentation	2.8
Vendor technical support	3.6
Training	2.8

Advantages: Flexible.
Modification required: Usually none.
Price: $15,000 (99-year license), plus $150/month maintenance.
CIRCLE 358 ON READER CARD

Minicomm
Informatics Inc.
Communications monitor for smaller DOS or DOS/VS installations.

Users reporting:	9
Overall satisfaction	3.6
Throughput/efficiency	3.8
Ease of installation	3.6
Ease of use	3.7
Documentation	2.6
Vendor technical support	2.9
Training	2.9

Advantages: Inexpensive; saves system and human resources.
Modification required: Usually, by vendor.
Price: from $9,500.
CIRCLE 359 ON READER CARD

MMAS Business Applications
IBM Corp., GSD
Generalized manufacturing management accounting routines for the IBM S/32.

Users reporting:	14
Overall satisfaction	2.6
Throughput/efficiency	1.9
Ease of installation	2.9
Ease of use	2.4
Documentation	3.3
Vendor technical support	3.1
Training	2.0

Advantages: Inexpensive.
Disadvantages: Inflexible.
Modification required: Usually, by user.
Price: $315 for 9-module package; $29-$45/month per module.
CIRCLE 360 ON READER CARD

Mortgage Loan
Florida Software Services, Inc.
Generalized mortgage loan system for IBM 360/370, Burroughs, and Honeywell computers.

Users reporting:	12
Overall satisfaction	2.8
Throughput/efficiency	2.6
Ease of installation	2.8
Ease of use	2.8
Documentation	2.6
Vendor technical support	2.4
Training	2.5

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $26,300, includes first 6 months maintenance ($2,940/year thereafter).
CIRCLE 361 ON READER CARD

MTCS
IBM Corp., DPD
Minimum Teleprocessing Communications System.

Users reporting:	13
Overall satisfaction	2.7
Throughput/efficiency	2.6
Ease of installation	2.5
Ease of use	2.2
Documentation	1.4
Vendor technical support	2.4
Training	1.7

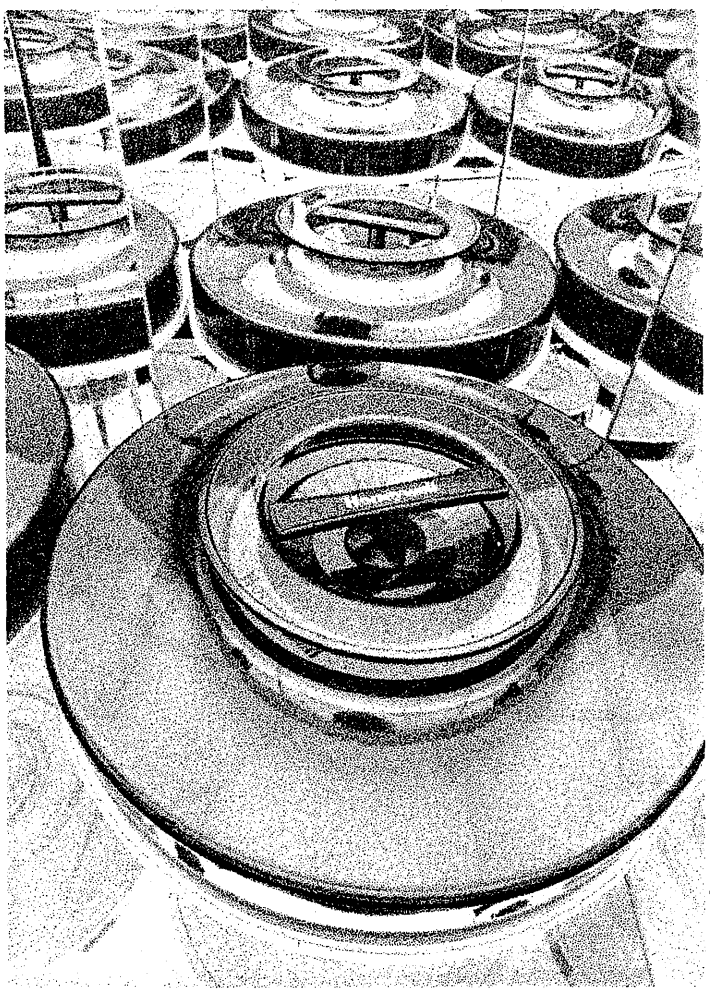
Advantages: Inexpensive.
Disadvantages: Lacks key capabilities.
Modification required: Usually, by vendor.
Price: $427 for 12 months.
CIRCLE 362 ON READER CARD

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:	35
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.3
Ease of use	3.4
Documentation	2.5
Vendor technical support	2.5
Training	2.6

Advantages: Flexible; saves human and system resources.
Modification required: Usually none.
Price: $4,600, plus $460/year license fee.
CIRCLE 363 ON READER CARD

DATA BASE CONTROL.



How Honeywell helps you manage all that data.

As computer users move into interactive and distributed systems, large data bases become increasingly necessary. And the storage and retrieval of this data becomes a problem.

Some computer manufacturers simply recommend more computer hardware. But this fails to address the key issue of *control.*

At Honeywell, we make effective control of data the foundation of our interactive and distributed systems. This control is provided by proven data base management techniques.

We pioneered and improved data base management.

The Integrated Data Store system introduced in 1963 is regarded as the industry's first. Its innovative data base structuring techniques have been imitated by others, and from it evolved the current CODASYL standards.

Now, after years of data base installation experience, I-D-S has evolved to today's Data Management-IV system, which provides a broad range of integrated on-line data management capabilities. Through a set of compatible software subsystems, DM-IV supports concurrent access by large numbers of users to common shared data bases in both conversational and procedural processing modes.

Now we lead with relational techniques.

Our Multics Data Base Manager is the industry's first fully implemented relational data base capability commercially available from a computer manufacturer. MDBM offers an exceptional degree of user flexibility. The result is an opportunity for a significant increase in the productivity of both programmers and end users.

Our systems are easy to install, easy to maintain.

Honeywell data base design and definition techniques make it simple to set up your data base in the first place. Independence between the data structure, application programs, and mass storage devices means you can make changes in one area without having to redesign others.

Data integrity and security are safeguarded.

Honeywell data base systems, and their hardware and software, provide outstanding controls to protect your data from accidental destruction or from unauthorized access.

Control. It's what managers need most.

From the most complex computer systems to the simplest control devices, providing better ways to help you control your business has always been our business at Honeywell.

For more information on Data Base Control, write: Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

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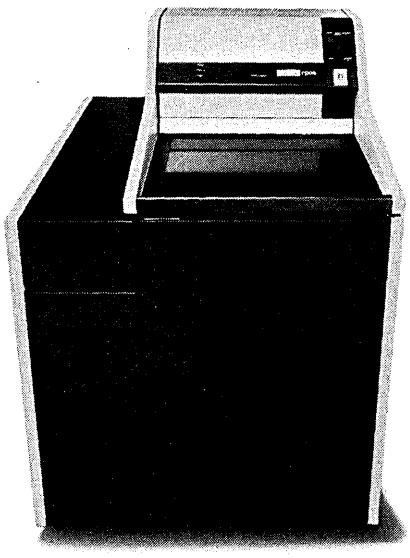

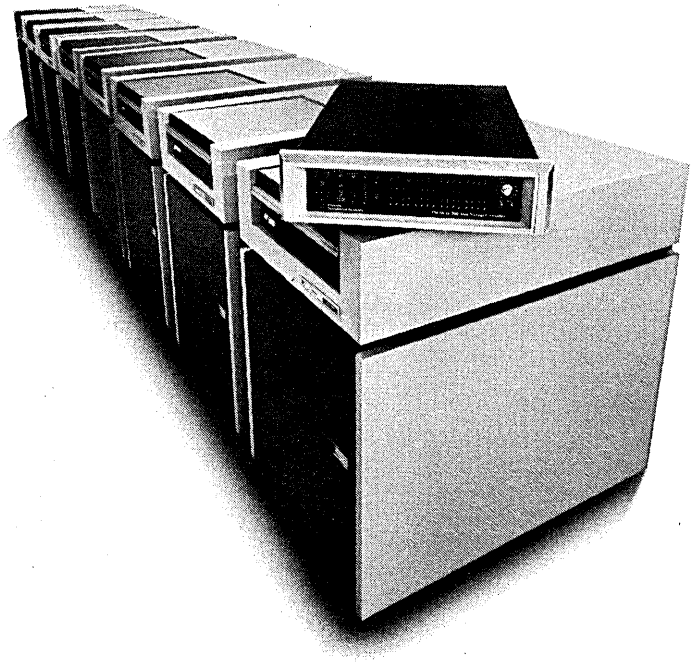

With every RP04/5/6,® you get a controller:

To get mass storage for your PDP-11,® you can use DEC's RJP04 or 05 with their 88 megabyte drives, or the RJP06 with its 176 megabyte drive. After installing DEC's four-board RH11® interface, drives can be added up to a maximum system capacity of 1408 megabytes.

But each drive you add comes with its own controller, the large box on the side of the drive. This adds hundreds of IC's to your system, and thousands of dollars to your system costs.

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Plessey controls your costs:

Our PM-DS11/300C mass storage systems are direct replacements for DEC's RJP04/5/6 systems, but store up to 45% more and cost 30% less.

Fully compatible with standard DEC diagnostics and operating systems, Plessey mass storage systems use a single microprocessor-based controller to handle up to eight of our 254 megabyte drives for a total system capacity of 2000 megabytes. The PM-DC11/300C controller includes power-on and off-line diagnostics, software error detection and correction, adjustable DMA control and dual Unibus® ports. System expansion requires no special device drivers, and *no* additional controllers.

The PM-DC11/300C controller is available in a 5¼" expansion chassis with a diagnostic panel, or may be embedded in only two system units of your PDP-11 cpu.

Providing more reliable yet less expensive products has made us the largest independent supplier of DEC-compatible peripherals Our product line presently includes add-in/add-on core and semiconductor memories, cartridge disc systems, floppy disc systems, mag tape systems, complete computer-based systems, and a wide variety of backplanes, expansion chassis and other accessories.

We're the only real alternative to DEC for all your miniperipherals, a complete single source. For all the details, please contact the nearest Plessey sales office today.

Plessey Peripheral Systems

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NCC '79: THE COMPLETE COMPUTING EXPERIENCE

The 1979 National Computer Conference will provide the year's most comprehensive computing experience. You'll see the industry's newest products and services and have the chance to speak with experts in every area of information processing. NCC '79, June 4-7 in New York City, will feature more than 120 sessions, a record-breaking exhibition, a Personal Computing Festival, Professional Development Seminars, and a variety of special events.

Preregister now to insure fast and easy access to NCC activities. Regardless of the registration category you select, your badge will be mailed to you well in advance of the conference. To preregister, complete and return the coupon.

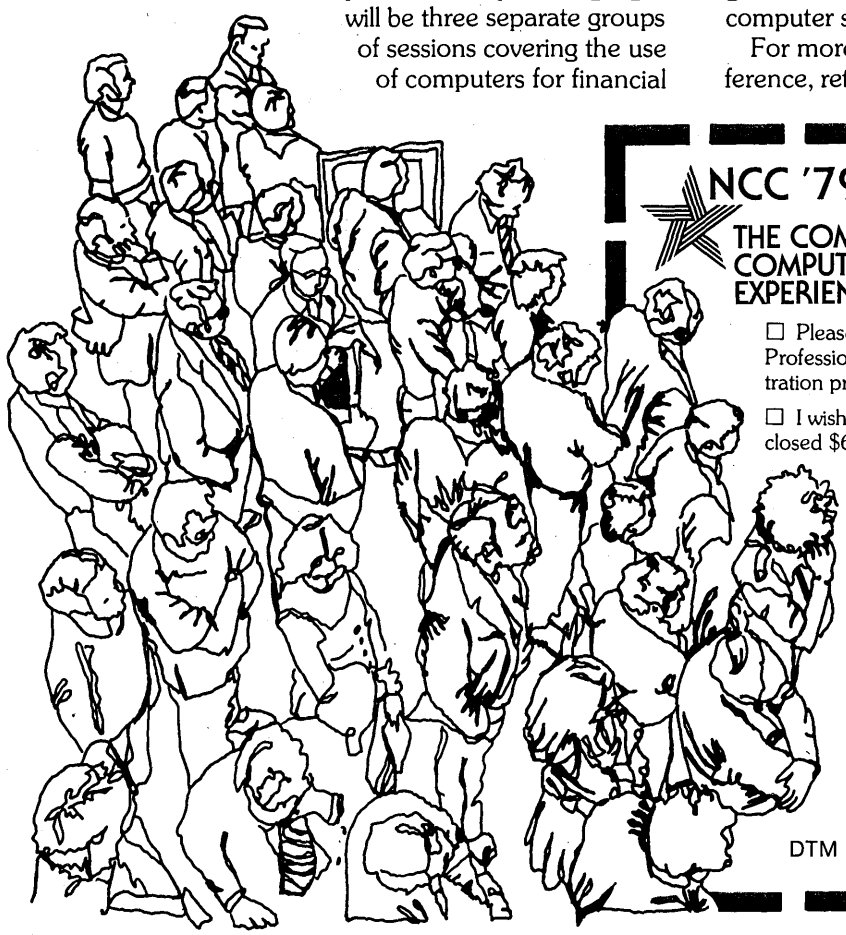
Practical solutions to data processing problems will be emphasized throughout the conference program. Major program areas will include applications, science and technology, management, and social implications. A special highlight will be three separate groups of sessions covering the use of computers for financial transactions, in law and public policy, and in health care.

The latest computer hardware, systems, and services will be on display at NCC '79 on all four floors of the New York Coliseum and at the nearby New York Hilton Hotel. More than 350 organizations will occupy nearly 1,700 booths, making this the largest exhibit of its kind ever assembled.

The Personal Computing Festival will feature program sessions and application demonstrations of interest to professionals, EDP specialists, and computer hobbyists. A major attraction of the Festival will be commercial exhibits devoted exclusively to personal computing.

The Professional Development Seminar program will consist of 15 one-day minicourses designed to increase professional skills and aid in career development. A separate fee of $50 will be charged for each course. Rounding out NCC '79 will be plenary sessions, a Pioneer Day program commemorating the 20th anniversary of COBOL, a computer stamp exhibit, and other high-interest activities.

For more information, or to preregister for the full conference, return this coupon.



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☐ Please send me information on participating in the Personal Computing Festival.

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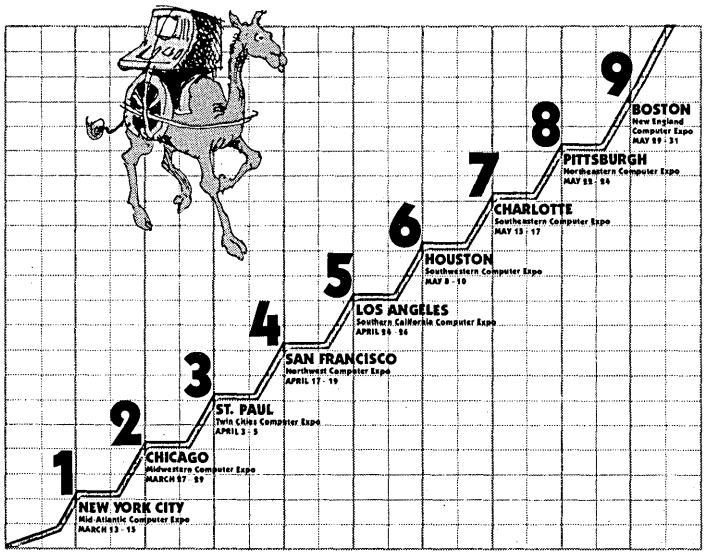

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CIRCLE 28 ON READER CARD

USER RATINGS

OPTIMIZER
Capex Corp.
Optimizes object code of IBM 360/370 ANSI COBOL programs under OS, OS/VS, and MVS systems.

Users reporting:	23
Overall satisfaction	3.4
Throughput/efficiency	3.5
Ease of installation	3.6
Ease of use	3.5
Documentation	3.2
Vendor technical support	3.5
Training	3.2

Advantages: Saves system and human resources.
Modification required: Usually none.
Price: $9,750-$28,500 perpetual license, includes first year's maintenance (12% of license fee thereafter). Monthly lease $325-$950 (36-month lease), includes maintenance.
CIRCLE 364 ON READER CARD

OS/8
Digital Equipment Corp. (DEC)
Tape or disk operating system for batch or interactive PDP-8 systems (8KB or larger).

Users reporting:	10
Overall satisfaction	3.2
Throughput/efficiency	2.6
Ease of installation	3.1
Ease of use	3.2
Documentation	2.6
Vendor technical support	2.2
Training	2.2

Advantages: Inexpensive; flexible; saves human resources.
Modification required: Usually, by user.
Price: $440.
CIRCLE 365 ON READER CARD

PAC II
International Systems, Inc.
Project planning and management control system for IBM 360/370, Burroughs, and Univac computers.

Users reporting:	10
Overall satisfaction	2.9
Throughput/efficiency	2.4
Ease of installation	2.3
Ease of use	2.3
Documentation	2.7
Vendor technical support	2.8
Training	2.6

Advantages: Saves human resources.
Disadvantages: Complex.
Modification required: Usually, by vendor.
Price: $19,800, includes first year's maintenance ($90/month or $1,000/year thereafter).
CIRCLE 366 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:	8
Overall satisfaction	3.1
Throughput/efficiency	2.8
Ease of installation	3.7
Ease of use	3.5
Documentation	3.1
Vendor technical support	2.8
Training	3.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $6,000 (OS), includes first year's maintenance ($750/year thereafter).
CIRCLE 367 ON READER CARD

PANVALET ✲
Pansophic Systems, Inc.
Program library maintenance system for any IBM 360/370; on-line version also available.

Users reporting:	145
Overall satisfaction	3.7
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.5
Documentation	3.3
Vendor technical support	3.3
Training	3.0

Modification required: Usually none.
Price: $4,980 (DOS), $5,980 (OS), includes first year's maintenance ($750 (DOS), $850 (OS) per year thereafter).
CIRCLE 368 ON READER CARD

PASCAL
Univ. of California at San Diego (UCSD)
Specialized version of the block-structured programming language for minicomputer systems.

Users reporting:	5
Overall satisfaction	3.0
Throughput/efficiency	2.8
Ease of installation	2.4
Ease of use	3.2
Documentation	2.0
Vendor technical support	2.0
Training	2.0

Advantages: Inexpensive.
Disadvantages: Compatibility problems.
Modification required: Usually none.
Price: $50; no support available.
CIRCLE 369 ON READER CARD

Payroll
Burroughs Corp.
A generalized payroll system for use on most Burroughs computers.

Users reporting:	9
Overall satisfaction	2.0
Throughput/efficiency	2.3
Ease of installation	2.4

USER RATINGS

Ease of use	2.7
Documentation	2.0
Vendor technical support	1.5
Training	1.5

Modification required: Usually, by user.
Price: $1,450-$2,100, plus $68-$155/year license fee.
CIRCLE 370 ON READER CARD

PLAN IV
Capex Corp.
Installation planning, performance evaluation, and measurement control system with forecasting capabilities for IBM 360/370 OS, OS/VS, and MVS environments.

Users reporting:	8
Overall satisfaction	3.4
Throughput/efficiency	3.1
Ease of installation	3.9
Ease of use	3.8
Documentation	2.9
Vendor technical support	3.3
Training	-

Advantages: Saves human resources.
Modification required: None reported.
Price: $9,500 (OS or VSI), $11,000 (MVS), perpetual license includes first year's maintenance ($1,140 or $1,320 per year thereafter). Monthly lease $475 (OS or VSI), or $550 (MVS).
CIRCLE 371 ON READER CARD

Payroll
Florida Software Services, Inc.
General-purpose payroll system for IBM 360/370, Burroughs, and Honeywell computers.

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

Advantages: Flexible; inexpensive; saves human resources.
Modification required: Usually, by user.
Price: $9,500, includes first 6 months maintenance ($1,200/year thereafter).
CIRCLE 372 ON READER CARD

Payroll
General Computer Services, Inc.
General-purpose payroll and personnel system for IBM 360/370 computers.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.4
Ease of installation	2.4
Ease of use	2.8
Documentation	3.2
Vendor technical support	2.6
Training	2.8

Advantages: Flexible.
Disadvantages: Complex.
Modification required: Usually, by user or vendor.
Price: $35,000-$125,000, includes first year's maintenance (10% of purchase price per year thereafter).
CIRCLE 373 ON READER CARD

Payroll
Honeywell Information Systems, Inc.
For Honeywell Series 60, Level 6 and up.

Users reporting:	14
Overall satisfaction	2.6
Throughput/efficiency	2.4
Ease of installation	2.2
Ease of use	2.3
Documentation	2.3
Vendor technical support	2.8
Training	2.3

Advantages: Inexpensive; saves human resources.
Modification required: Usually, by user.

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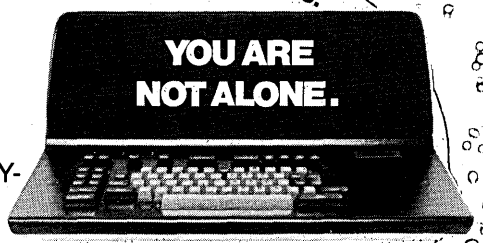

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USER RATINGS

Price: $2,067-$4,000 initial license, plus $78-$133 monthly license fee.

CIRCLE 374 ON READER CARD

Payroll
IBM Corp., GSD
Generalized payroll system for small- to medium-sized payrolls; runs on the IBM S/3.

Users reporting:	21
Overall satisfaction	2.7
Throughput/efficiency	2.8
Ease of installation	2.5
Ease of use	3.0
Documentation	2.4
Vendor technical support	2.4
Training	2.6

Modification required: Usually, by user.
Price: $130/month for 12 months.

CIRCLE 375 ON READER CARD

Payroll
IBM Corp., GSD
This version runs on the IBM S/32 and S/34 computers.

Users reporting:	13
Overall satisfaction	2.8
Throughput/efficiency	2.3
Ease of installation	2.5
Ease of use	2.5
Documentation	2.8
Vendor technical support	2.5
Training	3.5

Advantages: Saves human resources. Modification required: Usually none.
Price: $37/month (S/32), $49/month (S/34).

CIRCLE 376 ON READER CARD

Payroll
Information Science Inc. (InSci)
General-purpose payroll system for use on any IBM 360/370.

Users reporting:	5
Overall satisfaction	2.8
Throughput/efficiency	2.0
Ease of installation	2.0
Ease of use	2.8
Documentation	3.2
Vendor technical support	2.3
Training	2.8

Advantages: Flexible.
Disadvantages: Complex.
Modification required: Usually, by user.
Price: $32,000, includes installation and first year's maintenance.

CIRCLE 377 ON READER CARD

Payroll Systems
Wang Laboratories, Inc.
Generalized payroll systems for IBM 360/370 and Honeywell computers.

Users reporting:	15
Overall satisfaction	3.0
Throughput/efficiency	2.5
Ease of installation	2.7
Ease of use	2.5
Documentation	2.7
Vendor technical support	2.3
Training	2.5

Modification required: Usually, by user.
Price: $17,000-$37,000, plus $3,600-$6,000/year maintenance.

CIRCLE 378 ON READER CARD

Payroll/Personnel
Cyborg Systems, Inc.
Generalized payroll/personnel system for most computers supporting an ANSI COBOL compiler.

Users reporting:	10
Overall satisfaction	2.8
Throughput/efficiency	2.2
Ease of installation	2.6
Ease of use	2.6
Documentation	2.6
Vendor technical support	2.6
Training	2.8

Advantages: Flexible; inexpensive.
Disadvantages: Slow; uses excessive resources.
Modification required: Usually, by user.
Price: $35,000, includes first year's maintenance.

CIRCLE 379 ON READER CARD

Payroll/Personnel
Management Science America (MSA)
For any IBM 360/370 or Burroughs B 3500 or larger system.

Users reporting:	58
Overall satisfaction	2.7
Throughput/efficiency	2.3
Ease of installation	2.3
Ease of use	2.6
Documentation	2.9
Vendor technical support	2.4
Training	2.6

Advantages: Flexible.
Modification required: Usually, by user.
Price: $30,000 (Payroll), $25,000-$60,000 (Personnel), includes first year's maintenance (approx. 10%/year thereafter).

CIRCLE 380 ON READER CARD

Payroll/Personnel
NCR Corp.
Standard payroll/personnel system for use on most NCR Century and Criterion computers.

Users reporting:	43
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	2.9
Ease of use	2.8
Documentation	2.7
Vendor technical support	2.4
Training	2.3

Advantages: Inexpensive; saves human resources.
Modification required: Usually, by user.
Price: $490. Monthly lease $10.

CIRCLE 381 ON READER CARD

PC/70
Atlantic Software Inc.
An automated project planning and resource measurement system with cost forecasting facilities.

cost forecasting facilities.

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

Advantages: Flexible; saves human resources.
Modification required: Sometimes, by vendor or user.
Price: $18,500, includes first year's maintenance ($950/year thereafter).
CIRCLE 382 ON READER CARD

PCS
Burroughs Corp.
Production control system; runs on most Burroughs B Series computers.

Users reporting:	8
Overall satisfaction	3.0
Throughput/efficiency	3.1
Ease of installation	2.6
Ease of use	3.1
Documentation	2.8
Vendor technical support	2.5
Training	2.6

Advantages: Saves human resources; flexible.
Modification required: Usually, by user.
Price: Four types ranging from $1,065-$6,675, plus $48-$334/year license fee.
CIRCLE 383 ON READER CARD

PEP
Stockholder Systems Inc.
Paperless Entry Processing for automatic payment through ACH; for IBM 360/370 and Burroughs systems.

Users reporting:	10
Overall satisfaction	3.4
Throughput/efficiency	3.0
Ease of installation	2.7
Ease of use	2.9
Documentation	3.6
Vendor technical support	3.3
Training	2.8

Advantages: Flexible; saves human resources.
Modification required: Usually, by user or vendor.
Price: $6,500-$14,500, includes first year's maintenance (10% of price per year thereafter).
CIRCLE 384 ON READER CARD

PERPAS/POBAS
Aries Information Systems, Inc.
A Personnel/Payroll System and Project Oriented Budgeting and Accounting System for use on medium- to large-scale computers.

Users reporting:	9
Overall satisfaction	2.9
Throughput/efficiency	2.9
Ease of installation	2.9
Ease of use	2.6
Documentation	3.0
Vendor technical support	2.6
Training	2.2

Modification required: Usually, by vendor.
Price: Vendor will not release pricing.
CIRCLE 385 ON READER CARD

PL/1
IBM Corp., DPD
For IBM 360/370; has automatic optimizer.

Users reporting:	15
Overall satisfaction	3.4
Throughput/efficiency	3.6
Ease of installation	3.1
Ease of use	3.5
Documentation	3.3
Vendor technical support	2.7
Training	2.5

Advantages: Saves human resources.
Modification required: Usually none.
Price: $283-420/month.
CIRCLE 386 ON READER CARD

PLANCODE
IBM Corp., DPD
System for building business planning models on VS systems; batch and interactive versions available.

Users reporting:	5
Overall satisfaction	2.2
Throughput/efficiency	2.0
Ease of installation	2.5
Ease of use	2.8
Documentation	2.5
Vendor technical support	2.2
Training	3.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $450-550/month.
CIRCLE 387 ON READER CARD

PLOT-10
Tektronix Inc.
Versatile graphics support system for use with a variety of host computers.

Users reporting:	8
Overall satisfaction	3.1
Throughput/efficiency	2.9
Ease of installation	2.8
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.1
Training	2.0

Advantages: Flexible; saves human resources.
Modification required: Usually, by user.
Price: $850-$3,100 perpetual license, includes maintenance.
CIRCLE 388 ON READER CARD

POISE
The Poise Company, Inc.
Data management system for use on DEC PDP-11 minicomputers with RSTS.

Users reporting:	7
Overall satisfaction	3.4
Throughput/efficiency	2.6
Ease of installation	3.7
Ease of use	3.6
Documentation	2.7
Vendor technical support	3.1
Training	3.0

Advantages: Inexpensive; saves human resources; flexible.
Modification required: Usually none.
Price: $7,000, includes first year's maintenance ($250/year thereafter).
CIRCLE 389 ON READER CARD

POWER-POWER/VS
IBM Corp., DPD
Spooling supplement to IBM 360/370 DOS or DOS/VS.

Users reporting:	8
Overall satisfaction	3.1
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	2.8
Documentation	2.7
Vendor technical support	2.5
Training	2.5

Advantages: Flexible.
Modification required: Usually none.
Price: $80 for 12 months.
CIRCLE 390 ON READER CARD

PROJACS
IBM Corp., DPD
Project Analysis and Control System for IBM 370 DOS/VS and OS/VS.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.0
Ease of installation	2.8
Ease of use	2.2
Documentation	1.8
Vendor technical support	1.4
Training	1.8

Advantages: Saves human resources.
Modification required: Usually none.
Price: $210/month.
CIRCLE 391 ON READER CARD

QDMS
Quodata Corp.
An interactive data management system for use with DEC PDP-11 series minicomputers.

Users reporting:	5
Overall satisfaction	2.8
Throughput/efficiency	2.8
Ease of installation	3.0
Ease of use	2.8
Documentation	2.2
Vendor technical support	2.6
Training	2.3

Advantages: Saves human resources.
Modification required: Usually none.
Price: $5,000, includes first year's maintenance (10% of purchase price per year thereafter).
CIRCLE 392 ON READER CARD

QUIKJOB
System Support Software, Inc.
File management and reporting system for any IBM 360/370; can handle one or more input files.

Users reporting:	37
Overall satisfaction	3.6
Throughput/efficiency	3.5
Ease of installation	3.8
Ease of use	3.6
Documentation	3.0
Vendor technical support	3.0
Training	2.7

Advantages: Flexible; inexpensive.
Modification required: Usually none.
Price: $5,445, includes first year's maintenance ($200/month thereafter).
CIRCLE 393 ON READER CARD

RAMIS
Mathematica Products Group, Inc.
Data management information and retrieval system; interfaces with several data base management systems and runs on IBM 360/370.

Users reporting:	5
Overall satisfaction	3.0
Throughput/efficiency	2.4
Ease of installation	2.5
Ease of use	3.0
Documentation	2.4
Vendor technical support	2.4
Training	3.0

Advantages: Saves human resources; flexible.
Disadvantages: Uses excessive resources.
Price: $22,000-$60,000 (DOS), $37,000-$84,000 (OS), includes first year's maintenance (10% of existing purchase price thereafter). Monthly lease $1,000-$3,000 (DOS) $1,700-$3,600 (OS).
CIRCLE 394 ON READER CARD

RDOS
Data General Corp.
Real-time disk operating system for Nova and Eclipse minicomputers.

Users reporting:	8
Overall satisfaction	2.5
Throughput/efficiency	2.1
Ease of installation	2.9
Ease of use	3.1
Documentation	2.5
Vendor technical support	2.1
Training	2.7

Advantages: Inexpensive.
Disadvantages: Slow.
Modification required: Usually none.
Price: No charge with "minimum configuration."
CIRCLE 395 ON READER CARD

REPORTER
Burroughs Corp.
COBOL source code report preparation system for most Burroughs computers.

Users reporting:	19
Overall satisfaction	2.6
Throughput/efficiency	2.8
Ease of installation	3.3
Ease of use	2.9
Documentation	2.8
Vendor technical support	2.3
Training	2.6

Advantages: Saves human resources; flexible; inexpensive.

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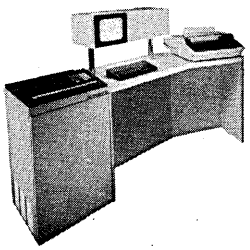


NCSS 3200

USER RATINGS

Modification required: Usually none.
Price: $3,200.
CIRCLE 396 ON READER CARD

RESOLVE
Boole & Babbage, Inc.
On-line system performance and job monitoring package that supports OS and OS/VS systems on IBM 360/370 computers.

Users reporting:	6
Overall satisfaction	3.3
Throughput/efficiency	3.0
Ease of installation	3.3
Ease of use	3.2
Documentation	3.0
Vendor technical support	3.5
Training	3.0

Advantages: Saves system and human resources.
Modification required: Usually, by vendor.
Price: $5,000 cpu license, plus $21,600 site license, includes first year's maintenance (15% of current purchase price thereafter). Monthly lease $450-1,944/month, includes maintenance.
CIRCLE 397 ON READER CARD

RMF ✲
IBM Corp., DPD
Resource Measurement Facility for logging and recording system activity data on IBM 370 OS/VS systems.

Users reporting:	6
Overall satisfaction	3.5
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	2.8
Documentation	3.5
Vendor technical support	3.3
Training	3.0

Modification required: Usually none.
Price: $250/month.
CIRCLE 398 ON READER CARD

RMS-11
Digital Equipment Corp. (DEC)
A file management system designed to operate on the PDP-11 minicomputers under the RSTS/E operating system.

Users reporting:	7
Overall satisfaction	3.1
Throughput/efficiency	2.7
Ease of installation	3.4
Ease of use	3.0
Documentation	2.7
Vendor technical support	2.6
Training	3.0

Modification required: None reported.
Price: $2,750-$3,000.
CIRCLE 399 ON READER CARD

ROSCOE
Applied Data Research Corp. (ADR)
Remote job entry system for OS and OS/VS operating systems.

Users reporting:	20
Overall satisfaction	3.5
Throughput/efficiency	3.5
Ease of installation	3.3
Ease of use	3.5
Documentation	3.1
Vendor technical support	3.0
Training	2.8

Advantages: Saves human and system resources; flexible.
Modification required: Usually none.
Price: $28,000-$42,000, includes first year's maintenance ($3,000-$4,500/year thereafter). Monthly lease $1,200-$1,800.
CIRCLE 251 ON READER CARD

RPG ✲
IBM Corp., DPD
Versions for IBM 360/370 DOS, OS, and their VS counterpart systems.

Users reporting:	45
Overall satisfaction	3.5
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.5
Documentation	3.1
Vendor technical support	2.9
Training	2.8

Modification required: Usually none.
Price: $100/month (DOS).
CIRCLE 252 ON READER CARD

RPG II ✲
IBM Corp., GSD
Standard RPG compiler for the IBM S/3.

Users reporting:	43
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.6
Ease of use	3.5
Documentation	3.4
Vendor technical support	3.4
Training	3.3

Modification required: Usually none.
Price: $97/month.
CIRCLE 253 ON READER CARD

RPG II ✲
IBM Corp., GSD
Version of standard RPG for IBM S/32 and S/34.

Users reporting:	9
Overall satisfaction	3.6
Throughput/efficiency	3.3
Ease of installation	3.7
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.2
Training	2.6

Advantages: Saves human resources.
Modification required: Usually none.
Price: $29/month (S/32), $26/month (S/34).
CIRCLE 254 ON READER CARD

RSTS/E
Digital Equipment Corp. (DEC)
Resource-sharing/time-sharing operating system for the PDP-11.

Users reporting:	24
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.6
Ease of use	3.5
Documentation	3.4
Vendor technical support	3.4
Training	3.3

Modification required: Usually none.
Price: $97/month.
CIRCLE 253 ON READER CARD

USER RATINGS

Overall satisfaction 3.3
Throughput/efficiency 3.0
Ease of installation 3.0
Ease of use 3.5
Documentation 3.1
Vendor technical support 3.3
Training 2.7
Advantages: Flexible.
Modification required: Usually none.
Price: $12,100-$12,700.
CIRCLE 255 ON READER CARD

RTE III
Hewlett-Packard Co.
Real-time executive operating system for HP 21MX and 2100 series.
Users reporting: 5
Overall satisfaction 3.4
Throughput/efficiency 3.0
Ease of installation 3.6
Ease of use 3.2
Documentation 2.4
Vendor technical support 2.8
Training 2.6
Advantages: Flexible; saves human resources.
Modification required: Usually none
Price: $5,000.
CIRCLE 256 ON READER CARD

RSX-11M
Digital Equipment Corp. (DEC)
A subset of the larger RSX-11D advanced real-time operating system for the PDP-11.
Users reporting: 30
Overall satisfaction 2.9
Throughput/efficiency 2.8
Ease of installation 2.3
Ease of use 2.9
Documentation 2.8
Vendor technical support 2.3
Training 2.4
Advantages: Flexible.
Modification required: Usually, by user.
Price: $5,500.
CIRCLE 257 ON READER CARD

RT-11
Digital Equipment Corp. (DEC)
Foreground/background real-time disk operating system for the PDP-11.
Users reporting: 26
Overall satisfaction 3.3
Throughput/efficiency 3.2
Ease of installation 3.2
Ease of use 3.2
Documentation 3.3
Vendor technical support 2.6
Training 3.1
Advantages: Flexible.
Modification required: Usually none.
Price: $2,700-$3,000.
CIRCLE 258 ON READER CARD

SAS ✲
SAS Institute, Inc.
Statistical Analysis System with generalized data management capabilities; runs on IBM 360/370 under OS or OS/VS.
Users reporting: 22
Overall satisfaction 3.5
Throughput/efficiency 3.1
Ease of installation 3.3
Ease of use 3.3
Documentation 3.0
Vendor technical support 3.3
Training 2.9
Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $4,500 first year license ($3,000 for secondary sites and government agencies); $1,500 annual renewal.
CIRCLE 259 ON READER CARD

SCHOLARS
NCR Corp.
School automated records system for NCR Century and Criterion series computers.
Users reporting: 8
Overall satisfaction 2.9
Throughput/efficiency 2.6
Ease of installation 2.5
Ease of use 2.5
Documentation 2.9
Vendor technical support 1.8
Training 2.3
Advantages: Saves human resources.
Modification required: Usually by user.
Price: $9,400, plus $500/year maintenance. Monthly lease $300.
CIRCLE 260 ON READER CARD

SCORE
Informatics Inc.
Multipurpose COBOL program generator for most mainframes.
Users reporting: 5
Overall satisfaction 2.6
Throughput/efficiency 3.0
Ease of installation 2.8
Ease of use 3.0
Documentation 2.6
Vendor technical support 2.8
Training 2.7
Advantages: Saves human resources.
Modification required: Usually, by vendor.
Price: $17,500.
CIRCLE 261 ON READER CARD

SCRIBE
Honeywell Information Systems, Inc.
School attendance and grade reporting system.
Users reporting: 6
Overall satisfaction 2.3
Throughput/efficiency 2.0
Ease of installation 2.2
Ease of use 2.2
Documentation 2.5
Vendor technical support 2.0
Training 2.0
Advantages: Saves human resources.
Disadvantages: Slow; uses excessive resources.
Modification required: Usually, by user.
Price: $3,780-$6,143 initial license, plus $95-$149 monthly license fee.
CIRCLE 262 ON READER CARD

Shadow II ✲
Altergo Software Inc.
A general-purpose teleprocessing monitor that supports DOS, OS, or their VS counterpart operating systems on IBM 360/370 computers; offers multitasking and multithreading facilities.
Users reporting: 18
Overall satisfaction 3.7
Throughput/efficiency 3.7
Ease of installation 3.5
Ease of use 3.4
Documentation 3.1
Vendor technical support 3.4
Training 3.2
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $8,000-$40,000 (DOS-VS), $36,000-$60,000 (VS). Includes first year's maintenance (12% of purchase price per year thereafter). Monthly lease $235-$1,200 (DOS-VS), $1,058-$1,500 (OS).
CIRCLE 263 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: 43
Overall satisfaction 3.7
Throughput/efficiency 3.7
Ease of installation 3.6
Ease of use 3.6
Documentation 3.1
Vendor technical support 3.3
Training 3.0
Advantages: Inexpensive; saves human and system resources; flexible.
Modification required: Usually none.
Price: $2,950 (DOS), $3,950 (OS), for 99-year license, includes first year's maintenance (optional $354-$474 thereafter).
CIRCLE 264 ON READER CARD

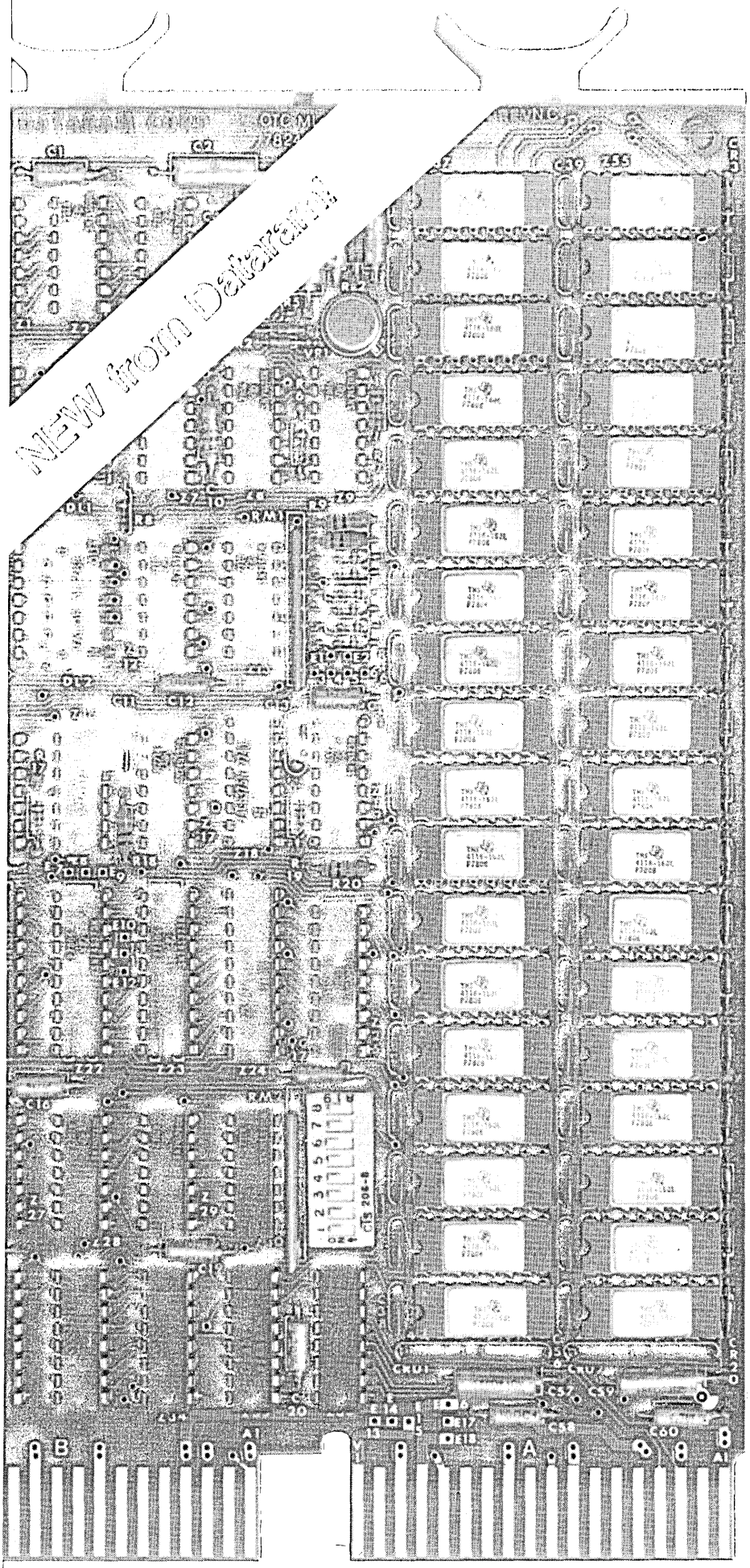
Software 1040
SAB, Inc.
For preparation of personal income tax Form 1040; runs on a variety of minicomputers.
Users reporting: 21
Overall satisfaction 3.4
Throughput/efficiency 3.0
Ease of installation 3.4
Ease of use 3.3
Documentation 2.9
Vendor technical support 3.1
Training 3.1
Advantages: Saves human resources.
Modification required: Usually none.
Price: $1,750 for the first 400 returns (lease, only on a service basis).
CIRCLE 265 ON READER CARD

Sort
IBM Corp., DPD
Disk-based sort for IBM 360/370.
Users reporting: 64
Overall satisfaction 3.2
Throughput/efficiency 2.9
Ease of installation 3.5
Ease of use 3.3
Documentation 3.1
Vendor technical support 2.7
Training 3.2
Modification required: Usually none.
Price: $68-$181/month (OS/VS and OS).
CIRCLE 266 ON READER CARD

Sort ✲
IBM Corp., GSD
Small sort (disk or card versions) for IBM S/3.
Users reporting: 33
Overall satisfaction 3.5
Throughput/efficiency 3.8
Ease of installation 3.6
Ease of use 3.6
Documentation 3.4
Vendor technical support 3.3
Training 3.1
Advantages: Flexible; inexpensive.
Modification required: Usually none.
Price: $51/month.
CIRCLE 267 ON READER CARD

Sort-1
Oregon Minicomputer Software, Inc. (OMSI)
Sort/merge package for use on DEC PDP-11 computers running under RSTS/E.
Users reporting: 6
Overall satisfaction 3.8
Throughput/efficiency 3.8
Ease of installation 3.8
Ease of use 3.7
Documentation 3.0
Vendor technical support 2.6
Training 2.0
Advantages: Saves system resources; inexpensive.
Modification required: Usually none.
Price: $500, includes first year's maintenance ($100/year thereafter).
CIRCLE 268 ON READER CARD

1130/Sort ✲
DNA Systems Inc.
Generalized sort program for IBM 1130 and compatible systems.
Users reporting: 10
Overall satisfaction 3.6
Throughput/efficiency 3.9
Ease of installation 3.7
Ease of use 3.7
Documentation 3.3
Vendor technical support 3.0
Training 2.6
Advantages: Flexible; saves system resources.
Modification required: Usually none.
Price: $730, includes first year's



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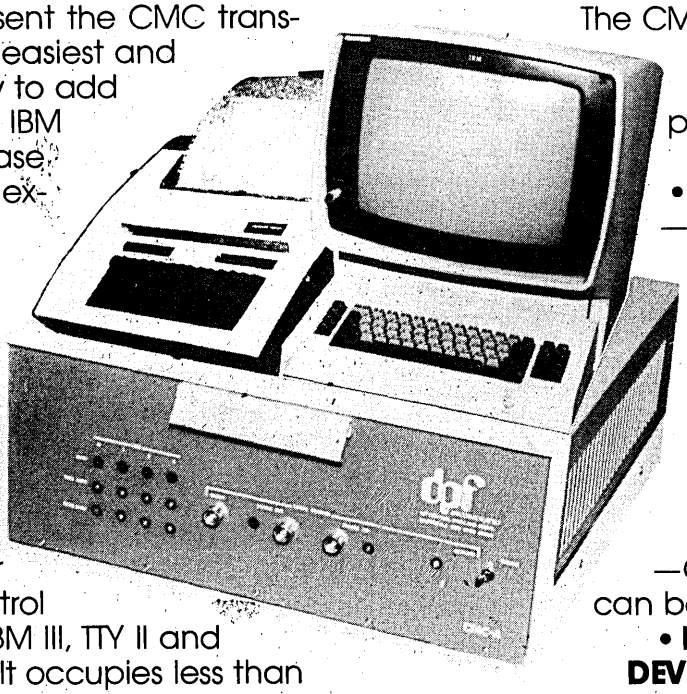
CIRCLE 35 ON READER CARD

COMMUNICATIONS MICRO CONTROLLER

DPF is pleased to present the CMC transmission controller, the easiest and most economical way to add teleprocessing to your IBM computer. It will increase the capability of your existing system, and/or add a new teleprocessing application without disturbing your in-place operational system.



The CMC is a high performance microprocessor directed controller that emulates the IBM 2701 or 2703 transmission control units for IBM I, IBM II, IBM III, TTY II and SDA II line disciplines. It occupies less than 1.3 cubic feet of space and can replace up to two IBM 3704's for IBM 2701's at a fraction of their combined cost. EIA RS 232-C and wide-band interfaces offer high throughput in a extraordinary reliable and compact package.

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- **CUSTOMIZING**—Custom modifications can be easily implemented
- **FLEXIBILITY—CHANGE DEVICE ADDRESS**—Switch changeable, independent device addresses. Multiple lines per CMC.

CHANGE LINE PROTOCOLS—Switch selection of IBM I, II, III, TTY II or SDA II disciplines and their features.

CHANGE LINE SPEEDS—User selection of line speeds up to 56,000 BPS

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DPF Incorporated, a Fortune 500 company, is one of the largest independent computer leasing organizations in the United States. Through its computer leasing operation, DPF services a broad range of leading corporations, institutions and governmental agencies. It owns and/or manages a computer portfolio with an original manufacturers price approaching one-half billion dollars.

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CIRCLE 43 ON READER CARD

maintenance (10% per year thereafter).
CIRCLE 269 ON READER CARD

Source Program Maintenance (SPM-360/370)
IBM Corp., DPD
For IBM 360/370 COBOL programs.

Users reporting:	29
Overall satisfaction	3.3
Throughput/efficiency	3.1
Ease of installation	3.2
Ease of use	3.3
Documentation	2.6
Vendor technical support	2.7
Training	2.8

Advantages: Saves human resources; inexpensive.
Modification required: Usually none.
Price: $150/month.
CIRCLE 270 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:	8
Overall satisfaction	3.8
Throughput/efficiency	3.3
Ease of installation	3.1
Ease of use	3.6
Documentation	2.9
Vendor technical support	3.1
Training	2.5

Advantages: Saves human resources; flexible.
Disadvantages: Uses excessive resources.
Modification required: Usually none or by user.
Price: $425/month.
CIRCLE 271 ON READER CARD

The SPOOLER
DataCorp of Virginia Inc.
A modular DOS and DOS/VS spooling enhancement.

Users reporting:	5
Overall satisfaction	3.4
Throughput/efficiency	3.4
Ease of installation	3.8
Ease of use	3.8
Documentation	3.2
Vendor technical support	3.0
Training	2.7

Advantages: Flexible; inexpensive; saves system and human resources.
Modification required: Usually none.
Price: $400 monthly lease includes maintenance. Perpetual license available.
CIRCLE 272 ON READER CARD

SPRINT ✲
Jason Data Services
Spooling supplement to IBM 360/370 DOS and DOS/VS.

Users reporting:	9
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.8
Ease of use	3.8
Documentation	3.2
Vendor technical support	3.1
Training	3.3

Advantages: Inexpensive; saves human resources.
Modification required: Usually none.
Price: $3,300-$8,500 perpetual license, plus $150/year maintenance. Monthly lease $115-$325.
CIRCLE 273 ON READER CARD

SPSS ✲
Northwestern Univ.
Specially modified version of the SPSS, Inc. package for use on Control Data computers.

Users reporting:	8
Overall satisfaction	3.6
Throughput/efficiency	3.1
Ease of installation	3.1
Ease of use	3.5
Documentation	3.4
Vendor technical support	3.1
Training	1.0

Advantages: Flexible; saves human resources.
Modification required: Usually, by vendor.
Price: Batch version $5,000 initial license, includes first year's maintenance ($2,000/year maintenance renewal thereafter). On-line $2,500 initial fee, plus $1,000/year maintenance renewal. Prices are for commercial users; discounts are available for academic and nonprofit/governmental organizations.
CIRCLE 274 ON READER CARD

SPSS
SPSS, Inc.
For statistical work in the social sciences on IBM 360/370 computers; originator of basic SPSS package.

Users reporting:	49
Overall satisfaction	3.3
Throughput/efficiency	2.9
Ease of installation	3.1
Ease of use	3.2
Documentation	3.3
Vendor technical support	2.8
Training	2.5

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: Commercially $5,000 first year, $2,000 annual renewal. Tax exempt organizations $3,000 first year, $1,500 renewal. Academic users $1,000 first year, $600 renewal. Maintenance included.
CIRCLE 275 ON READER CARD

SPSS
Univ. of Pittsburgh
University-modified version of the SPSS, Inc. package for statistical work in the social sciences.

Users reporting:	6
Overall satisfaction	3.7
Throughput/efficiency	2.3
Ease of installation	3.4
Ease of use	3.2
Documentation	3.3
Vendor technical support	2.2
Training	2.0

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: Commercially $5,000 first year, $2,000 annual renewal. Tax-exempt organizations $3,000 first; $1,500 renewal. Academic users $1,000 and $600 renwal. Maintenance included.
CIRCLE 276 ON READER CARD

SPSS/C
Carleton College
Version of Statistical Program for Social Sciences for Xerox Sigma computers.

Users reporting:	12
Overall satisfaction	3.3
Throughput/efficiency	2.8
Ease of installation	2.6
Ease of use	3.0
Documentation	2.7
Vendor technical support	2.5
Training	2.5

Advantages: Saves human resources; inexpensive.
Modification required: Usually none.
Price: Commercial $4,000, plus $1,600/year maintenance; nonprofit $1,200, plus $480/year; academic $800, plus $640/year.
CIRCLE 277 ON READER CARD

SRI/EDIT ✲
Systems Research, Inc.
On-line programming text editor and file maintenance system for use on Burroughs B 2700 and up.

Users reporting:	7
Overall satisfaction	3.7
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.6
Documentation	3.4
Vendor technical support	3.6
Training	3.0

Advantages: Saves human and system resources.
Modification required: Usually none.
Price: $4,750 perpetual license, includes installation, training and first 120 days maintenance ($250/year thereafter).
CIRCLE 278 ON READER CARD

Students Records System ✲
Information Associates, Inc.
College and university student records processing system; can run on a variety of medium to large-scale computer systems.

Users reporting:	5
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	3.4
Ease of use	3.4
Documentation	3.4
Vendor technical support	3.6
Training	3.2

Advantages: Saves human resources.
Disadvantages: Complex.
Modification required: Usually, by vendor.
Price: $75,000. No maintenance offered.
CIRCLE 279 ON READER CARD

SUPER Payroll System
Wang Laboratories, Inc.
Payroll/personnel system for IBM 360/370, Burroughs, and Honeywell computers.

Users reporting:	10
Overall satisfaction	3.1
Throughput/efficiency	2.6
Ease of installation	2.6
Ease of use	2.9
Documentation	2.9
Vendor technical support	2.6
Training	2.9

Advantages: Flexible; saves human resources.
Modification required: Usually, by user.
Price: $37,000, plus $6,000/year maintenance.
CIRCLE 280 ON READER CARD

SYNCSORT ✲
Whitlow Computer Systems, Inc.
Efficient DOS, DOS/VS, OS, or OS/VS disk and tape sorting program for IBM 360/370.

Users reporting:	94
Overall satisfaction	3.6
Throughput/efficiency	3.6
Ease of installation	3.3
Ease of use	3.6
Documentation	3.2
Vendor technical support	3.2
Training	3.0

Advantages: Saves system resources.
Modification required: Usually none.
Price: $1,950/year (DOS), $3,000/year (OS); both include maintenance.
CIRCLE 281 ON READER CARD

System 2000
MRI Systems, Inc.
Generalized data base management system for IBM 360/370, Univac, and CDC computers.

Users reporting:	24
Overall satisfaction	3.3
Throughput/efficiency	2.9
Ease of installation	3.1
Ease of use	3.2
Documentation	2.8
Vendor technical support	2.8
Training	3.0

Advantages: Flexible; saves human resources.
Modification required: Usually none.
Price: $30,000-$100,000 (paid-up lease), rental from $1,200/month. Maintenance $170/month.
CIRCLE 282 ON READER CARD

TASK/MASTER
Turnkey Systems, Inc.
Data communications monitor for IBM 360/370.

Users reporting:	27
Overall satisfaction	2.9
Throughput/efficiency	3.0

USER RATINGS

Ease of installation 2.6
Ease of use 2.9
Documentation 2.5
Vendor technical support 2.5
Training 2.7
Advantages: Flexible.
Modification required: Usually, by vendor.
Price: $20,000 (DOS), $44,000 (OS), includes first year's maintenance (10% of purchase price per year thereafter). Monthly lease (3-years) $555 (DOS), $1,225 (OS).
CIRCLE 283 ON READER CARD

Text/Editor
Burroughs Corp.
A text editing facility for remote programming operations; for B 1700 and up.
Users reporting: 10
Overall satisfaction 3.1
Throughput/efficiency 3.2
Ease of installation 3.4
Ease of use 3.4
Documentation 2.7
Vendor technical support 2.8
Training 2.6
Advantages: Saves human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $1,800, plus $180/year license fee.
CIRCLE 284 ON READER CARD

TFAST & TFAST/VS
Oxford Software Corp.
Provides tape management capabilities for IBM 360/370 DOS or DOS/VS users.
Users reporting: 15
Overall satisfaction 3.2
Throughput/efficiency 3.2
Ease of installation 3.3
Ease of use 3.2
Documentation 2.7
Vendor technical support 2.6
Training 2.3
Advantages: Saves human resources.
Modification required: Usually none.
Price: $5,500, includes first year's maintenance (10% per year thereafter).
CIRCLE 285 ON READER CARD

TLMS
Gulf Computer Sciences, Inc.
Tape library management system for IBM 360/370 OS or OS/VS systems.
Users reporting: 12
Overall satisfaction 2.9
Throughput/efficiency 2.8
Ease of installation 2.4
Ease of use 3.2
Documentation 2.5
Vendor technical support 2.3
Training 2.0
Advantages: Saves human resources.
Modification required: Usually, by user.
Price: $12,500, includes first year's maintenance ($1,000/year thereafter).
CIRCLE 286 ON READER CARD

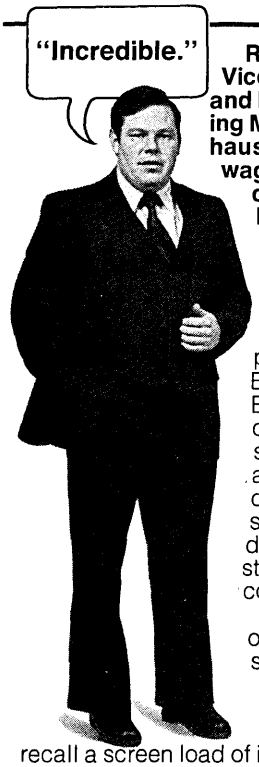
TONE
Tone Software Corp.
Interactive time-sharing facility for IBM 370 OS/VS systems.
Users reporting: 6
Overall satisfaction 2.7
Throughput/efficiency 2.8
Ease of installation 2.0
Ease of use 2.8
Documentation 2.5
Vendor technical support 2.7
Training -
Advantages: Saves human resources.
Disadvantages: Compatibility problems.
Modification required: Usually by user.
Price: $26,500. Maintenance 15%. Monthly lease $825.
CIRCLE 287 ON READER CARD

TOTAL
Cincom Systems, Inc.
Generalized data base management system for use on a variety of systems from minis to large-scale computers.
Users reporting: 108
Overall satisfaction 3.2
Throughput/efficiency 3.1
Ease of installation 3.2
Ease of use 3.2
Documentation 2.7
Vendor technical support 2.7
Training 2.7
Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $41,000 (DOS), $52,000 (OS), includes first year's maintenance ($2,500 or $2,750/year thereafter). Monthly lease $1,025 (DOS), $1,300 (OS), including maintenance.
CIRCLE 288 ON READER CARD

TSO
DNA Systems Inc.
Time-sharing operating system for IBM 1130 and compatible systems.
Users reporting: 10
Overall satisfaction 3.5
Throughput/efficiency 3.7
Ease of installation 3.2
Ease of use 3.3
Documentation 2.6
Vendor technical support 3.1
Training 2.3
Advantages: Flexible; saves system resources.
Modification required: Usually, by user.
Price: $8,000, includes first year's maintenance (10% per year thereafter).
CIRCLE 289 ON READER CARD

TSX
S & H Computer Leasing, Inc.
Time-sharing executive that supports a series of language processors under RT-11 on DEC PDP-11 min-

EDP professionals have a word for the new Wang VS computer.



Richard Berger, Vice President and Data Processing Manager, Bughaus, Inc., a Volkswagen service center network headquartered in Hartford, Conn.

"Because we had been using a computer—the Burroughs B1700—with card input sequential files and no video displays, we suffered long delays and storage constraints.

"Now, with our Wang VS system, storage is virtually unlimited, and we simply recall a screen load of information on the CRT to make a change in seconds—all of this without interrupting our normal flow of work.

"We've put everything in our business onto our VS system, including payroll, accounting, sales and wholesale and retail inventory control. And we did it in 90 days without changing languages and with only minor modifications in almost 90 COBOL programs."

"We are absolutely amazed at the throughput rate we've achieved with our Wang VS. On our very first job for one of the country's largest student insurance agencies, the VS arrived in Pittsburgh on December 23 and was completely installed and operational on-site on February 15, with 61 programs written, debugged and tested—all by only two people—and not a single line of code had been written until the machine came in the door.

"The VS really fulfills all of our requirements, particularly in areas where other systems are weak: cost/performance, language-availability, user-utility software.

"I think the real key for the DP manager is the utilities available with the VS, its speed and its interactive COBOL compiler. These three things combined make for a very powerful tool."

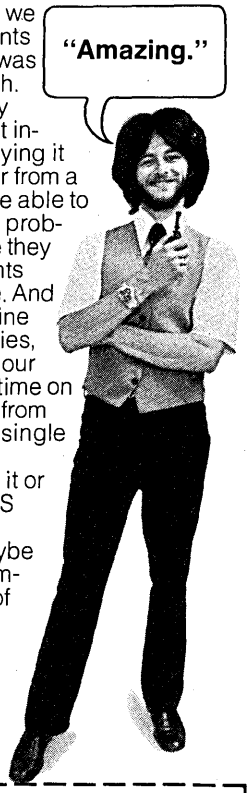
J.P. Scott, Data Processing Manager, Aptech Computer Systems, Inc., Pittsburgh, Pa.

Kenneth W. Cakebread, Manager of Data Processing, Trans-Air Forwarding and Brokerage, Inc., Inglewood, Calif.

"I had 30 days to convert about 220 programs from our old batch-oriented Honeywell 62 system to our new Wang VS system. Not only did I do it: Thanks to the programming power of the VS, I actually came up with more.

"Before we converted to the VS, the biggest problem we had in the accounts receivable area was misapplying cash. No more. Now, by capturing current information and keying it into the computer from a workstation, we're able to sort out potential problems long before they get to the accounts receivable stage. And with Wang's on-line editing capabilities, I'd say we've cut our average editing time on a per-item basis from 30 seconds to a single second.

"And believe it or not, while the VS gives us faster access and maybe triple the programming efficiency of our old system, it was only half the cost."



EDP professionals in more than 100 companies are singing the praises of the Wang VS. And for good reason.

The VS is a remarkably sophisticated, fully expandable virtual storage computer designed to provide maximum interaction in a mainframe environment.

The VS provides for distributed data processing, thus avoiding costly consumption of mainframe resources. It's fast, responsive, ease to use and can support up to 2.3 billion bytes of on-line storage. What's more the VS speaks EDP people's language: COBOL, BASIC, RPG II and ASSEMBLER.

We also think you'll appreciate how simple the VS is to operate. In fact, because of its level of sophistication, it can be operated by people with little or no computer-related training or experience.

One more thing: the entry level price of the VS is under $50,000. Which is perhaps the most remarkable thing of all about this computer.

For more information on the VS, return this coupon to Wang Laboratories, Lowell, MA 01851.

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DP88/D128

USER RATINGS

icomputers.

Users reporting:	5
Overall satisfaction	3.2
Throughput/efficiency	3.4
Ease of installation	3.0
Ease of use	3.4
Documentation	2.8
Vendor technical support	3.2
Training	-

Advantages: Saves human resources; flexible; inexpensive.
Modification required: Usually none.
Price: $1,275 perpetual license. Updates $85 each.
CIRCLE 290 ON READER CARD

UCC 1 (or TMS)
University Computing Co. (UCC)
Tape management for IBM 360/370 OS or OS/VS.

Users reporting:	25
Overall satisfaction	3.6
Throughput/efficiency	3.4
Ease of installation	2.5
Ease of use	3.3
Documentation	2.9
Vendor technical support	3.2
Training	2.7

Advantages: Saves human resources.
Modification required: Usually none.
Price: $12,900, includes first year's maintenance ($1,400/year thereafter).
CIRCLE 291 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	3.0
Ease of use	3.2
Documentation	2.8
Vendor technical support	3.0
Training	3.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $34,000, plus $2,400/year maintenance.
CIRCLE 292 ON READER CARD

UCC 10
University Computing Co. (UCC)
Data dictionary manager and control statement generator for IBM's IMS.

Users reporting:	8
Overall satisfaction	3.1
Throughput/efficiency	2.6
Ease of installation	2.5
Ease of use	2.8
Documentation	2.3
Vendor technical support	2.4
Training	2.0

Disadvantages: Complex.
Modification required: usually, by user.
Price: $18,000, plus $2,000/year maintenance.
CIRCLE 293 ON READER CARD

UNIS/90
Sperry Univac
A bill of material, inventory control, planning, and scheduling system for the Univac 90 series.

Users reporting:	22
Overall satisfaction	3.2
Throughput/efficiency	3.0
Ease of installation	3.0
Ease of use	2.9
Documentation	2.7
Vendor technical support	2.8
Training	3.0

Advantages: Inexpensive; flexible; saves human resources.
Modification required: Usually, by user.
Price: $275/month.
CIRCLE 294 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	3.4
Throughput/efficiency	3.4
Ease of installation	3.1
Ease of use	3.8
Documentation	2.9
Vendor technical support	2.3
Training	-

Advantages: Flexible; saves human resources.
Modification required: Usually, by user.
Price: $12,000-$30,000 first cpu, $4,000-$10,000 each additional cpu. No maintenance offered.
CIRCLE 295 ON READER CARD

Utilities (S/3)
IBM Corp., GSD
(Not further qualified by survey respondents.)

Users reporting:	14
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.6
Ease of use	3.6
Documentation	3.1
Vendor technical support	3.3
Training	3.3

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: Insufficient description to price out.
CIRCLE 296 ON READER CARD

Utilities (S/32 & S/34)
IBM Corp., GSD
(Not further qualified by survey respondents.)

Users reporting:	9
Overall satisfaction	3.4
Throughput/efficiency	3.2
Ease of installation	3.4
Ease of use	3.3
Documentation	3.1
Vendor technical support	3.2
Training	3.4

Advantages: Inexpensive.
Modification required: None reported.
Price: Insufficient description to price out.
CIRCLE 297 ON READER CARD

VALU-LIB
Value Computing Inc.
Tape library management system written in ANSI COBOL for use on most computers.

Users reporting:	6
Overall satisfaction	3.0
Throughput/efficiency	3.0
Ease of installation	2.8
Ease of use	2.8
Documentation	2.5
Vendor technical support	2.6
Training	2.3

Modification required: Usually none.
Price: $12,500, plus $1,500/year maintenance.
CIRCLE 298 ON READER CARD

Versaplot
Versatec
Supports the company's electrostatic printers and plotters on nearly any byte-oriented FORTRAN minicomputer.

Users reporting:	5
Overall satisfaction	3.0
Throughput/efficiency	2.6
Ease of installation	2.4
Ease of use	2.4
Documentation	2.0
Vendor technical support	2.5
Training	1.0

Advantages: Flexible.
Modification required: Usually, by user.
Price: $2,000 perpetual license for minis, $5,500 for mainframes. Maintenance $100/month, includes automatic updates.
CIRCLE 299 ON READER CARD

Video/370
IBM Corp., DPD
Crt oriented on-line data entry system for IBM 370.

Users reporting:	5
Overall satisfaction	2.4
Throughput/efficiency	2.4
Ease of installation	2.2
Ease of use	3.3
Documentation	2.6
Vendor technical support	2.2
Training	4.0

Advantages: Saves human resources.
Modification required: Usually none.
Price: $292/month.
CIRCLE 300 ON READER CARD

VOLLIE ✲
Applied Data Research Corp. (ADR)
An on-line program development tool that offers extended LIBRARIAN features.

Users reporting:	7
Overall satisfaction	3.9
Throughput/efficiency	3.7
Ease of installation	3.6
Ease of use	3.7
Documentation	3.4
Vendor technical support	3.6
Training	3.3

Advantages: Saves human resources; flexible.
Modification required: Usually none.
Price: $11,500, includes first year's maintenance ($1,700/year thereafter). Monthly lease $420. All prices approximate.
CIRCLE 201 ON READER CARD

WATFIV
Univ. of Waterloo
Fast, in-memory FORTRAN compiler for IBM 360/370.

Users reporting:	6
Overall satisfaction	3.8
Throughput/efficiency	3.5
Ease of installation	3.5
Ease of use	3.7
Documentation	3.7
Vendor technical support	2.4
Training	3.0

Advantages: Saves human and system resources; inexpensive.
Modification required: None reported.
Price: Commerical $1,200/year, academic $600/year, third-party $2,400/year.
CIRCLE 202 ON READER CARD

WESTI ✲
Westinghouse Electric Corp.
Teleprocessing interface system for small to medium IBM 360/370 DOS or DOS/VS installations.

Users reporting:	46
Overall satisfaction	3.7
Throughput/efficiency	3.6
Ease of installation	3.5
Ease of use	3.4
Documentation	3.2
Vendor technical support	3.2
Training	3.1

Advantages: Inexpensive; saves system and human resources; flexible.
Modification required: Usually none.
Price: Local $8,500, plus $750/year maintenance; remote $12,500, plus $1,000/year maintenance.
CIRCLE 203 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:	9
Overall satisfaction	2.8
Throughput/efficiency	2.1
Ease of installation	2.9
Ease of use	2.8
Documentation	2.6
Vendor technical support	2.3
Training	2.2

Advantages: Saves human resources.

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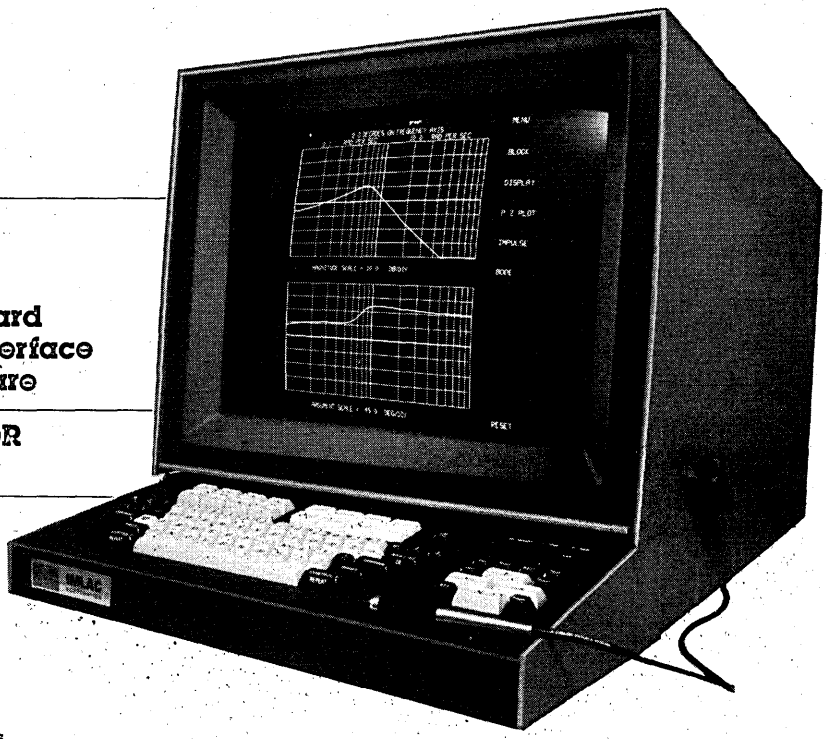

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CIRCLE 42 ON READER CARD

USER RATINGS

Disadvantages: Slow; uses excessive resources.
Modification required: Usually, by user.
Price: Bundled with the hardware.
CIRCLE 204 ON READER CARD

XREF ✲
MICRO Systems Inc.
RPG-II compiler extension that produces an alphabetic cross-reference listing automatically; for use on IBM S/3.
Users reporting: 5

Overall satisfaction	3.8
Throughput/efficiency	3.0
Ease of installation	3.6
Ease of use	3.8
Documentation	2.8
Vendor technical support	3.0
Training	-

Advantages: Saves human resources.
Modification required: None.
Price: $375 one-time license fee.
CIRCLE 205 ON READER CARD ✲

VENDOR INDEX

To obtain additional information about the software packages rated in the preceding listing, please contact the vendor directly at the address listed below, or circle the appropriate number on the reader service card bound into this issue.

Altergo Software Inc.
Wellesley Office Park
40 William St.
Wellesley, MA 02181
(617) 237-6132

American Valuation Consultants, Inc.
2200 East Devon Ave.
Suite 247
Des Plaines, IL 60018
(312) 297-6100

Applied Data Research, Inc.
Route 206 Center, CN-8
Princeton, NJ 08540
(609) 924-9100

Aries Information Systems, Inc.
7400 Metro Blvd.
Suite 370
Minneapolis, MN 55435
(612) 835-2366

Arthur Anderson & Co.
69 West Washington St.
Chicago, IL 60602
(312) 346-6262

Atlantic Software Inc.
Lafayette Building, Suite 910
Fifth & Chestnut Sts.
Philadelphia, PA 19106
(215) 922-7500

Bancroft Computer Systems, Inc.
715 Trenton St.
P.O. Box 1533
West Monroe, LA 71291
(318) 388-2236

BMS Computer
Box 3086
Walnut Creek, CA 94598
(415) 938-2620

Boole & Babbage, Inc.
510 Oakmead Pkwy.
Sunnyvale, CA 94086
(408) 735-9550

Burroughs Corp.
Burroughs Pl.
Detroit, MI 48232
(313) 972-7269

California Computer Products, Inc. (CalComp)
2411 W. LaPalma Ave.
Anaheim, CA 92801
(714) 821-2011

Cambridge Systems Group, Inc.
19857 Beekman Pl.
Cupertino, CA 95014
(408) 255-5727

Capex Corp.
P.O. Box 13529
Phoenix, AZ 85002
(602) 264-7241

Carleton College
Computing Activities
Northfield, MN 55057
(507) 645-4431 ext.443

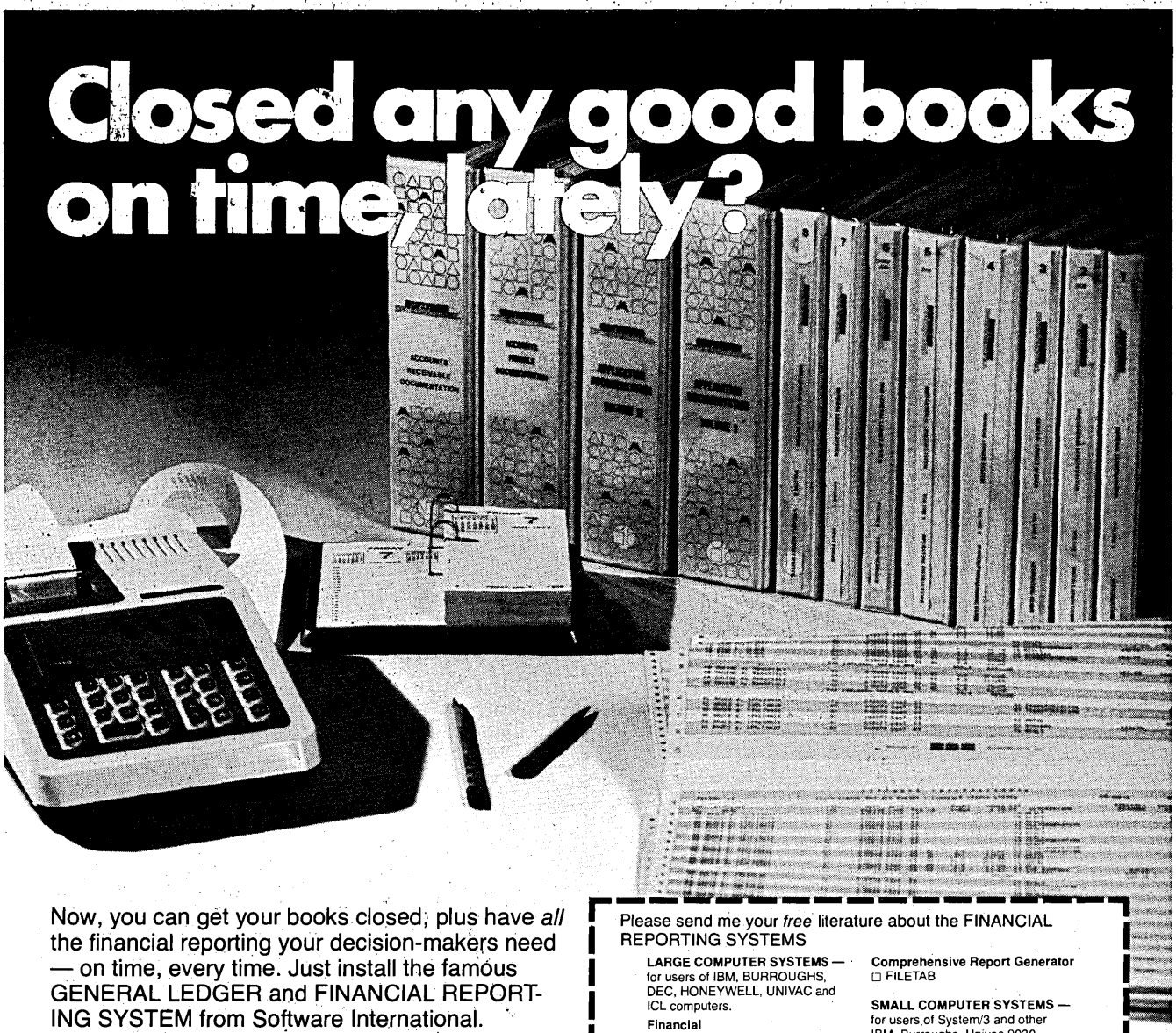
C F S Inc.
1330 Boylston St.
Suite 608
Chestnut Hill, MA 02167
(617) 566-0222

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

The Computer Software Co.
6517 Everglades Dr.
Richmond, VA 23225

Closed any good books on time, lately?



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Computer System _____
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CIRCLE 58 ON READER CARD

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Wellesley, MA 02181
(617) 237-6600

Cyborg Systems, Inc.
2 N. Riverside Plaza
Suite 2225
Chicago, IL 60606
(312) 454-1865

Datachron Corp.
174 Fifth Ave.
New York, NY 10010
(212) 675-5333

DataCorp of Virginia, Inc.
RNB Center
Harrisonburg, VA 22801
(703) 433-9141

Data Design Associates, Inc.
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Suite 418
Santa Clara, CA 95051
(408) 985-2570

Data General Corp.
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Westboro, MA 01581
(617) 485-9100

Datapoint Corp.
9725 Datapoint Drive
San Antonio, TX 78284
(512) 699-7000

Dearborn Computer Company, Inc.
1460 Renaissance Dr.
Suite 400
Park Ridge, IL 60068
(312) 827-9200

Digital Equipment Corp. (DEC)
146 Main St.
Maynard, MA 01754
(617) 897-5111

Digital Research
P.O. Box 579
Pacific Grove, CA 93950
(408) 649-3896

DNA Systems, Inc.
P.O. Box 1424
Saginaw, MI 48605
(517) 793-0185

Dylakor Software Systems, Inc.
16255 Ventura Blvd.
Suite 808
Encino, CA 91436
(213) 995-0151

Financial Technology, Inc.
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Chicago, IL 60506
(312) 280-0635

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Gulf Computer Sciences, Inc.
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Information Associates, Inc.
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Rochester, NY 14609
(716) 288-6900

Information Processing Inc. (IPI)
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Winter Park, FL 32789
(305) 647-2200

Information Science, Inc. (IncSci)
95 Chestnut Ridge Rd.
Montvale, NJ 07645
(201) 391-1600

Innovation Data Processing, Inc.
970 Clifton Ave.
Clifton, NJ 07013
(201) 777-1940

Insurance Systems of America, Inc. (ISA)
P.O. Box 47975
Atlanta, GA 30362
(404) 449-3950

International Systems, Inc.
890 Valley Forge Plaza
King of Prussia, PA 19406
(215) 265-1550

Jason Data Services
1871 Jonive Rd.
Sebastopol, CA 95472
(707) 823-2293

Johnson Systems, Inc.
7923 Jones Branch Dr.
McLean, VA 22102
(703) 821-1700

Macro-4 Inc.
Gothic Plaza
376 Hollywood Ave.
Fairfield, NJ 07006
(201) 575-6466

Management and Computer Services, Inc. (MACS)
790 Valley Forge Plaza
Valley Forge, PA 19482
(215) 265-2910

Management Science America, Inc. (MSA)
3445 Peachtree Rd.,N.E.
Suite 1300
Atlanta, GA 30326
(404) 262-2376

Martin Marietta Data Systems
300 E. Joppa Rd.
Towson, MD 21204
(301) 321-5700

Mathematica Products Group, Inc.
P.O. Box 2392
Princeton, NJ 08540
(609) 799-2600

McCormack & Dodge Corp.
381 Elliot St.
Newton, MA 02164
(617) 964-6610

Medical Information Technology, Inc. (MEDITECH)
255 Bent St.
Cambridge, MA 02141
(617) 354-3000

Microsoft
300 San Mateo, N.E.
Suite 819
Albuquerque, NM 87108
(505) 262-1486

MICRO Systems, Inc.
501 Third St., S.W.
Albuquerque, NM 87102
(505) 243-1677

Mini-Computer Business Applications, Inc.
4929 Wilshire Blvd.
Suite 940
Los Angeles, CA 90010
(213) 936-7131

MRI Systems Corp.
P.O. Box 9968
Austin, TX 78766
(512) 258-5171

MSP, Inc.
21 Worthen Rd.
Lexington, MA 02173
(617) 861-6130

National Information System, Inc.
20370 Town Center Lane
Suite 245
Cupertino, CA 95014
(408) 257-7700

NCI, Inc.
6075 Roswell Rd.,N.E.
Atlanta, GA 30328
(404) 252-9474

NCR Corp.
5225 Springboro Pike

VENDOR INDEX

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Vogelback Computer Center
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(312) 492-3682

On-Line Software International
65 Route 4 East
River Edge, NJ 07661
(201) 488-7770

Optipro, Inc.
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Stock Exchange Tower
Montreal, Quebec H4Z 1J8
Canada
(514) 845-8107

Oregon Minicomputer Software, Inc. (OMSI)
2340 S.W. Canyon Rd.
Portland, OR 97201
(503) 226-7760

Oxford Software Corp.
174 Boulevard
Hasbrouck Heights, NJ 07604
(201) 288-1515

Pansophic Systems, Inc.
709 Enterprise Dr.
Oak Brook, IL 60521
(312) 986-6000

The Poise Co., Inc.
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Roswell, NM 88201
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Price Waterhouse & Co.
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New York, NY 10020
(212) 489-8900

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95 Chestnut Ridge Rd.
Montvale, NJ 07645
(201) 391-9800

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196 Trumbull St.
Hartford, CT 06107
(203) 728-6777

S & H Computer Leasing, Inc.
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Nashville, TN 37215
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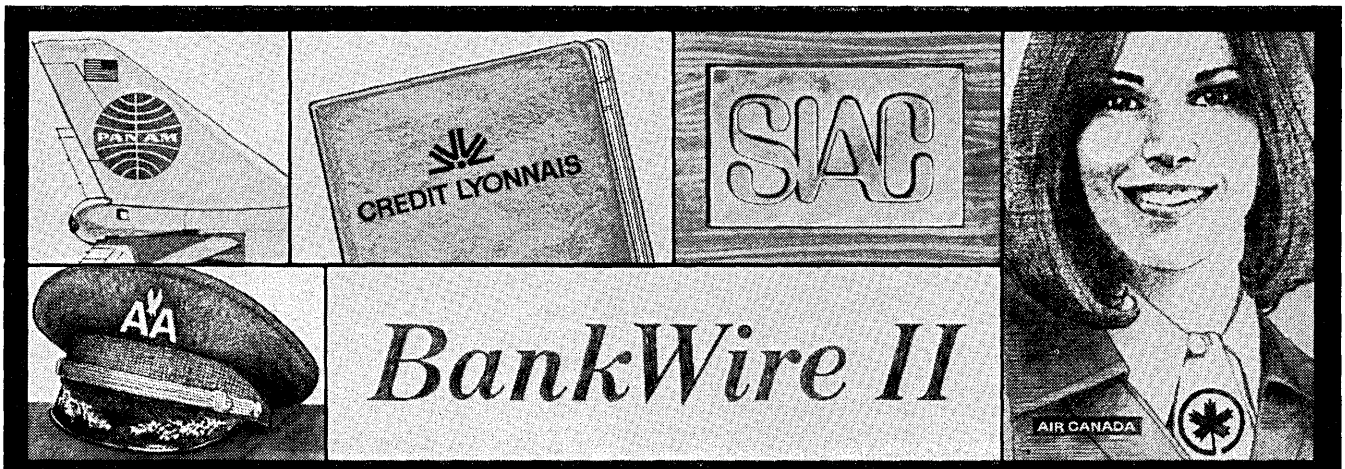

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CIRCLE 66 ON READER CARD

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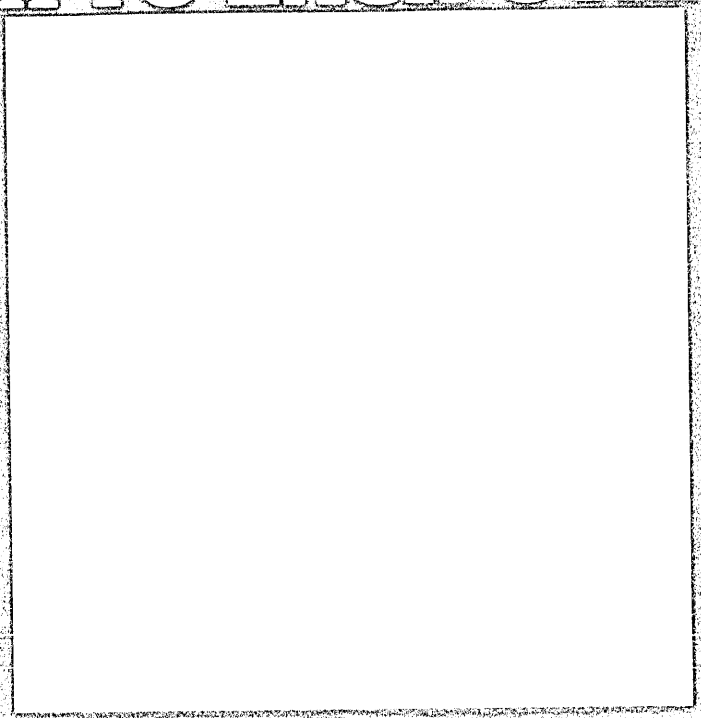

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CIRCLE 122 ON READER CARD

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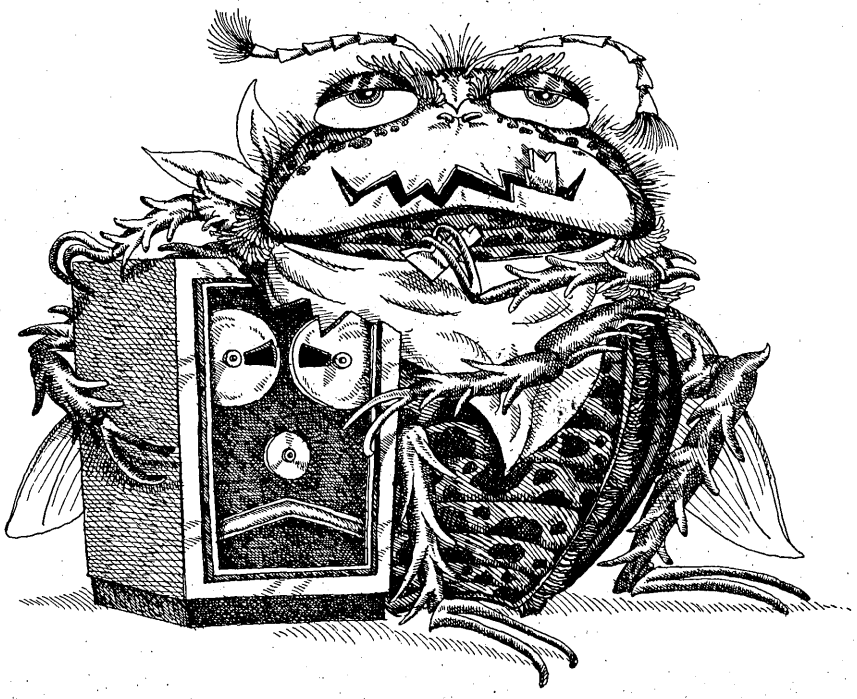

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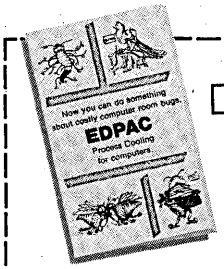

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CIRCLE 130 ON READER CARD

HARDWARE

OFF-LINE

A process that can double the speed at which electrical current moves through semiconductor crystals at room temperature has been developed by researchers at Bell Labs. The process could lead to faster computers, communications systems with more capacity, and new, previously unthought of devices as it alters the material's electrical conductivity (previously considered a constant). The technique consists of layering two semiconductor materials to form a single crystal. Silicon impurities, which donate free electrons to the crystal, are added to only one of the materials; they migrate to the other layer because they can exist in it at lower energy levels. The positively charged remnants of the silicon electron donors remain in the other layer, where they can't slow down current flow. At low temperatures, devices constructed with the new method are said to conduct current even faster, perhaps 20 times as fast.

Two developments, both said to be commercially available, have come to our attention via the Japanese trade press. Fujitsu Ltd. has come out with a 72Kbps fiber optic modem with a 4km range. Called the FOPIC, an as yet undefined acronym, the selling price ranges from ¥200,000 to ¥400,000. Sharp Corp. has come up with an Electrochromic Display (ECD) resembling an LCD. Unlike LCDs, which switch between clear and opaque states based on electrical inputs, the ECD uses a solution that changes color when given an electric signal.

Parker Brothers, the games and toys maker, and its Canadian subsidiary, have recently installed ICL 2903 and 2904 computers. The machines will be used in manufacturing and distribution applications.

A friend thinks he's found the perfect place for a personal computing convention: Micro Beach. In Guam. Hotel facilities are available.

PASCAL PROCESSOR

The Pascal Microengine, offered as a 16-bit chip set or assembled, packaged system, directly executes Pascal object programs. Based on the Univ. of California, San Diego campus, implementation of the language, the Microengine is the P-machine which interprets Pascal object code. The hardware implementation reduces the overhead of simulating the P-machine in software, at the same time saving memory.

The chip set consists of four elements: an arithmetic chip, a microsequencer that handles I/O control and some instruction decoding and two ROM chips containing microinstructions and microdiagnostics. The chip set runs on a 3MHZ, four-phase clock. The packaged processor contains 64KB of RAM, DMA controller, integrated floppy disk drive controller, two RS232 ports, two 8-bit parallel ports, and power supplies. A single chip set sells for $195, discounted to $97.50 in lots of 10,000. The packaged system, including ASCII console, and the Pascal operating system (Pascal compiler, BASIC compiler, file manager, screen-oriented editor, debugger, and graphics package) is priced at $2,995. Deliveries are slated for the first quarter of next year. WESTERN DIGITAL CORP., Newport Beach, Calif.

FOR DATA CIRCLE 400 ON READER CARD

FLOPPY DISK DRIVE

After all its success with daisywheel printers, this manufacturer is going after a new market: floppy disk drives. Due to "its expertise in mass-production of sophisticated servomechanisms," the vendor has received exclusive rights to manufacture (for North America and Europe) the DataTrak 8 drive developed by the Japanese firm, Y.E. Data. The American and Japanese companies are currently completing a joint development project to design a 5¼-inch dual-sided, double-density floppy drive for introduction next year. The DataTrak 8, which is available now, is a full-size double-density, dual-sided drive capable of storing 1.6MB of unformatted data, or 1.2MB in IBM format. It has a track-to-track access time of 3msec, average access time of 91msec, and a 15msec settling time. Transfer rate is 500Kbps. Intended for sales to oem's, the DataTrak 8 goes for $755 in quantities from one to 24. QUME CORP., Hayward, Calif.

FOR DATA CIRCLE 416 ON READER CARD

CRT TERMINAL

The Bantam crt's makers tout it as a fourth generation crt, with character decoding and crt control logic on a single custom LSI chip. The unit's total chip count of 19 IC's probably contributes to the crt's $599 price for orders of 100 ($966 in singles). Bantam displays upper and lower case in a 24 line by 80 character display format. Tabbing, full cursor addressing, self-test, and repeat, backspace, shiftlock, and separate print keys are

standard. RS232 communications at speeds ranging from 110bps to 9600bps are standard; a current loop interface is optional. The keyboard includes an imbedded numeric keypad. Options include an overstrike APL model, international character sets, and an RS232 printer port. PERKIN-ELMER CORP., Terminals Div., Randolph, N.J.

FOR DATA CIRCLE 414 ON READER CARD

PRINTER

The 55cps model 5500Q Spinwriter is the latest addition to this vendor's line of "thimble" printers. A plug-compatible replacement for Qume daisywheel printers, the Spinwriter's thimble resembles a

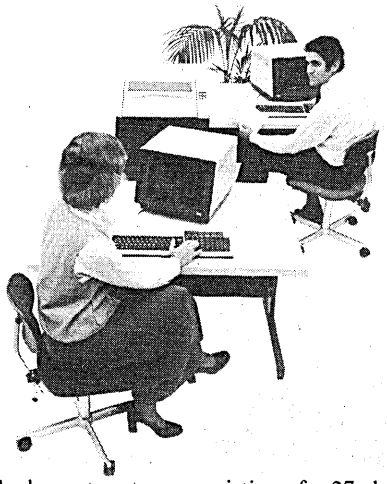
daisywheel with all its petals bent up 90°. The thimbles contain up to 128 characters. The 5500Q can print at 10cpi or 12cpi (switch selectable) with proportional spacing. At 12cpi, the printer has 163 column positions; the unit also can print subscripts and superscripts. In line plotting mode the unit can step horizontally in 1/120-inch increments, and vertically in 1/48-inch steps. An end user configuration sells for $2,169; oem's can get the mechanism for $1,140 in lots of 100. NEC INFORMATION SYSTEMS, INC., Lexington, Mass.

FOR DATA CIRCLE 412 ON READER CARD

BUSINESS COMPUTER SYSTEMS

Targeted at small to medium-sized businesses and larger organizations with regional warehouses, the Versatile Processor (VP) family comprises half-a-dozen basic systems. Modular business applications software from the vendor allows it to offer complete distribution management and financial control systems.

All six of the basic systems are built around the vendor's 8870/1 minicomputer with 64KB of memory. The smallest system, which sells for $29,500 ($250 per month maintenance), includes a 13-slot chassis, 6MB of disk, crt, and 165cps printer. For $84,400, users can get



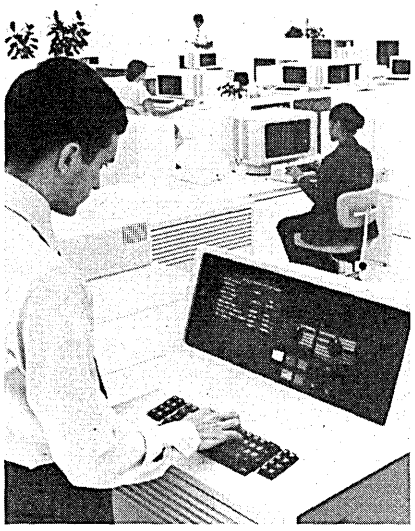
the largest system, consisting of a 27-slot chassis, an additional 64KB of main memory, four crt's, 66MB of disk, and a 300 lpm printer. A programmable line controller for 2780/3780 bisync communications will be available at the end of June 1979. The vendor's real time operating system (NIROS), and Terminal Automatic Monitoring System (TAMOS), are required; the pair licenses for $50 per month.

The vendor's COMET software runs on the VP series. Users can get the entire package for $12,000 (single payment license) or $250 per month, or they can pick and choose among the four modules: order processing and invoicing ($4,500, or $95 per month), inventory control ($3,800, or $80 per month), financial accounting ($4,200, or $90 per month), and financial modeling ($1,500, or $30 per month). NIXDORF COMPUTER CORP., Burlington, Mass.

FOR DATA CIRCLE 420 ON READER CARD

HARDWARE SPOTLIGHT

COMPUTER SYSTEM



IBM is busy making new entries into the less-than-a-mainframe market. First off, it was Data Processing Div. with its 8100 Information System. Then, three weeks to the day later, General Systems Div. unveiled its System/38. While there was some speculation that GSD would retailiate against DPD's entry into the small computer market, System/38 seems more complementary than competitive when compared to the 8100. Deliveries are still a fair ways off: of the two processors in the series, the smaller model 3 is slated for August 1979 deliveries, and the larger model 5 won't make its first appearance until February of 1980.

In addition to using the same 64Kb chips and 18Kb chips announced with the 8100, System/38 also uses one of the missing links, a 32Kb chip. GSD doesn't copy DPD's blueprint for memory modules, yielding slightly faster memory cycle times of 1.1usec (model 3) and 600nsec (model 5). Memory size can grow from 512KB to 1MB (on the model 3) or 1.5MB (on the model 5). Nonremovable disk storage capacity ranges from 64.5MB to 387.1MB. Both processors come with integral 16 line by 64 character crt consoles and diskette magazine drives.

For an operating system, System/38 offers Control Program Facility (CPF). CPF handles memory using "single level storage management," under which both main and disk memory are treated as a single and very large virtually addressed storage space. Only one programming language, an extension to RPG II, known as RPG III, is offered. It is said RPG II programs for the Systems/32 and /34 can be recompiled without a major conversion effort. Additionally, System/3 to System/38 conversion utilities are offered. CPF also supports interactive data base utilities, and communications with remote 5250 Information Display System devices or mainframes using SNA/SDLC.

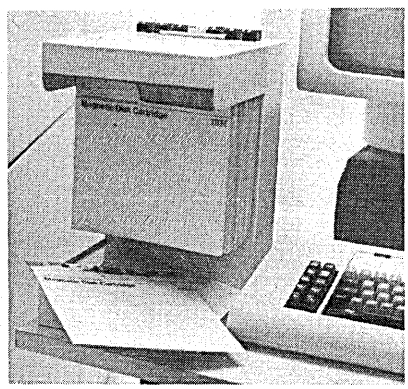
System/38 can support up to 40 terminals (12 standard). Line printers, 96-column card I/O, and mag tape units are also offered.

A system consisting of a model 3 processor with 512KB of main memory and 64.5MB of disk, one 3262 printer (650 lpm) and printer attachment, and two 5251 model 11 display units with keyboards, sells for $91,780. Software license fees are $400 per month for CPF, $60 per month for RPG III, and $30 per month for the Interactive Data Base Utilities (IDU). The above combination of hardware and software leases for $2,790 per month on a three year lease. INTERNATIONAL BUSINESS MACHINES CORP., General Systems Div., Atlanta, Ga.

FOR DATA CIRCLE 401 ON READER CARD

DISKETTE STORAGE

What could be more appropriate than a random access storage device for random access storage media? That's just what the Random Access Diskette Retriever (RADR, pronounced "radar") is. As many as 50 diskettes can be hung from the unit. Punch in the number of the diskette desired, press the release button, and out pops the diskette. After use, the diskette is simply replaced at the front of the unit.

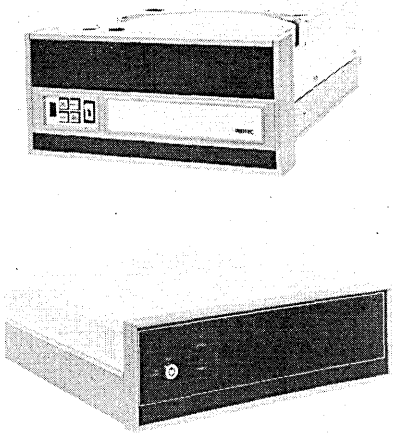


It's also said the RADR will reduce diskette warpage because the diskettes hang vertically. The RADR sells for $195. AMERICAN NATIONAL SUPPLY CORP., Gardena, Calif.

FOR DATA CIRCLE 419 ON READER CARD

MICROCOMPUTER DISK SUBSYSTEM

A synergy between divisions has produced this disk subsystem for S-100 bus microcomputers. Called the 4511, the subsystem consists of an intelligent controller, and one to four of the vendor's D3000



10MB disk drives. Each drive has 5MB of fixed disk and 5MB of removable disk. The bipolar microprocessor within the controller is programmed for functions such as cylindar seek, status checking, and read/write sector. The vendor says an enterprising oem could reprogram the controller for special functions as needed. A 10MB subsystem sells for $9,000; each additional drive adds another $5,500 to the bottom line. PERTEC COMPUTER CORP., Chatsworth, Calif.

FOR DATA CIRCLE 418 ON READER CARD

MAINFRAMES

From the company that started off the current wave of successful plug-compatible mainframers, comes a new top-of-the-line, the 470V/8. Simultaneously, the firm announced a faster version of its low-end entry, the 470V/5-II. In an interactive, high supervisor state environment, the V/8 is said to run 20% to 30% faster than the previous top-of-the-line, the V/7. The V/8's cycle time is 26nsec, compared to the V/7's of 29nsec. The V/8 also has twice the cache, 64KB. And the V/8 uses prefetching, a predictive technique for selecting data to bring into cache. As is the case with all 470s, the V/8 runs all 370 operating systems; the vendor supports MVS, VM/370, SVS, VS1, and MVT. MVS/SE runs when the vendor's MVS/SE Assist program product is installed. Scheduled for September 1979 deliveries, the V/8 pricing schedule starts at $3,280,000 for a minimum configuration of 4MB main memory and 12 I/O channels. A maximum configuration of 16MB main memory and 16 channels lists for $4,450,000.

The V/5-II, estimated to run 10% faster than the original V/5, has twice the cache, 32KB. With deliveries commencing next month, its prices range from $2,100,000 (4MB, 8 channels) to $2,640,000 (8MB, 16 channels). AMDAHL CORP., Sunnyvale, Calif.

FOR DATA CIRCLE 407 ON READER CARD

PERSONAL COMPUTER I/O INTERFACE

Users of the popular Radio Shack TRS-80 personal computer can put their systems

to work in control applications with the A828 AC-P/TRS-80 I/O Interface. The interface provides eight channels of logic-level input, and eight channels of latched logic-level output. Four of the output channels also switch independently controllable AC power outlets, each rated at 600W. The TRS-80 controls the interface with the INP and OUT functions of Level II BASIC, or with T-BUG and Level I BASIC. An assembled, packaged unit, complete with power supply, TRS-80 interface cable, and I/O port connector cable, sells for $165 ($6 more for an additional cable if the TRS-80 includes an expansion chassis). The unpackaged board, sans cables, sells for $124.50. JC ENTERPRISES, San Diego, Calif.

FOR DATA CIRCLE 422 ON READER CARD

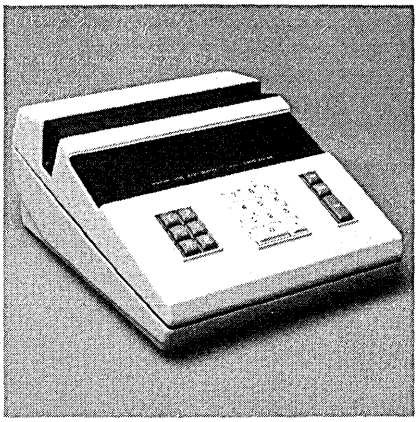
PORTABLE COMPUTER

The Findex line of portable computers includes models using bubble memory as secondary storage. The units have Z80 microprocessors as their computing element, ROM-based BASIC, 6 line by 40 character plasma display, integral 23-column electrostatic printer, and 77-key keyboard with calculator pad and 17 programmable function keys. Bubble memory modules come in 128KB and 256KB sizes; minifloppy drives also are offered. Integral and free-standing modems are offered for communicating with other Findex units or computers from other sources. External 132-column printers can interface to the unit. A basic Findex system with integral minifloppy drive, sells for $4,980; adding 128KB of bubble memory brings the price to $7,912. A unit with 256KB of bubble memory sells for $10,480. The vendor also plans to sell applications packages for prices ranging from $800 to $2,500. FINDEX INC., Los Angeles, Calif.

FOR DATA CIRCLE 406 ON READER CARD

POINT OF SALE TERMINAL

The module 9301 transaction terminal has a 10-key numeric pad, six programmable function keys, eight status indicators that can be used for prompting, and built-in diagnostics. A 16-position alphanumeric display can be used to scroll through the unit's receive buffer. Options include a magnetic card reader, personal identification number pad, form printer, and cluster controller. The vendor will customize the units for protocols, operating codes, and field descriptors. Basic price for the unit is $995, with discounts for quantity and oem customers. DMC, Santa Clara, Calif.



FOR DATA CIRCLE 405 ON READER CARD

DISK CONTROLLER

The SMC-100 forms the link between S100 bus microcomputers and storage module

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CIRCLE 141 ON READER CARD

disk drives. The controller uses direct memory access transfers. Onboard buffering allows automatic CRC generation and error recovery. Each SMC-100 can support up to four storage module drives. A single SMC-100 sells for $1,650. KONAN CORP., Phoenix, Ariz.

FOR DATA CIRCLE 404 ON READER CARD

ENTRY LEVEL SYSTEM

The Eclipse C/150, an entry level member of the commercial Eclipse line, sports up to 256KB of semiconductor or core main memory. Typically supporting 6 to 12 users, the C/150 runs the Real-time Disk Operating System (RDOS). Programming languages offered include COBOL, extended BASIC, FORTRAN, and RPG II. RJE80 and HASP II communications packages allow data communications between other machines from this vendor, or IBM-compatible mainframes. Both Interactive Data Entry/Access (IDEA) and INFOS file management software can run on the C/150; up to 32 terminals may be supported for certain INFOS applications. A small Eclipse C/150 system, including 128KB of MOS memory, 10MB of cartridge disk, 800bpi tape unit, 60cps terminal printer, RDOS, INFOS, and RPG II sells for roughly $54,000. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 411 ON READER CARD

LABORATORY COMPUTER SYSTEM

The MINC combines a 30K-word PDP-11/03 processor with the users choice of functional I/O modules for automating laboratory applications. The seven module types, which can be used in combination up to a maximum of eight modules, are: analog-to-digital converters, digital-to-analog converters, digital input, digital output, multiplexor, preamplifier, and programmable clock. Additionally, the MINC has an IEEE-488 standard bus that can interface up to 14 instruments or testing devices. An extension to PDP-11 BASIC,

MINC BASIC includes commands for controlling I/O via analog and digital interfaces. RT-11 FORTRAN IV, with subroutines to support lab applications, also is available. Mounted in a scope cart with an RXO2 double density diskette unit, the MINC system uses a VT105 graphics terminal for operator interaction. System prices start at $12,500. DIGITAL EQUIPMENT CORP., Laboratory Data Products Group, Maynard, Mass.

FOR DATA CIRCLE 409 ON READER CARD

NETWORK DIAGNOSTICS

For use with this vendor's 1200bps and 2400bps loop modems (with T7 option installed) and loop systems used with IBM 3600 financial terminals, the System 185 provides microprocessor-based monitoring, diagnostics, and management of communications networks from a central site. It checks for malfunctions in data

lines, modems, and terminal equipment, polling as many as 16 lines simultaneously. System 185 can monitor up to 16 lines, each of which can have 254 devices attached. A typical 9 to 12 line system sells for approximately $10,000. RACAL-MILGO INFORMATION SYSTEMS, INC., Miami, Fla.

FOR DATA CIRCLE 408 ON READER CARD

CRT HARDCOPY UNIT

The Complot 8600 series of crt copiers can provide hard copy reproductions from the screen on a Hewlett-Packard 2640 series crt. Copies are produced by a dual row of styli (with overlapping dots) on electrostatic paper. A complete screen copy takes 10 seconds. The crt's must be equipped with HP's video interface (HP 13254A). The Complot 8640 sells for $4,495, and the 8640A, which can produce copies from up to four attached terminals, goes for $4,995. HOUSTON INSTRUMENT, Austin, Texas.

FOR DATA CIRCLE 402 ON READER CARD

PET TO S100 BUS CONVERTER

The Betsi is a Commodore PET to S100 bus interface and four-slot motherboard. Attaching directly to the PET's memory expansion connector, the board operates from an S100 power supply. It doesn't interfere with the PET's parallel or IEEE-488 I/O ports. The unit is offered as a kit with one S100 connector for $119, or fully assembled with four S100 connectors for $165. FORETHOUGHT PRODUCTS, Eugene, Ore.

FOR DATA CIRCLE 403 ON READER CARD

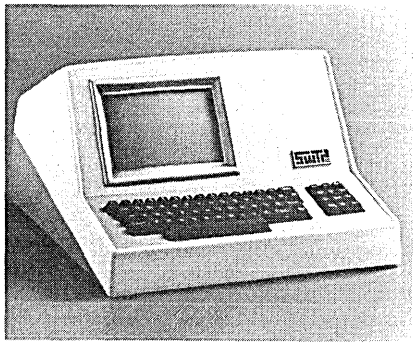
ACOUSTIC COUPLER

The model 710 acoustic coupler features compatibility with Bell's 103A2 data set. It can transmit and receive at up to 450bps, in either full or half duplex. Both 20mA current loop and RS232 terminal interfacing are provided. The 710 sells for $165, with quantity and oem discounts offered. OMNITEC DATA, Phoenix, Ariz.

FOR DATA CIRCLE 410 ON READER CARD

CRT TERMINAL

This company, well known in the personal computing market, may well make some inroads into the mainstream terminal market with its CT-82. The Motorola 6802 microprocessor-based terminal provides a number of features in firmware, and sockets for a customizer's EPROM-added functions. Normally, the CT-82 displays 16 lines (20 lines selctable) of 82 upper and lower case characters. In all-caps format, the CT-82 displays 92 characters per line,



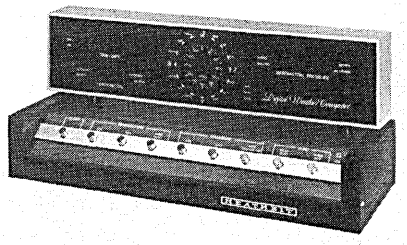
with 16, 20, or 22 lines on the screen. In this mode, lower case characters are replaced by graphic symbols. Editing functions include insert and delete line or character, and partitioning the screen into separately controllable (roll, scroll, etc.) quadrants. Software also selects standard data rates ranging from 50bps to 38,400bps. With an RS232 interface, the CT-82 sells for $795. SOUTHWEST TECHNICAL PRODUCTS CORP., San Antonio, Texas.

FOR DATA CIRCLE 413 ON READER CARD

WEATHER STATION

The Computerized Weather Station (ID-4001) monitors temperatures, indoors and out, wind speed, barometric pressure, and more. LED displays indicate time and date, temperature, wind speed and direction, and pressure. Its memory allows recall of maximum and minimum temperatures, including date and time, time of wind gusts, and maximum and minimum barometric pressure. The microprocessor-based weather station can calculate wind chill factors, as well as the barometric pressure's rate of change per hour. Measurement unit conversions also are possible. The ID-4001 comes complete with necessary sensors. Connector cabling is additional at $7.95 for 50 feet, $13.95 for

100 feet, and $18.95 for 150 feet. In kit form, the weather station sells for



$369.95; fully assembled it goes for $595. HEATH CO., Benton Harbor, Mich.

FOR DATA CIRCLE 417 ON READER CARD

3270 PRINTER

For attachment to IBM 3271, 3272, and 3274 control units, the model 6540-02 bidirectional printer offers the same performance as IBM's 3287 model 2 printer, but at a price of $3,975. The printer can form 96 9x7 dot matrix characters; it has a 132 position print line and can print sprocket-fed forms of up to five parts. It also has a 4,000 character buffer. Rental prices, including all interface attachments and maintenance, ranges from $130 per month to $175 per month, depending on contract term. DECISION DATA COMPUTER CORP., Horsham, Penn.

FOR DATA CIRCLE 421 ON READER CARD

INTELLIGENT TERMINAL SYSTEM

An intelligent terminal system, targeted for the distributed processing market, provides local data entry intelligence and communications capabilities. The 774/1, located at a remote site, won't process your payroll, but it will make certain your input is valid, send it on to a central computer for the payroll run, and then accept a print file from the mainframe, printing paychecks locally.

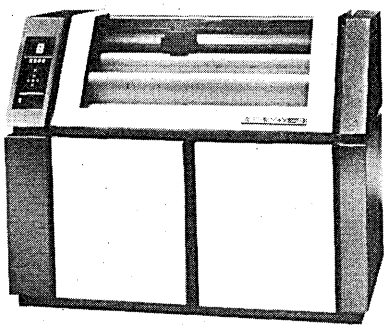
The system, standard with one crt terminal, dual floppies, dual communications ports, and a 64KB processor, can grow into four terminals, four diskettes, and two 150cps impact printers. Local programming may be done in TPL, the language used on the vendor's previously announced model 770 intelligent terminal.

The 774/1 comes in two versions: A software version sells for $12,950 (no discounts offered), and includes installation, system software, and one year of software update service. The hardware version excludes installation and software updates, and sells for $12,950 (quantity one) with discounts offered on quantity orders. TEXAS INSTRUMENTS INC., Houston Texas.

FOR DATA CIRCLE 218 ON READER CARD

DRUM PLOTTER

The four-pen, microprocessor-controlled model 3653SX drum plotter can draw lines as fast as 15ips. The unit's resolution is 0.001-inch, but for faster plotting (such as called for when previewing a newly developed plot) users can switch select resolutions of 0.002-inch, 0.004-inch, 0.005-inch, or 0.01-inch. The 3653SX uses a 36-inch wide paper, and has a full plotting area of 34-inches by 120-feet. The plotter sells for $18,000, including integral buffered controller. ZETA RESEARCH, INC., Concord, Calif.



FOR DATA CIRCLE 415 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

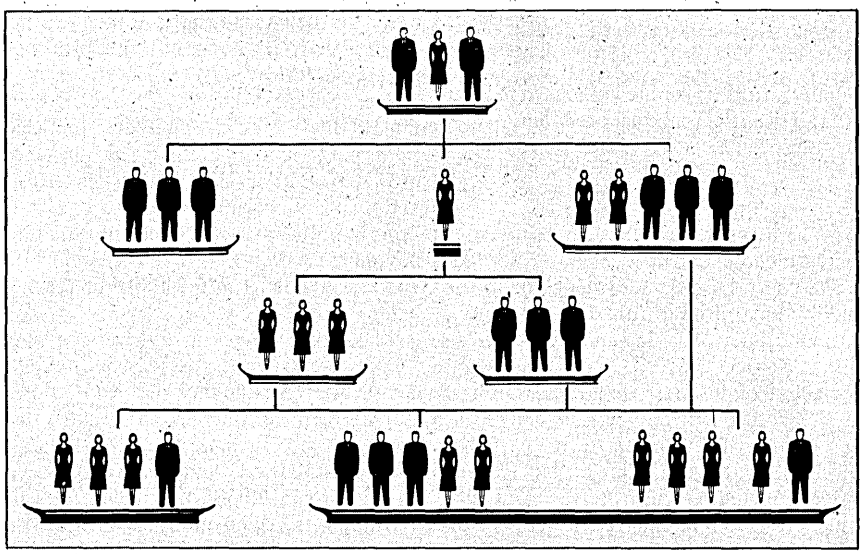
The U.S. Coast Guard has contracted with Lloyd's Register of Shipping/Lloyd's of London Press Ltd. for information on ships contained in the Register Book data base. Data on more than 60,000 merchant ships have been put into the Coast Guard's marine safety information system. The Coast Guard receives magnetic tapes from Lloyd's on a quarterly basis.

The Bay Medical Center in Bay City, Mich., has commissioned a $63,000 study on the development of an improved computer-based medical information system. The study, to be conducted by Battelle's Columbus Laboratories, will include the development of a five-year master plan for implementing the system.

Cullinane Corp., the Massachusetts-based developers of the IDMS data base management system, is looking into developing applications packages to run with IDMS. First up will be general ledger. If reactions are encouraging, others can be expected to follow.

The routes used by private truckers carrying mail for the USPS in 13 Midwestern states will soon be designed by computer. The USPS will use a computer on the McDonnell Douglas Automation Co. network, and software known as IVESS, developed by Decision Graphics of Nashville. In a test on routes linking Chicago, St. Louis, and Columbus, the computer-generated routes were less expensive than those developed by schedulers using maps and mileage charts.

A layman recently asked a programmer we know, "Who the hell was Pascal? Was he the guy that made it safe to drink milk?"



PERSONNEL SYSTEM

The Interactive Personnel System can maintain a company's personnel data base, provide reports, and allow users in the personnel department to define procedures unique to the organization's needs. The system uses three interrelated DL/I data bases: a personnel data base of current and retired employees, a positions data base defining interrelations and current occupant of each position within the organization, and a jobs data base including tasks and skills required for each job. Most inquiry and update actions can be performed on-line; printing the organization chart, an open positions listing, an internal phone directory, and several other reports are done in batch mode. With the proper security clearance, an on-line user can look into employee information, personal skills profiles, position reporting paths, and many other areas. Users can create their own procedures with a specially designed "procedure definition language." Users of IMS/VS and CICS/OS/VS can use the package for a monthly fee of $1,100. CICS/DOS/VS users must also have Data Language/1; for these users the license fee is $800 per month. INTERNATIONAL BUSINESS MACHINES CORP., White Plains, N.Y.

FOR DATA CIRCLE 428 ON READER CARD

REMOTE BATCH EMULATION

A no-cost software option allows this vendor's remote batch terminal systems to emulate IBM 3776s. To emulate IBM's remote batch terminal, the users system must include at least two diskette drives and 4800bps bisync communications. Card readers, punches, and line printers also are supported. The software uses English-language messages as opposed to numerical system messages. DATA 100 CORP., Minneapolis, Minn.

FOR DATA CIRCLE 430 ON READER CARD

MANUFACTURING

Intended for use by the estimated 20,000 manufacturers in the $5 million to $15 million annual sales range, the Interactive Manufacturing Control System comprises four subsystems: Bill of Material, Inventory Control, Material Requirements Planning (MRP), and Routing. Subsystems may be implemented one at a time or all at once. Three more subsystems—Order Processing, Work In Progress, and Capacity Planning—are in the works. The package operates interactively on the vendor's upward-compatible systems, starting with an I-8230 with 96KB, 10MB of disk, crt, and line printer.

The MRP system can take a company's production plan or forecast and, working backwards, can specify when components are needed and in what quantity. The Bill of Materials module tracks

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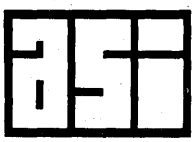
- Permits creating and updating TOTAL and IMS data bases as well as retrieval.
- Allows concurrent processing of conventional data files with IMS or TOTAL data bases.
- Supported in both batch and on-line environments.

IMS users such as *American Airlines, Dow Chemical, TWA, American Can, The Hartford, Union Carbide;* and TOTAL users like *Combustion Engineering, Northwestern Mutual Life, Anheuser-Busch, Corning Glass Works, Eli Lilly* and *Holiday Inns* are a few who agree ASI-ST and data base belong together. In addition, ASI-ST provides an unequalled return on investment by maximizing the productivity of both man and machine. Since ASI-ST fully supports conventional data files as well as complex data bases, these benefits are not restricted to IMS and TOTAL users. To obtain more information contact:



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CIRCLE 77 ON READER CARD

all manufacturing and engineering data associated with each product. It includes the capability to designate effective dates for engineering changes, automatically updating all files concerned on the effective date. Inventory control watches over material movement, purchase orders, production orders, sales orders, and other parts transactions. Step-by-step product assembly is tracked by the Routing subsystem. All four modules can be had for a one-time license fee of $11,100; they can be rented for $217 per month. Price per module ranges from $2,400 to $3,600. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 432 ON READER CARD

COMMUNICATIONS

To broaden the usefullness of its System Ten computers, particularly in distributed processing environments, this vendor has come up with the software and hardware necessary to support interactive communications with IBM mainframes. Initially, the system emulates IBM's 3271 Remote Cluster Controller; support for other devices from both IBM and this vendor are said to be in the works. Software known as the Communications Access Manager (CAM) provides a system interface to the Integrated Communications Adaptor (ICA) and provides macros for program preparation. Up to eight data streams (each equivalent to an IBM screen or printer) can be run through an adaptor. The software requires 20KB of common memory, and 10KB per partition. It carries an $80 per month license fee. The microprocessor-based ICA plugs into a System Ten I/O channel slot in place of a local I/O channel, providing bisync communications, data buffering, and error recovery facilities. It sells for $8,300. ICL, INC., East Brunswick, N.J.

FOR DATA CIRCLE 424 ON READER CARD

STATISTICAL PACKAGE

The latest release of BMDP77, the UCLA-developed statistical package for IBM mainframes, has been adapted to the PDP-11. Seven new programs have been added, bringing the total to 33; several older programs have been modified for the sake of efficiency and ease of use. Among the 33 programs are a number of regression techniques (stepwise, linear, nonlinear, multivariate, etc.), as well as plotting routines, cluster analyses, and general mixed model analysis of variance. With the exception of one assembly language subroutine, the PDP-11 package is written entirely in FORTRAN IV (as is the mainframe version). The statistical parts of the mainframe and mini versions are identical; changes were made to the data manipulation and I/O parts of the package. The package is said to run under all DEC operating systems, and a UNIX version is reportedly on the way. Under RSTS, the package needs at least 28K words; 30K words to 32K words are needed under RSX/IAS. Users also must have a 9-track, 800bpi mag tape unit, as the package is distributed only on tape. The package is offered on a two-year license. Single cpu licenses are $250 for degree-granting institutions, $500 for nonprofit and government agencies, and $750 for commercial users. The license fee does not include media, shipping, or manuals, but it does include maintenance and updates. SOFTWARE DEVELOPMENT INC., Middlebury College, Middlebury, Vermont.

FOR DATA CIRCLE 425 ON READER CARD

SOFTWARE SPOTLIGHT

```
USING CUSTOMER-ANALYSIS
PRINT CUSTOMER-NUMBER PRODUCT-NUMBER QUANTITY-ON-ORDER BACK-ORDER-NOTIFICATION
      SCHEDULED-SHIPPING-DATE ORDER-DATE ORDER-NUMBER SALES-AMOUNT
IF BACK-ORDER-NOTIFICATION IS NOT ZERO
WHEN FINISHED PRINT TOTAL SALES-AMOUNT QUANTITY-ON-ORDER AVERAGE SALES-AMOUNT
PRINT CUSTOMER-NUMBER AS 'CUST-NO'

NEXT:_
```

DATA BASE MANAGEMENT

After 10 years in the data base management business, this vendor has come up with a new system that may eclipse the popularity of even the vendor's TOTAL system. But they're not about to give up brand-name recognition: the new package is named the Total Information System (TIS).

Central to the system is a module dubbed the Directory. It operates as the system driver, and incorporates the functions of a data dictionary. In place of schemata, TIS substitutes Logical Views. A Logical View defines all data within the data base, but need not describe the actual organization. User-specific Logical Views provide a businessman's view of the data base; acting as subschemata, they define what data may be accessed, as well as the names by which the user wishes to access actual data elements. A user may have more than one Logical View, and different users may know the same element by different names.

But what can it do? First off, it can still support programs written for TOTAL, though new applications most likely will be written using Logical Views for access. Secondly it allows several query options. On-line, users can get at data through a free-form English language dialog. The system uses artificial intelligence techniques in both its language recognition and prompting (it notices how familiar the user seems to be with the system, and prompts accordingly). An example query: "PRINT CUSTOMER, ORDER, AND QUANTITY TIMES PRICE IF ZIPCODE IS BETWEEN 90000 AND 99999 AND WHEN FINISHED PRINT TOTAL AND AVERAGE OF QUANTITY TIMES COST." Users also can use expression equations, such as "LET WESTCOAST MEAN 'ZIPCODE IS BETWEEN 90000 AND 99999.' " Similar inquiries can be made in batch mode. Additionally, a report writer can be used. Finally, a preprocessor translates query language requests imbedded within applications programs. Data base updating and maintenance are performed in much the same way as queries.

Within the system, away from the users' view, data can be organized as hierarchies, networks, and inverted files. The three organizations can coexist within the same data base. Because the Directory handles all access, the data base can be reorganized or restructured without impacting users or application programs. Likewise, the data base administrator can specify BDAM or VSAM access, and change the access method at a later date. The system also has dynamic transaction backout capabilities for maintaining the integrety of data should a process fail in midtransaction.

TIS runs on 370s under DOS/VS or OS/VS. Though the "entry" module can run in as little as 60KB, it's doubtful that you'll find a full blown version on a machine smaller than a 512KB 138. In pre-release at this point, a full blown TIS goes for $200,000. Release 1 and a firm price are due April 1. CINCOM SYSTEMS, INC., Cincinatti, Ohio.

FOR DATA CIRCLE 423 ON READER CARD

TEXT EDITOR

Scroll is an interactive text editor written in FORTRAN IV and currently implemented on DEC's PDP-11 and Harris Corp.'s Slash series. Patterned after the Univ. of Maryland's editor for Univac 1100s, Scroll moves a one-line editing "window" through the edit file; users view and edit data through this window. After learning 10 or so commands the user can start editing. These basic commands consist of those for moving the window, printing text, inserting and deleting lines, string searches and replacements, and even an UNDO command in case the user makes

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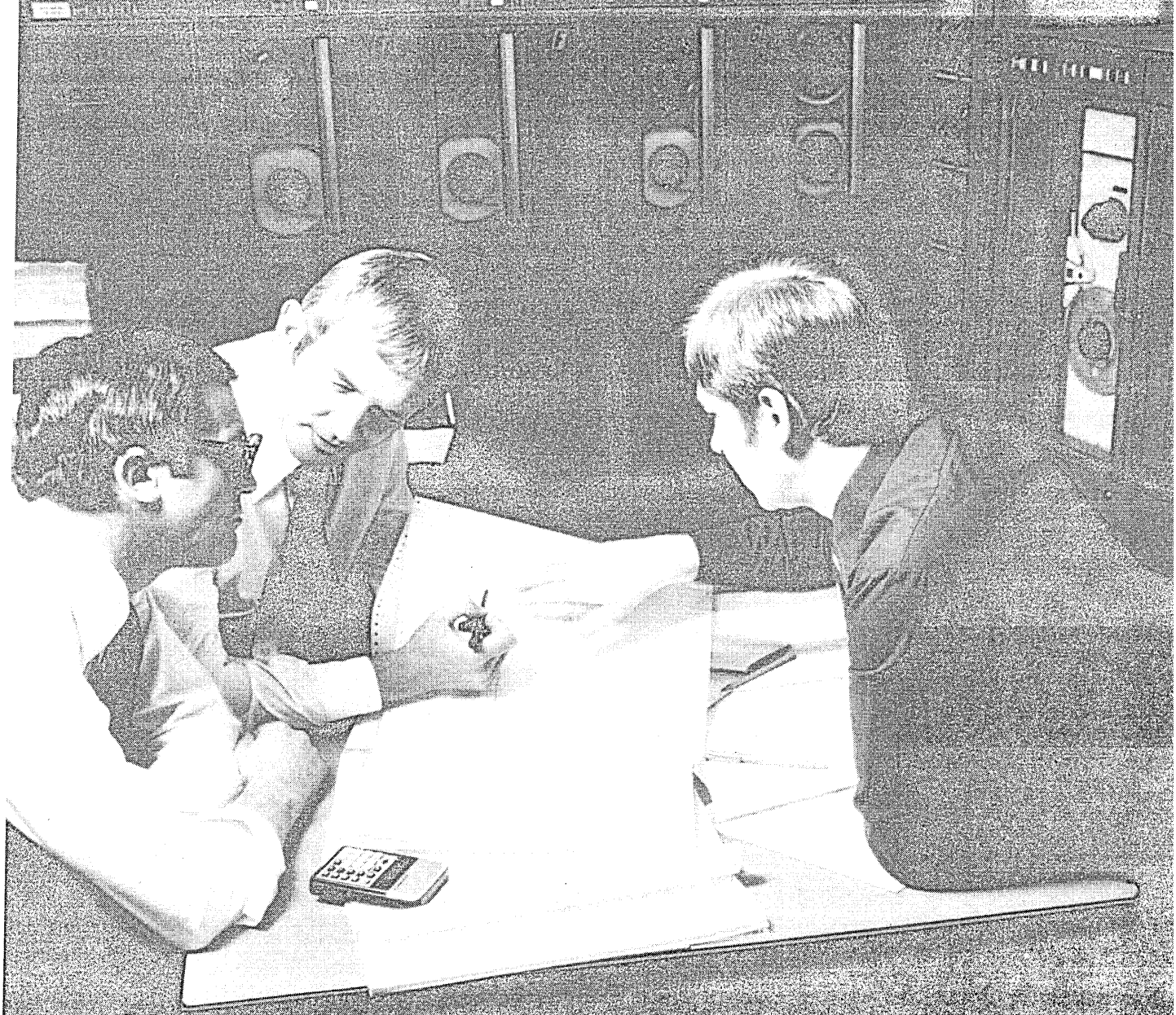

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CIRCLE 12 ON READER CARD

some grievous mistake, such as deleting 100 lines instead of 10. Additional commands (more than 30) are available for setting tabs, duplicating blocks of text, setting margins, and other functions. Scroll handles file I/O via subroutines to aid portability. The package is priced at $1,200; an added cost installation service is available. SOFTWARE SORCERERS, Boulder, Colo.

FOR DATA CIRCLE 426 ON READER CARD

MICROCOMPUTER PACKAGES

A couple of ex-IMSAI managers have set up shop to develop and sell software for microcomputers. The new company's first offerings are a sort package and a text editor. Super-Sort is said to offer capabilities akin to those available in IBM sort utilities. The package may be invoked as a standalone utility, or it may be called from user programs written in assembler, FORTRAN, COBOL, or BASIC. User exits allow the sort to call user written subroutines. The package provides a multilevel sort/merge with up to 32 keys, intermixed sequence indicators, data types, and collating sequences. SELECT and EXCLUDE allow users to specify source file extraction criteria.

Word-Master, designed for use with dumb crt's, has control key commands for bidirectional word tab, line tab, and screen tab. Characters, words, and lines can be the objects of insert or delete operations. The editor can merge several floppy files, move or replicate blocks of text, and perform string searches and substitutions.

Both packages run under CP/M, or any of its derivatives, on 8080, 8085, or Z80 based microcomputers with at least 24KB of memory. A floppy disk drive is needed. Word-Master requires a crt with cursor addressing and a clear screen sequence. Super-Sort sells for $250, and Word-Master goes for $150. MICROPRO INTERNATIONAL CORP., Rohnert Park, Calif.

FOR DATA CIRCLE 429 ON READER CARD

C COMPILER

These compilers for C, a programming language developed at Bell Labs, run under the major PDP-11 operating systems. While not a very high level language, C is a small, powerful, general purpose language. It was developed to run under UNIX, and much of UNIX and many UNIX applications are coded in C. Versions of this vendor's compiler run under UNIX, RT-11, RSTS-E, RSX-11M, and IAS. The compiler produces symbolic assembler code, allowing an interface to assembler and other PDP-11 languages. The compiler is said to handle all features of C, including bit fields and defined types. A run-time library is included. On an LSI-11 under RT-11, the compiler needs as little as 20K words of memory and a disk drive; the UNIX version can replicate in 16K words. A perpetual binary license for a single cpu goes for $500 (plus the cost of delivery media). Full source code is available for $5,000, and an intermediate assembler version can be licensed for $2,000. A five-year maintenance plan is priced at $5,000, regardless of the plan under which the compiler is licensed. WHITESMITHS, LTD., New York, N.Y.

FOR DATA CIRCLE 433 ON READER CARD

DATA DICTIONARY

Users of IDS/I (Integrated Data Store/I) on this vendor's large mainframes now can get a Data Dictionary. The package handles data element reporting, where-used reports, record creations, maintenance reporting, and other functions. Routines are included for analyzing COBOL, Index Sequential Processing, and transaction-driven systems source programs, identifying the data elements accessed and how the program uses each element. The package can be used to determine the fundamental structure of the data, as well as the way events and functions use data. The IDS/I-Data Dictionary needs 48K words of memory; it carries a license fee of $14,500. HONEYWELL INC., Phoenix, Ariz. ✲

FOR DATA CIRCLE 427 ON READER CARD

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CIRCLE 115 ON READER CARD

SOURCE DATA

BOOKS

MIS: A MANAGERIAL PERSPECTIVE
V. Thomas Dock, V. P. Luchsinger, W. R. Cornette, eds.

Art Buchwald's name as one of the contributing authors to this text book was an eye-catcher. I think he is one of the funniest authors around, and the addition of an article by him in a textbook on management information systems suggested that the editors had a sense of humor and this book might be more entertaining than the average scholarly work.

The book is a softcover, somewhat awkward-sized textbook (9½" wide, 8" high), bringing together previously published articles that, in the words of the editors, "provide insight into the primary concepts of management information systems." There are 50 articles by 59 authors, previously published in 23 different journals. The articles are grouped into six major subject areas: (1) Systems: a management perspective, (2) Management Information Systems: a conceptual foundation, (3) Managing the MIS, (4) MIS and People, (5) MIS and Society, and (6) The State of the Art. The six general subject areas (called units by the editors) are further subdivided into 15 topical areas with names like General Systems Theory, The Organization as a System, The MIS Idea, and Behaviorial Issues, just to name a few.

At the time of publication (1977), the editors were faculty members in business administration schools.

The authors of the articles read like the who's who of the data processing world, with a few experts from other fields: Ackoff, Barnett, Dearden, Head, Emery, Kanter, Withington, Nolan, Argyris, et al. While the organization of the book is excellent for its stated purpose, there is a significant amount of redundancy between some articles and sections of the book. This is the penalty of using more than one previously published article on the same subject. Each author must introduce his subject, and this is often redundant even when authors are taking different viewpoints. For example, the editor's introduction to MIS, the first selection in the book, and the second article by Luchsinger and Dock (two of the editors) in section 2 are each excellent alone but represent a duplication.

Of the 50 articles, 35 were originally published more than five years ago, and 20 were published as long ago as 1970 or earlier. Some of the older articles are as fresh today as when they were originally published. Bob Head's "The Elusive MIS," published in this magazine in 1970, could have been written yesterday. Ward Frederick's 1971 "A Manager's Perspective of Management Information Systems" carries a message that will be as fresh tomorrow as when it was written: "The development of an MIS is worthwhile only to the extent that the system will favorably affect the variables in the firm's profit equation." Brandt Allen's two articles on computer security, first published in 1972, are outstanding and of more current interest than when first published. Gaylord A. Freeman, Jr.'s 1969 "The Role Top Management Must Play in MIS Planning and Implementation" is superb and may be the best MIS article in the book.

Other articles can also be commended. A few examples: Burt Namus' 1972 "Managing the Fifth Information Revolution" is thought-provoking; Robert C. Goldstein's and Richard L. Nolan's 1975 article on "Personal Privacy versus the Corporate Computer" has good information about how much privacy may cost the business firm; David Barr's description of "GM's Parts Ordering System" is meaty material as is Jerome P. Rickert's "Online Support for Manufacturing"; James C. Emery's and Christopher R. Sprague's 1972 response to a controversial John Dearden article is excellent reading (the Dearden 1971 article is also included, although outdated); and Gerald F. Price's "The Ten Commandments of Data Bases" is good reading and solid advice. These and others are high quality, real-world stuff of value to the budding MIS practioner.

But everything old is not necessarily good or vice versa. There are selections that are very much dated. These could either mislead a student or require clarification by the instructor. Some of these outdated articles were outstanding contributions to the literature and the practice and theory of MIS at the time, but as it has often been observed, dp technology has been moving at a pace that often makes today's good information obsolete by tomorrow. The authors of textbooks on MIS have this problem to some extent when they write about the application of technology, and to a lesser degree when they write about MIS management theory and practices. It is a temptation to advise authors to publish MIS texts in looseleaf notebook form.

Not all of the articles were written in a serious vein. Dr. Ruth Davis' 1975 piece, "The Computer Serves, the Consumer Relishes," is a serious article that was written with tongue in cheek. There are such subtitles as Deep in the Heart of Taxes, or Ma, He's Mechanize at Me, and The Great Barrier Reef. And of course, as mentioned at the beginning, there is an article by Art Buchwald, "The Great Data Famine," published in 1968 and reprinted in DATAMATION (April 1976, p. 45). It is brief and hilarious (shorter than this review). However, even Mr. Buchwald's article is dated. His major premise is that "one of the many problems we face in the 1970s is that so many computers will be built in the next decade that there will be a shortage of data to feed them." Mr. Buchwald advocates birth control pills for computers to reduce computer proliferation (heaven only knows we need them with all those minis and micros running around!), and that the Government should build a data manufacturing plant. What Mr. Buchwald failed to recognize is man's insatiable appetite for data and the government bureaucrat's unlimited ability to devise new requirements for reports and data. Most government agencies *are* data manufacturing plants, and they subcontract a lot of their work out to private enterprise. The more productive data plants in the government are OSHA, Social Security Administration, Internal Revenue Service, and the FBI.

The last article in the book is "The Future of MIS," by Charles H. Kriebel. It was a fine, profound article in 1968 or '69 (the date was missing from the reference), but it is out-of-date for this text. Some of Frederick G. Withington's more recent predictions of the future, that have been published in both this magazine and *The Harvard Business Review*, would have been more appropriate as a climax to the text.

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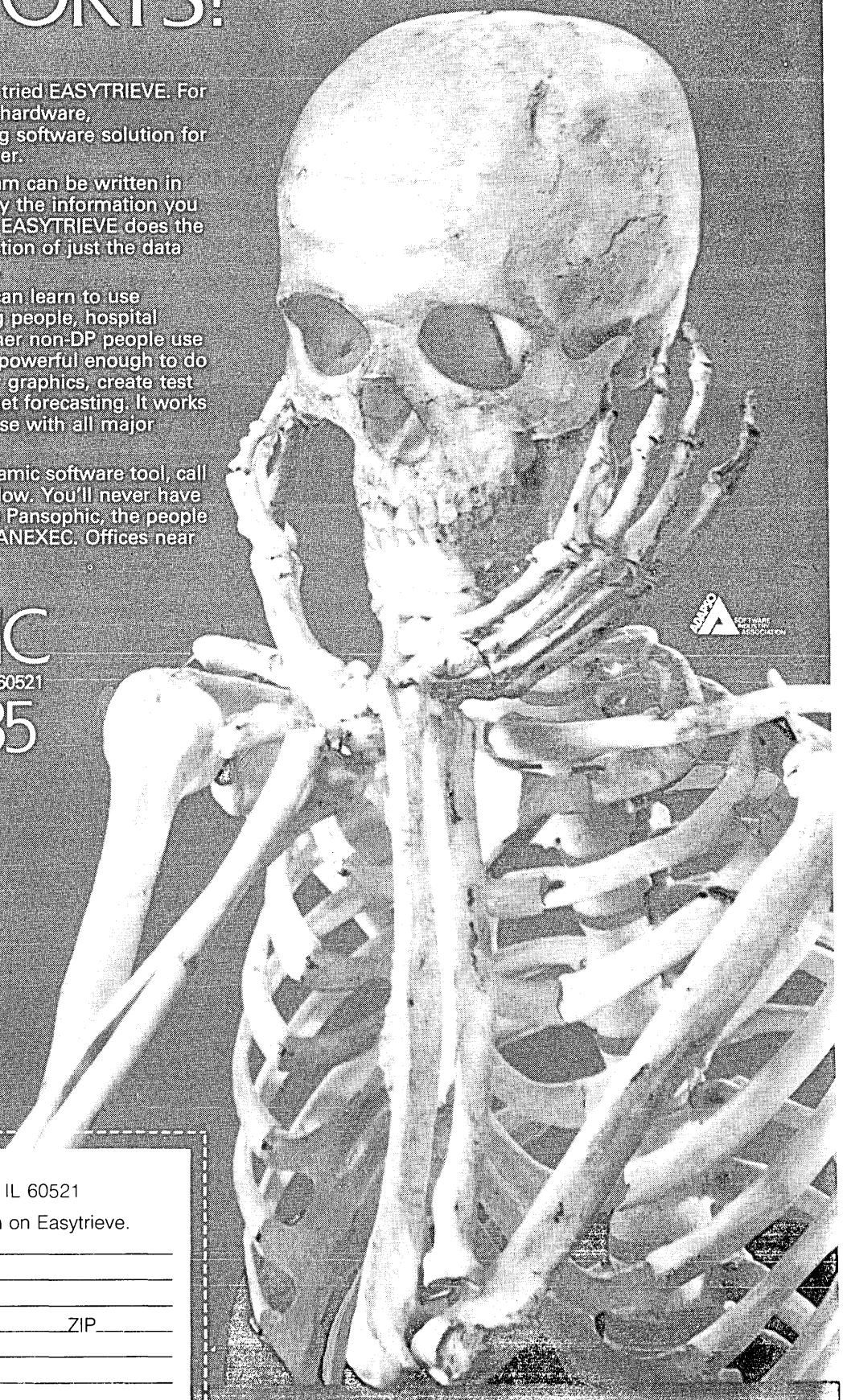

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CIRCLE 149 ON READER CARD

BOOKS

If the authors are planning a second edition, I would suggest they carefully screen their material for repetition (fewer articles would be preferable to the redundancy) and replace technologically outdated material with fresh—and they will find a wide selection. Using highly subjective criteria, and based on today's knowledge, the 50 articles are graded as 13 excellent, 17 good, 12 average, and 8 good but outdated. Of the 50 articles, 8 were also partially redundant with material that had preceded them. The book can be recommended as a beginning text for the undergraduate newcomer to MIS, with some updates and clarification by the instructor. The old hands of MIS might find much of the book a little too old hat. (Science Research Associates, Palo Alto, 460 pp., $9.95.)

—C. William Getz II

THE CODASYL APPROACH TO DATA BASE MANAGEMENT by T. William Olle

I found this book to be quite detailed and, for the most part, very accurate. A number of typographical errors proved a small annoyance.

The audience for this text will be a programmer or systems analyst who already has a strong systems background and who understands data base. Programming specifics are initiated early and are continued almost all the way through the book. One does not sit down and read this book any more than you would sit down and read a college level mathematics text. As a matter of fact, to have a truly positive impact, it should be used on an active

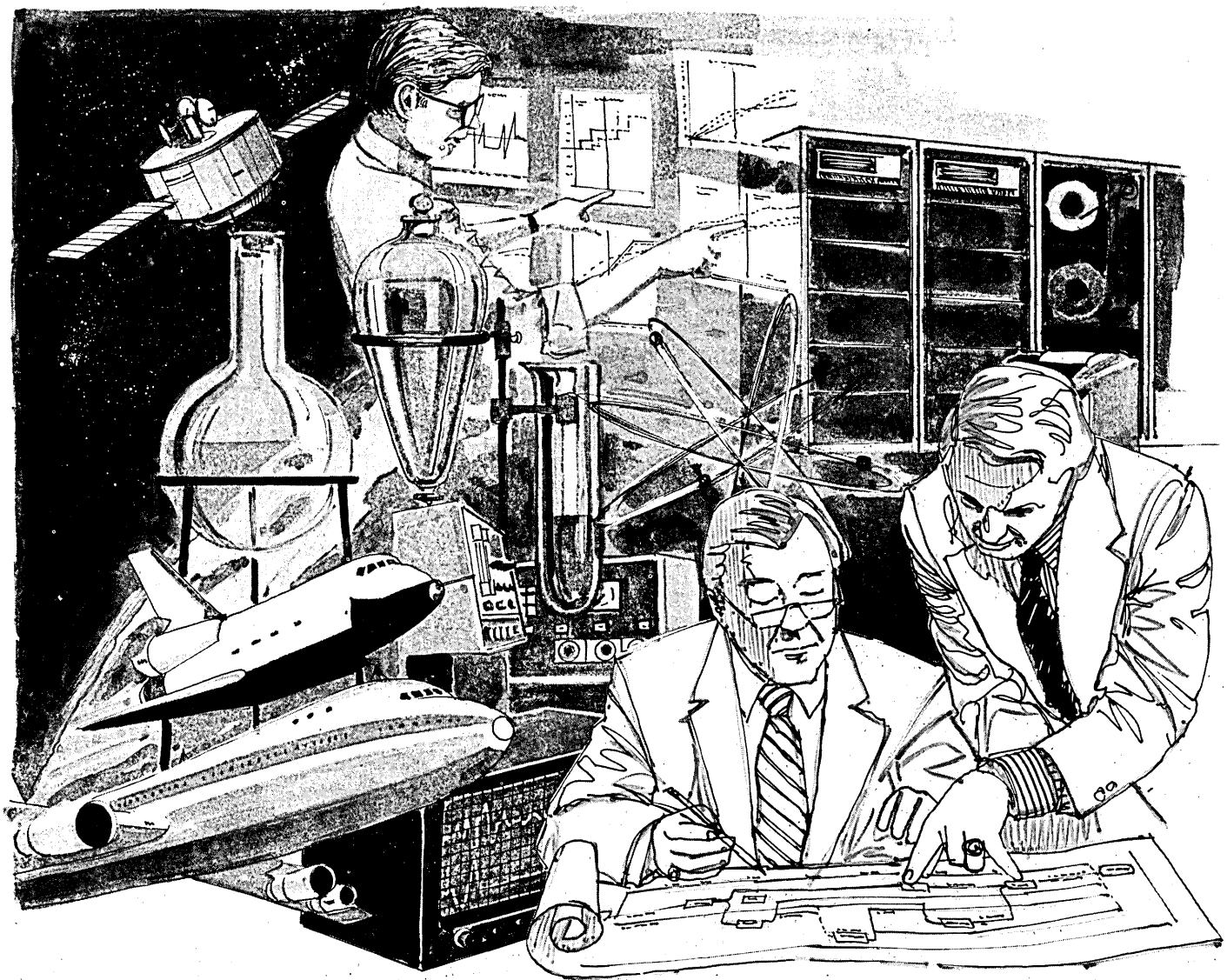
basis in combination with the writing of programs using a CODASYL DBMS.

The CODASYL concepts of data base management are powerful and rather widely accepted, but certainly no one has ever accused them of being easy to understand. The book faces a substantial challenge in getting these concepts across and will, therefore, it seems to me, be of primary interest to those who have a need and specific desire to get detailed insight into the CODASYL concepts.

The book has, for comparison purposes, four chapters (representing approximately 20% of the total content) devoted to four other widely discussed approaches to data base management: those of three commercial products—TOTAL, IMS, and ADABAS—and the relational data base model. The TOTAL chapter is well written and is interesting for the detailed contrast and comparison that it provides between TOTAL and the CODASYL concepts. The IMS chapter does not get into programming level comparisons but discusses systems level comparisons, as does the ADABAS chapter. The relational chapter is unusually good, with definitions of relational terms and an excellent rationale for the relational approach. It might be the best short writeup I've seen on the relational concept except that no mention at all is made of first, second, or third normal forms—an important omission.

The usefulness of the text may be indicated by the fact that the data base administrator of the company, an individual with several years experience in the use of IDMS, a CODASYL system, who received the volume as part of the reviewing process, was able to learn new concepts in a short period of time, and thought he could probably gain much knowledge from reading the book. Wiley Interscience, N.Y. (1978, 283 pp., $21.50).

—George Schussel



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REPORTS AND REFERENCES

INTERNATIONAL SOURCE DATA

While users rate software packages in the December regular edition of DATAMATION, the International Section tells how vendors of those packages rate international markets in both systems and application software.

A valuable chart shows where the rated packages are available overseas and how they are supported. In addition, this 20-plus page section will feature an in-depth interview with Chris Wilson, managing director of International Computers Ltd., one of the world's largest mainframers; dp concerns of the developing nations; Ireland's push to become a computer manufacturing center; and the latest in foreign new products.

For a reprint of the International Section send $3.00 to DATAMATION International, 35 Mason St., Greenwich, CT 06830.

COMPUTER USE IN JAPAN

An 81-page fact-filled book, *EDP in Japan 1978* provides a snapshot look at the installed base of computers in Japan, the world's second largest users. This year's annual, however, also includes the results of a survey of dp users' spending plans—a study conducted, unfortunately, late last year. Government statistics on the industry show there were almost 42,000 computers in operation in Japan in June 1977, up 15% from the previous year. Those of foreign origin comprised 42.5% of that number, and approximately the same in terms of their value. The number installed is expected to grow by some 350% by the end of fiscal 1985, the value to increase in that period by 380%. Statistics on the services business are also included. The colorful volume is priced at $50, including postage, from Japan Electronic Computer Co., Ltd., New Kokusai Building, 5th Floor, 4-1 Marunouchi 3-Chome, Chiyoda-ku, Tokyo 100, Japan.

MINI/MICRO MARKET GROWING

The minicomputer market continues to expand rapidly. User base expansion over the last eight years has averaged 24% annually, with the small business systems market segment growing at a faster, 31% expansion rate. Worldwide minicomputer unit purchases are projected conservatively to rise by 33% by June 1979.

These key findings from DATAMATION magazine's annual Mini-Microcomputer Market Survey show a continuing solid trend in growth of the small systems market, especially in applications relating to business data processing. Also projected to go up are the markets for intelligent terminals and data entry systems.

Topics of special interest in the 200-page report include: user purchase plans through 1979; high-growth applications; user assessment of the IBM Series/1; DEC VAX and new 370-compatible hardware; vital factors in vendor selection; and potential in the international market.

Buyers at 5,600 oem, systems house and end-user locations responding to the survey had 36,000 mini-based systems already in place and represent a major share of the high growth market. They intend to purchase 19,150 more minicomputers valued at $790 million by June 1979.

DATAMATION magazine's 1978/79 Mini/Microcomputer Market Survey is now available to industry analysts, market planners, sales executives and minicomputer end users. For prepaid orders, the report is being offered at a $40 savings off the regular price of $445 in North America and $475 elsewhere. To reserve your survey report, contact Dorothy Chamberlain at: (203) 661-0055.

COMPUTER BOOK BIBLIOGRAPHY

More than 250 new books are listed in the 12th edition of the *Annual Bibliography of Computer-Oriented Books*, from the Univ. of Colorado. Books published prior to 1973 have been deleted from the bibliography, with the exception of classics

such as Dahl and Dijkstra's *Structured Programming*. A 50% increase can be seen in the number of books on management of data processing. Over 20 books were added to the systems analysis and design section. Data base books increased 40%, and the data communications section has seen an increase of 30%. The bibliography is indexed according to type (reference, textbook, handbook) and style of presentation (programmed instruction, case study, narrative). $4, or $5 if an invoice is required, from *Computing Newsletter*, Box 7345, Colorado Springs, CO 80933.

EUROPEAN MARKETS

Martin Simpson predicts growth in the minicomputer industry in Europe to continue at 20% to 30% annually over the next several years, with the semiconductor industry in Europe expanding at close to 15%. Reasons cited in their newly available report on dp markets in Europe are: greater emphasis on productivity improvement, expansion of computer applications, a less mature industry environment that can increasingly afford the most modern equipment to improve efficiency and, of course, dramatic technological advances in electronic circuits. The report is also said to cover competitive market shares and details of the European economic outlook. $795. MARTIN SIMPSON RESEARCH ASSOCIATES, INC., 63 Wall Street, New York, NY 10005 (212) 344-3480.

AUDIT AND EFTS

A 47-page report published by the American Institute of Certified Public Accountants provides an overview of the nature of an EFT (electronic funds transfer) network, concentrating on physical characteristics, legal and government status, and implications for independent auditors. *Audit Considerations in Electronic Funds Transfer Systems* is priced at $4. From AICPA Order Dept., 1211 Avenue of the Americas, New York, NY 10036 (212) 575-6200.

OS/6 USERS REPORT

SBS Publishing interviewed 40 companies using the IBM Office System/6 and found the machines being used in a variety of tasks not limited to word processing. And while the users reported several problems, such as ink clogs, paper jams, and lack of communications between the Office Products Div., which sells the system, and the General Services Div., which services it, they still rated IBM'S service as excellent.

The report is an examination of the role of the OS/6 in the IBM product line and the word processing marketplace based on an analysis of the user interviews, and is generously seasoned with user comments.

The Office System/6—User Report is $395. From SBS PBULISHING, 4320 Stevens Creek Blvd., Suite 190, San Jose, CA 95129 (408) 243-8121.

KEEP IT PRIVATE

"Arizona—License is required; grounds for refusal, suspension or revocation of license include failing to inform subject that participation is voluntary, making inquiries during pre-employment exam regarding religious, labor, sexual activities, or political affiliation; failing to inform subject of results if requested." That is one of hundreds of capsule descriptions of privacy law found in the third edition of *Compilation of State & Federal Privacy Laws*. This listing was under the heading "Polygraphing in Employment." Other categories include Arrest Records, Bank Records, Credit Reporting and Investigation, etc.

In addition to the capsule descriptions, the 166-page report includes the text of more than two dozen representative statutes. $14.50, from PRIVACY JOURNAL, Box 8844, Washington, DC 20003.

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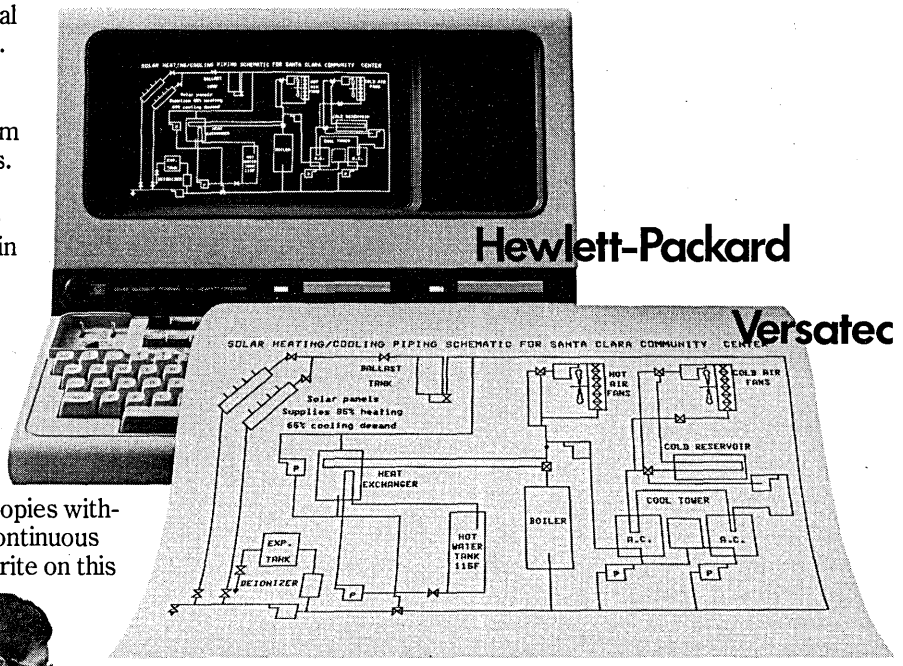

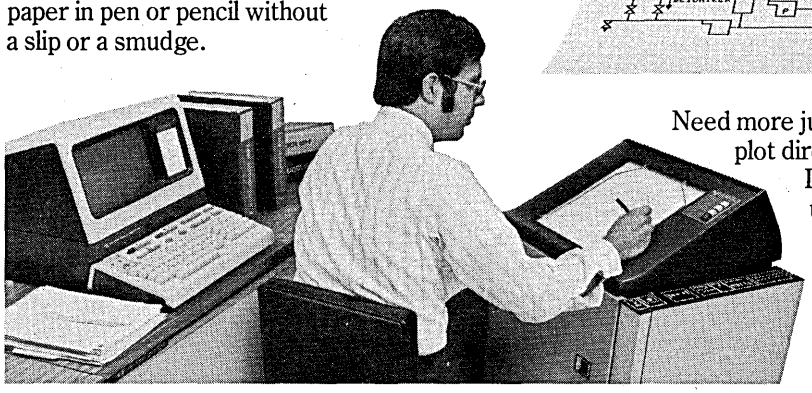

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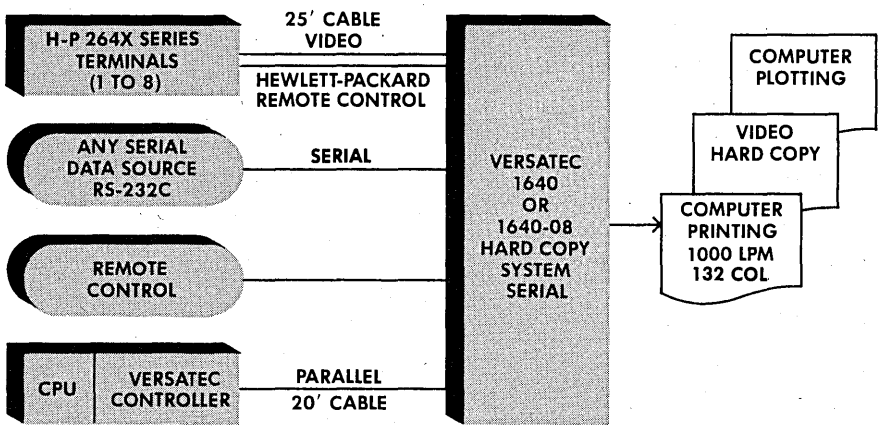

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REPORTS AND REFERENCES

MINIS AND MICROS

In 1971, Intel produced a microprocessor chip for a Japanese manufacturer of calculators, and called it the 4004. That was the start of something big—actually, the start of a lot of very small things. Now the digital world is populated with at least 109 microprocessors (according to "Microprocessor Specifications") and at least 146 microcomputers (according to "All About Microcomputers"). The specifications for the devices, along with some analysis of their functions and popularity, and the addresses for their manufacturers are provided in two reports.

A companion publication, "All About Minicomputer Printers," takes issue with a recent article in this magazine which prophesized the death of printers. It claims that the base of minicomputer printers installed will grow from 1977's $1.25 billion to $3.75 billion by 1982. Whether or not that prediction is correct, the report carries descriptions of 294 current models and information about their manufacturers.

The reports run from 28 to 67 pages and are priced at $12 each. DATAPRO RESEARCH CORP, 1805 Underwood Blvd., Delran, NJ 08075.

WORD PROCESSING DIRECTORY

The International Word Processing Association has compiled a directory containing lists and addresses of: word processing equipment, manufacturers, consultants, personnel services, service bureaus, information resources, and educational institutions. The 58-page softcover book will be a valuable reference for users. Vendors are invited to provide information for listings in future annual editions by completing a business reply mail form bound into the issue. The price of the book is $7. IWP MEMBERSHIP SERVICES, Maryland Road, Willow Grove, PA 19090.

PRACTICAL GUIDE TO IMS

"IMS Concepts" is an introduction to IBM'S data base management system, IMS, in the context of how it is meant to be used. The author, Ronald G. Ross, points out that choosing IMS will change the way one thinks about system design and implementation, therefore, these considerations are important from the start. The booklet is aimed at those considering IMS for their installations, those learning IMS, or those who need to explain how IMS fits into a design proposal; in short anyone who wants to know the nature of IMS as a tool and how it can be used to solve problems.

The book is divided into five sec-

tions: data base organization, mangement of the physical data base, logical relationships, secondary indexing, and application programming.

$21.50 (additional copies $12.50 each), from PERFORMANCE DEVELOPMENT CORP., 1101 State Road, Bldg. M, Princeton, NJ, 08540 (609) 921-3770.

EFTS SECURITY AND RELIABILITY

A revised edition of a guide entitled "Security and Reliability in Electronic Systems for Payments" is now available at no charge from the Federal Reserve. Included are a 33-page paper, a corresponding 39-page checklist, and "security profile evaluation" (forms and an outline with which to detail a management overview of the security system). Written by computer specialists of the central banks of the Group of Ten Countries and Switzerland, the guide covers development, operation and control of computer and related equipment. Copies are available from Howard Crumb, Advisor, FEDERAL RESERVE BANK OF NEW YORK, 33 Liberty St., New York, NY 10045.

COMMUNICATIONS CONFERENCE

Something like 1,000 pages on what's happening in the communications industry is offered in the form of the conference record for the International Conference on Communications which was held in Toronto this June. The conference had 44 sessions with approximately five presentations each. The presentations ranged from those readily understood by laymen, such as "Fiber Optics Systems—Early Applications" and "Communications Privacy," to titles we need a translation for, such as "Sequential Detection of M-Ary Data with Higher Than First-Order Markov Dependencies." The three-volume record would work as a complete course on the communications field, but it wouldn't be a short course by any means. The set is $28 for IEEE members, $35 for nonmembers. (Catalog number 78CH 1350-8 CSCB.) IEEE,. Single Copy Sales, 445 Hoes Lane, Piscataway, NJ 08854.

ARAB COMPUTER MARKETS

21st Century Research is compiling a special multiclient study of existing and potential dp business opportunities in Arab countries, where the computer import markets are the fastest growing in the world. Scheduled for completion in November 1978 the study will include mailing lists for "unlimited promotional use" of subscribers. Cost of the study will be $1,00. 21ST CENTURY RESERACH, 8200 Kennedy Blvd. East North Bergen, NJ 07047 (201) 868-0881.

FINANCIAL STATS

Using its substantial computerized file of financial statements (over 700,000 listings), Dun & Bradstreet completed its *1978 Financial Analysis of the Computer Industry*. The study compares financial statements of 837 computer industry companies broken down into four standard industry categories: hardware manufacturing, software and services companies, data processing services; and other, related services. A financial analysis of these industries is based on ratios of sales to income, etc. The study costs $160 and is available from DUN & BRADSTREET, Financial & Economic Data File, 99 Church Street, New York, NY 10007.

SEMINARS

SOFTWARE QUALITY

A software quality assurance course is being offered Jan. 15-17 in Washington, D.C., and Jan. 29-31 in Los Angeles. For information contact Software Enterprises Corp., 2239 Townsgate Rd., Westlake Village, CA 91361 (213) 889-7814.

SEMINARS

COMPUTER CONTRACTS

"Computer Contract Negotiation" is being offered by the Brandon Consulting Group Dec. 11-13 in Washington, Feb. 12-14 in Denver, April 9-11 in Atlanta, and June 6-8 in New York. Dick Brandon will be the instructor on the first day, when the topic of study is to be "The Contracting Process: Software and Service Contracts." Sidney Segelstein will lead the second day's study of "Legal Issues/Hardware Contracts," and Joseph Auer will teach "Negotiating Strategy & Financial Optimization" on the final day of the seminar. $650. Contact: Registrar, Brandon Consulting Group, Inc., 505 Park Ave., New York, NY 10022 (212) 935-6290.

NEW TRAINING FIRM IN U.K.

A new consulting firm in computers and communications, David Hebditch Ltd., will be offering in-house courses in both technical and management categories. Among the titles to be offered are: Distributed Systems and Management Strategies, Terminal-based Systems and the Manager (billed as suitable for user personnel), Creative Problem-solving for Management, User-centered Systems Design, Minicomputer Technology and Systems, and Programmer Productivity Techniques. For detailed agendas and copies of lecture notes, contact: David Hebditch Ltd., P.O. Box 31, Otley, West Yorkshire, England LS21 2RY.

DATACOMM SOFTWARE DESIGN

Major considerations of software design for remote batch, message switching, time-sharing, transaction processing, packet switching, and distributed network data communications systems are to be discussed. The course is to include both applications and operating systems concepts and will consist of both classroom and workshop sessions. $430. Dec. 18-20, Washington, D.C. Contact: Continuing Engineering Education Program, George Washington Univ., Washington, DC 20052 (202) 676-6106.

PERIODICALS

SMALL-BUSINESS BOOK

A new quarterly magazine for independent business is being offered by the financial services arm of the Control Data Corp., Commercial Credit Co. The magazine aims to cover marketing, employee relations, financial management, and government, among other subjects of interest to small businesses. Subscriptions are at no charge when requested on company letterhead by chief executives or financial officers of independent businesses. *Successful Business*, 505 Market St., Knoxville, TN 37902.

TDF NEWSLETTER

A new monthly newsletter has been established to provide information about worldwide activities related to transnational data flows. News, features, publications, and events are to be covered. Yearly subscriptions are $75 in the U.S. and Canada, $100 overseas. From Information Gatekeepers, Inc., 167 Corey Rd., Brookline, MA 02146 (617) 739-2022.

FEDERAL COMMON USE SOFTWARE

A new quarterly catalog of federally owned common use software such as management applications, computer systems support and utility programs, simulators, scientific applications, and bibliographic programs is offered for a $75 yearly subscription. Details to be provided about each program include processing mode, computer manufacturer and model, operating system, language(s), input/output media, memory requirements, and prices. The Federal Software Exchange Catalog will be indexed by subject and by machine. From the FEDERAL SOFTWARE EXCHANGE CENTER, 5285 Port Royal Rd., Springfield, VA 22161. ✲

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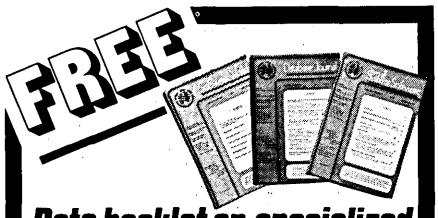

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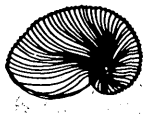

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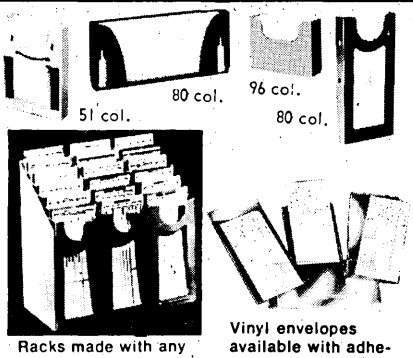

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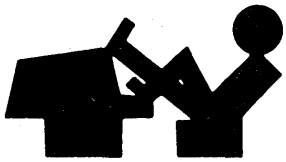

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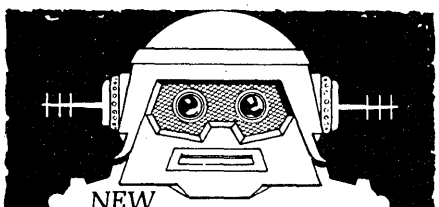

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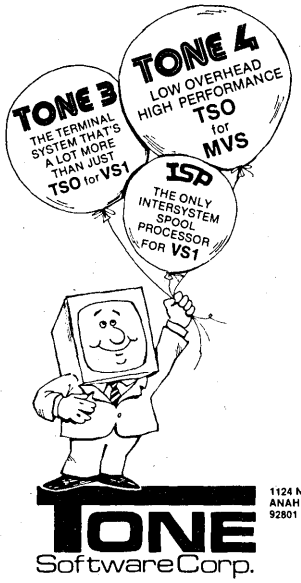

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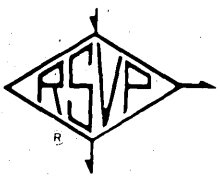

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Technical Software Group

Principal Software Engineers-Systems

You will assume project management/technical leadership of customer funded software turnkey projects, with responsibility for all phases of these projects: application, qualification, quotation and proposal, systems and design specifications, implementation, debugging, and installation. You will also be responsible for planning, budgets, and schedules.

A minimum of 5 years experience, including experience with the PDP family of computers, RSX operating systems; primary emphasis on real-time data acquisition, process control, special interfaces, handlers, and drivers; FORTRAN IV, MACRO and BASIC programming needed. Must be up-to-date on software technology, such as structured design, HIPO and PSUEDO codes.

Product Development Group

Diagnostics Software Engineers

Working closely with hardware engineers, you will design, implement, debug, test, document, and support diagnostic programs for CSS projects. You must be capable of handling sophisticated projects independently under limited supervision.

Required are a BSEE or equivalent hardware experience and experience in programming computer peripherals, including mass storage devices, in at least one of Digital's assembly languages, preferably MACRO-11.

If you are interested in one of the above positions, please forward your resume with salary history to Hank Vezina, Digital Equipment Corporation, Dept. C1201 3801, 55 Northeastern Boulevard, Nashua, New Hampshire 03060. We are an equal opportunity employer m/f.

digital

What's a Software Expert Like You Going to do at a Hardware Company Like Amdahl?

- You're going to be part of something new—Amdahl's entrance into the product software development arena.
- You're going to grow with Amdahl like few other software professionals have ever had a chance to grow.
- You're going to be a member of a select team, developing and using the most advanced programming tools, methodology and hardware in the industry today—Amdahl is determined to build a software development environment where professionals like you can produce "state-of-the-art" large-scale systems software and enhancements.
- You're going to be working for one of the most successful companies in the industry. Our exceptional growth tells our story best:

	3Q77	3Q78
Net Income	6.4M	12.8M
Revenues	46.5M	85.0M
Employees	1700	2700

So if you're an experienced software professional who shares our enthusiasm and accepts the challenge of this exciting endeavor, consider the following opportunities. Then contact Amdahl Corporation. We're eager to talk with you.

Amdahl is located in the San Francisco Bay Area at 1250 East Arques Avenue, Sunnyvale, CA 94086. An equal opportunity employer.

OPERATING SYSTEM DEVELOPMENT PROGRAMMERS

Development System Programmers are needed who have a proven expertise in modifying and upgrading IBM Operating Systems. Requirements include an exceptionally strong, in-depth knowledge of MVS and/or VM internals and the ability to work in a structured product development environment.

PRODUCT EVALUATION PROGRAMMERS

New departments are being staffed for evaluating and testing Amdahl product software. Programmers should have a strong background in IBM Operating Systems, testing methodology, and organizational experience.

PRODUCT SOFTWARE DEVELOPMENT COMPUTER CENTER PROGRAMMERS

Systems Programmers are needed for the generation and updating of in-house development support systems, hardware resource planning and the day-to-day operation of a dedicated Product Software Development Computer Center.

DEVELOPMENT SUPPORT PROGRAMMERS/ANALYSTS

Programmers will be involved in the design and development of an in-house planning and control system and an associated data base system to manage product software development. General requirements include a working knowledge of the software development process, use of higher level languages and data base management systems.

SOFTWARE ENGINEERS/ COORDINATORS/PLANNERS

Individuals in these positions will be responsible for the coordination of development activities. They should have a working knowledge of the software development process, excellent communications skills and a systems programming background. Experience in product software development organizations is highly desirable.

Please indicate 473-N3 on your response.

amdahl

"WITH DATUM, YOUR SERIES/1 WON'T STAND ALONE"

Datum won't let your Series/1 minicomputer stand alone. Datum Series/1 peripheral systems are designed to give you the value-added efficiency and flexibility to build the precise system you need to meet your changing data processing requirements.

Now, Datum adds to its Series/1 commitment with support for all 3 Software Operating Systems. Control Program Support (CPS), Realtime Programming System (RPS) and Event Driven Executive (EDX) are link-edited object modules.

Series/1 peripheral systems from Datum will enhance your IBM Series/1 Model 3 or 5 Computer by providing expanded capabilities.

Need magnetic tape capability — **Only Datum offers 7 or 9 track magnetic tape systems**, with recording densities of 200 bpi NRZ through 1600 bpi PE. Speeds from 12.5 ips through 125 ips. Up to four transports can be attached to each system.

Datum offers you a family of removable media Storage Module disk systems — 40 through 300 megabytes.

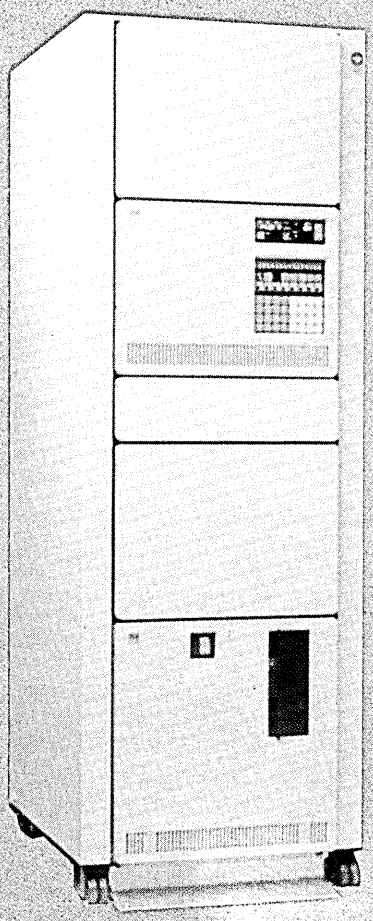
Both systems incorporate the Datum "Universal User's Adapter", a device that allows connection of external devices to the Input-Output bus of IBM Series/1 computers.

Datum provides high speed line printer systems — 300 to 1500 lpm (64 characters) — which operate without software modification. (Compatible with IBM's 4973 Line Printer operations). A self test feature on the line printer controller provides the user with visual performance check of the printer system.

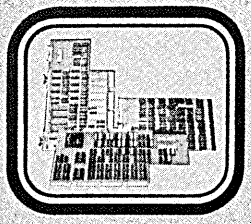
Ongoing Datum maintenance is available under the Datum Maintenance Agreement at a fixed monthly charge.

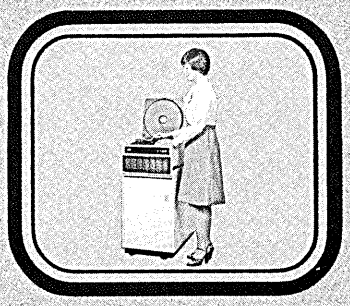
For more information about the Datum commitment to your Series/1, call or write Datum, Inc., 1363 S. State College Blvd., Anaheim, California 92806. Telephone (714) 533-6333.

datum inc

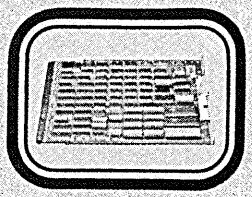


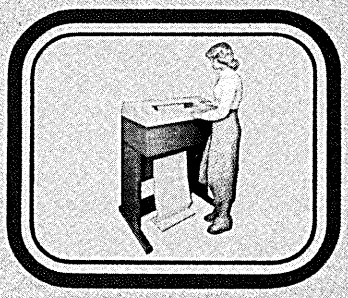
STORAGE MODULE SYSTEM
40 to 300 megabytes



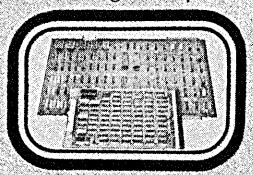


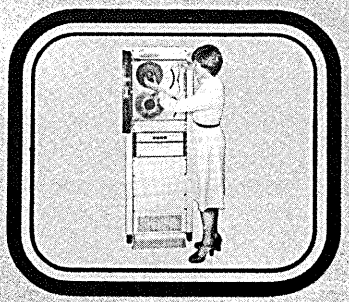
LINE PRINTER SYSTEM
300 to 1500 lpm
(64 characters)





MAGNETIC TAPE SYSTEMS
200 bpi NRZ through
1600 bpi PE
12.5 through 125 ips





CORPORATE HEADQUARTERS, 1363 S. State College Blvd., Anaheim, CA 92806, Tel: 714/533-6333, TWX: 910 592-1289, Telex 68-5579 • **EUROPEAN HEADQUARTERS, DATUM (ELECTRONICS) LTD.**, DATUM House, Harlington, Middlesex, England, Tel: 01-897-0456, Telex: 935-398 • **DATUM SALES OFFICES**, CANADA, Willowdale, Ontario, Tel: 416/491-6960, Telex: 06-966857, EOR TOR; MOUNTAIN STATES, Denver, Colorado 80232, Tel: 303/693-3414; EAST COAST, Mountainside, New Jersey 07092, Tel: 201/654-5590; MIDWEST, Des Plaines, Illinois 60018, Tel: 312/296-1064; SAN JOSE, San Jose, CA 95117, Tel: 408/249-5370; NEW ENGLAND, Framingham, MA 01701, Tel: 617/872-6911.

PPD 102

CIRCLE 2 ON READER CARD

A NEW PRODUCT. A NEW DIRECTION. A NEW COMMITMENT

With each advancement of computer communications technology, a Teletype* product has been there to meet the need.

Today, the latest Teletype product to follow in this tradition of quality, performance, dependability and price is the new 4540 Series of data terminals.

Not merely a new product, the 4540 Series represents a new direction for Teletype Corporation. A change from a philosophy of product orientation to one focusing on user-applications.

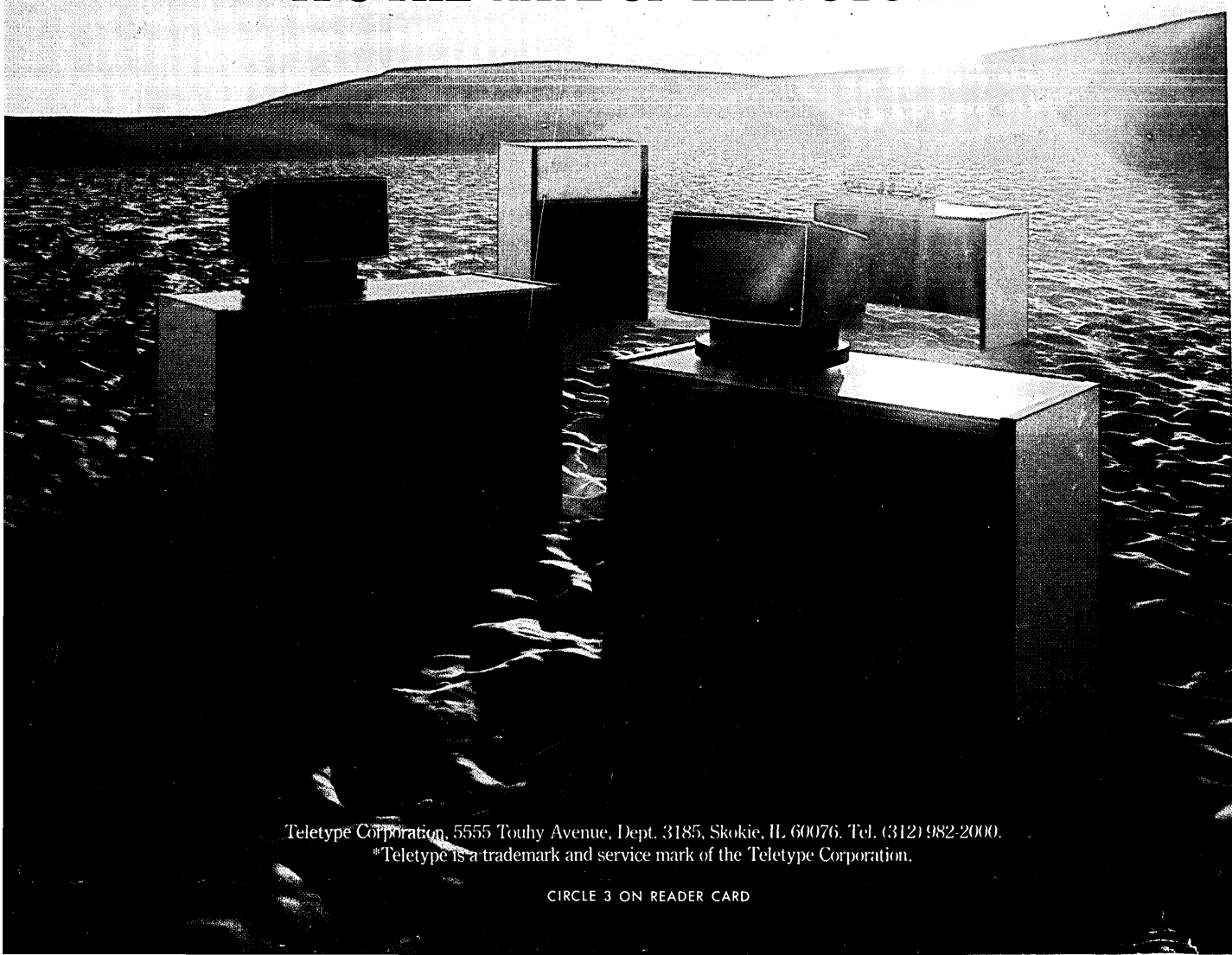
The 4540 Series also represents a new commitment. A commitment to provide a wide range of system solutions to meet user needs in computer-based systems. A commitment to customers before, during and after the sale.

The new 4540 is a keyboard-display based interactive series of synchronous terminals designed for inquiry/response, data entry and data retrieval. Operating at speeds ranging from 2400 to 9600 bps, it utilizes keyboard, display, character printer and line printer modules, as well as a controller with a simplified sub-set of software modules.

Since it truly is the state of the art in data terminals, the 4540 Series is available in several configurations compatible with the most popular standard host protocols for communications control. Initially, single-display and clustered configurations will be available, with the clustered version able to accommodate a maximum of 32 devices—including up to 8 printers. All 4540's can be coupled to multi-point or point-to-point private line facilities.

The new Teletype 4540 Series is the wave of the future. For the needs of today. Not only does it deliver the highest standards of quality and performance in the most common computer-based applications, it delivers these standards with true economy.

THE TELETYPE 4540 SERIES. IT'S THE WAVE OF THE FUTURE.



Teletype Corporation, 5555 Touhy Avenue, Dept. 3185, Skokie, IL 60076. Tel. (312) 982-2000.
*Teletype is a trademark and service mark of the Teletype Corporation.

CIRCLE 3 ON READER CARD