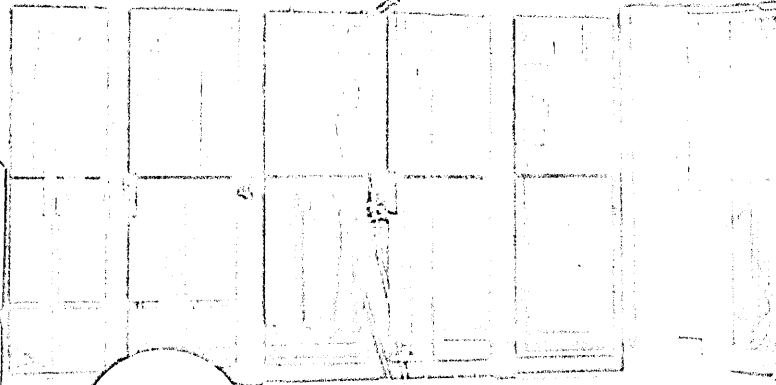


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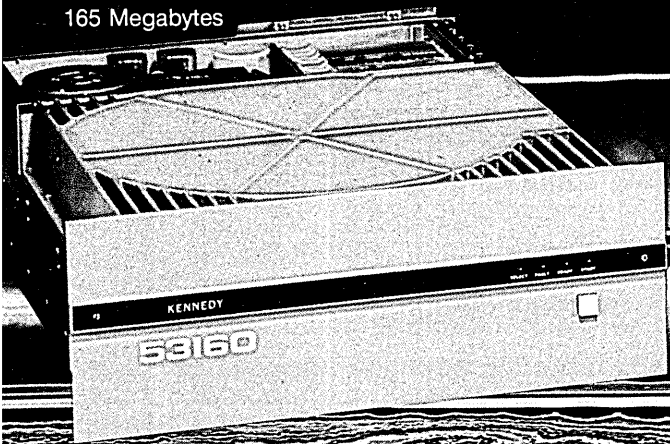
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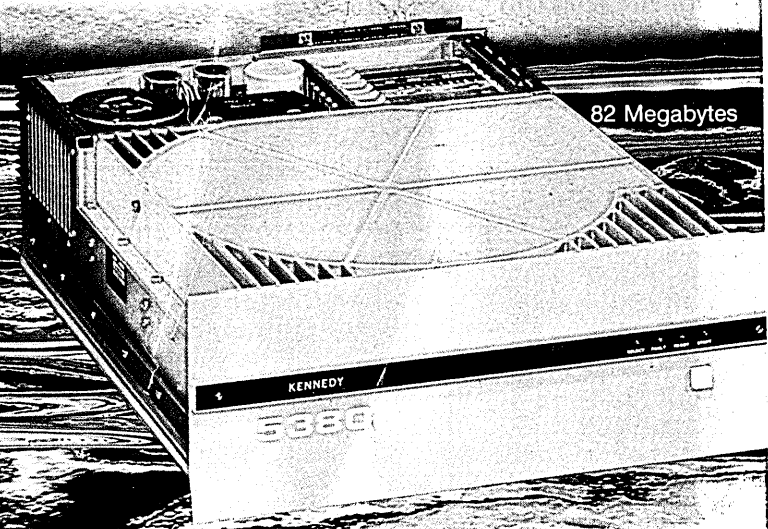
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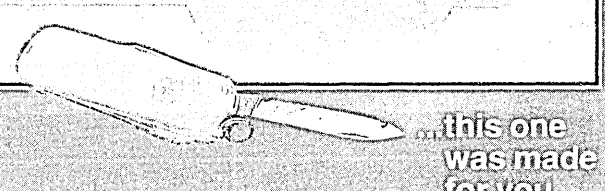
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VOLUME 28 NUMBER 13
This issue, 165,364 copies

FEATURES

34 IN FOCUS

Handheld computers may be a good bet for a Christmas present. These "Micro Micros" are examined by Michael Tyler, who investigates their history and discusses price, power, and performance.

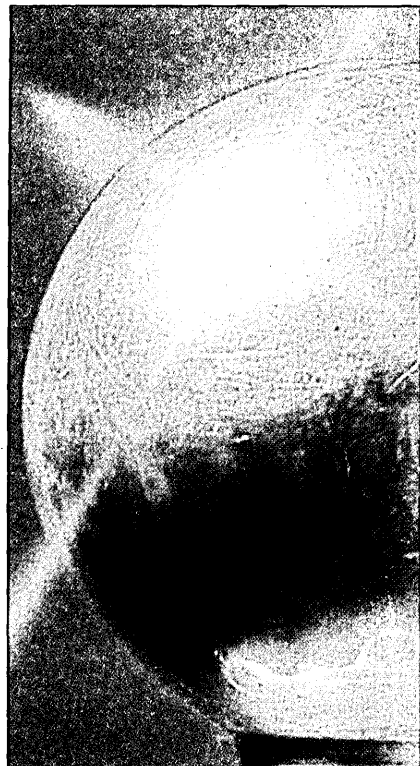
88 ATARI: PLAYING WITH HOUSE MONEY

Laton McCartney

Those in the know say the games-maker is not only capable of giving IBM and the other big boys in the home and personal markets a run for their money, but is pioneering technical innovations that may make conventional computing obsolete.

96 SYSTEMS SOFTWARE SURVEY Data Decisions

More than 2,500 users rated nearly 100 packages. An overwhelming 89% of them were well satisfied with their purchases. Bar charts showing evaluations of each package begin on p.105.



143 FOUR EXPERT OPINIONS

Jan Johnson

Computer industry authorities Gene Amdahl, Seymour Cray, Victor Poor, and James Thornton voice their views of the past, present, and future of the technology.

155 MINICOMPUTER CAPACITY OPTIMISM

Ronald D. Emrick

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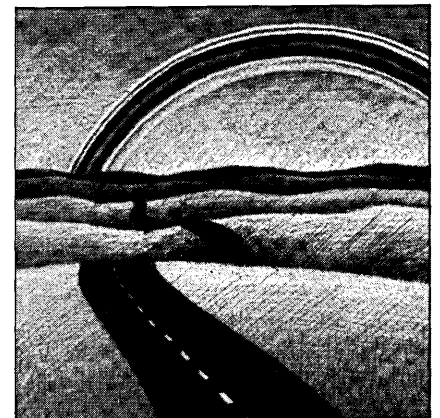
Larry D. Woods makes some sharp "Computer Show Observations" about vendor reps. In "Designing for Users," J. Harvey Trimble Jr. and Jay Miller call for a restructure of attitudes and behavior in the systems shop. In "Machiavelli on Consulting," Joe Celko updates the old master's work and applies it to office managers in the dp field.

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COVER PHOTOGRAPH OF THE UNITED ARTISTS RIALTO THEATER, WESTFIELD, N.J., BY PETER ANGELO SIMON.

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CIRCULATION

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Circulation Manager Joseph J. Zaccaria
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DATAMATION (ISSN 0011-6963) Magazine is issued monthly on or about the first day of every month, with the exception of July, which is semi-monthly. Published by Technical Publishing, a company of The Dun and Bradstreet Corp., 1301 South Grove Ave., Barrington, IL 60010; James B. Tafel, Chairman; John K. Abely, President. Executive, advertising, editorial offices, and subscription department, 875 Third Ave., New York, NY 10022. Published at East Greenville, Pa. Annual subscription rates: U.S. and possessions: \$40; Canada: \$55; Europe, Japan, Australia, New Zealand: £48 air freight, £90 air mail. All other countries: £48 surface, £90 air mail. Reduced rate for qualified U.S. students, public and school libraries: \$30 Single copy: \$4 in U.S. Sole agent for all subscriptions outside the U.S.A. and Canada is J. B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England, (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office. ©Copyright 1982 by Technical Publishing Co., a Division of Dun-Donnelley Publishing Corp., a company of The Dun and Bradstreet Corp. All rights reserved. "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Brown Printing Co., Inc. POSTMASTER: Send address changes to Datamation, 875 Third Avenue, New York, NY 10022.

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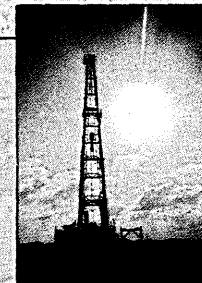
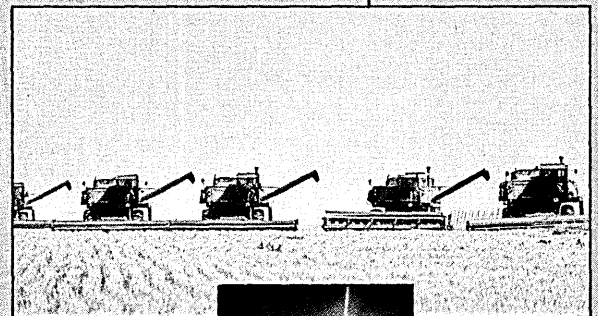
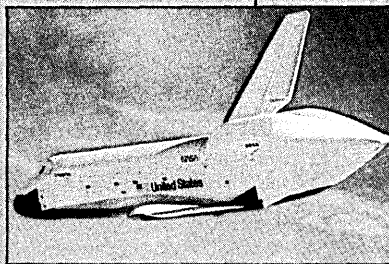
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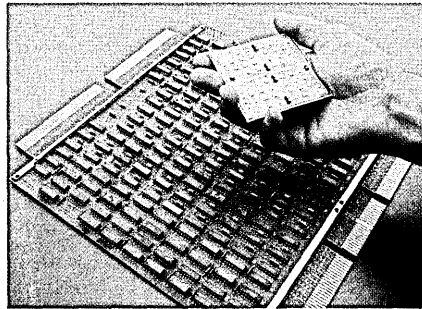
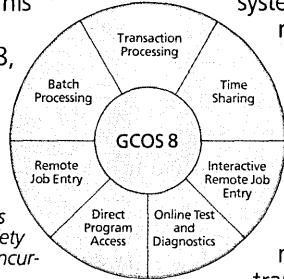
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LOOKING BACK

STILL SEARCHING

December 1962: Though language often facilitates communication, it sometimes adds more confusion than clarity. This is especially true when we're not all working with the same dictionary, or, in the case of the computer industry, the same glossary.

Several organizations were diligently at work compiling several "standard glossaries" of computer terminology. For example, there were ACM's SCOPT (Sub-Committee on Programming Technology), IFIP, BEMA, and the British BSI, all simultaneously trying to formulate something definitive. This was a necessary task, as the definitions in many of the glossaries then in use were sadly outdated. A case in point came from a musty IBM tomb that said a computer was "a device capable of accepting, processing, and reporting information." That definition could be stretched without much effort to include gasoline pumps, color tvs, and gumball machines. Then there was the early Sperry Rand meaning of random access: "a feature of certain internal memory systems, particularly the magnetic drum type."

Although DATAMATION contributed little more to the effort than teasing and wisecracks, the editors believed the elusive standard glossary to be the "cornerstone of all standardization and the very foundation of continued growth in our industry." So someday, if the dream comes true, maybe we'll all understand each other.

STRETCHING THE WEATHER

Another of IBM's giants, the STRETCH computer, was installed; this time the recipient was the U.S. Weather Bureau's General Circulation Research Laboratory. STRETCH was recruited to simulate global weather, with a long-term goal of simulating daily weather changes at 10,000 points around the world. The behemoth would also analyze weather patterns on the earth's surface and at nine other atmospheric levels. This particular system came equipped with core storage of 65K words and disk storage of over 2 million words.

PRIVATE LIFE

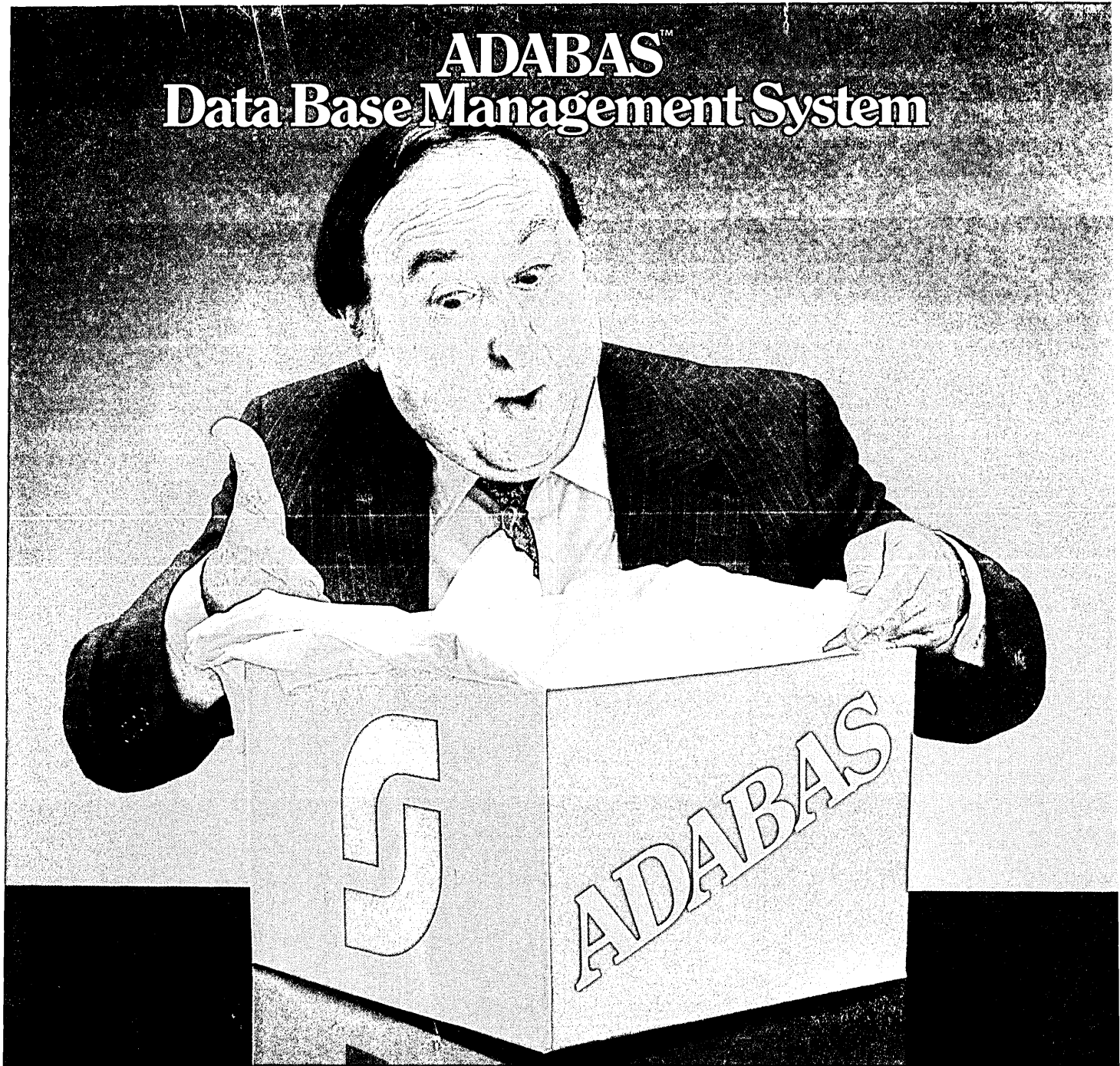
December 1972: It was late autumn, the cherry trees were bare, and a report entitled "Communications for Social Needs" was making the rounds on Capitol Hill. It proposed federal support for new communications and computer technology applications, including one system that would allow the government to turn on every tv and radio in the country in the event it had to warn citizens of "impending disaster." Congressman Bill Moorhead of Pennsylvania called the system "a Nixon Administration plan for a potential government-operated propaganda and spy system." The congressman questioned presidential science advisor Dr. Ed David regarding government acceptance of the report, and David assured him that it had been rejected.

DATAMATION reporter Phil Hirsh later found out from David's press spokesman, John Lannon, that although the report had indeed been "completely rejected," the projects described within it were still being considered. Furthermore, when *Electronic News* ran an interview with William Magruder, special assistant to the President, by Jack Robertson, Magruder stated that he expected the Administration to provide some money for experiments with CATV-wired cities and electronic mail. Both projects had been detailed in the report.

While the report insisted that individuals' privacy would not be violated by these proposals, Hirsh reported, it was evident to anyone with a modicum of technical knowledge that the potential was there. For instance, on electronic mail handling the report stated "all handling of letters will be mechanized so that the original letter cannot be read while being converted for transmission" and that "all materials will be outputted in sealed letter form. Thus, the letter will never exist in a form which can be read during the time it is in the sanctity of the mail." What the report failed to mention was that a system of that nature could easily be programmed to detect and print out letters with any particular name or address.

—Deborah Sojka

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ADABAS has proven itself to be one of the easiest data base management systems to install and operate on IBM 370, 30XX, 4300 and plug-compatible computers.

Together with its relational-like architecture—which simplifies file design—this means that ADABAS can be installed and your data files loaded in one day. And that's how quickly you can start producing results. You don't need specialized programmers. You can respond to application changes as fast as users can think them up. And you can do it all in an integrated DBMS environment that includes an online data dictionary, and NATURAL, the productivity tool that can reduce application development time by 90%.

ADABAS from Software AG: easy to implement, easy to live with.

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THE DATASET JUGGLE: WITH UCC ON THE JOB, YOU'LL NEVER DROP THE BALL.

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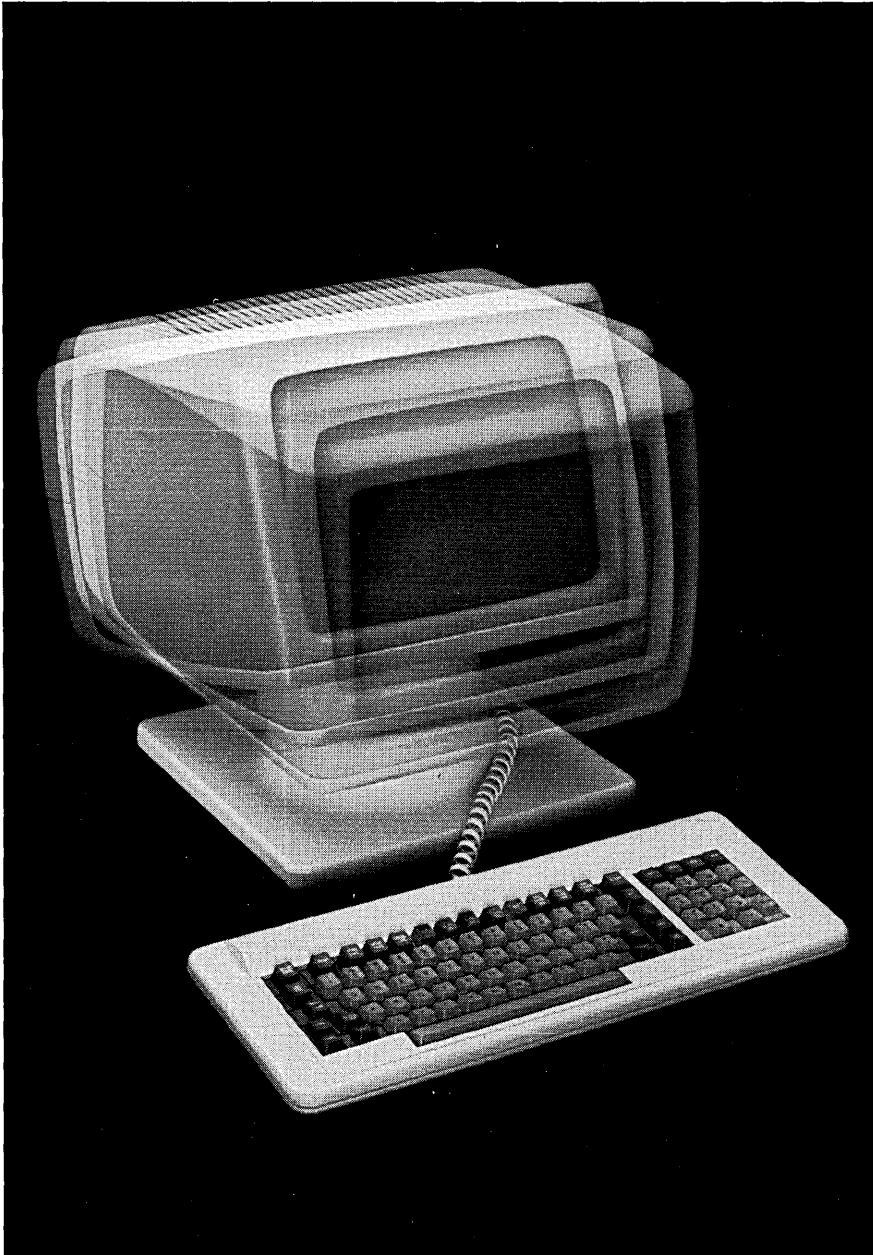
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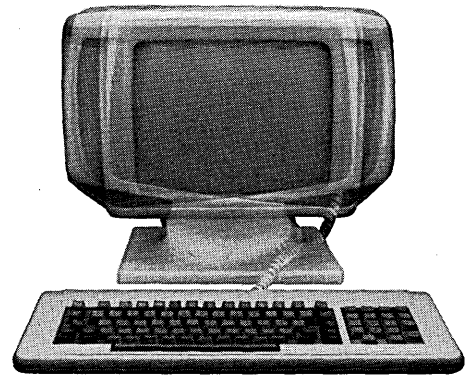


Epic's 14€ is everything you expect in a smart terminal. Plus full ergonomic movement to assure optimum operator comfort and productivity.

Screen tilts up and down over a 30 degree angle. It moves side to side, 180 degrees. Detached keyboard. Move it wherever it's needed.

Consider these other unique angles:

- 14" non glare, high resolution monitor, standard
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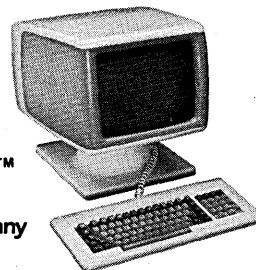
Epic's 14€ is built to European DIN standards. This is an absolute requirement, no matter where in the world your marketing plans take you. Few other suppliers can meet this futuristic requirement, today.

Service available through 18 established Epic/KTS service centers and three service depots, located throughout the United States and Canada.

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CIRCLE 25 ON READER CARD

LOOK AHEAD

CDC 800 REACHES
DOWN AND OUT

Vaulting into the VAX level of the market, Control Data will soon introduce the sixth and smallest model in its Cyber 170/800 series. Called the 815, it will be outfitted with CAD/CAM software from the Cybernet service and should cost in the half million dollar range. Meanwhile, watch for CDC to add a souped-up version of its remote micro facility to Cybernet, allowing Cybernet users to hook up minis and micros.

HEAR IBM
HAS P.C. PLUS

We hear that IBM may come out with a Unix-based personal computer, perhaps using the Motorola 68000 which is already employed in an IBM Instruments Inc. machine and which also forms the basis of a system to be installed en masse at Carnegie-Mellon University (see Benchmarks, p. 84).

NEW TO THE
32-BIT WORLD

The 32-bit computer market is extending onwards and upwards. Following Perkin-Elmer's November introduction of a multiprocessor machine claimed to far outperform DEC's VAX-11/780, new high-end machines are expected shortly from Digital Equipment and Data General. DEC's VAX-11/790 is expected in the second quarter of '83, while DG's biggest machine ever should be arriving at the market early in the year. Meanwhile, a number of pseudo-32-bit systems, based on the Motorola 68000, are competing in the same areas.

ELIAS TO
ENTER U.S.?

A user-friendly software package offered by IBM only in Europe is expected to get a marketing push here in the States. Called Elias, the package supposedly helps managers and end users to query their database systems in a more natural way and to generate COBOL code from a few simple statements. Pressure is mounting on IBM to fill the widening void for end-user aids that can help reduce the crippling application backlogs at customer sites.

UNLEASHING
THE 3270

Want to use your 3270 to talk to more than just an IBM mainframe? Keep an eye on local net company Sytek in Sunnyvale, Calif. The company is said to be working on a black box project, code-named Sunflower, that will allow 3270 terminals to connect into a Sytek network and talk with non-IBM devices.

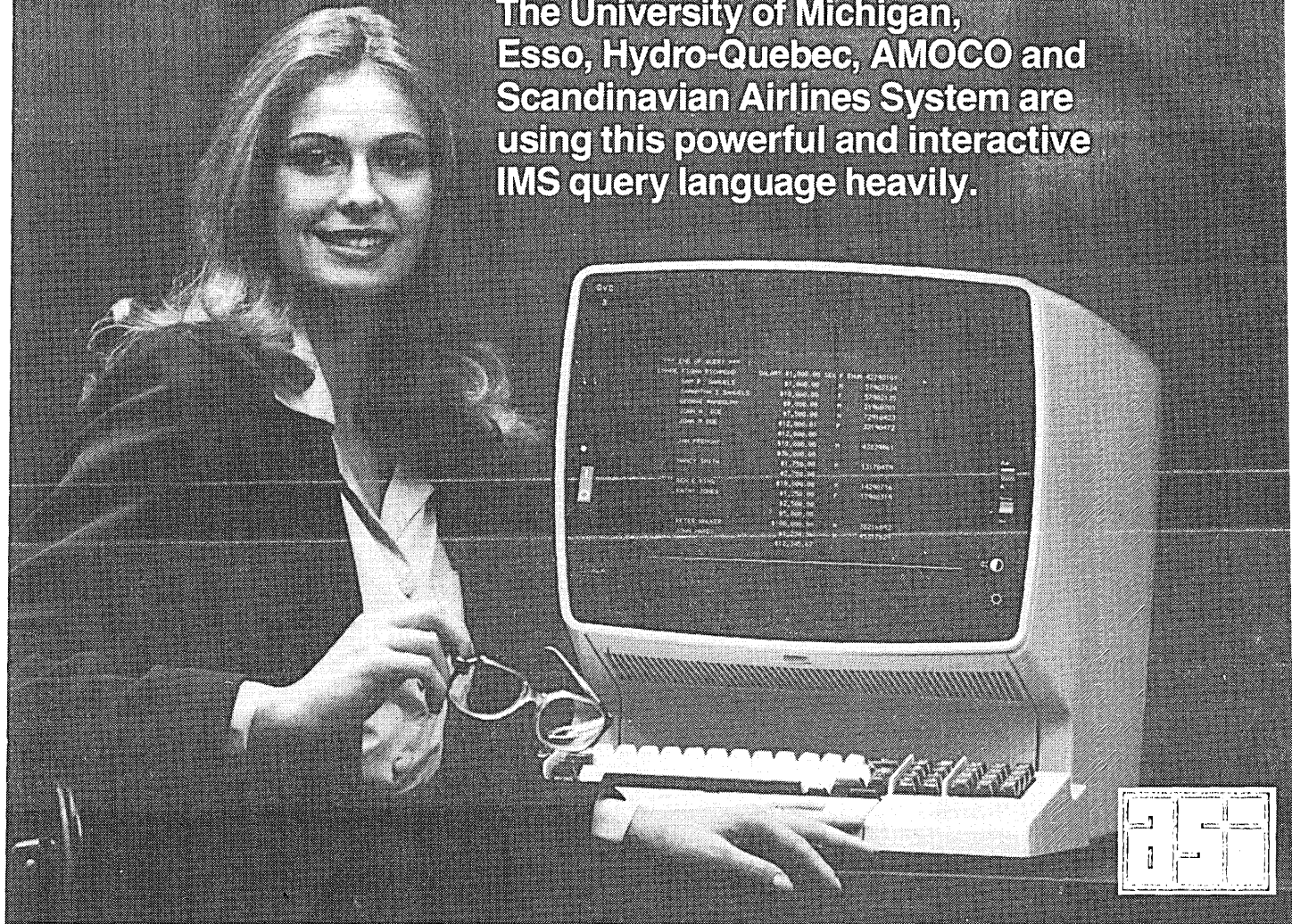
AND REPLACING
THE 3270?

IBM's legion of 3270 terminal users can expect a powerful replacement in the near future. Though rumors are that the announcement is imminent, informed sources suggest that IBM will hold off until next summer for financial reasons. "Maybe

LOOK AHEAD

	<p>60% of the 3270s are currently being leased, so IBM would probably prefer a fire sale before moving to the new model," one source said. Since its emergence in the early '70s, the 3270 has become a de facto standard and has attracted at least 60 competitors such as Memorex, Beehive, ITT-Courier, and, more recently, Lee Data.</p>
ATLAS AT LAST	<p>ICL shortly will install the first of its Atlas mainframes, the IBM-compatible systems it buys from Fujitsu. The Science and Engineering Research Council's Rutherford Lab in Chilton, England, will be the first customer, installing in "early 1983" a model 15 system with 16 megabytes of main memory and 16 I/O channels.</p>
IBM SAYS NO GO, SO FAR	<p>IBM denies reports emanating from Japan that it plans to formally join that country's fifth generation computer project. IBM says it has made no commitment to help out with the ambitious 10-year project.</p>
PLAYING FAIR OR FAVORITES?	<p>It hardly seems possible, but word has it that American Bell's under a six-month hiring freeze that should thaw sometime next spring. The going theory is that when the FCC turned thumbs down on AT&T Long Lines' Bell Packet Switching Service (the hang-up was Ma's friendly pricing breaks to Baby Bell), the decision put a crimp in Baby's plans for Net 1000, since BPSS is the backbone of that offering.</p>
GRUMBLINGS OVER WANGNET	<p>It appears Wang's Wangnet is meeting with resistance from beta test users, who complain about having a broadband cable strung like a trunk line through a facility and then being able to hang only Wangs off it. They question whether Wang wants to offer a local area network for facility-wide use or only for the office area.</p>
RUMORS AND RAW RANDOM DATA	<p>Sources say DEC and IBM will work together on a factory automation project for General Motors. The project is said to be based on IBM's System 38....Honeywell has laid off all the marketing staff of its communications subsidiary, SESA.... William Schmidt, vice chairman of CDC, is the new CBEMA chairman. Rumor has it that Schmidt's immediate boss at CDC, Bob Price, was a probable candidate for the association post but the feeling among CBEMA members was that Price would "soon" be ascending to the chairmanship of Control Data....Insiders say sour software from Systar is to blame for Van Dusen's failed timeshare service....ADAPSO has recognized the micro and unveiled its Micro Computer Software Assn.</p>

ASI/INQUIRY: Customers like Hughes Aircraft, The University of Michigan, Esso, Hydro-Quebec, AMOCO and Scandinavian Airlines System are using this powerful and interactive IMS query language heavily.



And here are three productivity-boosting reasons why.

1. ASI/INQUIRY Is Remarkably Easy to Use.

Because inquiries are stated in simple English, nonprogrammers can learn to use ASI/INQUIRY quickly. DL/1 structures are completely transparent to the user. You need not understand the complexities of multipathing or multiple data base access. Comprehensive diagnostic messages simplify error correction. ASI/INQUIRY automatically displays data in the appropriate format—horizontal, vertical, or overflow. Or you can specify any desired screen format. Repetitively executed queries can be saved in an on-line catalog. New Release 5.5 features include the ability to defer query execution from MP to BMP and support of IMS *Fastpath* facility.

2. ASI/INQUIRY Assures Faster Access and Response Time.

ASI/INQUIRY lets you access your DL/1 data bases through IMS or TSO faster and more efficiently. That's because it eliminates need to write and debug those highly procedural programs usually required to access data bases. ASI/INQUIRY operates as an IMS message processing program executed from any IMS DB/DC-supported terminal. Execution priority is dynamically controlled through automatic program message switching. High initial priority assignment assures fast response. Priority is then automatically adjusted to the rate that to-be-displayed data is encountered, which optimizes *load leveling* of IMS DB/DC resources.

3. ASI/INQUIRY Provides Complete Security.

Built-in safeguards protect data at the system, terminal, data base, field and value levels. Further, an installation's customized security system, as well as RACF or ACF2, may be integrated with ASI/INQUIRY security.

Learn why ASI/INQUIRY is the *most heavily used* IMS query language. Call or write — today!

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OMEGAMON/CICS® is a realtime monitor that warns of CICS problems as they are happening. The RTA/CICS™ option will display response time information graphically. ESRA/CICS™ is a new intelligent background performance analyzer that searches for response time problems and then looks for the causes.

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Candle is currently introducing a series of IMS products. OMEGAMON/IMS™, RTA/IMS™, and DEXAN/IMS™ will provide realtime windows into IMS problems, response time and degradation. EPILOG/IMS™ will perform in a background mode looking for and diagnosing response time problems.



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Candle provides top level technical support to customers. We offer courses, seminars, video-tapes, tuning guides, and special reports to help keep users up to date on how to monitor the ever changing IBM systems.

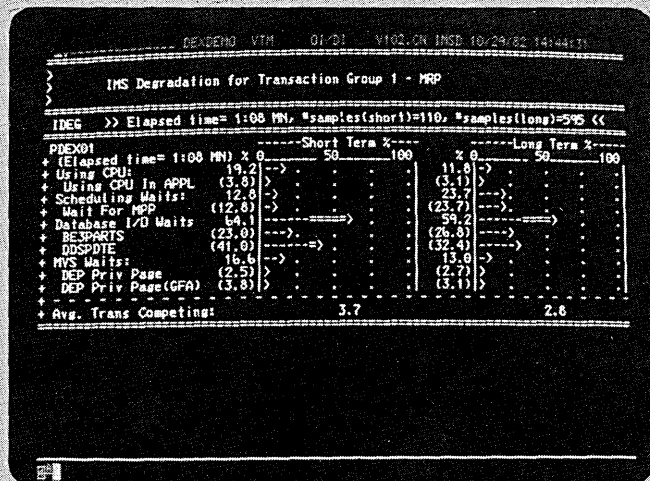
TECHNICAL NEWSLETTER

The Candle Computer Report is a newsletter that explores current topics and news in MVS, CICS, IMS and IBM hardware. It is provided free to IBM and IBM compatible installations.

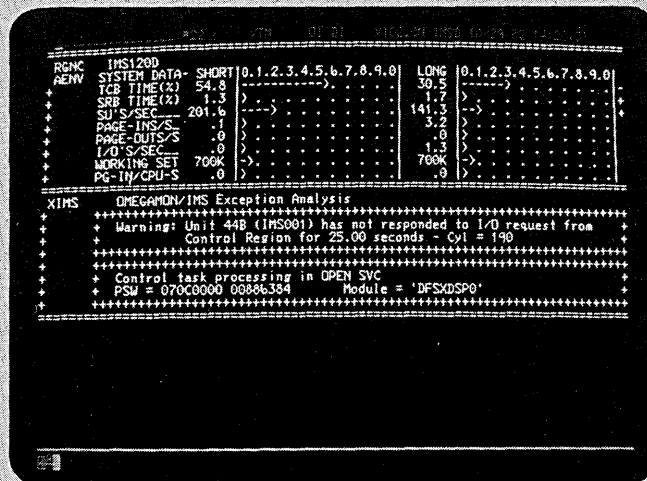
Candle™
announces

Two Exciting Windows into IMS Performance Problems

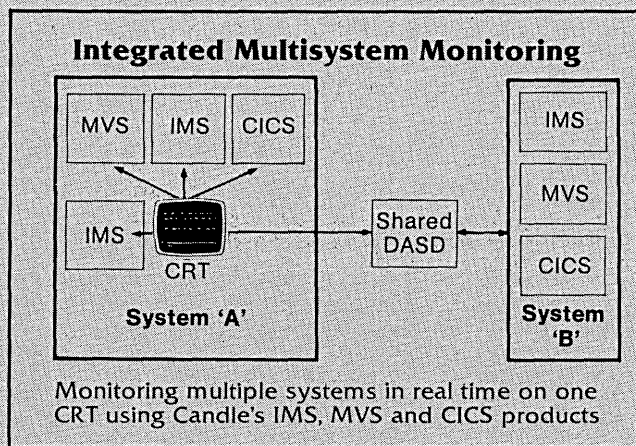
Today, thousands of computer systems all over the world are having their MVS and CICS performance diagnosed every few seconds by Candle's software monitors. Now Candle's innovative technology can illuminate performance and availability problems in IMS.



DEXAN™/IMS enables IMS specialists to quickly and easily zero in on why IMS transactions are running slowly. This ease of use is achieved through a diagnostic technique that Candle presented for MVS and CICS called degradation analysis. In the above example, transactions wait % on DB I/O (BE3PARTS=23%, DDSPDTE=41%)



OMEGAMON®/IMS will alert operators of problems in IMS by color messages and audible alarms. Comprehensive views into IMS performance and activity (400 commands) are provided for systems programmers. Dynamic screen formatting, tutorials, action commands and PFK support enhance the power of OMEGAMON/IMS for all users.



DEXAN/IMS and OMEGAMON/IMS:

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CALENDAR

DECEMBER

CMG XIII, December 12-16, San Diego.

The 13th International Conference on Computer Performance Evaluation is sponsored each year by the Computer Measurement Group. Contact CMG Headquarters, P.O. Box 26063, Phoenix, AZ 85068, (602) 995-0905.

2nd Gulf Computer Exhibition, December 13-16, Dubai, United Arab Emirates.

The exhibition is the only show in this region devoted exclusively to computer technology. It is organized by the Trade Centre Management Co. in association with Middle East Computing, and is supported by the Ministry of Finance and Industry, United Arab Emirates. Contact Trade Centre Management Co., P.O. Box 9292, Dubai, United Arab Emirates, tel. 472200.

JANUARY

PTC '83, January 16-19, Honolulu.

PTC is organized by the Pacific Telecommunications Council. This year's event will focus on communication infrastructures, the "technical, human, and institutional resources that contribute to economic and social development of the Pacific Hemisphere." Contact PTC, 1110 University Ave., Suite 303, Honolulu, HI 96826.

FEBRUARY

Kuwait Info '83, February 1-5, Kuwait.

In addition to last year's equipment demonstrations, the 1983 show will expand to a broader conference and seminar program. For further information, contact Clapp & Poliak International, P.O. Box 70007, Washington, DC 20088, (301) 657-3090.

Caribbean Expo '83, February 4-6, Paradise Island, Bahamas.

This computer and electronics expo will operate under the theme "Computers, The Door to Our Progress." Contact Ormand Vee Co., 1430 Miner Rd., Des Plaines, IL 60016, (312) 397-9572.

OAC '83, February 21-23, Philadelphia.

Theme for the fourth annual Office Automation Conference is "Explorations in Office Automation." For information, contact AFIPS, 1815 N. Lynn St., Arlington, VA 22209, (703) 558-3624.

ISSCC, February 23-25, New York City.

The 30th annual International Solid-State Circuits Conference is touted as a "global forum," covering topics that include the design, performance, fabrication, testing, and application of solid-state circuits, devices, and systems. Contact Lewis Winner, 301 Almeria, Coral Gables, FL 33134, (305) 446-8193.

SECURICOM '83, February 23-25, Cannes, France.

Also known as the Worldwide Congress on Computer Security and Protection, the goal of the congress is to support the exchange of

information on technological, economic, and social aspects of computer protection, data security, and privacy. Contact Peter Hazelzet, SEDEP, 8, Rue De La Michodiere, 75002 Paris, France, tel. 073-94-66 or 742-41-00.

Computer Expo '83, February 25-27, Orlando, Florida.

Featuring mini- and microcomputers, the expo will focus on the needs of end users in small business, real estate, education, and entertainment; professional and home use will also be covered. Contact Tom Blayney, P.O. Box 1185, Longwood, FL 32750, (305) 339-1731.

MARCH

Comcon Spring '83, March 1-3, San Francisco

Get ready to lose your heart all over again, at the latest Comcon show. For details contact Harry Hayman, IEEE Computer Society, P.O. Box 639, Silver Springs, MD 20901, (301) 589-3386.

Office Automation Conference and Exposition, March 22-23, Zurich-Regensdorf, Switzerland.

The show will concentrate on OA solutions developed in the U.S. that are applicable to the European office environment. Contact the Foreign Commercial Service, American Embassy, P.O. Box 1065, CH-3001 Bern, Switzerland, 031/437011, Telex: 32128.

Future Office, March 29-April 1, Milan, Italy.

This exhibit will feature U.S. equipment and will be held in conjunction with an OA conference. Contact Carol Ross, U.S.I.M.C., Via Gattamelata 5, Milan, Italy, 39-2-469-6451; Telex: 330208.

APRIL

Hannover Fair '83, April 13-20, Hannover, West Germany.

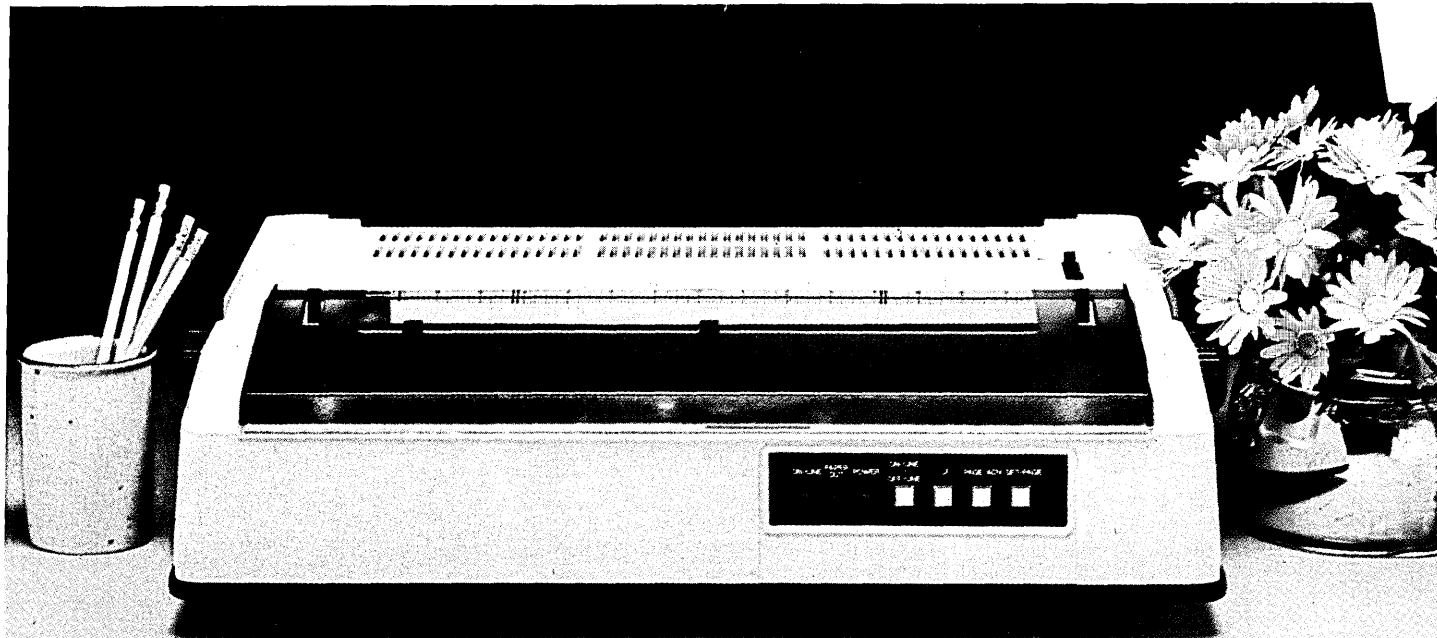
Last year's show had over 600,000 visitors from 118 countries; of course, "the world's largest industrial fair" expects another record-breaking crowd this year. Contact the Hannover Fair's Information Center at P.O. Box 338, Whitehouse, NJ 08888, (800) 526-5978.

13th International Symposium on Industrial Robots/ROBOTS 7, April 18-21, Chicago.

"Robotics: The Emerging Challenge" is the theme for this combination conference and expo, cosponsored by Robotics International of the Society of Manufacturing Engineers and the Robot Institute of America. Contact Pat Van Doren, SME Technical Activities, One SME Dr., P.O. Box 930, Dearborn, MI 48128, (313) 271-1500.

National Material Handling Show, April 25-28, Chicago.

This year's theme is "The Automated Factory." The show is sponsored by the Material Handling Institute, Inc. For additional information, contact the show organizers at 1326 Freeport Rd., Pittsburgh, PA 15238, (412) 782-1624.



C. Itoh's F-10 Daisy-wheel printer is the compact beauty you can easily get attached to. Just look at all the useful features you get.

1. Small footprint, low-profile design (only 6" high) fits easily into your system.
2. Downloading wheel and impact sequences allow use of a variety of unique wheels and permit OEM's to tune the printer to specific needs.
3. Comes in two Shannon-text-rated speeds. 40 CPS and 55 CPS.
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5. Extensive, built-in word processing functions allow easy adaptability and reduced software complexity.
6. Uses mono and dual-plastic wheels. (Unlike metal wheels, dual-plastic provides superior print quality over the entire life of the wheel.)
7. Field proven, firmware intensive technology for increased reliability.
8. Cast aluminum base plate with high quality metal parts provide lasting dependability.
9. Low-noise operation is ideal for office environment.
10. Choice of friction feed or bidirectional tractor feed for precise print positioning of tabular and graphics data.
11. Uses industry-standard wheels and ribbon cartridges available from multiple sources at low prices.
12. Universal power supply is standard and allows worldwide power source compatibility.
13. FCC approved and under 50 lbs. in weight for fast shipments and sales.
14. Easy-to-load wheels with tested and proven method of wheel support (spring loaded with positive detent).

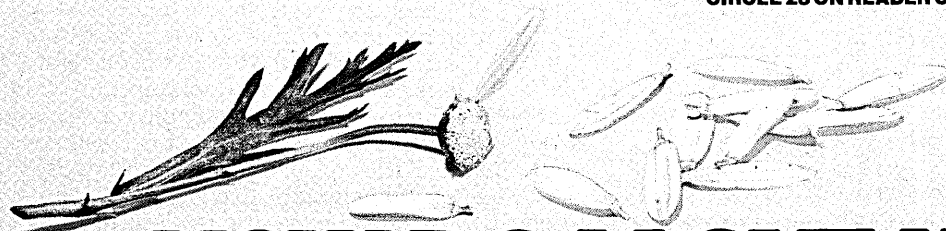
We could go on. But quite frankly, once you see the F-10 perform, you'll never look at another Daisy.

The F-10 is fully backed by C. Itoh's warranty and complete support organization. Contact C. Itoh Electronics, Inc. 5301 Beethoven St., Los Angeles, CA 90066 (213) 306-6700.

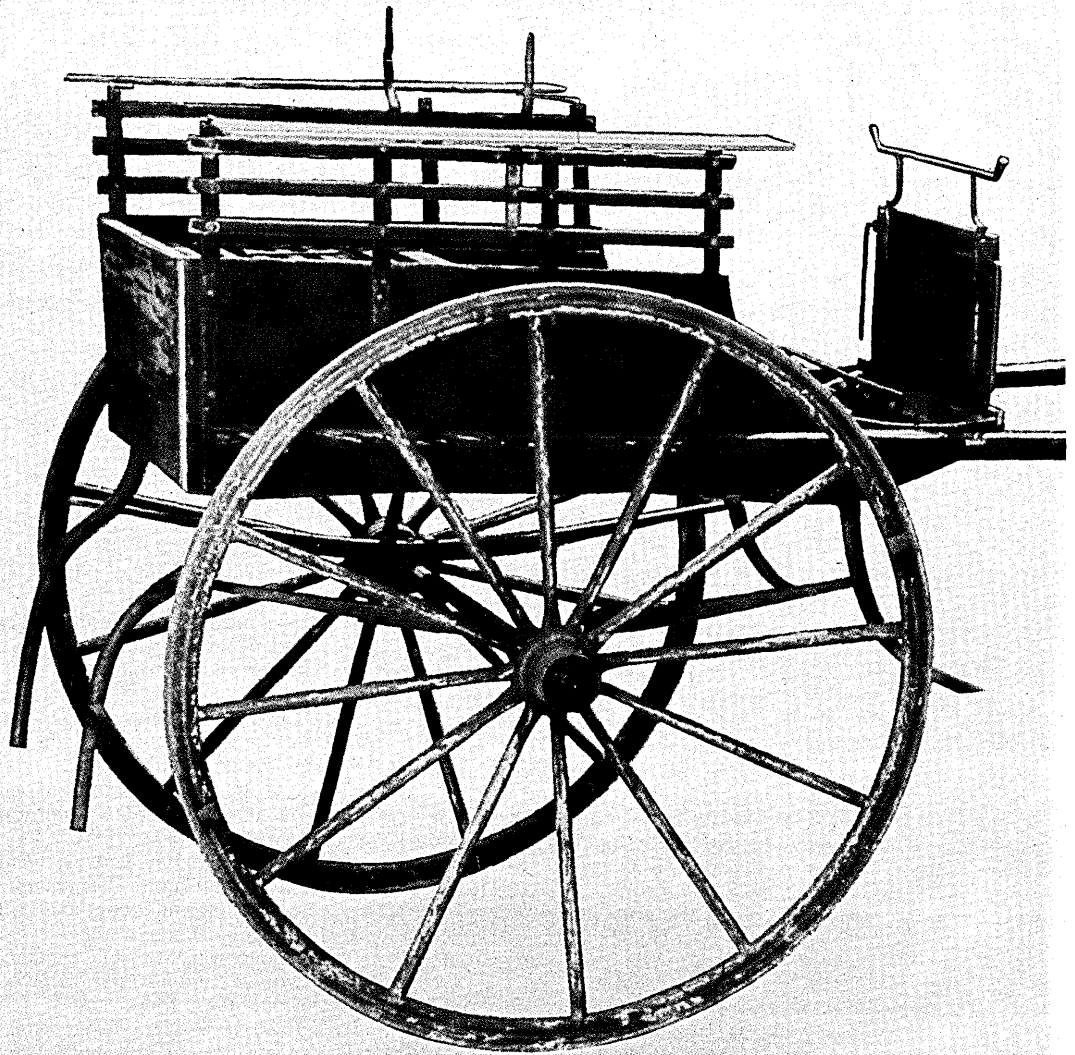
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**HOW DO I LOVE YOU?
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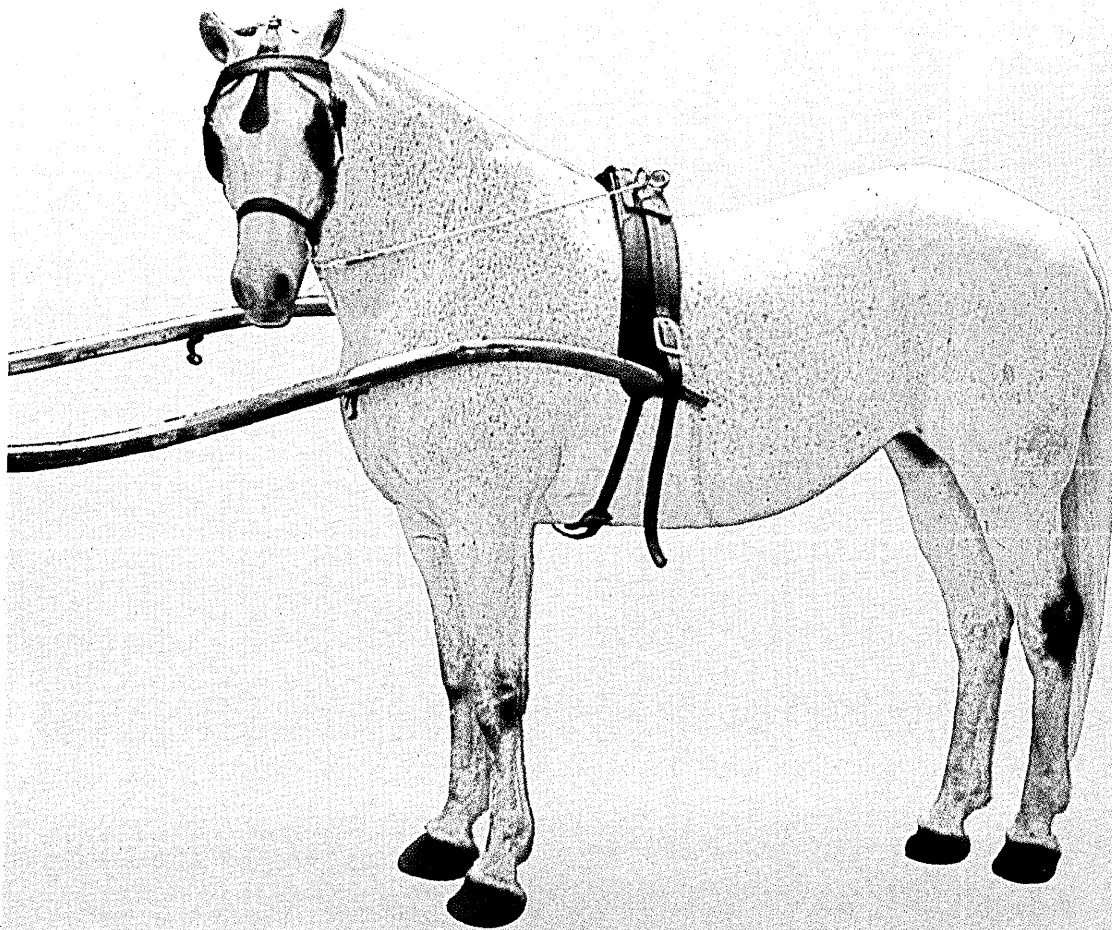


**Sometimes,
you need a
solution before
you know
the problem.**

End users don't always know exactly what they need, but they usually know precisely when they need it. Typically, it's yesterday.

They don't do it to complicate your life, but to un-complicate theirs. All too often, the need for fast solutions exceeds their understanding of the problems. Theirs and yours. After all, your responsibilities are to meet the data processing requirements of the entire organization. That's why you've established the need for clear definitions, defined parameters and realistic priorities. But to someone with an urgent need, your rules and procedures may seem more like obstacles than answers.

That's when Control Data Business Information Services can help you *and* your end users. Even when they don't know exactly what



they need (their problems are urgent and important, but ill-defined, evolving, or both), we can help them create their own prototype systems. In a fraction of the normal development time.

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You maintain control. And you decide when or if these new applications should be integrated into your own system. Either way, you've helped provide your end users with sound solutions

without burdening or diverting any of your energies and resources.

Today, data processing managers in hundreds of the nation's largest companies are benefiting from Control Data Business Information Services . . . we're the alternate resource.

When you have to provide a solution before you know the problem, let us help you and your end users. They get the answers they want. You keep the control you need.

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Control Data
Business Information Services
500 West Putnam Avenue
Greenwich, CT 06830

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PERSONAL COMPUTING AND APPLICATION DEVELOPMENT HAVE NEVER BEEN EASIER.



Ever since Henco Software joined the Prime Solutions Program, personal computing and applications development has become available to people of all skill levels.

For non-DP people, INFO is a truly functional departmental computing tool. Users can access corporate data or set up their own files. And they can enter and update information, query and generate reports, and write simple applications programs. Henco also offers a range of INFO-based interfaces for document management, graphics, modelling and word processing. All can be run on the same departmental machine. And all with a minimum of technical support.

For the DP department, INFO is a fast application development and design tool. Productivity will soar because system development takes just one-fourth to one-tenth the time as COBOL or FORTRAN. So projects scheduled to take a year can be done in a few months. And because INFO is so easy to use, many users maintain their own applications, allowing the DP department to concentrate on major programming projects.

And for DP management, INFO provides all the advantages of a 4th generation language, plus fast and easy integration into existing systems and files.

Even if you start with a small

system, the Prime/INFO combination gives you mainframe performance at a fraction of the cost. And you get Prime's unique full-line compatibility for easy growth, along with state-of-the-art distributed processing capabilities.

All in all, INFO is one of the most versatile and cost-effective software tools available today. In fact, payback can be measured in weeks, not years. Which helps to explain why it's installed at nearly 1000 sites worldwide, from small businesses to giant Fortune 500 companies.

If you'd like to know more about how Prime and Henco are providing solutions for the '80's, write to Prime Computer, Prime Park, MS 15-60, Natick, MA 01760. Or call 1-800-343-2540. In Massachusetts, call 1-800-322-2450.

- Send more info on INFO.
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DM-12/82

PRIME Computer

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LETTERS

RETURN TO WRITE-ONLY MEMORIES

While I thoroughly enjoyed your 25th Anniversary Issue, you did err when you presented the "Most Creative PR Department" award to National Semiconductor for its announcement of the write-only memory ("Products of Their Times," September).

The story was hatched by the West Coast editor of a leading electronics publication who wanted to test the knowledge of a New York-based section editor. In order to give the story an aura of authenticity, he recruited a reluctant Roy Twitty, then public relations manager at Signetics, to write a press release announcing this technology breakthrough.

Obviously, the ruse succeeded.

GEORGE BOARDMAN
Manager, Media Relations
Ampex Corp.
Redwood City, California

CLEAR THE DEC

I find it incredible (!) that your history of the computer industry (September Anniversary Issue) fails to mention DEC or its founder Ken Olsen! We are celebrating our 25th anniversary also this year, and are the world's leading manufacturer of minicomputers and the second largest (next to IBM) computer manufacturer in the world.

JACK MILESKI
Marketing Manager
Digital Equipment Corp.
Merrimack, New Hampshire

We would like to refer you to "As Time Goes By," our 25-year time line that begins on p. 65 and includes numerous mentions of DEC and its important contributions to the information processing industry.—Ed.

MISPLACED MEMORIES

Your September 1982 Silver Anniversary Issue contains an article called "Thanks for

the Memories" in which you give a profile of Edgar F. Heizer Jr. In that profile you make the statement that "Heizer was the man who first put Amdahl and Fujitsu together." This statement is totally incorrect.

The relationship between Amdahl Corp. and Fujitsu existed as a personal relationship between myself, Dr. Hanzo Omi, and Dr. Toshio Ikeda, whom I knew for more than a year before I met Ned Heizer and for three years before they met Ned Heizer.

The negotiation of the first investment from Fujitsu into the relationship between Amdahl Corp. and Fujitsu took place and was completed in 1971. Mr. Heizer's first negotiations with Fujitsu did not occur until 1974.

GENE M. AMDAHL
Chairman of the Board
Trilogy Systems Corp.
Cupertino, California

SOLD!

A fantastic Anniversary Issue!

But I want to know if that bar in Rock Island, Ill., where John Atanasoff dreamed up the computer is still there ("The Independent Inventor," p. 12). If it is, let me be the first to contribute \$50 to the "Birthplace of the Computer" fund. . . . and let's buy the joint!

BRENT MARSH
Georgetown, Delaware

A good idea. Let's talk about it someday over drinks.—Ed.

I have just finished reading the 25th Anniversary edition of your magazine (September) and I would like to congratulate you on a fine job. In particular, the stories about the beginnings of computing were of great interest to me.

THOMAS S. MIRLEY
Malden, Massachusetts

POWER OF THE (ASSOCIATED) PRESS

In your Silver Anniversary Issue you carried a boxed item, "The Power of the PTTs" (September, "Deja Vu on a Decade"), in which you reported: "SWIFT, the international banking network that started up seven years ago, was hit with rate increases of up to 150%. SWIFT complained to the EEC to no avail. Unlike SWIFT, other operations, such as the Associated Press photo wire service, were unable to absorb the costs and folded as a result of the PTT rate rise."

That information is incorrect. The AP has not folded its wire picture service anywhere in the world, has no intention of doing so and has, in fact, just completed five years of unprecedented growth in terms of staff to produce our news picture service and in terms of members and subscribers who receive it.

Where your information could possibly have originated is a mystery because the reliability of AP service is a widely accepted given in the news industry.

HAROLD G. BUELL
Assistant General Manager for Newsphotos
Associated Press
New York, New York

We get the picture, AP. In retracing previous DATAMATION reports on the international scene for this article on historical perspective, we misinterpreted an earlier story regarding the effect of PTT rate hikes on operations such as the AP wire picture service. We apologize for this error.—Ed.

WOULD YOU BELIEVE . . . ?

To set the stage for this next letter, which did indeed just arrive, we'd like to give you a little background. Over a year and a half ago we published a news story by Edith Myers titled "Boom in Business Graphics" (April 1981, p. 92), in which we discussed the various segments of the graphics market

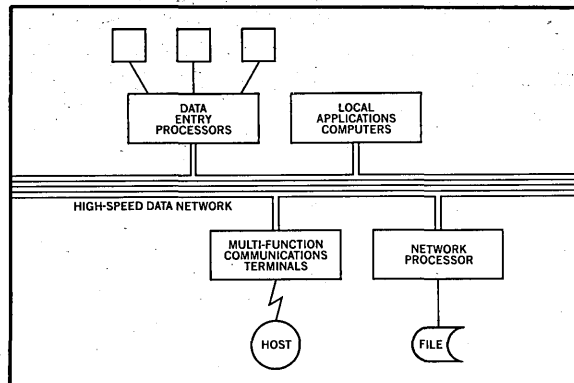
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LETTERS

and their projected growth rates. The letter that follows makes reference to one sentence: "ISSCO's [Meldon] Gafner said he believes presentation graphics will account for 60% of business graphics growth rate over the next five years." Voila. Read on. . . —Ed.

In April 1981 you published an article which includes our mark PRESENTATION GRAPHICS[™]. The article does not, however, display our mark in proper form and does not include a notation that PRESENTATION GRAPHICS[™] is a mark of Arens Applied

Electromagnetics, Inc. I am, therefore, writing to bring our rights in the mark to your attention and to ask that this apparent oversight be corrected in future publications.

PRESENTATION GRAPHICS[™] is a service mark and trademark of Arens Applied Electromagnetics, Inc. We adopted and first used the mark in 1979 in the development, licensing, and sales of computer software. Since that time, we have continuously used the mark with our services and products, and we presently have an application on file in the United States Patent and

Trademark Office for federal registration of the mark. We have made a considerable expenditure in the advertisement of our services and products under the mark PRESENTATION GRAPHICS[™] and have developed substantial goodwill in the mark. Thus, the mark is a valuable asset of our corporation which is protected under state and federal law.

To protect our mark, we are required by law to bring any infringement or misuse of our mark to your attention and request that such infringement or misuse be discontinued. Since I am confident that the improper use of our mark is an oversight, I would simply ask that you ensure that our mark is not misused in the future in advertisements, articles, or the like. I would suggest that you either not use our mark in future printings or use it in a proper sense by capitalizing the mark, placing a [™] notice next to the mark, and including a statement that PRESENTATION GRAPHICS is a trademark and service mark of Arens Applied Electromagnetics, Inc.

STEVE WHITE

Director of Marketing
Arens Applied Electromagnetics, Inc.
Gaithersburg, Maryland

From now on, when we refer in the generic sense to the field of "you know what," we'll call it prezentashun grafix. —Ed.

PARLEZ-VOUS FRANCAIS?

Mr. Michael Cashman's article in your 25th Anniversary Issue (September, "Products of Their Times," p. 127) has a section titled "Has This Been Done?" in which he mentions early efforts in computerized language translation. This ability has not been lost, and WCI is a company that offers computer assisted language translation software.

We currently have software that translates English to Spanish, English to French, English to German, English to Portuguese, English to Arabic, French to English, Spanish to English, and German to English. We are developing Japanese to English translation software and plan to release it in the second quarter of 1983.

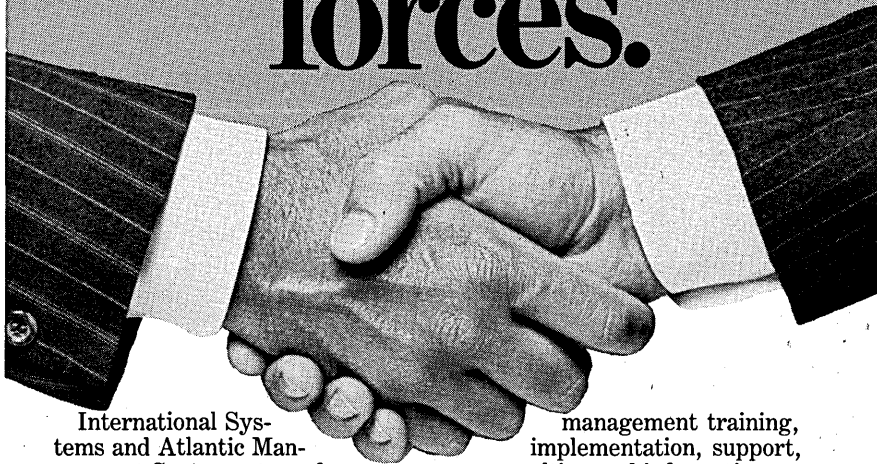
We believe that we were the first company to put this translation capability on a minicomputer and are working on translation products that will operate on microcomputers.

JOHN R. JACOBS

Vice President, Engineering
Weidner Communications Inc.
Highland Park, Illinois

Editor's note: Your comments on articles appearing in the magazine are most welcome. We do reserve the right to edit the letters for either brevity or clarity. Letters to the Editor should be addressed to: Letters Editor, DATAMATION, 875 Third Ave., New York, NY 10022.

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CIRCLE 32 ON READER CARD

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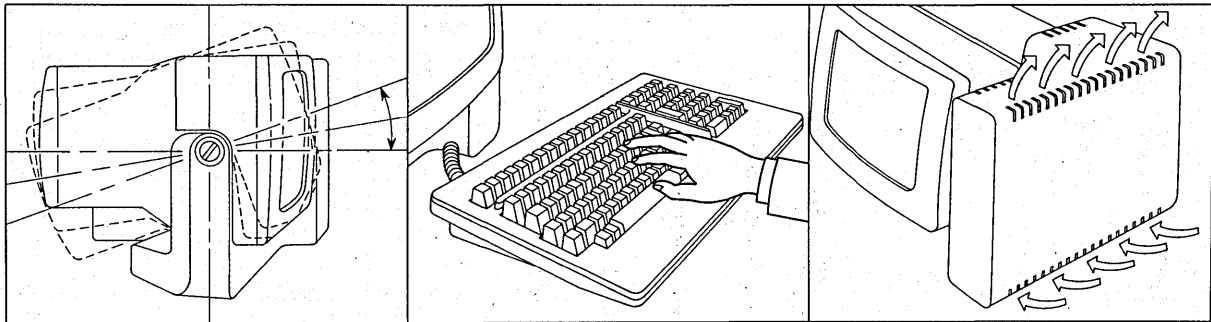
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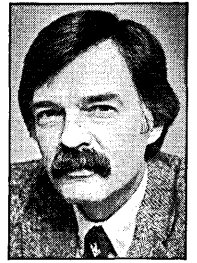
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CIRCLE 35 ON READER CARD



EDITOR'S READOUT



FROM RIP-OFFS TO REWARDS

"In the early years, computers upset our economy, caused waste in public expenditures, and placed us at the mercy of aggressive manufacturers."

Those early years, spoken of with such bitterness by one Tunisian official, don't seem so long ago to most Third World countries that feel they've been pillaged and plundered in the wake of the computer revolution. No longer willing to tolerate exploitation at the hands of the technology-rich nations, the developing countries are recognizing the need to mold their own technological destinies.

For the Third World community, it's a matter of catching on and catching up. In the beginning rip-offs seemed the rule, rather than the exception. Retribution soon followed. Some of the countries so abused allowed only locally owned companies to do dp business inside their borders. But like it or not, these same countries rapidly came to realize that they alone could not supply their burgeoning computer and communications needs.

They also rapidly realized, as did the rest of the industrialized world before them, that information processing power is real power in an economic, social, and political sense.

The meaning of all this was not lost on one very determined developing country—Brazil, which ranks among the world's top 10 computer markets. Brazil is out to turn the technological tables on the rest of the world. It wants its own information industry, and is doing everything it can to foster and further that goal.



The government's farsighted planning in the informatics realm is commendable. So too is the study the nation completed this year on the touchy transborder dataflow (TDF) topic. The voluminous report, prepared for the U.N.'s Center on Transnational Corporations, is the best-documented case study yet to be published on TDF.

The Brazilians are right to focus so much attention on this sensitive subject. Often overlooked in our own country, the TDF issue is of far graver concern to Third World nations that believe they have been cruelly tricked on their first technological go-around.

They hope to be luckier the second time around, and the Intergovernmental Bureau for Informatics hopes they will, too. Any talk of the Third World and its dp dreams would be meaningless without a mention of this Rome-based organization that has come to be the voice of the developing world.

IBI's voice rarely wavers, although to some ears it has become less strident. Its message: bring sophisticated information technology to develop-

ing countries. At a meeting in Mexico City in June 1981, a statement was issued that still epitomizes the Third World's stand: "Humankind faces increasingly complex problems that may condition its survival. These trends are interacting in a way that increases tension within and between societies to the point of endangering peace. Informatics can play a critical role in lowering these tensions."

It's easy to endorse such worthwhile global planks. It's harder to back up that endorsement with meaningful support—support that Third Worlders can not only implement but also accept without fear of strings attached.

The developing countries are indeed justified in their fears. The Third World is riddled with horror stories of users being hoodwinked by hardware sellers, who convince them to buy high-priced, high-powered, totally unnecessary systems. The feast-famine syndrome is at work here.

A more basic fear underlies all this wariness. The simple fact is that many Third World citizens are afraid of what the computer represents. So while they seem to welcome the benefits of technology, they also are still suspicious of it.

To overcome this suspicion, foreign suppliers will have to recognize that buyers in these nations want more than equipment—they also want an understanding of their applications and service needs.

DATAMATION recognizes the needs and aspirations of the developing nations, and urges the worldwide vendor community to do the same. The road from rip-offs to rewards has been a rough one for these countries. Hopefully now, that road will become a two-way street. For, as IBI's controversial and colorful leader Fermin Bernasconi has declared, "If the political game is played in the right way, it could benefit the whole world." *

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CIRCLE 36 ON READER CARD

NEWSFOCUS

THE MICRO MICROS

They're small enough to fit in your hand, cheap enough to buy as Christmas gifts, and powerful enough to run sophisticated applications.

by Michael Tyler

The handheld computer is here. Its arrival was inevitable, the result of two long-converging trends. Ever since the first ENIAC was put into production, manufacturers have been making computers smaller, cheaper, and more powerful than their predecessors. And ever since the days when the four-function Bowmar Brain signaled the beginning of the end for the slide rule, more and more powerful capabilities have been appearing in each generation of handheld calculators. It had to happen at some point that these two marvels—the computer and the calculator—would merge.

It looks to be a happy marriage. Handheld computers are the first truly portable computers—the Osborne, Otrona and other transportable computers are too bulky and heavy to be strapped to one's belt and carried anywhere. These new machines, on the contrary, fit in your hand, run on batteries, and offer impressive computer functionality, usually for less than \$1,000.

Of course, these handheld computers don't offer quite the same functionality and capabilities as desktop computers or larger machines. They can support only one user at a time, their memories are quite limited, and the typical one-line display can be infuriating. And when peripherals like printers, larger screens, or off-line storage are added, these machines can quickly lose their portability.

Nonetheless, users who want to stay in the vanguard of new technology in tiny computers will have to be satisfied with the handheld variety. There are not even that many of these around; indeed, only a handful qualify as fully functional handheld computers. That is, they are approximately the size of a handheld programmable calculator, weighing under two pounds, and can be held in one hand while being operated with the other; they must contain at least a 4-bit microprocessor and be programmable in BASIC or some other high-level language; and they must be compatible with some kind of peripheral devices for hardcopy output and for off-line storage.

While many machines are dubbed handheld computers, they do not fit our

definition. The Epson HX-20, the Teleram 3000, and the Timex-Sinclair Z1000, among others, are indeed portable, but they are still the size of a loose-leaf binder or a book and are not easily handheld; and machines like the Lexicon Lex-31, the IXO Telemicrocomputer, and the Axlon Datalink are sufficiently small but offer only terminal capabilities.

There are four leading handheld computers. At the low end there is the Casio FX-702P, a machine that fulfills all of the requirements but is labeled "programmable calculator." Slightly more powerful are the Sharp PC-1211 and PC-1500, which are identical to the Radio Shack TRS-80 PC-1 and PC-2. The PC-1 was the first handheld computer introduced in the U.S., in 1980. (The Sharp version was introduced in Japan a year earlier.) Still more powerful, and more expensive, is Matsushita's Hand Held Computer, marketed in this country as the Panasonic RL-1000 or the Quasar HHC. Perhaps the most powerful and versatile of this new breed of computer—the nanocomputer, as it were—is the Hewlett-Packard HP-75C, which can cost as much as some desktop computers.

It's clear that Hewlett-Packard and Panasonic—and, to a lesser extent, Sharp and Casio—are competing against one another, but it's not exactly clear what they are competing for—that is, there is no consensus on how big a pie there is to slice up. Nor, for that matter, does anyone seem to agree on the character of the market. Just who will be willing to spend anywhere from \$200 to \$2,500 to be able to carry a computer strapped to his belt or tucked away in a coat pocket?

There's no question that there is a market and that it is poised to take off in the next few years. Because the computers

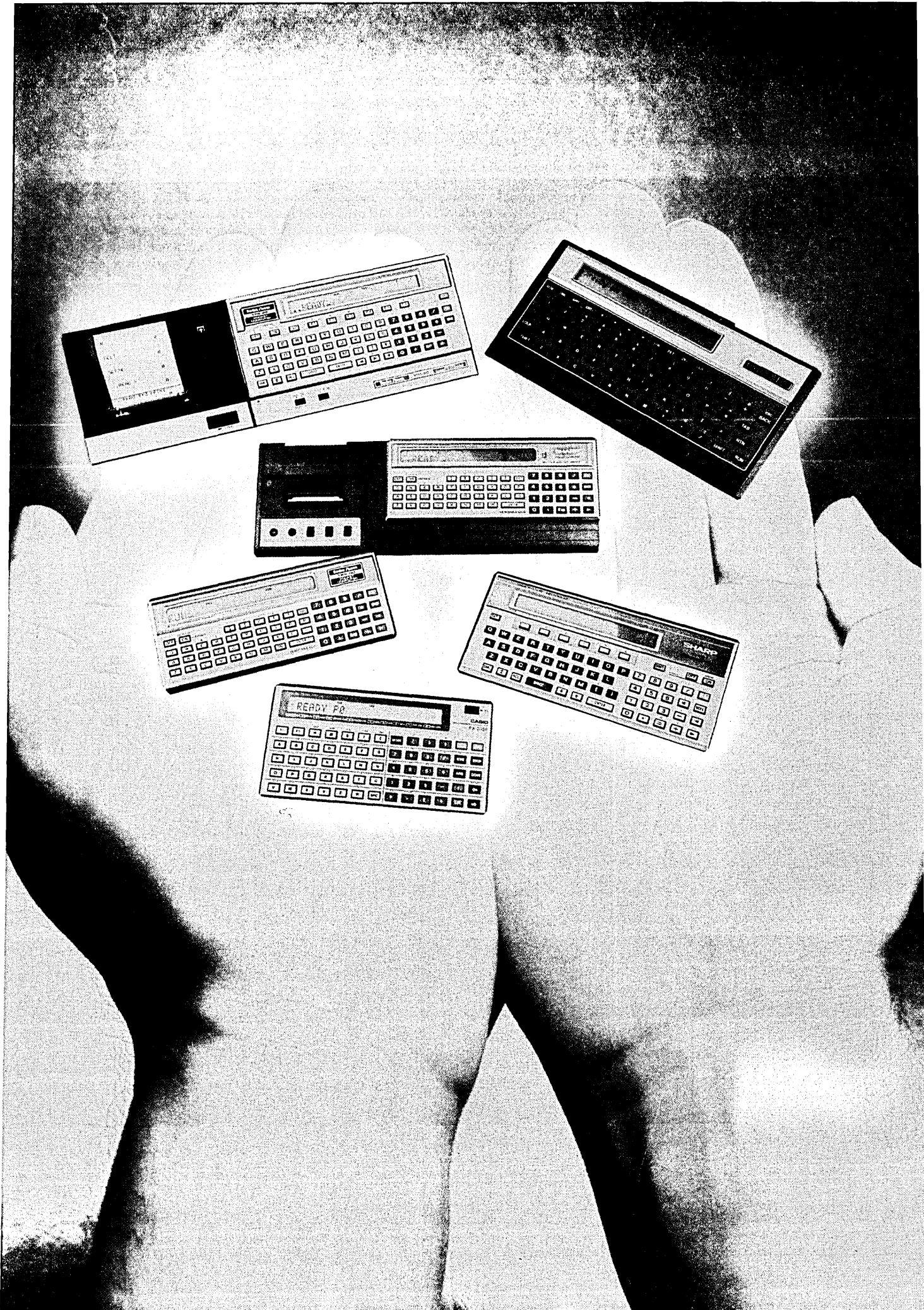
Studies have predicted that half a million units would be sold in 1982 and over a million in 1983. Sales may reach 5 million by 1986.

have been on the market for only two years, the installed base is still low. A Yankee Group study recently tabbed the current market at some 162,000 units sold this year, or about \$52 million in sales.

Great expectations are held for this infant market. Studies by Future Computing in Dallas and Creative Strategies International in San Jose have predicted that close to half a million units would be sold in 1982 and over a million in 1983. Sales can be expected to reach 5 million units in 1986, with revenues of \$754 million, according to the CSI study. Future Computing predicted that sales would not reach 5 million until 1987, but even that represents enormous growth.

"The market is extremely price sensitive," says Future Computing chairman

PHOTOGRAPHS BY JOOK LEUNG



IN FOCUS

Egil Juliussen. "We assumed an average list price of \$300 and a low end of about \$150, but if the price continues to drop the volume will increase significantly." The cutoff cost is about \$500, above which Juliussen expects volume to decline rapidly. "The price is too high on the Hewlett-Packard and Panasonic machines. The Radio Shack computer sells because it's cheap."

Steve Ruddock, a spokesman for Hewlett-Packard, believes the market is potentially even more explosive. "Handheld computers are still an emerging market—they may reach \$2 billion to \$3 billion in 1985." Despite the hefty price tag, \$995 for the basic unit, he expects the HP-75C to sell very well. "We would like to be the Apple of handheld computers—the first and the leaders. The competition this year is slim, but we expect there will be many more competitors next year. We want to grab the position as the leader early on."

While the handheld computer manufacturers generally hold rosy views of the market and their products—even if they disagree by a billion dollars or so on the size of the market—there are still those who forecast less rapid growth. Says Aaron Goldberg of International Data Corp., "Handheld computers are not immensely popular. They don't offer the important functionality of other computers. I'm not sure they will ever catch on." Part of the problem, he says, is that "there are a lot of portable terminals that offer the same communications capabilities but are easier to use."

Retorts Juliussen, "Soon terminal capabilities will be included in handheld computers. Then why buy a handheld terminal when you can buy one machine that is both a computer and a terminal?"

Retailers have mixed views on the salability of the handheld computer. Andy Hofer, a salesman with Computronics, in

Spring Valley, N.Y., says the Panasonic RL-1000 is selling "up to expectations. It's very expensive, so it's not a big mover. Still, we've sold about 12." He added that the Sharp computers were "not selling well at all." In New Jersey, the Computer Discount of America store was having a rough time with the Panasonic. "I sold my last two at cost just to get rid of them," says salesman Wayne Atkins.

One New York City retailer, 47th Street Photo, tells a different story. "We seriously misjudged the market at first," marketing director Jacob Honig said. "Sharp came to us first and we said we didn't want to sell the PC-1211. We felt that it wouldn't go anywhere. We were very wrong. We've sold a thousand units in four months."

While it is too early to determine the salability of the HP-75C, Ruddock says that initial shipments have been heartening. "We've been shipping as quickly as we could have expected." Several hundred

Retailers have mixed views on the salability of the handheld computer.

units were shipped to California retail outlets Sept. 15 and to New York in early October, but no sales figures were available at press time.

One reason for the wide disparity in reported sales and marketability is that advertising has been lackluster. Atkins complained that Panasonic never marketed its handheld computer heavily, hurting sales. Computronics, meanwhile, advertised the same unit in its catalog and had more success. Both Radio Shack and 47th Street Photo have been plugging the Sharp machines to boost sales.

Advertising has been limited at least

in part because no one is entirely sure who is going to buy these machines. Without a clear market segment in sight, advertising the products makes little sense. Several potential markets have been claimed. Lower-end machines, like the Casio and the Sharp, are being sold primarily to current users of programmable calculators who want to move up to a computer; programming BASIC on a handheld computer is far more efficient and friendly than programming machine language on a handheld calculator, says Sharp Midwest sales manager John Stafford.

Supporting evidence of this view is the variety of available software. Scientific and engineering packages are the most popular software for handhelds, says Juliussen, because they are the ones most needed by former programmable calculator users.

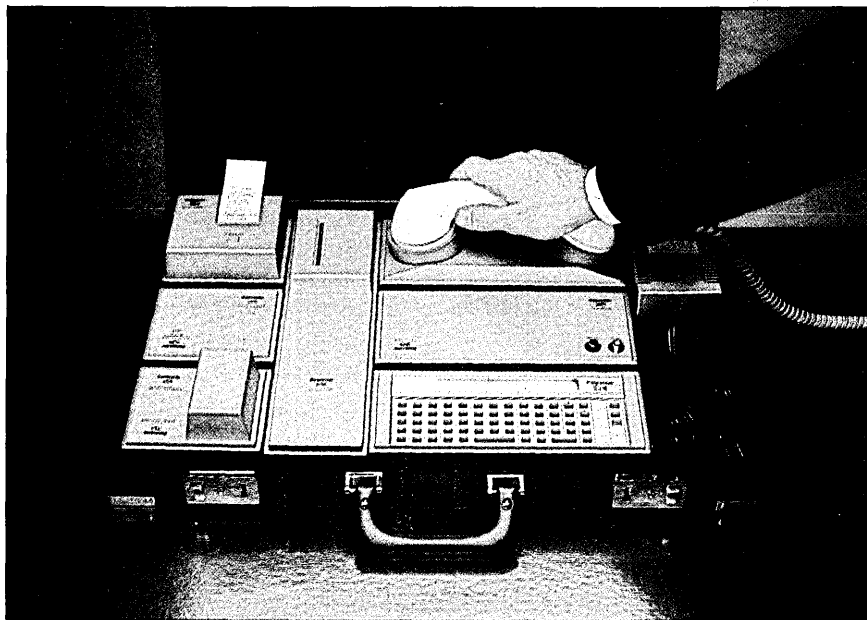
But there are other potential markets. Marty Wyrod, president of handheld terminal manufacturer Applied Systems Corp., sees the best uses to be in retail businesses. "The handheld computer market is for dedicated applications rather than for general computing; they can be used for route accounting, sales, technical monitors, inventory and sales from points of sale in the field, and for small retail transactions."

Other dedicated applications will also become common, penetrating new markets, Wyrod says. "Handhelds should also become a common tool for executives and managers, but it's a question of time. God knows it will occur. I expect handheld computers to permeate the marketplace much like personal computers have."

Others are also looking at business as a potentially lucrative market. Time and appointment management programs are available on all of the major handheld computers, and Hewlett-Packard is developing a system that will include an appointment calendar, clock, personal files, phone numbers, memo writing capabilities, and an alarm, all in one ROM module. The idea is to give the executive or manager as much of a personal computer and a secretary as can be crammed into 16K.

The marketplace is bigger still, if you ask 47th Street Photo, than merely traveling executives, managers, and engineers. The store has been targeting its advertising at that very common class of businessman, the daily commuter. "People buy it to use on the subway," Honig says. "Commuters of all classes like to have it with them for brainstorming." Yet another market has been students, who learn BASIC in the classroom and then practice immediately on the way home from class.

Are these potential markets real, or will they eventually evaporate into thin air? Clearly, the manufacturers and retailers believe that the markets will grow and mature. Still, there's always someone who won't believe it until he sees it. International Data Corp. has no intention of including hand-



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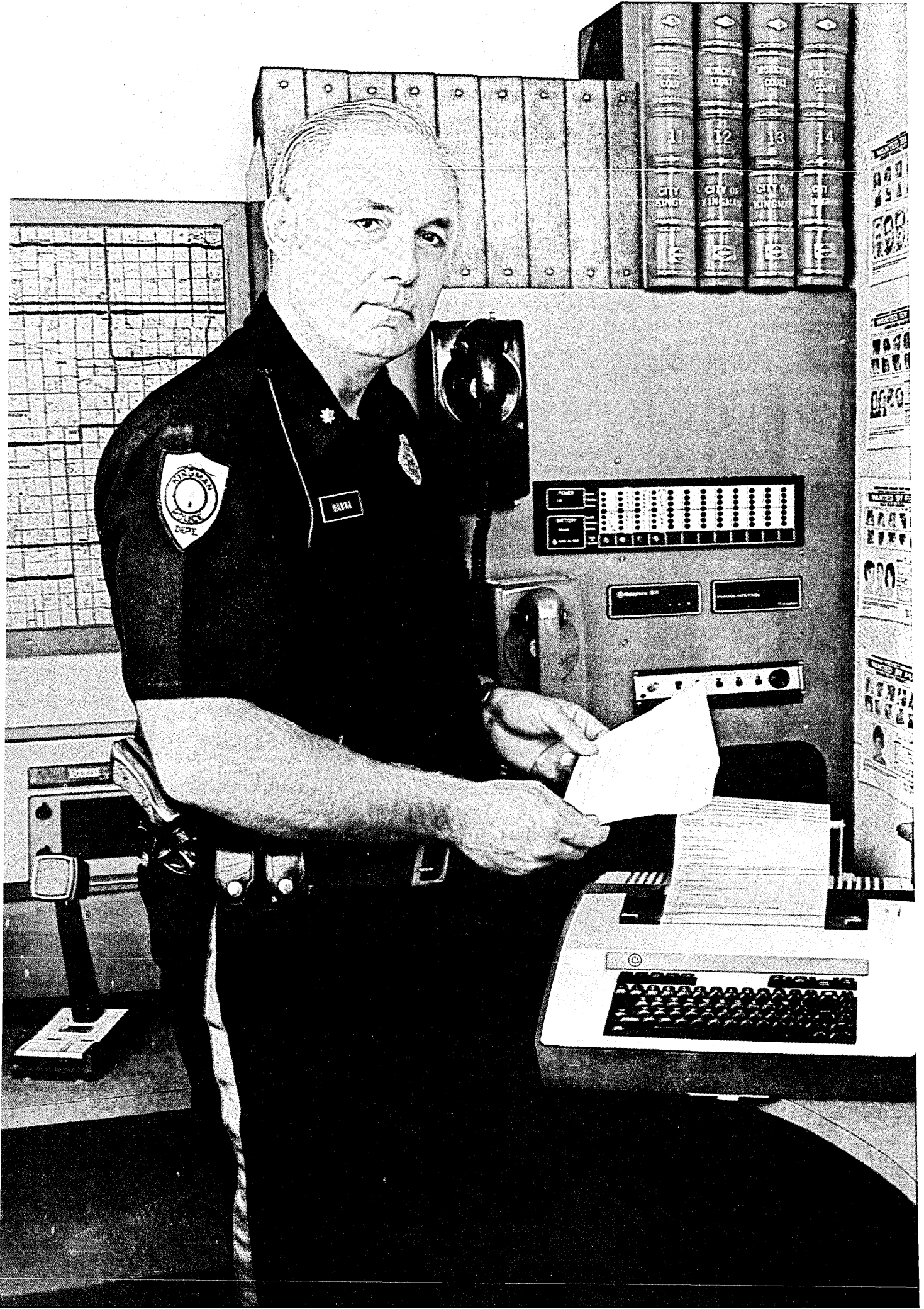
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The knowledge business



held computers in any of its studies, Goldberg says, because "most users do not have much impetus to carry around a computer. I'm not optimistic about the size of the handheld computer market."

If the handheld computer market is indeed to become a significant segment of the computing industry, everyone agrees that the software must be developed to a greater extent than it has been. To be sure, each of the handheld computers has some packaged software available, usually for engineering, statistical, and time management functions; but compared to the disk-based software available for desktop and large portable computers, virtually nothing is on the market.

"We've got to get the software solutions out," says Ruddock. "They are the key to opening up the market." Even Future Computing's Juliussen laments, "The software is coming along slower than I thought it would. The software has got to come through for the market to take off." He estimates that software for these computers is currently a \$50 million business, but could blossom into a \$500 million business in five years. "People usually buy at least one or two packages when they buy a machine," he says, explaining why he feels the software growth will parallel the hardware growth.

But while everyone agrees that the software must come through, no consensus exists on where it will come from. Currently, companies like Friends Amis Inc. and Interactive Systems Consultants are specializing in developing software for nano-computers; Hewlett-Packard is hoping that more established software vendors will turn their attention to handheld computers. "The independent software vendors have been concentrating on the desktop computers," Ruddock says. But we've got to communicate to them that handheld computer software is a good business opportunity for them."

If only those vendors thought so. Digital Research, which developed and markets the CP/M operating system for microcomputers, has no plans to adapt CP/M or any other software to handheld computers, according to Fred Langhorst, a company development manager. The company does not offer software for custom chips or the 6502 chip, which so far are the only processors being used in handheld computers.

Even if a handheld computer did run on an Intel, Zilog, or Motorola chip, he said, it is doubtful that Digital Research would develop software. "We do not produce CP/M or other software for anything other than a disk-based computer," Langhorst says. It seems unlikely that we will see disk drives being added to any of the handheld computers in place of cassette recorders, for the logical reason that even so-called microfloppy drives are inherently too bulky to be portable. (In desktop configura-

tions of the Panasonic and Hewlett-Packard computers, interfaces are available to access disk drives, and the Panasonic machine is already CP/M compatible.)

So it seems that the manufacturers and the industry watchdogs are counting on third-party software vendors to produce package software for handheld computers, but these vendors are reluctant. Those that have bucked the trend and plunged into software for these machines stand to make a lot of money if the market comes to life; but if Goldberg is correct and it bottoms out, they could wind up big losers. In either event, software is seen to be the key to the success or failure of the handheld computers. "It takes about two years for the software to come full steam," Juliussen says. "We're just at the beginning of that cycle."

Only time will tell what the market will be like at the other end of that cycle.

HAND OVER FIST

While there are only four major handhelds that fit our definition, they vary greatly in power, price, and performance.

They come in different sizes and shapes, and they carry different price tags. But they all fit in the palm of your hand. That alone has to be one of the fascinations that the handheld computer market holds for curious consumers. Even though there are currently only four major handhelds on the market, the product span is great between the low-end Casio FX-702P and high-end Hewlett-Packard HP-75C.

The Casio FX-702P runs off a custom 4-bit CMOS chip manufactured by Hitachi. It has a 65-button keyboard in which most keys can stand for BASIC commands for conservation of input effort. The 20-character, 5 × 7 dot matrix liquid crystal display line acts as a window on a 30-character input buffer. The machine's memory is entirely composed of about 1.5KB RAM, enough for 1,680 BASIC program steps. No additional memory or plug-in software packages are available on the machine, which retails for about \$200. Programs and data can be stored off-line on a cassette recorder through the \$50 FA-2 cassette interface; hardcopy can be generated on an 18-column 5 × 7 dot matrix printer (\$90) that attaches to the left side of the unit.

While no plug-in software packages can be designed for the unit, Casio does publish a "program library." It comprises 73 programs in nine fields—the user must type the programs letter by letter into the unit from the published library. The application fields are mathematics, electrical en-

gineering, mechanics, physics/chemistry, statistics, medicine, banking, navigation, and games. The machine can interpret 37 different BASIC commands and statements.

By comparison, the Sharp computers offer significantly more versatility. The smaller PC-1211 (Radio Shack's PC-1) runs off two 4-bit CMOS microprocessors—one for arithmetic operations, and one for the BASIC interpreter and for key-in. It has a 57-key alphanumeric keyboard with user-reservable keys, and its 24-character 5 × 7 dot matrix liquid crystal display acts as a window on an 80-character input buffer. The machine's ROM contains about 7KB for the BASIC interpreter and about 4KB for the monitor. Internal CMOS RAM is 1.9KB, but there is a slot underneath the computer for an additional 4KB or 8KB module. The internal RAM translates to 1,424 BASIC program steps. Programs and data can be stored when the power is off—as is the case with more powerful handheld computers—either internally or on cassettes; a cassette interface (\$30) and recorder (\$70) are available. For hardcopy, a 16-column printer (\$130, including cassette interface) is available.

The computer, which can be found for around \$150 to \$200, offers a library of off-the-shelf software that sets it apart qualitatively from programmable calculators and other less powerful devices. Packages are available for under \$25 for applications such as personal or business finance, statistical analysis, real estate, civil engineering, surveying, electrical engineering, games, calendars, and sports. Some 20 packages are currently available. These applications are still quite limited however; a business finance package for the PC-1211 bears little resemblance to a package for a desktop computer, due in large part to the limitations of a one-line screen.

The more powerful Sharp PC-1500 (Radio Shack's PC-2) is based on an 8-bit custom CMOS chip. The keyboard has 65 alphanumeric keys, including six user-programmable function keys. An 80-character input buffer can be displayed on the 26-character, 5 × 7 dot matrix upper- and lower-case LCD. Memory is composed of 16KB system ROM, 1.9KB RAM for BASIC program steps and data, 600 bytes fixed data memory, and 190 bytes reserve memory. A single plug-in slot under the machine accepts a module with up to 16KB of ROM, RAM, or any ROM/RAM combination. Graphics capability is included via a fully addressable 7 × 156 dot matrix screen for special characters.

BASIC programming ability includes 42 commands that allow two-dimensional arrays, variable length character strings with extensive string handling, formatted printing, and about 30 other functions. A "reserve" mode essentially allows the user to redefine some keys as BASIC steps—for example, converting the letter "p" into the "LIST" command.

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IN FOCUS

The computer can be attached to printer/cassette interface (\$240). This device, which attaches to the left side of the machine, provides four-color plotting capabilities governed by BASIC commands. It can produce upper- and lower-case characters in nine sizes and offers a graphics resolution of $256 \times 4,096$. The cassette interface will connect to two recorders simultaneously.

The PC-1500 is not necessarily better than the PC-1211, however; a major disadvantage of the more powerful product is a

The Sharp PC-1500 is not necessarily better than the PC-1211; a major disadvantage of the more powerful product is a limited software library.

limited software library. So far, only four packages are being sold through Radio Shack for the PC-2, all for under \$20. They are personal finance, business finance, and two sets of games.

The Panasonic RL-1000 does not suffer from the same lack of software, and its hardware is also somewhat more powerful than the Sharp handheld computers. The machine, manufactured by Matsushita, is based on the 6502 8-bit microprocessor. The 65-button keyboard—including seven function keys—controls a 26-character, 5×7 dot matrix LCD screen. The computer's memory includes a 16KB operating system in ROM and 8KB internal RAM; in addition, six 16KB RAM modules can simultaneously be hooked in, as can up to three 16KB ROM capsules. Optional equipment includes a cassette controller, modem, RS232C port, printer, plotter, color video, and EPROM burner. Microsoft BASIC is standard.

The communications port, CP/M compatibility, and larger memory give the Panasonic computer more versatility than the Sharp machines, but you pay for it: list price, \$480 (\$380 with 4KB internal RAM). Moreover, the optional peripherals aren't cheap, either. Each 8KB RAM module costs \$250; an acoustic coupler and modem with cassette interface costs \$300; the 40-column thermal printer costs \$300, or \$480 with four-color graphics. These peripherals are as portable as the basic unit, and plug into the RL-1000 in building block fashion so that a fully equipped unit will still fit snugly into a briefcase.

Perhaps the most significant of the possible additions to the basic unit is the Friends Amis "Datashuttle" peripheral. For \$700, you get a device that fits like a sleeve over the computer. It expands internal RAM capacity to 40KB and external ROM to 80KB. It includes a cassette controller, modem, and RS232C port as standard equipment. (Note that the modem connects directly to the CPU bus, leaving the RS232C port free for other peripherals.) Printer, plotter, color video, and EPROM burner are

still optional. The expanded computer lacks some of the features of the basic computer, however: Microsoft BASIC is optional, not standard, and external RAM capacity is only 16KB.

There are roughly a dozen software programs available for the RL-1000 and Quasar HHC, ranging in price from \$45 to \$195. As with the Sharp machines, some of the programs—each of which comes in a single ROM capsule—are for specific applications: The Portacalc electronic spreadsheet, the Portawriter word processor, the Portabudget planner and general ledger, the Portalog appointment scheduler and biller, and the scientific calculator emulator. But, unlike the Sharp machines, there is also a substantial library of packages aimed at programmers: SnapFORTH and SnapBASIC interpreter/compilers; Microsoft BASIC; SnapFORTH cross development system; Portaflex (which aids in customizing EPROMS); and communications protocols that can either turn the unit into a dumb terminal with full ASCII transmission capability or transfer files among units and host computer.

As powerful as the Panasonic RL-1000, the handheld computer that offers the most power and versatility is probably the Hewlett-Packard HP-75C, dubbed the "Kangaroo." The \$995 computer is based on a CMOS version of the custom 8-bit processor used in the company's Series 80 personal computers. Each of the 65 keys on the uncluttered keyboard can be redefined, and a portion of the right half can be converted into a numeric keypad. The 32-character liquid crystal display serves as a movable window on a 96-character line and features fully formed character descenders for upper and lower cases.

The machine's internal memory includes a 48KB ROM operating system and 16KB of internal RAM. Up to three 8KB RAM modules can be added in, at \$195 apiece, and three ROM plug-in ports accept 8KB or 16KB modules. The maximum configurable memory is 120KB.

Off-line storage is also available in two forms. One type, a magnetic card reader, is integrated into the unit and represents the most portable mass storage currently available. Magnetic cards about 10 inches long and half an inch wide can be hand pulled through the reader; up to 1.3KB can be read from or written onto each card. Secondary off-line storage is available through an optional digital cassette drive (\$550). Each cassette tape holds 128KB of data or programs. Bidirectional access lets the drive read at nine inches per second and search at 30 inches per second. These capabilities are beyond the capacity of analog cassette drives used in other machines.

Communications capabilities are built into the HP-75C, through an HP-IL (interface loop) communications port. This two-wire interface allows the computer to communicate with other HP computers and peripher-

als. The unit will also be able to communicate with devices not compatible with the interface loop through an HP-IB IEEE-488 converter, an RS232C serial converter, or a GPIO converter, which will be available early next year.

The computer is expandable either as a desktop system or as a briefcase system. As a desktop computer, it can be connected to an 80-column impact printer (\$795), video monitors (\$295 for nine-inch crt, \$325 for 12-inch crt), home television sets, and plotter (available early next year). The briefcase system includes digital cassette drive and 24-character per line thermal printer/plotter (\$495). Coming soon is an acoustic modem operating at 300 baud.

Software for the HP-75C is not yet as developed as it is for the Panasonic or Sharp computers, but then the computer itself has only been on the market for a couple of months. Nonetheless, the computer is pre-programmed with 147 BASIC commands, statements, and functions. In addition, there are nine "solutions books" currently available, each of which contains five to 10 programs.

Applications include math, electrical engineering, statistics, input/output (needed to use the modem), finance/investment, real estate, and games. A presentation graphics solutions book is expected early next year. These solutions books come on digital cassettes or on magnetic cards and cost \$10 each.

For more specific applications, plug-in ROM modules containing "software pacs" will be available early in the year for about \$150. They will consist of 8K or 16K bytes of programs covering data analysis, electrical engineering, surveying, finance, and real estate. Other expected applications

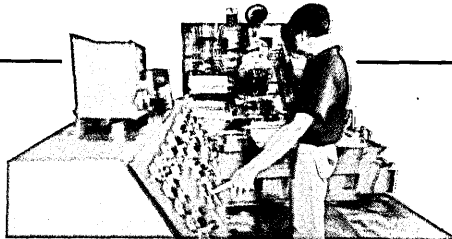
Hewlett-Packard's HP-75C offers the most power and versatility—and costs the most money.

include an electronic spreadsheet, file management, memo writing, data communications, and personal time management.

The company is also pushing for independent software for the HP-75C. About 50 independent software vendors (ISVs) are currently working on software packages for the Kangaroo, says HP spokesman Steve Ruddock. Of those, about 10 have already signed business contracts with HP to write and market software. The company held a seminar at COMDEX last month to acquaint ISVs with the computer and to help them start developing software. "We'll also help them in marketing software for the HP-75C," Ruddock says. Among the most promising potential packages are adaptations of CP/M and FORTH. So far, only the Panasonic machine is CP/M compatible and offers languages other than BASIC. HP is intent on breaking that monopoly.

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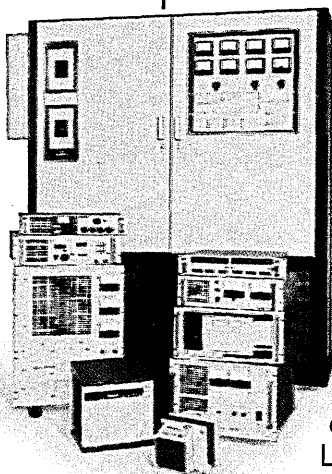
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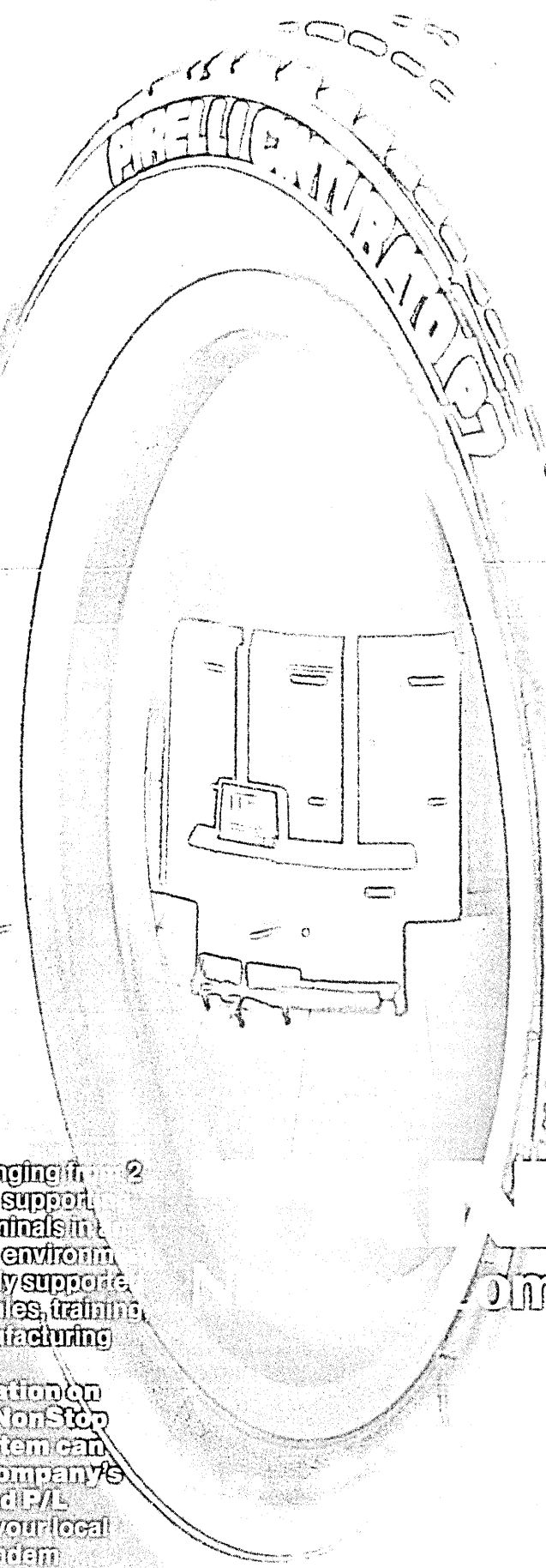
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NEWS

IN PERSPECTIVE

COMMUNICATIONS

VAN MARKET GROWS

The value-added network market is catching the eye of many a vendor who wants to sell data communications services.

The value-added networking business is shaping up into one of the most competitive sectors of the industry as a host of companies vie for position under the approaching shadow of AT&T's new American Bell subsidiary.

Recent months have seen the likes of IBM and RCA get into the business in a big way, while several remote computing services firms have decided to take advantage of excess network capacity and sell it to computer users needing to tie remote pieces of hardware together. The value-added networking (VAN) marketplace, once ruled primarily by GTE Telenet and Tymnet, is growing quickly in several directions and is being fought over by as many as two dozen competitors.

What's drawing so much attention is an estimated annual growth rate of 40%, according to industry executives. The market this year is expected to total only \$150 million, but next year it should be about \$210 million. The high growth rate is expected by most observers to continue throughout the decade as the demand for interconnection of virtually every type of computer and computer-based equipment expands.

"The market is growing nicely," says Esther Dyson, an industry analyst at

IBM surprised the industry by winning a large contract to supply networking services to the insurance industry.

Rosen Research in New York. "The market isn't very well defined yet, but it seems clear that you can't just offer raw data communications anymore. There has to be some value added."

That value usually comes in the form of protocol conversion for interconnection of differing types of terminals or in the supply of applications programming taking place on the network vendor's central computers. Thus, several traditional timesharing companies—Automatic Data Processing, CompuServe, General Electric, and United Telecommunications, for instance—have made moves into the VAN marketplace. Says Dyson, "These compa-

nies say to themselves, 'We have the facilities, so we might as well get into the business.'"

Perhaps the biggest networking news came in early October when IBM beat out challenger American Bell and four other contenders for a contract to supply a nationwide collection of insurance agents and underwriters with an operational network in mid-1983. IBM plans to piggyback the insurance network on its Information Network, a service introduced early this year as the firm's reentry into the services business after a nine-year, court-ordered absence.

The insurance network will provide store-and-forward message services and protocol conversion to interconnect some 70 types of terminals and processors, making the system similar in function to American Bell's AIS/1000 offering.

While the IBM network is not an open one available to the general market, it gives strong indication that the computer firm has the capability and motivation to maintain a strong presence in the networking business. It has been suggested by industry observers that the company may set up other closed user group networks aimed at specific markets or that it might eventually get into the generalized public networking business. In any case, it has made a dramatic entry into the VAN business.

It was a good bet that IBM would win the unpublicized insurance network contract since the company already supplies a large part of the insurance industry with computers. Indeed, an estimated 16% of IBM's installed base is at insurance companies, ranging from Series/1 systems at independent agents' premises to large mainframes at underwriters' facilities.

Initial testing of the insurance network is to begin next month, and by mid-'83 about 250 agents and 10 underwriters will be using the network. According to the Insurance Institute for Research, which let the contract, about 80% of the industry's transactions will be handled by the so-called IVANS network by early 1984. The potential market is 60,000 individual agents, 10,000 of whom already have computers installed. Typical charges would be in the range of \$33 a month.

Approximately 60 companies were polled for proposals, nine of those responded, and six finalists were chosen for evaluation. Joining American Bell in the loser's corner are National CSS, Control Data, Electronic Data Systems, and United Telecommunications' Isacomm subsidiary.

Essentially, the insurance network is a volume purchase of services from IBM's Information Network at a discount of up to 35%. An independent management entity, to be put together by the research institute, will resell the services to industry participants.

Also in October, RCA bought Cylix Communications Network, a Memphis,

Tenn., supplier of data communications services. The \$62 million transaction brings RCA squarely into the value-added networking business with a satellite-based network serving 140 customers at 3,000 locations nationwide. It gives RCA a much-needed piece of the networking puzzle it is building with the international RCA Globcom and American telex networks, according to Ralph Johnson, president of Cylix.

"RCA wanted to get into the domestic enhanced communications business quickly and this was the best way it could do it," Johnson says. "Cylix gives it a proven, running network."

Cylix offers mainly 3270-compatible transmission services, tying about 30 of its own earth stations through a satellite link into a Memphis switching site. Similar to the routing scheme of Federal Express's air services, all Cylix traffic is switched in Memphis and routed back through a satel-

RCA has bought its way into a lucrative segment of the market with its recent \$62 million purchase of Cylix.

lite to its final destination. Western Union's Westar satellite is being used currently, but a switchover to an RCA satellite will be made soon, Johnson adds.

The company bills on the basis of the volume of information it handles, giving large-volume customers cost advantages. The distance data is moved matters little in a satellite-based network, according to Johnson, and those customers with high enough volumes can take advantage of the situation. Customers attach into the firm's earth stations through leased lines.

Cylix is hoping to add X.25 services soon and may handle facsimile traffic as well as pure data. "The IBM 3270 is our main target," he notes. "It represents about half of the data communications marketplace and it's the fastest growing and the most sophisticated. Most on-line business applications, where reliability is so important, are done with 3270s."

Future plans for Cylix, now that it is part of RCA, include adding about 50 more earth stations and investigating alternatives to the currently used telephone company local loops. Cylix says it is looking into using cable television systems and microwave to move data between user sites and its earth stations.

Johnson says the network should become profitable in the last quarter of 1983, by which time it will have been a common carrier for three years.

In the asynchronous VAN market, several newcomers are expected to show themselves shortly. General Electric is understood to be eyeing the possibility of providing common carrier services on its time-sharing network.

"We're evaluating it," says Arthur

J. Marks, senior vice president, programs management operations. "The incremental cost of a value-added network is much less than starting up one from scratch."

GE, he notes, already has a network connecting 700 cities in 30 countries that provides timesharing services. The company is not likely to provide "raw packet switching," Marks says, but rather some sort of enhanced service. He declined to provide details, but would say "our end of the business is quality, not volume."

One sign pointing to a potential entry by GE Information Services Co. into the VAN arena is a reorganization earlier this year that gave the company control of GE's in-house telecommunications and data processing business, known internally as TIPO. At that time GEISCO identified networking as a "potential new target market."

"It's obvious there are some economies of scale to be had by consolidating," says Marks.

Graphnet, a facsimile network, is also testing the VAN waters, having begun beta testing of such services in New York City, according to a spokesman there. "We expect to offer services at 50 bps to 1,200 bps with some speed and protocol conversion," the spokesman says.

CompuServe, a Columbus, Ohio, timesharing company owned by H & R Block, the tax return preparation company, recently made its formal entry into the VAN market after about a year of quiet market-

CompuServe expects to be offering services in about 300 cities by early 1984.

ing. Says Joseph J. Porfeli, vice president of network services marketing, "We expect American Bell to expand the market for everyone. They will give us more credence. Their entry tells me the market is going to grow."

Porfeli says CompuServe, which entered the computing services business in 1970, plans to expand its network to service 300 cities by April 1984. The company has about 25 accounts for network services, including Holiday Inns, Chase Manhattan Bank, and Borden Inc., Porfeli says, noting that revenues for this first year of operation are expected to exceed \$1 million.

One moving force behind that growth has been the company's electronic mail offering, InfoPlex. It delivers messages electronically from terminal to terminal, but CompuServe plans to expand its capability to attach differing word processors to each other, Porfeli explains. He adds that InfoPlex has been interfaced to the U.S. Postal Service's E-Com electronic mail facility, giving users guaranteed two-day delivery of mail anywhere in the U.S. Mail can be addressed individually or by mailing list.

—John W. Verity

BRAVE NEW LAN

Applitek, a newcomer to the LAN market, claims there is a growing demand for voice and data on one network.

Broadband? Baseband? Twisted pair? Token passing? Carrier sense? Voice? Data? Can't decide which local area network (LAN) to go with? Not to worry: the vegetable equivalent to the LAN market may be just around the corner.

There are signs that some LAN makers are heading for the all-in-one product already. What isn't clear is whether the market is ready to pay a premium for that kind of product.

A Boston-based startup is betting that the market is ready. Applitek Corp., one of the newest members to join the 50 or more companies selling local area networks, says it has developed a product that combines voice and data on one channel by using two access methods, carrier sense multiple access/collision detection (CSMA/CD) and token passing (using a bus-type structure). Not only will it provide this service over broadband, but also on baseband or fiber optics. Ashraf Dahod, who started the company in December 1981, is chairman of Applitek and chief architect of this particular approach to LAN.

Calling his LAN an intrafacility or intracity "integrated communications system," Dahod said the network has a five-mile limitation and a single 10-megabit channel capacity. "We do not get our 10-megabits by having two five-megabit channels," he said. "We provide one 10-megabit channel." The network also has the ability, he added, to "automatically" reallocate bandwidth according to a user's preprogrammed plan. For example, at 8 a.m., eight megabits might be devoted to voice (using the token passing access scheme); while the remaining two megabits would be carrying data using CSMA/CD, he explained. Then at 9 a.m., the balance would shift, allocating eight megabits to CSMA/CD, while token passing would be shaved down to two megabits. Providing multiple channels using a frequency division multiplex system is not something the company plans to do.

Peter Appleton Jones, who recently left his post as executive vp of marketing at Cray Research Inc., Minneapolis, to take over as Applitek's president, described the device as a "black box about the size of a briefcase." It is capable of controlling up to eight devices, including terminals, printers, or numerical control machines, and linking

NEWS IN PERSPECTIVE

computers to computers, he added. The product is headed for test sites early next year. Plans are to be in production by mid-'83. As for pricing, the company figures it has a "superior product," said Appleton Jones, "so it will probably be a little more expensive than other LANs. But the best usually costs more."

Although Applitek executives were reluctant to release details about its market strategy, they did indicate the company will focus on the dp end of the market, as opposed to the office automation side. Applitek expects its early buyers to come from large scientific and engineering groups.

As Dahod sees it, there is a "big debate" over whether to go with token

Applitek's network has a five-mile limitation and a single 10-megabit channel capacity.

passing or CSMA/CD. "But customers have a need for both. Normally, they need CSMA/CD for interactive terminals and some kind of token passing performance for real-time digitized voice. We will provide the only LAN that allows you to do both—voice and data—on one network at the same time."

So if this all-in-one approach is such a great idea, why haven't the troops in the trenches, the ones with installed base and user experience, already covered that supposedly exposed flank? The consensus from the trenches was that the LAN market is not ready to accept the veg-o-matic, be-all product.

To begin with, agreed the vendors and industry analysts contacted, nobody installs a network based on the kind of access method employed. Access methods are simply a "non-issue," insisted Michael Killen, president of Strategic Inc., a San Jose market research firm. Strategic recently completed a three-part report culled from a survey of 50 companies. It discusses who buys LANs, why they buy them, and how they are installed. According to Killen, solving a wiring problem is one of the major considerations in a company's decision to go with a network.

Observed Ken Biba, vice president of engineering at Sytek Inc., a Sunnyvale, Calif.-based network supplier: "Most users don't care how it all bolts together underneath."

While access schemes may be a non-issue among users, the debate about offering voice and data on one LAN does not fall into that category. Although the two major network vendors, Sytek and Ungermann-Bass, do not offer voice and data at present, it is a technology they are keeping an eye on. "It's far more a marketing problem than a technology problem," responded Michael Pliner, president of Sytek. The biggest hurdle, he added, is establishing credibility as a voice carrier. "No one would believe that Sytek is a PBX manufac-

turer. Right now voice and data are perceived as separate entities. We could put switchable voice on our cable, but who would buy it? Why make the investment? We will do it in time, when the market is ready for it."

Ralph Ungermann, president of Ungermann-Bass Inc., Santa Clara, Calif., concurs. "It is trivial to take digitized voice and put it on the network. Those technologies have been around for a while; they are not magic."

First on Ungermann's wish list is "solving problems that customers will pay for," and like Pliner, Ungermann has not seen any indication among the companies in his market that they are interested in combining voice and data. "And second," he said, "we don't want to go outside the standards and blaze trails. When you do that you have to go off and pay for custom chips, which drives the cost up."

Perhaps one of the reasons the coaxial-based network providers have detected little interest in voice/data capabilities is that they tend to deal with the dp side of the house. In the telecommunications world, the merging of voice and data into one device and over one line seems to be moving much quicker. For example, there is Northern Telecom's Displayphone and Mitel Inc.'s Kontakt personal workstation. According to John Malone, president of Eastern Management Group, Morris Plains, N.J., shipments of "intelligent telephones" (personal computers with a telephone) are expected to jump from 4,700 units in 1984 to 350,000 annually by 1992.

Meanwhile, AT&T is feverishly working out the bugs on its "universal" Net 1000. In its push to put voice and data features into its Dimension PBX system, AT&T is considering the purchase of a voice-store package from IBM, said Malone. As for IBM in the PBX world, Malone expects that will not be as high on IBM's priority list as local area networks and personal computers since IBM's strategy revolves around large computer centers.

Yet another example of the voice folks forging ahead into the data world came when the Federal Communications Commission gave the go-ahead to five companies to set up metropolitan high-speed digital networks. The companies were ISA Communications Services Inc., a unit of United Telecommunications; Satellite Business Systems; MCI Communications Corp.; Tymnet Inc.; and Contemporary Communications Corp., a New Rochelle, N.Y.-based company that is the second-largest provider of multipoint distribution services.

It's only logical to expect computer industry vendors to protect their turf and counter with equally aggressive product announcements. Suddenly, Applitek's positioning with a voice/data coaxial network doesn't look so naive.

But another issue vendors and analysts raise is how a LAN supplier deals with the problem of connecting up dissimilar equipment, or more to the point, the issue of protocols.

Applitek's executives indicated that the first product would be a 10-megabit broadband system supporting two access schemes, CSMA/CD and token passing, and asynchronous protocols. Bisynchronous is to follow. As for SNA, that is something that is being watched and would come later, said a senior designer.

Commented Patricia Jordan, senior consultant with DataPro, Delran, N.J.: "Bridges are solving the dissimilar access scheme problem, but how does a vendor get dissimilar devices to talk to each other? That's the issue."

"High-level protocols, that's the real issue," echoed Sytek's Biba. "Deciding on which access scheme to go with is no more than 5% of the problem. The time-consuming problem [for a network supplier] is building high-level protocols. That's what we spent most of our time on," he said. Sytek, which entered the networking market in 1980, supports asynchronous, bisynchronous, SDLC, X.25 protocols, as well as interfaces to DEC and TI hosts and to equipment that uses a general purpose multibus. Work on SNA and a bridge to Xerox's Ethernet are said to be in progress.

In the telecommunications world, the merging of voice and data into one device and over one line seems to be moving much quicker.

Cost is another key consideration in the buying decision, note vendors and market researchers. To build a cost-competitive network, "you've got to make the digital electronics dirt cheap," said Sytek's Biba. Executives at both Sytek and Ungermann-Bass said they were not aware of any chips on the market that would do both CSMA/CD and token passing. If that is true, then Applitek has to special order its chips and pay a premium, speculate industry watchers. Applitek would not discuss its chip strategy.

Dahod maintained that, thanks to silicon foundries and CAD devices, it is becoming economically feasible to use custom chips. Having established himself as a fierce individualist, it was no surprise to learn that Dahod does not support the IEEE's work on standards.

"Anytime you talk about standardizing," he said, "you talk about stifling innovation. I think standards succeed only in socialistic markets, never in a free market environment. In a free market there are always new products—you can't expect technology to freeze—and there are always those users willing to pay the price for better performance."

—Jan Johnson

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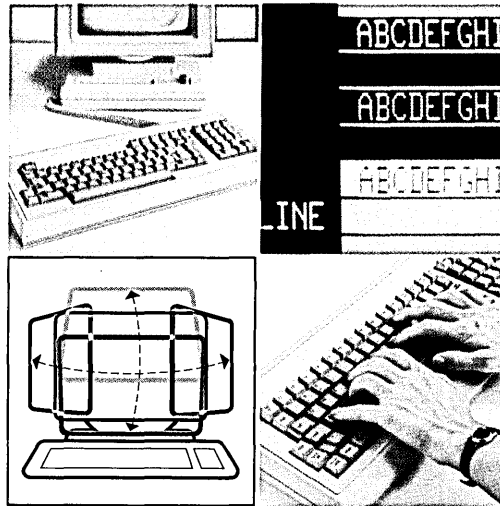
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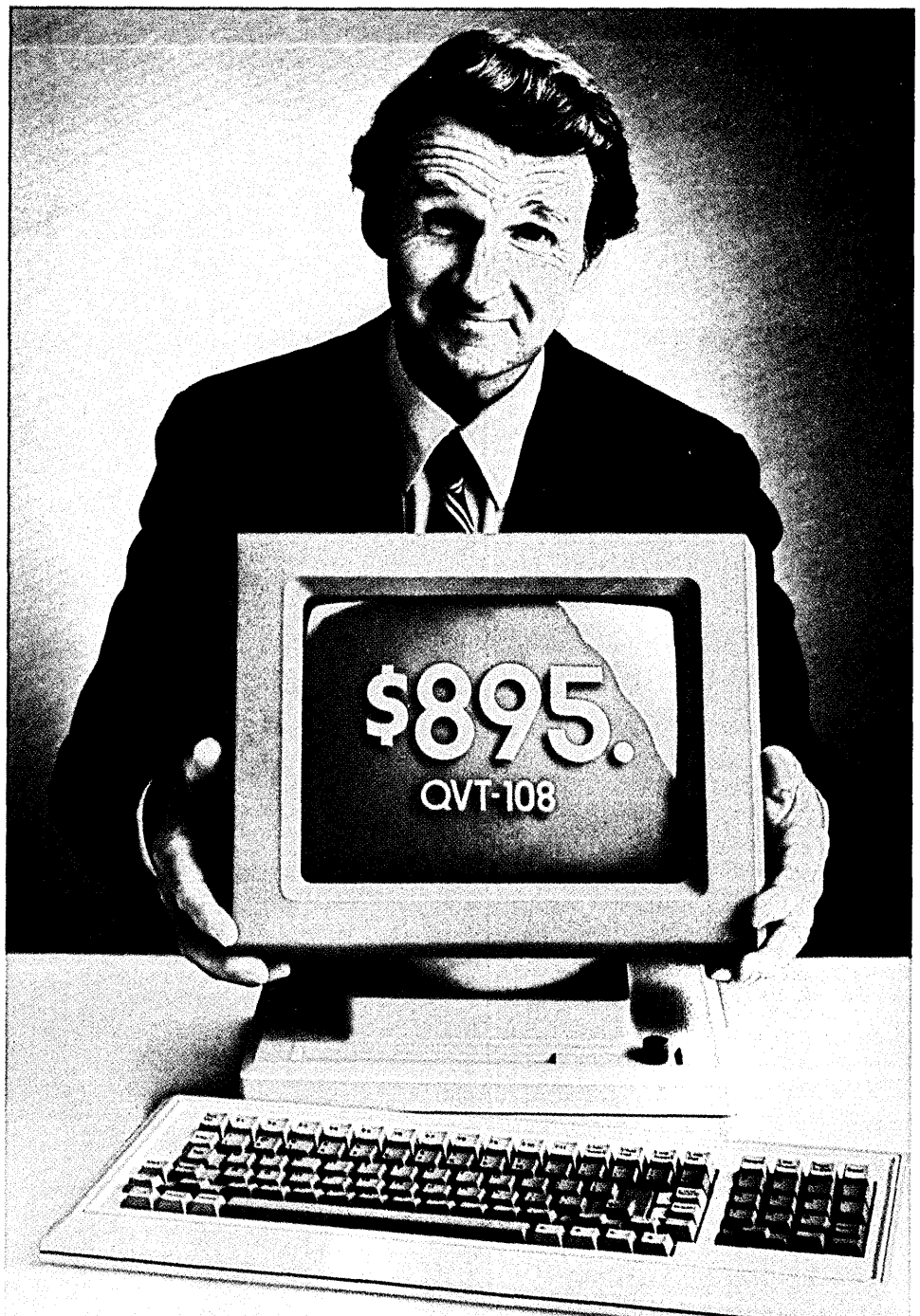
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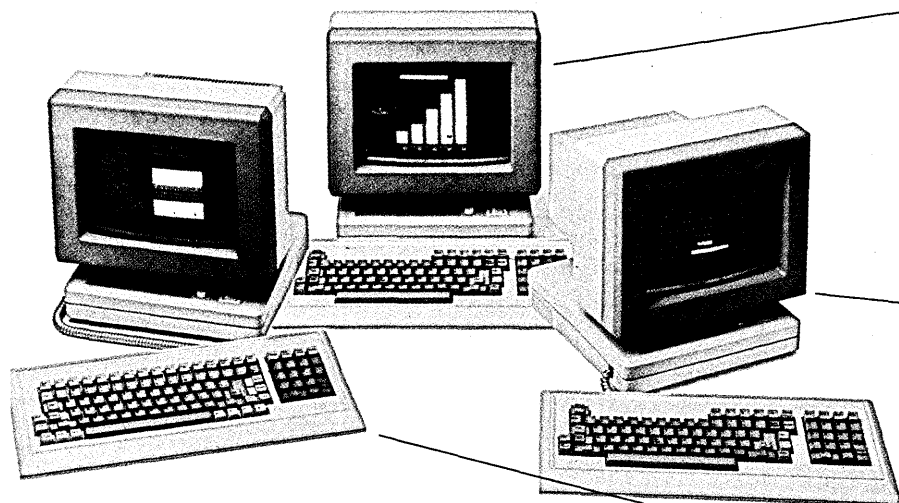
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QVT-102 COMPARISON CHART OF STANDARD FEATURES	QUME QVT 102	TELEVIDEO 910	LSI ADM 5	ADDS VIEWPOINT	HAZELTINE 1500
Display Character Size	7x9	7x8	5x9	5x8	7x8
25th Status Line	Yes	No	No	No	No
Menu Set-up	Yes	No	No	No	No
Line Drawing Set	Yes	No	No	No	No
Detachable Keyboard	Yes	No	No	Yes	No
Low-Profile Keyboard	Yes	No	No	No	No
Separate Programmable Function Keys	4	0	0	0	0
Switching Power Supply	Yes	No	No	No	No
Screen Tilt	Yes	No	No	Yes	No
Screen Rotate	Yes	No	No	No	No
Line Block Transfer Mode	Yes	No	No	No	No
Page Block Transfer Mode	Yes	No	No	No	No
Unprotected Block Transfer	Yes	No	No	No	No
Screen-saver Time Out	Yes	No	No	No	No
Insert/Delete Line	Yes	No	No	No	Yes
Insert/Delete Character	Yes	No	No	No	No
Clear Unprotected	Yes	No	No	No	Yes
Forward/Backward Tab	Yes	Yes	No	No	Yes
Column Tab Positions	80	80	0	0	0
Print Key	Yes	Yes	No	No	No
Programmable Answerback	Yes	No	No	No	No

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NEW LIFE FOR VOICE MAIL

Rolm's Phonemail marks the first time that a voice mail system has been integrated into a PABX.

Remember the magazine ad of a few years back, the one in which a series of pink message slips chronicled the collapse of a business deal—all due to missed communications? The ad captured the essence of one of corporate America's least favorite games—telephone tag.

The figures are a bit frightening. As few as 35% of all calls manage to get through to the intended party, according to some estimates. Telephone tag hurts office productivity and raises the phone bill. What's frustrating is that many of these calls are internal, between colleagues at the same company who are no more than a few doors apart. What's more frustrating is the lurking suspicion that most calls do not require immediate reaction or sustained interaction; they convey instructions, ask questions, announce results, and schedule meetings. Pink slips invariably seem to foul up some part of the message, even if no more than the name and phone number are taken. What is the solution?

In the past month and a half, Rolm and Sperry Univac have joined a small band of vendors who believe that voice store and forward messaging systems are the cure for business's voice communications ills. Rolm's announcement this month marks the first time that such a system has been integrated into a private automatic branch exchange (PABX), and Univac's the first time one has been integrated into a new office automation system. All previous voice mail systems have been standalone products, although some could be retrofitted to another vendor's office automation system.

A voice store and forward messaging system is similar to electronic mail. At the heart of the system is the capability of digitizing analog speech and storing it on hard disk for later retrieval. Typically, users are assigned voice mailboxes and access codes. In order to use the voice mail system, the user would dial the system's extension on his telephone and log on as if he were logging on to a terminal. The user could then listen to messages sent to him and dispose of them by saving them on disk for future reference, deleting them, forwarding them (with, if desired, a brief annotation) to another party, or answering

them directly. Or he could record a new message and send it to some subset of the total number of users.

Once installed, these systems can become addictive. Al Fross, a consultant with the Eastern Management Group, Morris Plains, N.J., who follows the voice mail market, says users have come to appreciate the technology involved and consider the systems useful and convenient. They realize that voice mail coordinates office communications better than a message center manned by operators who hand-deliver pink message slips every hour.

Yet the marketplace is not booming. George Colony, director of office systems research at the Yankee Group, Boston, says the voice mail market represents only \$5.5 million in sales in 1982, or 140,000 lines shipped. (Each line is a single extension in an office telephone system.) "What we are seeing now is an initial foray by the standalone vendors, and they have been meeting with limited success," he adds.

Indeed, even when they were first announced, voice mail systems attracted very little attention. Sudbury Systems in Sudbury, Mass., an early entrant into the

Wang's DVX initially limited messages to a mere 90 seconds.

competition, has been selling its product since 1972, primarily to hospitals. Doctors and radiologists use the systems to dictate notes while performing autopsies and operations, according to John A. Murphy, a consultant with Advanced Office Concepts, Bala Cynwyd, Pa.

Eventually, the market picked up steam. A company called ECS in Dallas offered a voice store and forward system, the Voice Message Exchange, as its first product in 1979. (The company has since changed its name to VMX, Inc., to highlight the product.) VMX still holds 21% of the market, more than any other vendor, Colony says. A few other vendors began offering similar systems, among them Exxon's Delphi, Voice and Data Systems, and Commterm.

Then, in 1981, both IBM and Wang entered the market, and in a sense legitimized it. (IBM's Audio Distribution System is licensed from Sudbury.) "The market really exploded about a year ago," Fross says. But some other companies that had entered the market earlier did not fare so well in the face of new competition. Delphi and Voice and Data Systems both folded, "and now there's not a whole lot of optimism about store and forward systems. People are not buying the systems."

Part of the problem is that the early vendors presented flawed systems and have had to suffer the consequences. After all, the pioneers get the Indians' arrows as well as the glory. Wang's original Digital Voice

Exchange was equipped to handle messages no longer than 90 seconds. But Wang misread its market. "An executive who wanted to dictate a letter one evening into his voice mail system and have his secretary type it in the morning couldn't say much in 90 seconds," notes Fross. Wang alleviated this problem several months ago by expanding the maximum length of a message to six minutes.

But there are other drawbacks to the standalone systems. By their very nature, the standalones are unable to operate as integral parts of an office phone system, and this creates annoying limitations. For example, the systems are unable to notify a user automatically if he has any messages, via a flashing light on the phone or some similar method, because the phones come from a different vendor. Thus, each time a user wants to see if he has received any messages, he must dial the voice mail system and, in essence, ask it. Many times there will be none, and the user will feel as if he has wasted his time. Alternatively, he may get tired of calling the system and then not find out that an urgent message has been left for him. Some vendors can remedy the situation by hard-wiring the phones to boxes that will sit on the user's desk and flash when messages are received, but this is hardly an ideal solution.

A second problem presented by the inability of standalone systems to connect directly to a PABX is that they are unable to provide an overflow capability if the phone is in use. "When you call someone and his line is busy, you have to hang up and call another number to use the voice mail system to leave a message," Fross notes. "This becomes an obstacle. Instead of removing obstacles to office communications, standalone voice messaging systems create one. Customers are waiting for an overflow capability wherein you get bumped immediately to the voice mail system if the line you're calling is busy or doesn't answer."

Univac's Voice Information Processing Station, part of the Sperrylink office automation system announced in late October, provides a partial solution in that it has overflow capabilities, but it has no message waiting signal. The VIPS is connected to a PABX via from two to 12 extension lines, and acts as a standalone system for most voice mail applications. But unlike standalones, the system is capable of answering phones with a message, so users can redirect incoming calls to a VIPS extension for overflow capabilities, according to Univac vice president of office information systems Stuart J. Miller. (Univac also announced an agreement with Northern Telecom under which the Sperrylink system will be fully compatible with the Nashville vendor's line of PABXs, and a test site in Salt Lake City has been established.)

If the key to producing a complete

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voice mail system, with overflow capabilities, message waiting signals, and ease of use, lies in integrating voice store and forward technology into a PABX, where have the PABX vendors been until now? It would seem, after all, that they would be in the position to offer the most complete systems. "The PABX manufacturers have been waiting to see the success of the standalones," Fross says. "They really don't have the technology and expertise as yet within their organizations." Nonetheless, one consultant noted, "in the voice mail competition, the players who integrate their products with PABXS will be the winners."

Rolm intends to corner the integrated market with its Phonemail system, which is tied into its computerized branch exchange (CBX). "I have concluded that the Rolm product is likely to be superior in functionality to any other voice mail system currently available," says Bruce Hasenyager, a vice president of Kidder, Peabody & Co. who has followed the voice mail market for some time. "They've done a good job designing the product from a human factors standpoint."

Phonemail, which was announced Dec. 1, offers all the features of standalone systems, but it also provides full overflow capabilities and a message waiting signal. The system also offers "return receipt" and "private" designations for messages that

users either want to know have been received or want to prevent from being forwarded on to other parties.

Depending on the configuration, Phonemail can cost as much as 40% less than comparable voice mail systems. The smallest Rolm configuration is priced at \$50,000. For that fee, the user gets the processor (which must sit less than 50 feet from the CBX), 8 channels, and a single 154MB Winchester disk. The disk can handle up to eight hours of messages, which Rolm

"Customers are waiting for an overflow capability wherein you get bumped immediately to the voice mail system if the line you're calling is busy."

claims can easily accommodate 100 users. The requisite software costs an additional \$20,000.

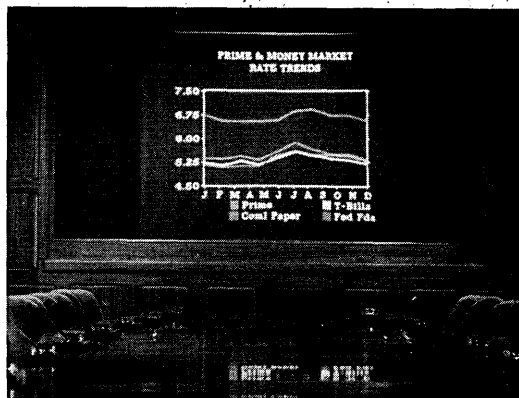
But while Rolm is alone in the integrated PABX/voice mail market now, it can hardly expect to remain so. American Bell is expected to include voice mail capabilities on its Antelope PABX when it is offered next year and possibly on upgrades to its Dimension PABX, according to the Yankee Group's Colony. Other PABX vendors, including Northern Telecom and Mitel, can also be expected to come forth with similar offerings in the near future, Advanced Of-

fice Concepts' Murphy says.

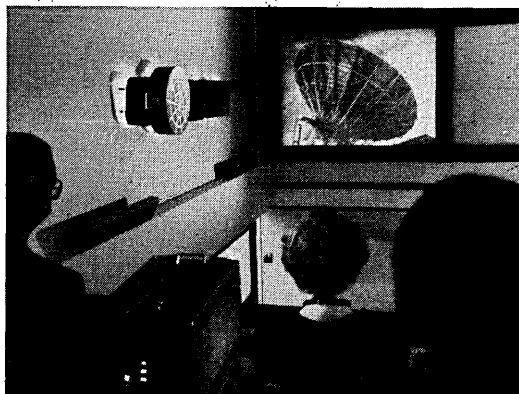
Other PABX/voice mail products will certainly come from joint ventures, Hasenyager predicts. Apart from the Univac-Northern Telecom agreement, which may or may not produce a combined product, "it's a very likely event that companies will join forces. The technology is driving applications areas together." Sudbury Systems is currently looking for a PABX supplier, according to company spokesman Joe Weber; the company has talked to Intercom, Datapoint, United Technologies, and others about licensing its store and forward system to the hardware vendors or buying the PABXS and selling integrated systems itself. So far, negotiations are still in an early phase.

One thing is certain: Rolm will not have the market all to itself, and as more vendors offer products, prices will decline. In short, as Hasenyager says, "Voice mail has a very high potential. It tends to grow explosively when it catches on." He believes that it will catch on so well that it will be offered as a standard service to most PABX users by the end of the decade.

Colony also sees tremendous growth, along with the entry of several superminicomputer vendors into the market. He predicts that the market will blossom to \$300 million by 1985, or about 1.6 million lines shipped. And the PABX vendors will



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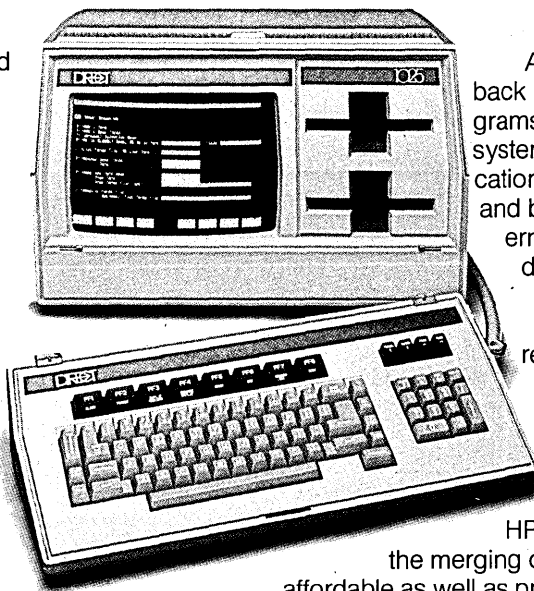


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have a significant part of it, about 35%. "We will see a shrinkage of market share for standalones in the next few years, as systems vendors will come to dominate the market." Thus, he sees IBM losing only a little ground, to 11% of the market, while Digital Equipment, Data General, and their competitors—none of which has announced any intention to enter the market as yet—will split up 30% of the market. "Voice store and forward will become an added value to office systems, especially for managers and executives."

—Michael Tyler

STANDARDS

SPECS THAT MATCH

A flurry of standards-making activity promises to ease system implementation, broaden product choices, and lower prices.

As manufacturers of office equipment, industrial machinery, and home appliances integrate microcontroller chips into their products, the whole world begins to go on-line. With a simple phone call, it's being promised, such devices can be turned on and off, which means a wrongly dialed number can be quite consequential. But before that stage arrives, there must be some standardization in things like chip design, the way controllers are integrated into equipment, and how those products interface with the outside world.

The ability of disparate devices to talk to each other is one of the benefits of industry-wide standardization. Groups such as the Network Users Assn. have been formed expressly to push for standards, hoping thereby to get equipment from different vendors to readily interface over a communications link. Indeed, there's an abundance of groups seeking the establishment of one standard or another.

Within the Institute of Electrical and Electronics Engineers (IEEE), for example, is a software engineering standards committee that has spawned several working groups to come up with standards, guidelines, and recommended practices. The California Tape Standards Assn. seeks the adoption of standards for half-inch computer tape for newer high-density drives. In the world of microcomputers, scads of people are working to establish standards for things like the S-100 backplane bus, the Multibus, STD bus, and VERSAbus, not to mention something called the Binary Floating Point

Arithmetic subcommittee, which is addressing a need to specify methods of implementing the arithmetic on an IC chip.

Between 1979 and 1982, the group at the American National Standards Institute working on standards in computing, the so-called X3 Committee, processed an average of 30 letter ballots each year. These ballots are not only on proposed standards and the establishment of new projects but also on international activities and draft standards. Through the first nine months of this year, however, that number had tripled to 92. Records of the committee serving as the secretariat of X3 show that it reviewed 675 documents in 1980, including proposals for new projects. Through the first nine months of '82 it was 894.

"People are starting to realize the importance of standards," says Peter Bono of Athena Systems, chairman of a technical committee working on standards in computer graphics. The reason is that people recognize the advantage of standards to the industry and to themselves, adds Ralph Ungermann, president of Ungermann-Bass Inc. "People would really like to see standards," he says. "But it takes a long time to develop them."

Ungermann was employed at Intel Corp. in the early 1970s when Hewlett-Packard began pushing for the adoption of its instrumentation bus as an industry standard. It eventually became the IEEE 488 standard and the design today is used worldwide in computers, tape drives, and instruments. But from the start of HP's efforts to the successful implementation throughout the industry, some eight years elapsed.

But the benefits that derive from something like the IEEE 488 standard were examined recently by Maris Graube, an engineer at Tektronix Inc. who spends most of his time in standards-making work. The HP design became a standard in 1975, and today more than 100 manufacturers are using it on one or more pieces of equipment, a total of more than 1,000 different machines, he found. Sales of those devices, all using the IEEE 488 interface, exceed \$800 million.

Not only does it become easier for the buyer to connect equipment from different vendors, but the manufacturers too avoid the headache "of designing a new kind of interface, documenting it, training our field guys to understand what it's all about, and then convincing customers that it's a good thing," says Graube. "That's really very expensive." He estimates that Tektronix spent some \$1.5 million just setting up the field support for that one interface. And if the company had to spend that kind of money for each type of interface that engineers might devise, it wouldn't be economically feasible.

The pain that the industry suffers from the absence of standards is explained

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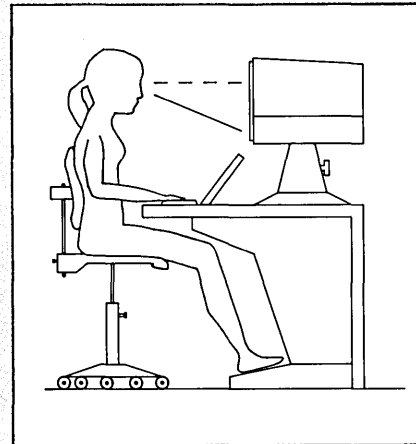
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NEWS IN PERSPECTIVE

by Raymond C. Freeman Jr., a consultant in Santa Barbara, Calif. He notes that in the 8-inch disk drive business alone there are five different sizes of disks and some 21 different interfaces. Disk dimensions differ not only in the overall diameter of the platter but also in the size of the hole in the middle.

"People didn't know what controllers to make because all the interfaces were different," Freeman says. "Without controllers, [oems] didn't buy the drives because it wasn't easy to integrate them [into their products]." With buyers holding back, manufacturers were unable to ramp up production quickly and achieve economies of scale, thereby bringing down costs and prices. That buyer resistance resembles today's situation in the home videotape recorder market, where there are three incompatible formats, so that videotapes recorded in one format cannot be played back on a foreign machine.

In sharp contrast, Seagate Technology pioneered the 5¼-inch Winchester drive, took the leadership role in that technology, and very quickly established what became a de facto standard. The specs were picked intelligently by Seagate, which started shipping products before any competitor could devise alternative specifications. So the others more or less went along with Seagate.

Freeman himself is the spokesman for a group called QIC, an acronym for the Working Group for Quarter-Inch Cartridge Drive Compatibility. It seeks to achieve this compatibility among streaming tape drives by establishing a standard, thereby promoting widespread market acceptance. If it is successful, says Freeman, a large number of drives will be able to work with one controller design. Additionally, recorded cartridges could be interchanged, so that they could be taken out of one manufacturer's drive and placed into that of another vendor.

Last August the QIC group agreed on a proposal for an intelligent interface, and that proposal has been officially forwarded to both ANSI and ECMA (European Computer Manufacturers Assn.). "The ball is in their court now," the consultant says. "What we hope for is their formal consideration of the proposal as a standard."

The group sees streaming tape drives primarily as a backup device, but denies that streamers are forever limited to that one application. As a result, the question addressed by the group is what interfaces and what recording formats should be used by streamers, regardless of what they're used for.

Just as the adoption of a standard can result in the interchangeability of tape cartridges, so also there can be software portability that nets out when standards are adopted in the world of graphics. Such portability, of course, helps protect the invest-

ment of users when they move to newer, more powerful systems, eliminating a total rewrite of the software. It also means that graphics programmers can avoid having to relearn their art when moving from one vendor's system to another. In the past, this

"People are starting to realize the importance of standards."

latter factor tended to argue against the adoption of standards, for vendors preferred to lock their users into that one system environment.

Improved software portability is but

FOR PERSONAL GAIN

Making the best use of personal computers in conjunction with mainframe operations is the name of the game these days. At the Infonet Group of Computer Sciences Corp., El Segundo, Calif., it actually became a game, or at least a contest.

Werner Schaer, president of Infonet's System Development Division, came up with a "Win a Personal Computer" contest for employees of the Infonet Group. CSC's Infonet Group, in business since 1970, operates an international information network serving the U.S. and 62 foreign countries. Its operating system is called Computer Sciences Teleprocessing System II (CSTS II). Most network users' programs can run on CSTSII without modifications and without recompiling or relinking.

Entrants were asked to design proposals for "a useful program involving a microcomputer and CSTS." Twenty-six entries were submitted, ranging from one hand-written page to a 25-page proposal. Three finalists were chosen and each was loaned a microcomputer of his or her choice and given six months to develop the proposed program. If judges approve of the finished product, the contestant gets to keep the microcomputer.

Schaer's contest was so successful that it has spread throughout the corporation. A second contest, this time corporate-wide, ended Nov. 15 with some 50 entries. Schaer is considering making the contest a permanent event.

Finalists in the first contest were Denny Williams of the Communications Industry Marketing branch in Atlanta, Ga.; Bruce Preston of the General Foods branch in White Plains, N.Y.; and Jeanne McMenemy of the Systems Development Division, El Segundo, Calif. All three came up with proposals that related to improving their jobs.

Williams, an Infonet Distributed Network Services marketing representative, proposed a "DNS Decision Support System Demonstration Package" that he hopes will make the field marketing rep's job easier. It is a menu-selected demo package designed to help reps show customers the capabilities of the IS-50 (a CSC-devel-

oped package of software pieces and an Intertec II) when it interfaces to CSTS. The menu includes a number of Infonet applications. Of course he is developing his package on the IS-50. He chose BASIC and SuperCalc as his development languages.

Branch support manager Preston proposed a graphics integration package that will allow a user to develop a graphics display on a host computer, using IGL or Disspla, and then produce a high-resolution plot on the color monitor of the personal computer. His chosen PC is an IBM; his aim is to make the personal computer an alternative to a plotter as well as a cost-effective method of producing both computer reports and graphic reports.

McMenamin, a senior member of technical staff responsible for the quality assurance function on the software development team, submitted a proposal for a system she calls Modes (Manage Off-line Data Entry System). Modes would permit a user to enter and manipulate data via a personal computer independent of the CSTS host. This, she contends, would allow the management-type user to develop new features more cost effectively and in a user-friendly environment. She estimates development time at 500 hours. She also chose the IBM P.C.

Schaer said the company is lending the finalists software and "all other elements they deem necessary." He feels the contest is in the best interests of the company and the employees.

"We want to promote use of microcomputers in distributed applications, including manufacturing. We hope to come up with some programs that will be useful to Infonet clients."

He said Infonet has other plans to increase internal PC use and has a number of pilot programs running internally. Schaer himself has a personal computer, but he's not entering the contest—directors of operating divisions and their superiors aren't eligible. But he's nonetheless working on "human engineering factors, looking for two-step pushbutton functions, trying to simplify computerese."

—Edith Myers



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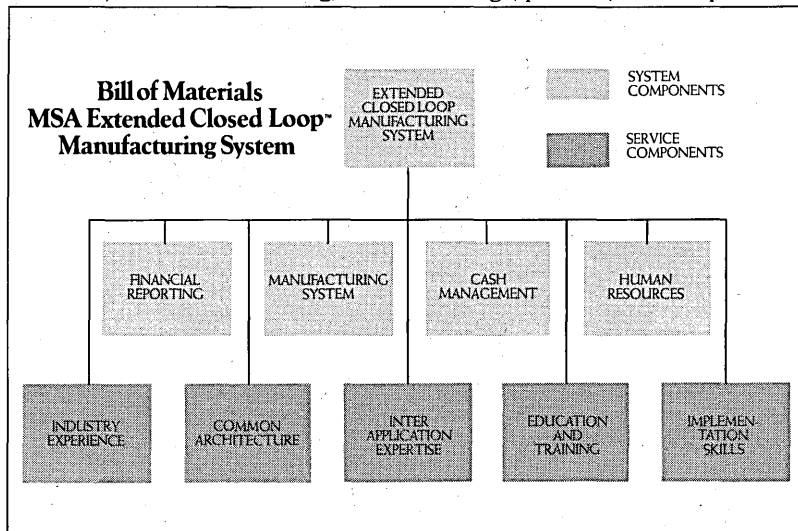
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A second proposed graphics standard is the North American Presentation Level Protocol Syntax, a communications protocol to be used in the transmission of graphics information. Developed by the Canadian Department of Communications and subsequently adopted and enhanced by AT&T, it is currently being considered for adoption by ANSI.

Even before the adoption of any NAPLPS standard, however, work proceeds on the design of an NAPLPS videotex decoder in chip form, followed by a board set based on such a graphics controller chip. The same applies to the VDI standard, which will be implemented in silicon and thus produce cost savings to system implementers and price savings to users.

And that may well be the reason for the flurry of standards activity in the industry. In the past, vendors had reason to go slow on the development of standards, preferring instead to sell their individual solutions. With the adoption of and manufacturers' conformity to a standard, however, "it means you're not locked into some operating system or some particular vendor's computer package," says Ed Post of Tektronix's Information Display Div.

Formerly, companies like Tektronix and CalComp enjoyed a marketing advan-

"Standardization of broadband is more critical than any other technology."

tage, having earlier set a pseudo-standard. Anyone who wanted to write an application that would run at a large number of user sites probably wrote it to run on one of those two graphics systems. But with standards in place, the buyer gets a wider choice of both hardware and software.

Earlier this year, some 15 companies announced their support of the VDI and NAPLPS standards. Similarly, some 20 companies said they were rallying behind a set of local area network standards. Among the leaders of this group is Ralph Ungermann. The most advanced of these proposals is the Ethernet standard, just because so many companies are adopting that baseband technology.

"There is some standardization effort in broadband," Ungermann explains, "and that's really important, but it's not nearly as far along as baseband." He thinks broadband standardization is critical "because the whole concept of broadband is to share the cable among a bunch of different users. If you don't have standards, you can't really ever hope to share. So I'd say standardization of broadband is more critical than that of any other technology." Some recommendations have been made, he notes, and his company subscribes to them.

In the baseband technology, apparently the only important proposal is Ether-

net. But there's also fiber optics, which no one is even talking about yet and is thus years away from standardization. "So what I'm saying is we're going to see a number of standards" that apply to LANS, says Ungermann. "It's not necessary that there be just one standard."

Above the lowest, or physical, level where standards can be established is the link level, which is concerned with the access technique. Here the leader by far is CSMA/CD (carrier sense multiple access/collision detection), which is generally used both in baseband and broadband systems. Here, too, token passing will become important. "That will emerge, with IBM as the leader," says Ungermann.

A number of companies have also initiated efforts to standardize on a so-called microflop, something smaller than the 5¼-inch miniflop. Twelve makers of magnetic media and disk drives have recommended that a 3½-inch floppy disk be adopted as a standard, the same size first developed by Sony Corp. But the specs proposed to ANSI by the group, which includes Olivetti Peripheral Equipment and an unnamed Japanese drive maker, call for a medium half the thickness of Sony's and with a higher recording density. Differing from Sony, too, it also calls for a shutter that automatically opens when the disk is inserted into the drive, closing when taken out. In a separate action, however, Sony has requested that its disk be standardized by ANSI.

One of the initiators of the microflop effort, Shugart Associates, is also pushing for the standardization of its own peripheral interface for low-end systems. Already a de facto standard, the Shugart Associates Systems Interface (SASI) has been renamed the Small Computer Systems Interface by an ANSI subcommittee. For the upper end, the subcommittee is considering Control Data's Intelligent Standard Interface.

While standardization eases the system integration job and has related benefits, in this case it also leads to the implementation of the interface in a few IC chips, thus dropping costs. Shugart, for example, has designed a SASI interface in LSI that consists of four chips and a microprocessor that it expects to be selling toward the end of 1983, says Jerry Kiltz, the company's director of product marketing.

This flurry of activity in the world of standards has created a need for participants from the user community. There's a technical committee working on standards on office systems. "We're looking for users [to serve] on that group," says Cathie Kachurik, director of standards at the Computer and Business Equipment Manufacturers Assn. in Washington, D.C. She adds that they're also looking for users in the X3 group.

—Edward K. Yasaki

COMPUTER COMPLEXES

RICHES FROM SWITCHES

A feisty Connecticut company is carving out a peculiar market for itself: peripheral switches.

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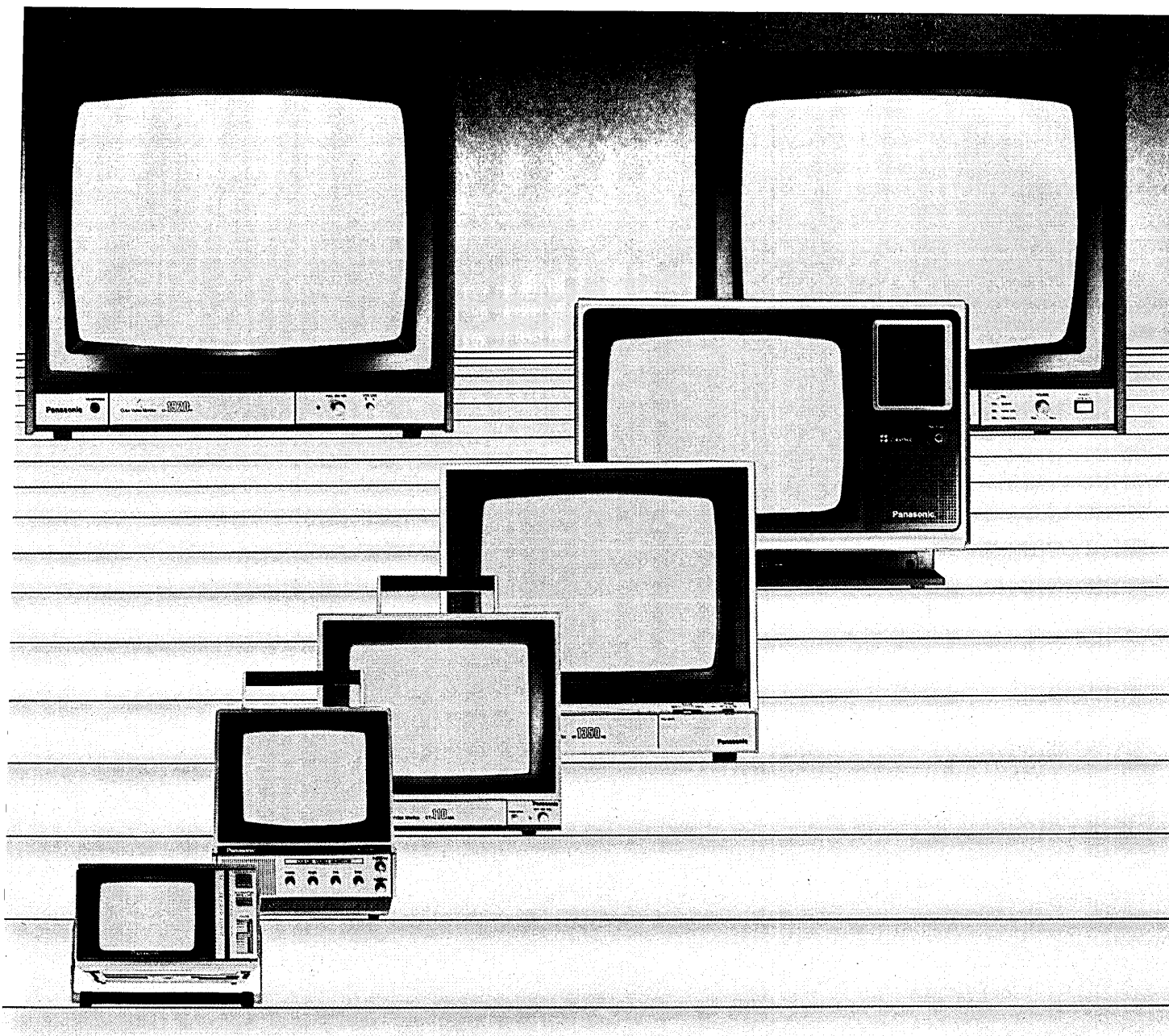
Greene's Norwalk, Conn.-based company has been enjoying unexpected attention from Wall Street and institutional investors lately as its over-the-counter stock took off from an opening price in April 1982 of \$12.50 to a late October level of just over \$33. The reasons behind that rise, Greene says, lie in the solid foundations he has laid for the company's future growth and its exploitation of a "protected niche."

"Our secret is that we're a quality company, we're selling added value, and we're not looking for spectacular growth for its own sake," the ex-IBM marketer adds. Looking for it or not, the company's revenues have been rising at an annual rate of more than 200% and earnings at as much as 400% a year. Greene's niche is paying off quite handsomely.

What Data Switch sells is a line of semiconductor-based switches that help connect central processors to peripherals, thus enabling a large computer complex to



RICHARD GREENE: "We're a quality company and we're not looking for spectacular growth for its own sake."



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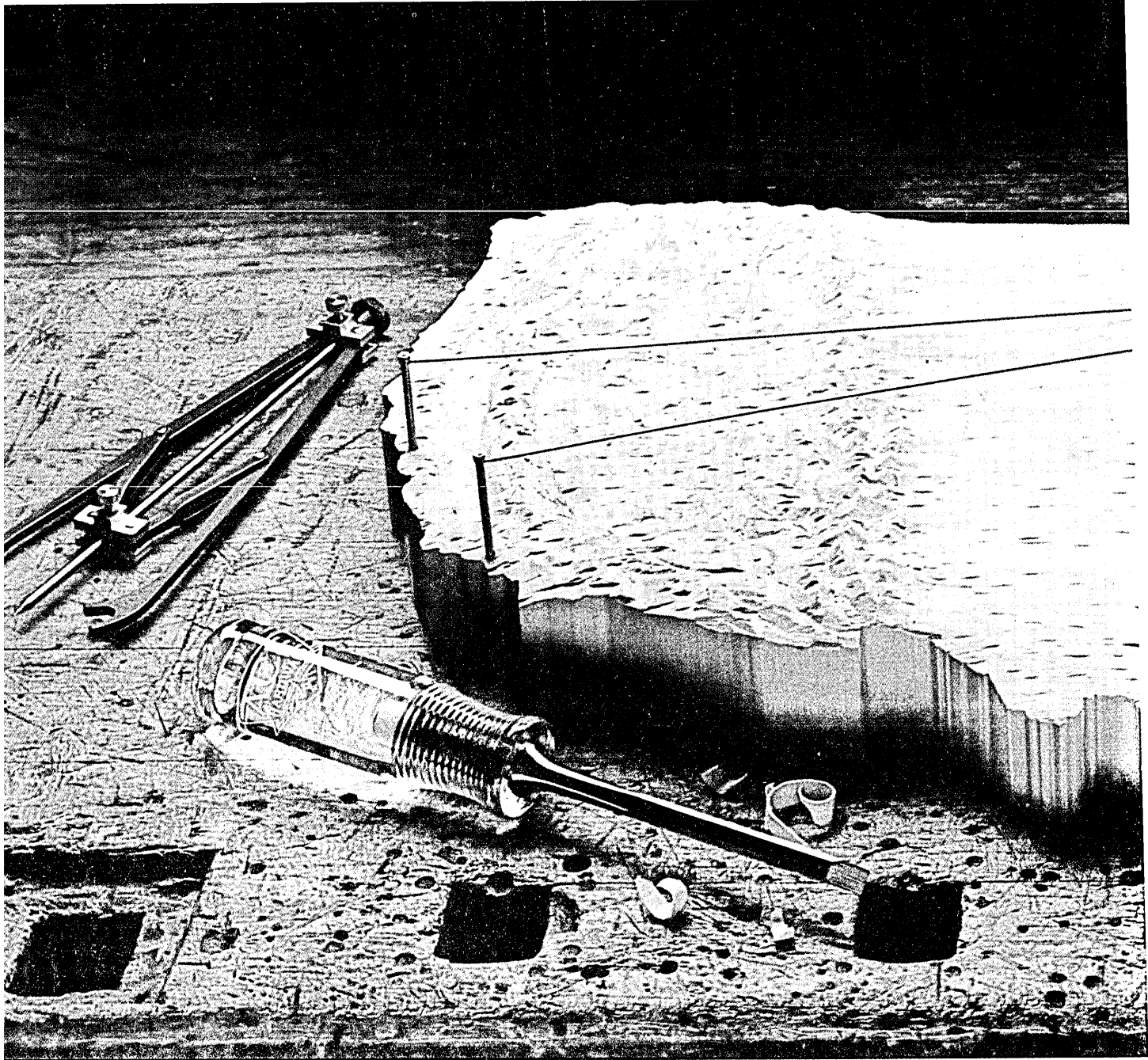
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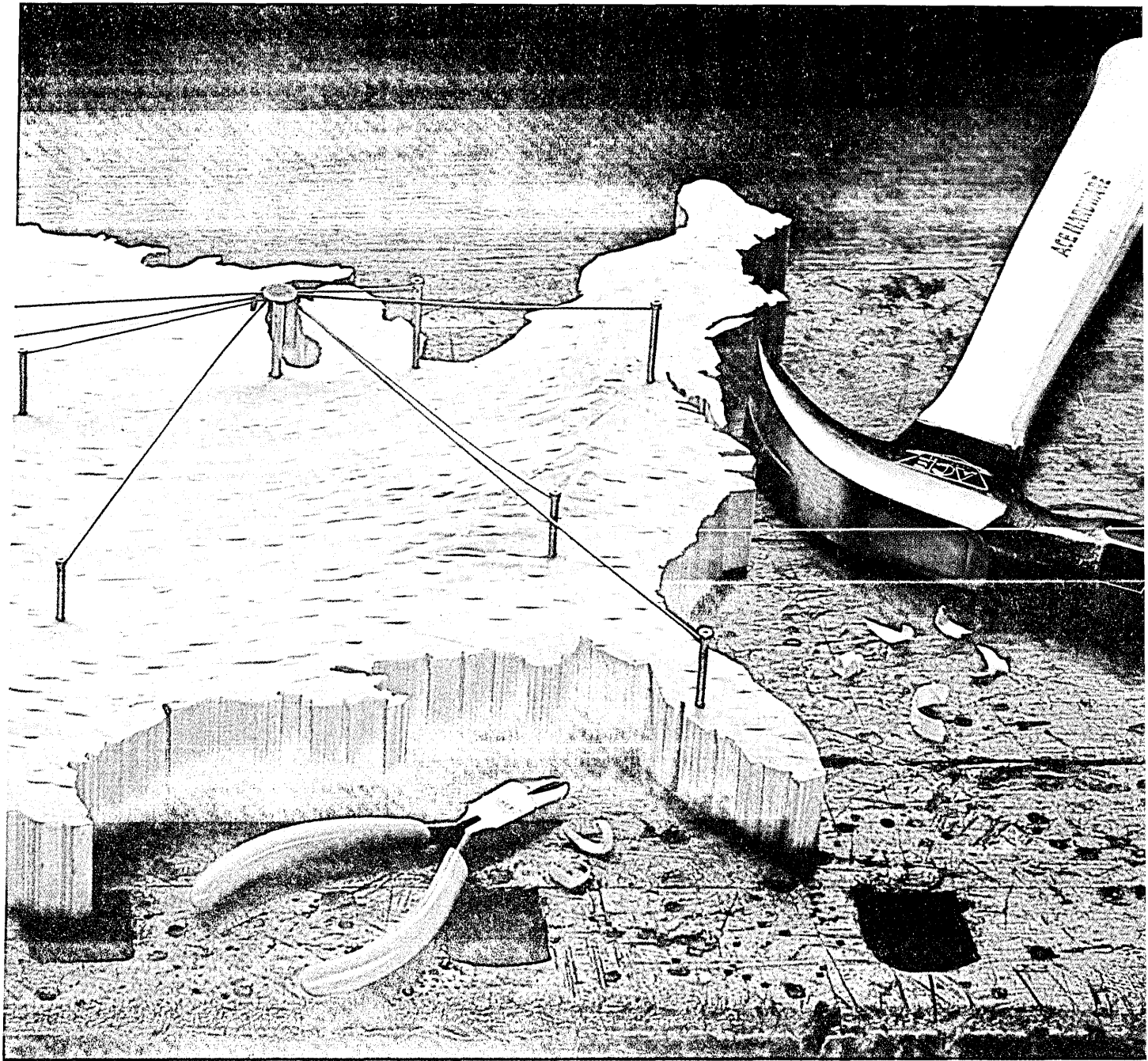


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Dramatic Gains

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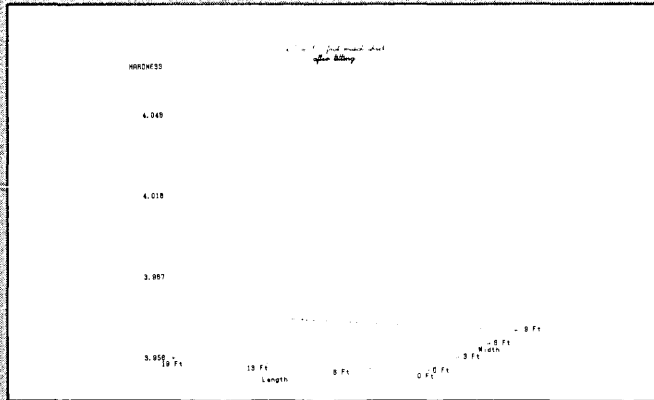
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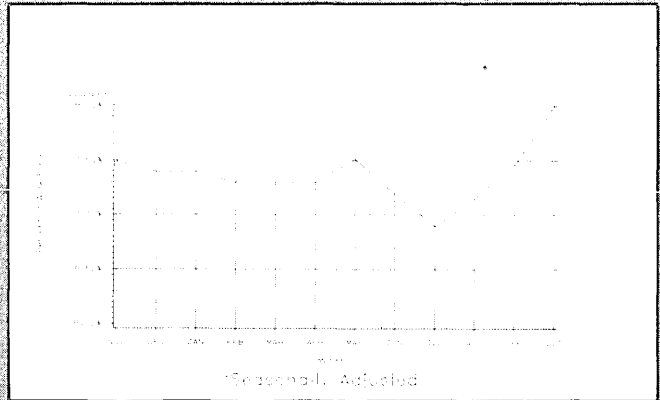
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Zeta 1453



Hewlett-Packard 7221

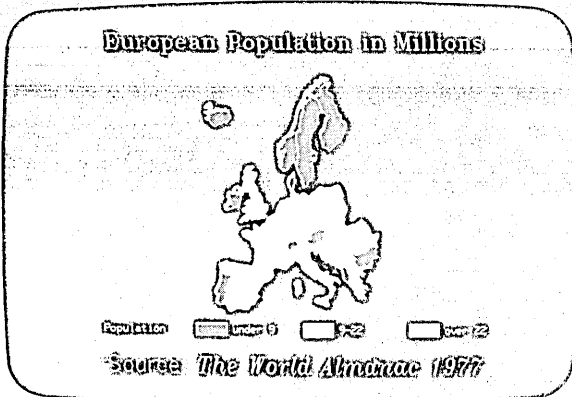
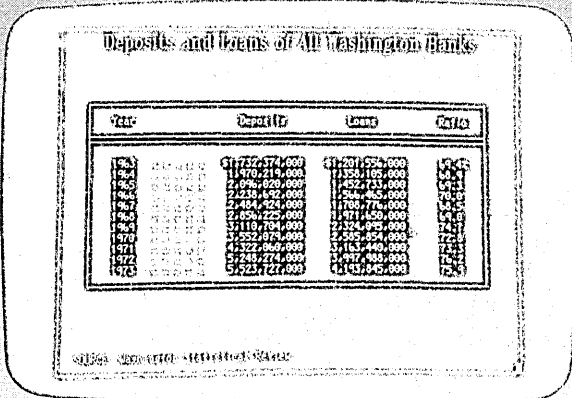
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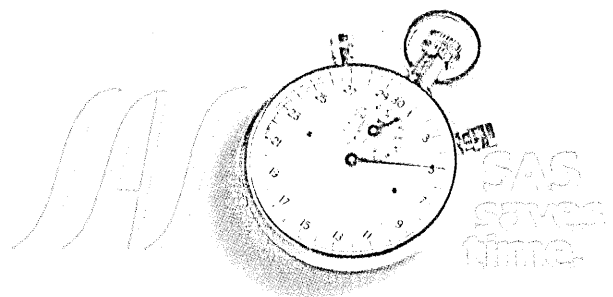
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CIRCLE 51 ON READER CARD



NEWS IN PERSPECTIVE

be reconfigured virtually at the push of a button. Switching his metaphors from airplanes to manufacturing, Greene states, "What MIS people don't understand is that they're running a data factory. You need to be able to manage that flow of raw data coming in and going out. What we're providing are the process control systems for the data factory."

The company's main competitors are IBM and T-Bar Inc., both of which employed Greene before his current stint as an entrepreneur. The story of his journey through the industry is one he has obviously told often, wooing investors, entertaining the press, and making sales calls.

He joined IBM in 1963, spent four years selling computers, and ended up managing a large account at a New York insurance firm. One day, he recalls, he began to wonder why IBM was not pushing its own peripheral switch, the 2914. With their 2900 series designation, these devices were known at IBM as RPQ products, not available as standard products but only upon special request from the customer.

"Obviously," Greene says, "it was counterstrategic for IBM to sell switches. The switch gave the customer flexibility in running his dp shop, a flexibility that would hinder sales of more profitable items such as additional IBM disks and cpus."

Despite the RPQ status, however,

some 7,500 peripheral switches were installed by IBM, showing a clear user need for such apparatus, Greene says. With that idea in mind, he left IBM for T-Bar, which at the time was itself dabbling in the peripheral switch arena after several years of making crossbar switches for telecommunications. From September 1974 to August 1976, Greene headed T-Bar's peripherals switch division, giving the firm a foothold in what was obviously, to Greene's mind anyway, a lucrative market. "After T-Bar I

"Obviously, it's counterstrategic for IBM to sell switches. The switch gives the customer flexibility that would hinder sales of more profitable items."

did some consulting to users, helping them plan their shops, and a side benefit was being able to pick up a lot of market research along the way," he recalls. "I also knew I wanted to start my own manufacturing company to sell solid-state switches.

"Unfortunately, or fortunately, I was too foolish to know the odds of getting into business for myself," he notes. "Due to the tax laws then, there was very little venture capital around."

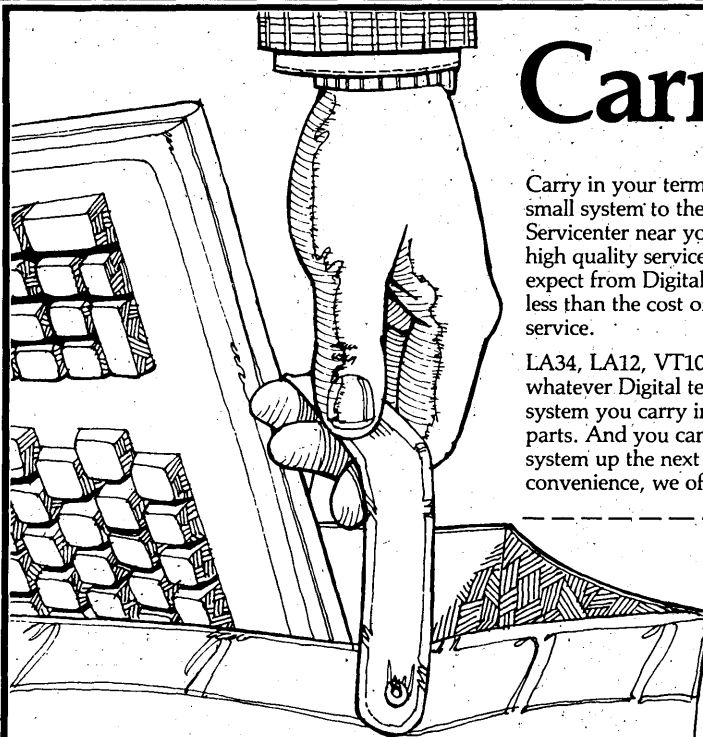
Some potential investors, he says, were initially interested in the product he

had in mind, but eventually kept their money in their pockets when they found out that Greene didn't have another glamorous disk or tape company to start. Thus, he ended up taking out a mortgage on his house and starting the company in a small office over an auto brake repair shop. He incorporated Data Switch in the spring of 1977, marketing a switch he had bought rights to from a New Jersey engineer. Much of his engineering help came from moonlighters from surrounding companies, he says.

Many of the firm's first sales were made overseas, Greene claims, noting, "We were selling larger switching capability, central control, and a knowledge of the applications."

By the end of 1979, 11 persons were on the Data Switch payroll and, surprisingly, the company was profitable. Sales didn't begin their current dramatic climb, however, until 1980, when IBM introduced its 3814 switch. It was not an RPQ product and thus legitimized the switching market, Greene recalls happily. He was on his way to success and he knew it.

Soon afterwards, plans were made to bring the company public and a board of seven directors was formed, rather large and experienced for a company of such youth. Among the outside directors are John Randolph, who founded leasing company Randolph Computer Corp., and Rob-



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ert Degan, president of Applied Digital Data Systems Inc., a leading crt terminals maker.

Data Switch's main product is the System 1000 switch, which comes in some

Data Switch's main product, the System 1000, can handle as many as 448 crosspoints.

58 models ranging from a two by four matrix to the recently introduced 16- by 28-point version. Over 300 of the systems have been installed, Greene says, noting that he

sees each and every one of the many IBM and T-Bar switches installed—whose numbers total upwards of 10,000—as potentially replaceable by his machine. "Any shop with more than a pair of 4341s is a potential customer of ours. There are about 4,000 of those sites worldwide and about 500 being added each year."

The System 1100 is a remote control console which, based on a Digital Equipment PDP-11/23 computer, can remotely control up to 56 System 1000 switches. Prices for the System 1000 range from about \$26,000 to \$400,000, depending on

size, while the 1100 starts at about \$30,000. It can be programmed to recall many different "mapped" configurations, which can be implemented quickly under program control. Thus, different routings of data from peripherals to cpu can be stored on disk and called into action as needed when the job mix or functionality of hardware changes.

As a follow-on act to the System 1000, Data Switch is marketing Xy-Max, a similar machine that is designed to switch data paths between incoming modems and front-end processors attached to cpus. Also controllable by a remote minicomputer, the Xy-Max is designed to replace the bulky panels of patch cords usually found in large dp shops handling hundreds of incoming data communications lines. Also the system is claimed to monitor data lines, letting operators know when trouble is approaching.

Eventually, Greene says, still another variation on the Data Switch theme will be unveiled, the Ana-Max, which would sit between incoming modems and their respective data communications lines from remote terminals. Ana-Max, also controllable by the remote mini, would route data around failed modems and would give network managers a window into the operation of their setup.

Also on the drawing boards is V-Max, a switch that would sit between a front-end processor and modems attached

"It all comes together through the switch, so we find a receptive audience for our product."

to 56K bytes/sec. data links, according to Greene. Clearly, he hopes to put a switch just about everywhere he can in the large data processing shop.

"If you would define the hardware analyst's job it would be to find the critical paths in a data processing complex and alleviate the bottlenecks," Greene notes. "It all comes together through the switch, so we find a receptive audience for our product." The entrepreneur and his company are bullish on the future, suggesting that the market for peripheral switches could easily hit a billion dollars in a few short years. A market that big is likely to draw additional competitors, but Greene says he's not too worried. "We're not a me-too company. We're selling an awful lot of function. We have to know a lot about the user's equipment. It's not just a matter of having the right technology to market. You need to know the applications."

Greene says his company is ready for the future and a continuation of big growth. It has the marketing savvy it needs: "I'm still very heavily involved in marketing. There's no need for big names for the sake of big names."

—John W. Verity

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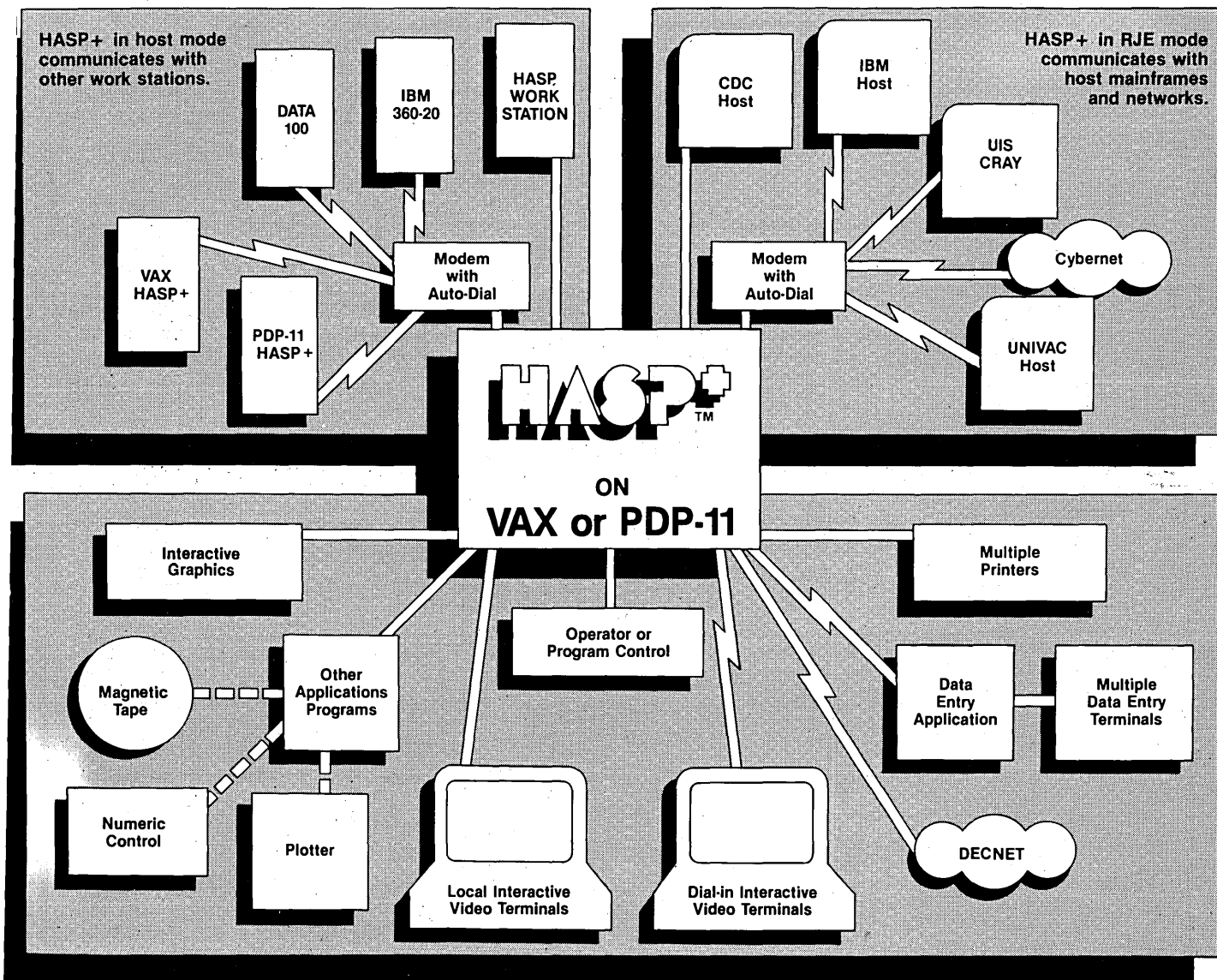
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CIRCLE 54 ON READER CARD

CAPACITY PLANNING PITFALLS

What to do about the applications backlog—add more MIPS or search for software?

This year's trend-bucking performance by IBM's 308X (H Series) family in an otherwise flat mainframe market has left experts wondering what the Armonk giant might do for an encore.

The general feeling is that IBM will top this year's 900 or so 308Xs with upwards of 3,000 more over the next two years. If this prediction pans out, experts say, the question becomes an issue: how will IBM's backlogged customer base put all this extra capacity to work?

Surveys by IBM's GUIDE and SHARE user groups have indicated that the current applications development backlog for large sites stretches from two to three years and is growing. Another study by MIT's Sloan School says it is even larger. Pat Sullivan, a

principal founder of the New York-based Technology Analysis Group (TAG) (formerly part of Advanced Computer Techniques Corp.), notes that compounding the problem is the severe shortage of trained programmers/analysts.

"Into this environment IBM will pump a minimum 30,000 MIPS—that's 30 billion extra instructions per second—over the next two years," says Sullivan. Put simply, he explains, this means the supply of processor capacity may exceed the ability of the user community to put it into service. If this happens, the financial impact on IBM and other manufacturers could be serious. "IBM is aware that the way to avoid this is to give end users the software and applications generators they need. And the company is proceeding along this course with some urgency," says Sullivan.

Other experts—particularly those among IBM's competitors and those in the field of capacity planning—feel that IBM's earnings are likely to be squeezed over the next couple of years.

"I've thought for some time," says IPL Systems president Steve Ippolito, "that IBM would have trouble growing its base. There are just too many cheap MIPS around and the market's getting saturated. Ippolito said that IBM will either be forced to raise its prices or reposition itself. "Either way, we should benefit," he said of his 4300-level

pcm operation.

Another observer, Robert Goldberg, marketing vp at BGS Systems, Waltham, Mass., says that IBM's users have been suffering from "MIPS indigestion" for some time. But unlike Ippolito, BGS has had first-hand experience with what it calls the IBM user "crisis" through the series of unique mathematical models it devised to help those users with capacity planning.

Says Goldberg: "Extra MIPS and memory are of little comfort to end users trying to mount new applications because all they ever see is the information bottleneck that gobbles up the extra capacity at the central site. Little enough is ever off-loaded to handle such vital concerns as decision support and office automation. Most

Over the next two years, the supply of processor capacity may exceed the ability of the user community to put it into service.

added capacity goes to feed the software and stays trapped in the large machine."

The biggest "feeder" is IBM's premier operating system, MVS; its voracious appetite for memory has led users to label it "monster," "behemoth" or "dinosaur."

"Many times," says Sullivan, "MVS and its CICS teleprocessing system

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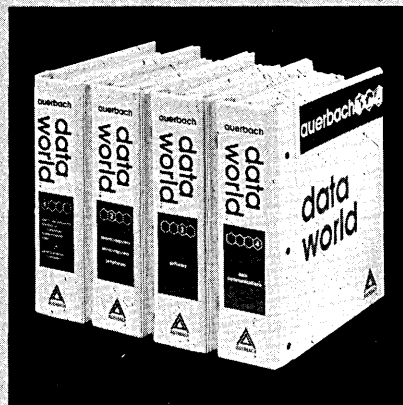
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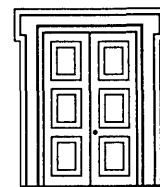
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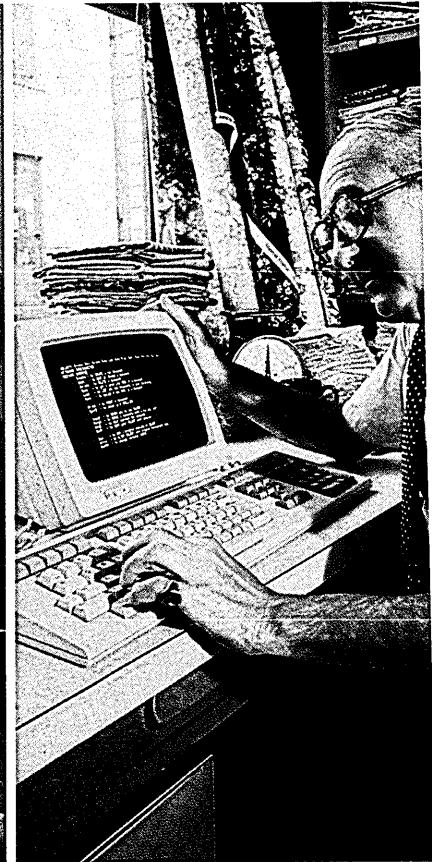
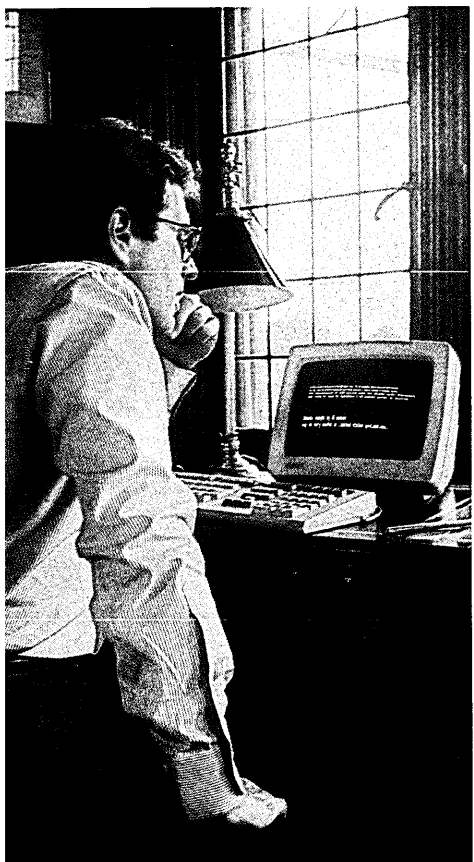
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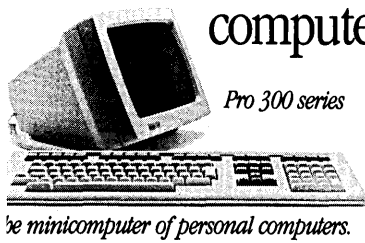


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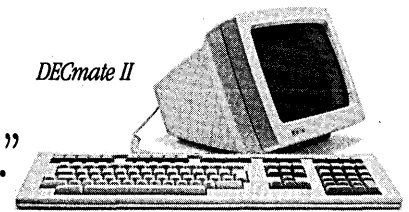
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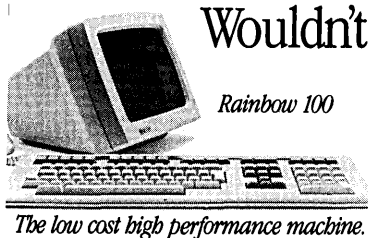
computers made by Digital Equipment Corporation are such an example. These are the personal computers about which industry analysts such as The Yankee Group have said: "... comparing other currently available personal computers to (Digital's) Professional series is like comparing a sub-compact car to a Porsche."

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can take up half the machine." Goldberg added that it's not uncommon to find machines in which the remaining space for user code and programs is less than 20% of the total.

Ed Pritchard, vp of corporate planning at Servio Logic Corp., Portland, Ore., says that MVS is rooted in the batch operating systems of the '60s. "That is, in inelastic mainframes that didn't have to change very much."

By IBM's own figures, the percentage of mainframe power used for on-line work was only 4% in 1973, but was 30% in 1980 and will be 60% in a couple of years. "Basically, MVS is a living index of every architectural attempt that IBM has instigated to meet those changes in on-line demands. It's a batch system made to look like an interactive system by adding extra layers of complexity.

"It is for these new levels of complication that IBM sells its additional MIPS too, once they are created," he says.

Goldberg described the added layers of complexity as a "cancer" growing through the system, which IBM feeds with more hardware. As Arthur D. Little's Ted

Industry observers claim that IBM's users have been suffering from "MIPS indigestion" for some time.

Withington and other industry experts have pointed out, these new layers increasingly take the form of both outboard and inboard processors—what Withington refers to as a "federation."

The result is a modular, fast-changing architecture characterized by increasingly complex internal workload flows. "This is the essence of the capacity planning problem users now face," says Goldberg. "Formerly, when a user wanted to mount a new application he would do a benchmark or simulation and then throw more hardware at the problem. There are even those today who say that you don't need all that performance measurement stuff . . . one megabyte of extra memory will do the trick, and with prices falling it'll only cost you \$15,000, they say.

"Even if you could get one megabyte [IBM usually offers megabytes only in increments of four], where would you use it," says Goldberg. "It's been our experience that users don't know where the new capacity is needed. Is it the cpu, the disks, the controller, the channels? Where? Users just don't know what to ask for to cover the new application.

"It's a sad fact," adds Goldberg, "that maybe nine out of 10 of the planned applications that we have been brought in to consult on in recent months were doomed to fail. It could be that the majority of new applications development now being undertaken at large multinational customers of

IBM will also fail."

Servio's Pritchard, a dp manager of many years and currently a capacity planning expert, said that many dp and information systems managers are so intimidated by central site capacity planning that they'd rather break the site down into a community of distributed 4300 application machines. "This way they break their service into chunks and get a better feel for the behavior of each application."

Other ways to get the capacity out into applications service are offered by IBM's currently available packages and ap-

plications generators such as DMF and the soon to be replaced ADF. But by general industry agreement, these solutions are only mediocre.

An intriguing new aspect of BGS Systems' business is the way its Crystal predictive model is being bought by users to compare the merits of various packages. One of Crystal's capabilities, the company demonstrated, is its ability to gauge the future performance of a new software subsystem or package before it is either written or mounted. For example, a large bank might want to compare two financial software

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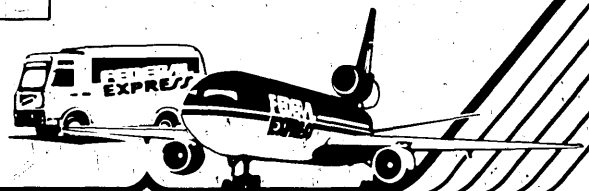
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packages against a write-your-own solution. Or an insurance company might want to do the same thing with two group claims processing packages versus one it may write itself, BGS explained.

Goldberg said that IBM's customers spend a great deal of time leveraging the trade-offs between a package and a hardware solution. "But these packages can result in much more complexity within the system because customers tend to use them to create more inefficient code and make naive assumptions about the DBMS and how to query it," he warned. He points out that

despite the inefficiencies created by the present MVS hierarchy, step function technology will come to the rescue in the latter part of the decade. "A first step in this direction will be the new 31-bit extended architecture [XA] next year. Though this is another example of IBM creating more complexity to sell more MIPS, the greater addressing capabilities will help users run more complex programs."

"Eventually," adds TAG's Sullivan, "one gigabyte addressing and beyond will be offered so that MVS-type systems will be able to handle things like decision

support quite comfortably." (This next generation of 10 MIPS to 50 MIPS models is known internally at IBM as Trout.)

A current approach to putting excess capacity into service is IBM's new Information Center, or nationwide bureau service. Many IBMers refer to its strategic role as that "big MIPS sponge." But as Jim Willcox, vp of marketing at Henco Inc., Waltham, Mass., points out, it has one major failing: "Just like all the other solutions that have so far emerged from IBM, the Information Center fails to address the needs of the end user and management."

Willcox said that the software was "not there" to allow middle and upper management to do such things as financial modeling, word processing, and ad hoc querying. "The whole thing is aimed at VM users and programmers."

He argued that IBM will never help users solve their backlog problems until the company comes up with user-friendly software, also known as fourth generation languages, and offers it in a dp context so that dp managers can dissolve the bottleneck.

"First through third generation software and programming aids have allowed dp managers to define their files, move to data entry and screen handling, handle queries and report generation and, more recently, to move into relational databases," he explained. "What fourth generation lan-

"Often, MVS and its CICS teleprocessing system can take up half the machine."

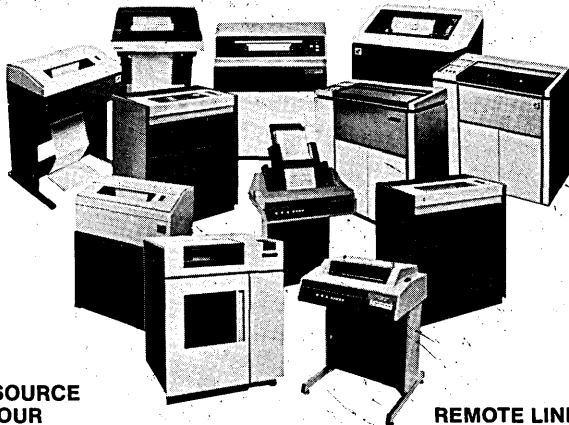
guages such as FOCUS, INFO, RAMIS, and NOMAD have achieved is the integration of these steps into one data management unit. To this has been added the crucial ease-of-use characteristic."

Willcox says that using his company's INFO language—now resident at over 900 installations—the dp manager can expand and offload ad hoc queries, financial modeling, color graphics, and word processing into the end-user domain.

He claimed that by using the INFO approach, one of his customers, Lincoln National Life, Fort Wayne, Ind., cleared a two year backlog in around three years. "When you can develop end-user applications in one quarter to one tenth the time it takes in COBOL, and at one tenth the cost it takes to maintain a COBOL solution, such figures don't seem so strange," he said. "In fact, this user isn't the exception, but rather the norm."

Willcox claimed that the system is so user friendly that Lincoln's president, vice president, 270 managers, and secretaries all use it. "None of them had used computers before. Usually around one day's training is necessary to get them on the system." Just as significant is the fact that both technical and nontechnical staff at Lincoln use that same system, he stressed.

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"This is critical because it allows the dp manager to remain the source for future personal computing developments and maintain his 'guru' status."

A case has also been made for using personal computers to chip away at the information backlog, but dp managers are quick to point out that these machines are still not sufficiently user friendly and there is a learning curve involved in their programming and application. Another problem highlighted by Willcox is that personal computers often have little compatibility with, and no direct access to, the central site. "You can dole information out to them, but it quickly becomes outdated when the central machine is updated."

But he added that these problems are being solved quickly, and that all kinds of excellent software is beginning to emerge for personal computers. Another point worth noting is that despite the obvious disadvantages of personal computers, one half of Apple Computer's 350,000 installations are being used in businesses.

Henco's Info software, like other fourth generation languages, runs under IBM's VM/CMS but not under MVS. Willcox didn't disguise the difficulty of trying to write it for IBM's big baby. "Frankly, I hope no one ever manages to make such a language available on MVS, because by not doing so IBM is losing market share. After all, the reason why the DEC and the Data General and Prime machines emerged—apart from their price—is because they're so much easier to use," he said.

Could it be then that the answer to "MIPS indigestion" is the availability of user-friendly software that offers solutions to end users and programmers alike? At least with much simpler software, harassed capacity planners might be able to build some "anticipation" into their systems. As the BGS motto goes, "Anticipation means never having to say you're sorry."

—Ralph Emmett

SOFTWARE

A NEW SIDE TO SOFTWARE

They come from a variety of backgrounds and go into software publishing for a number of reasons.

Louis B. Marienthal is a 26-year computer industry veteran. Starting in 1956 when he operated a Univac I, he's progressed up in corporate ranks with machines that have progressed down in size. Now he's into

software publishing.

Chuck Mildren used to run a company that produced software for Basic Four small business computers. Now he's into software publishing.

Terry Wright spent a number of years in programming and sales for NCR and then Sperry Univac. Now, he too is in software publishing.

So is Hindy Tolwyn, a user who had run software on a mainframe without even knowing what kind of computer it was.

Software publishing was born of the proliferation of microcomputers and the resultant need for thousands of copies of software packages. Distribution channels for software changed, and would-be authors/developers came out of the woodwork.

The earliest software publishers, such as VisiCorp with its VisiCalc, MicroPro International with its WordStar, and Software Publishing Co. with its PFS (Personal Filing System), published their own products: they developed them, packaged and documented them, and marketed them through dealers and/or distributors.

Probably the granddaddy of the newer breed, those software publishers who act for authors/developers as traditional book publishers act for writers, is Lifeboat Associates of New York City. This company, started in an apartment basement in 1977 as a one-stop source for microcomputer software packages, has grown to where it has more than \$10 million annually in sales and represents authors/developers from all over the world. Lifeboat, like other large publishers, is both publisher and distributor in that it will add value or not, as needed.

Lifeboat's products run the gamut of programs for business, professional, programming, and personal applications. It sells through computer retail dealerships, OEMs, mail order, telephone and telex transactions, and direct walk-in purchases.

The younger publishers beginning to spring up tend to be narrower both in the way they sell and in the types of products they offer.

Marienthal's Pacific Data Systems, Culver City, Calif., is starting out like the earliest software publishers, publishing a homegrown product. A money management program called =Money =Track =, it's targeted for such users as small businesses or farms; investors, accounting firms, financial advisors, business managers, and professionals such as doctors or lawyers. It's being offered initially for the IBM Personal Computer, but future versions are planned for personal computers from DEC, Hewlett-Packard, Texas Instruments, Xerox, Radio Shack, and maybe even Osborne. "It's the first of a line," said Marienthal. "You have to say that in the retail business."

Marienthal started the company as a systems house in 1978. The firm has been

designing and installing complete systems for small businesses, principally accountants and distributors. Now this activity is being phased out.

Why the switch to software publishing? "I looked around and saw the money being made by all of those young people with their products." Marienthal believes "there is a definite generation gap" in the use of computers, and he's out to bridge it.

"We've broken our backs to shield end users from the aggravation of the computer." He sees this in direct contrast to the new generation of computer literates. "People under 25 have a conversational knowledge of computers that they take for granted."

Marienthal is serious when he talks of a "line" of products. He has more planned for his own company's develop-

"We've broken our backs to shield end users from the aggravation of the computer."

ment and expects to publish compatible products of other authors/developers.

Chuck Mildren's State of the Art, Costa Mesa, Calif., also started by publishing its own works—accounting and productivity programs for the Apple II and III; last month it announced one for the IBM P.C. "Now we're licensing our tools to key developers experienced with minis who couldn't afford the transition to micros," said Mildren. When these licensees develop an application program, State of the Art will publish and sell it, paying the developer on a royalty basis.

Mildren describes a software publishing company as "a company that has a feel both for marketing and for end-user requirements of a product. In the classical sense we're the same as book publishers. We take a work, orchestrate it, put it into final form, publish and distribute it."

Most of the principals of State of the Art are, like Mildren, from the data processing world. But, he notes proudly, "our vice president of marketing, John Carrington, is from Peterson Publishing, where he had primary responsibility for publication of how-to books. His expertise is in consumer presentation of documentation. We have a marriage of good software plus some understanding of the consumer market."

To accept the need for software publishers, Mildren said, "you have to accept the basic premise that software is more an art than a science. People come to us in droves with their products." He said the products offered range from artificial intelligence products for the late '80s or early '90s to games to electronic worksheets. "We have positioned State of the Art to have a primary emphasis on accounting and productivity."

Mildren said the company will sell only through dealers and not through dis-

NEWS IN PERSPECTIVE

tributors. "We need more feedback from dealers and consumers than we could get using distributors."

As for protecting rights in software, Mildren said individual authors copyright their programs and State of the Art copyrights documentation. They even go so far as to get a Library of Congress number for each of their works, "which is one more step toward formally establishing that it is now a published work. That's the advantage of having someone around from the publishing business."

Terry Wright, president of Eagle Software Publishing Co., Wayne, Pa., offers this list of things a good software publisher will do: sort through many programs of varying quality, pricing and choosing the best; test products thoroughly prior to release; document professionally; package the products attractively; develop supporting tools such as brochures and advertising; and sell and distribute products using the most effective mix of marketing channels.

Wright said he dealt closely with users at top 1,000 U.S. companies during his years with NCR and Sperry Univac and got into software publishing "because I was sympathetic with the first-time user."

He believes there is something in software publishing worth the attention of big mainframe users. "Development backlogs can be slashed by acquisition of one or more of the popular micro systems." Also, he notes, "quality mainframe software products ranging from development tools to application products are in great demand and can be marketable." He said a software publisher could help here in determining the market and what an author or his company might expect on sale of a product.

Wright said his company hasn't published any mainframe software yet, but for the future "I'm quite optimistic."

Hindy Tolwyn started Link Systems, Santa Monica, to publish software because she discovered that mainframe software was inflexible once she had worked with her own personal computer, an Apple II. Tolwyn's nine-person company, formed two years ago, publishes what she calls a line of "Simply Powerful Software." Its newest product, DataFax, introduced at Comdex, is a filing system for professionals that lets them "get facts in different ways and get them fast."

In something of a departure from the ways most publishers sell, Link has begun talking to hardware manufacturers as potential marketeers for its products. "We have six products out there now," said Tolwyn. "They all use the UCSD p-System, are portable and relatively bug-free, and came out of a background of human engineering."

As State of the Art's Mildren indicated, there are overlaps between software publishers and software distributors. Two-year-old SoftSel Computer Products, Inc., Inglewood, Calif., was one distributor that

was doing some publishing. Now the publishing part has been spun off. Softsel in late October set up an autonomous subsidiary, Tronix Publishing Inc., also in Inglewood, to handle that part of the business.

—Edith Myers

MANAGEMENT

CROSSING THE BRIDGE

A few dp managers are breaking out of the technical ranks and moving into management.

The description of the award winner says it all: "One of the few dp managers to successfully cross the bridge into corporate management." But according to this year's winner of the DPMA's Distinguished Information Sciences Award, Jerome Geckle, there soon may be many more successes.

"Management is reasserting its control over the dp function. As a result, dp and information systems managers are being forced to become businessmen first and technicians second.

"The alternative," says Geckle, president of the PHH Group, Baltimore, "is obsolescence."

The need to bridge the gap between technical staffs and top management is not new, but "merely more acute," says Geckle. "And it's a situation being confronted by the dp manager in a much more dramatic way."

Adds Geckle: "The one thing the dp manager had direct control of—the hardware domain—is now slipping from his grasp. With it goes the absolute control of his own destiny, which he once held without question."

Like many others, Geckle recognizes that management's heightened computer awareness and expectation level is largely due to the emergence of the personal computer. Now, if it takes a dp manager months to respond to a request for report updates, management wants to know why.

"They have sensed that the personal computer will offer them a way to manage all aspects of the business again—including dp—and cut through the mystique of the high-technology generation that they've become dependent on," Geckle explains.

But this is by no means a reality yet. A dp manager who requested anonymity said that exactly the opposite situation exists at his site. "The technocrats are in control, and they have management so mystified that they don't know what to do. Fur-

thermore, the technicians are split into specialist camps with different languages and specialties, and they can't even talk to each other.

"When a dp manager in this situation tries to cross the bridge into management, he gets his head chewed off because he's the only target at which they can aim their frustration. He's a nowhere man in the middle."

At the opposite extreme there are cases of end users armed with hundreds of personal computers who are laying siege to the central dp site with impossible demands.

Neither of these extremes is acceptable to Bill Synott, vice president of dp services at First National Bank, Boston. "The only way to have effective bridging—and thus control—is to integrate the business and systems planning functions."

Synott is one of a growing number of dp managers who have created personal computer centers that act as both computer stores and advisory services. "End users only buy through us and only the machines we approve."

Synott said this was the only way to keep absolute control, "which is essential for planning, security, and the creation of the kind of database we want."

Again this points to the need for dp managers to become effective translators between end-user and technical camps. "But you can't put limits on the kind of personal computer technology that end users/managers want to use," Geckle warns. "Their free interaction with these devices is part of business evolution."

Clearly there is an important role for any dp manager who can keep an effective open channel between end users and the dp center. "But there has been such a polarization between the two camps that they seem incapable of talking the same language," says Pete Van Ogle, capacity planning manager for the San Francisco Bay Area Fireman's Fund. He claims that a personal/home computer generation is developing that expects response time "no longer than it takes for their fingers to leave a keyboard. This is a far cry from the reality that the dp staffs have come to know."

All this adds to the uncertainties that the dp manager is experiencing and helps create what Ed Pritchard calls the "identity crisis."

Pritchard, a former Oregon country dp manager and currently vp of corporate planning at Servio Logic Corp., Portland, said that this present anxiety is rooted in the late 1960s, when IBM's Integrated Management System (IMS) began offloading the trickle of on-line data that today constitutes a torrent of end-user demand.

"The dp manager's instinct is to try to control this flow of change, get it to make sense as things did in the 1960s," Pritchard explained. "He's looking for an automa-

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tion solution in keeping with his background as a technician. So he looks for capacity planning models and other predictive techniques. These fulfill a psychological need, but they only put off that dreaded day when he must learn to manage the unpredictable—namely, people.”

“The dp manager must turn himself into an improviser who can play variations on management themes at a moment’s notice,” Pritchard claimed. “For until he can do this he’s going to run the gauntlet between bits and bytes and end-user demands.”

Adds Geckle: “He must also dispel the myth that you can ever automate management.”

—Ralph Emmett

STRATEGIES

GI GOES HI TECH SHOPPING

General Instrument has set out to gain lost technology ground through a unique approach to venture investing.

Like a dark horse at the back of the pack, General Instrument Corp. in 1974 was a stodgy company, dangerously in debt and heavily dependent on a lackluster business. At that time, 46% of its revenues and 48% of profit came from the components business, primarily the selling of electromechanical components to the tv and radio industry.

Today, the company is financially healthy, reporting about \$1 billion in revenues and \$90 million in net income for fiscal 1982. It's also cash rich and nosing into some of the hottest technologies in the emerging telecomputing industry. GI's methods for building up its on-tap supply of leading edge technology are, by some standards . . . well, let's just say “unique.” But more about that later.

One of the first fruits of the revitalized GI will be MetroNet, a two-way, interactive, intracity cable network. It is a joint development project between GI's cable group, the Jerrold Division, and Sytek Inc., Sunnyvale, Calif. Basically, MetroNet will be an enhanced version of Sytek's LocalNet, a broadband, CSMA/CD local area network (LAN). In addition to supporting the same protocols, bridges, and network services as are supported on LocalNet, SNA should also be on the list of supported protocols by 1984, the year MetroNet installations should begin, said Ken Biba, vice president of engineering at Sytek.

GI intends to sell MetroNet and a special graphics terminal called Communicom to its current list of customers, which includes such cable operators as Cable Vision, Boston, and Tele-Communications Inc., Denver, for two-way home communications services such as bank-at-home and buy-at-home. For the commercial market, MetroNet will offer an alternative to Bell's costly private leased lines for intracity communications.

GI came out of the 1970s with very shallow R&D resources, a situation that had its origins in the '60s, when GI's top management went on a spending spree. Harry Rosenthal, senior analyst, telecommunications and electronics for Bear, Stearns & Co., New York, politely refers to that decade as one of “haphazard entrepreneurial investing.” In the '70s, “the haphazard ways of the '60s came home to roost,” said Rosenthal. “GI didn't have any money to invest in R&D and fell behind.”

After selling off several poorly performing businesses and getting its debt under control, GI again had some money to spend by late 1970. In order to shore up its lagging technology position, GI has sunk about \$18 million over the past two years into a string of high-technology companies, a move that grabbed the attention of Wall Street. The companies GI invested in include Sytek, the local area network maker; Symoblics Inc., the leading builder of LISP machines; IXO Inc., a maker of portable computer terminals; SED Systems Inc. of Canada and United Satellite Television Corp., two companies involved in direct broadcast satellite technology; and Centigram Corp., a small company with expertise in voice synthesis as well as voice recognition. Most of GI's investments represent only a 5% to 13% interest in any particular company. Sytek is the glaring exception; GI holds 49% of the LAN maker, with an option to go to 51%.

More recently GI set out on yet another investing spree. This time around, the company went technology shopping with several unwavering rules in mind, said chief investment scout Lewis Solomon, senior vice president and executive assistant to the chairman. “One is that we only do investments where the deal makes sense with our strategy. The other major rule is that we invest in companies that we think we can work with. Every deal we do has a quid pro quo,” said Solomon. The idea, he added, is that both companies get something out of the deal.

The young companies get immediate access to GI money, GI's field service people, GI management talent (about which Wall Street has been singing praises of late), GI's custom chip facility, and the company's manufacturing capabilities. “IXO, for instance, is such a small company,” pointed out Solomon, “who would do custom VLSI work for them? We did, but

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ALEXANDER	\$92,546	\$55,483	2,937	5.29
ADAMS	\$53,837	\$56,357	2,520	4.47
McNEIL	\$95,760	\$96,929	1,169	1.21
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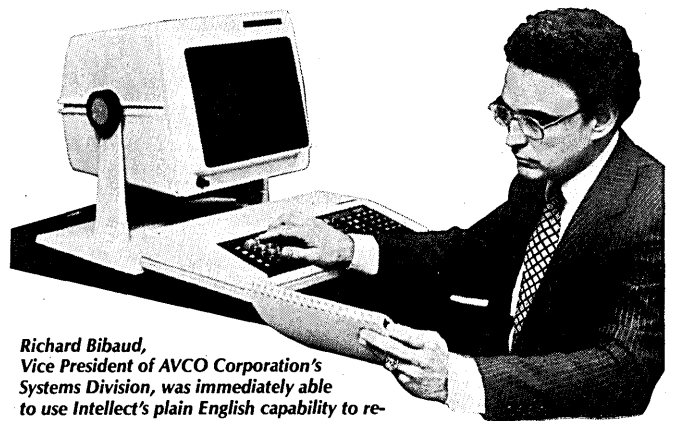
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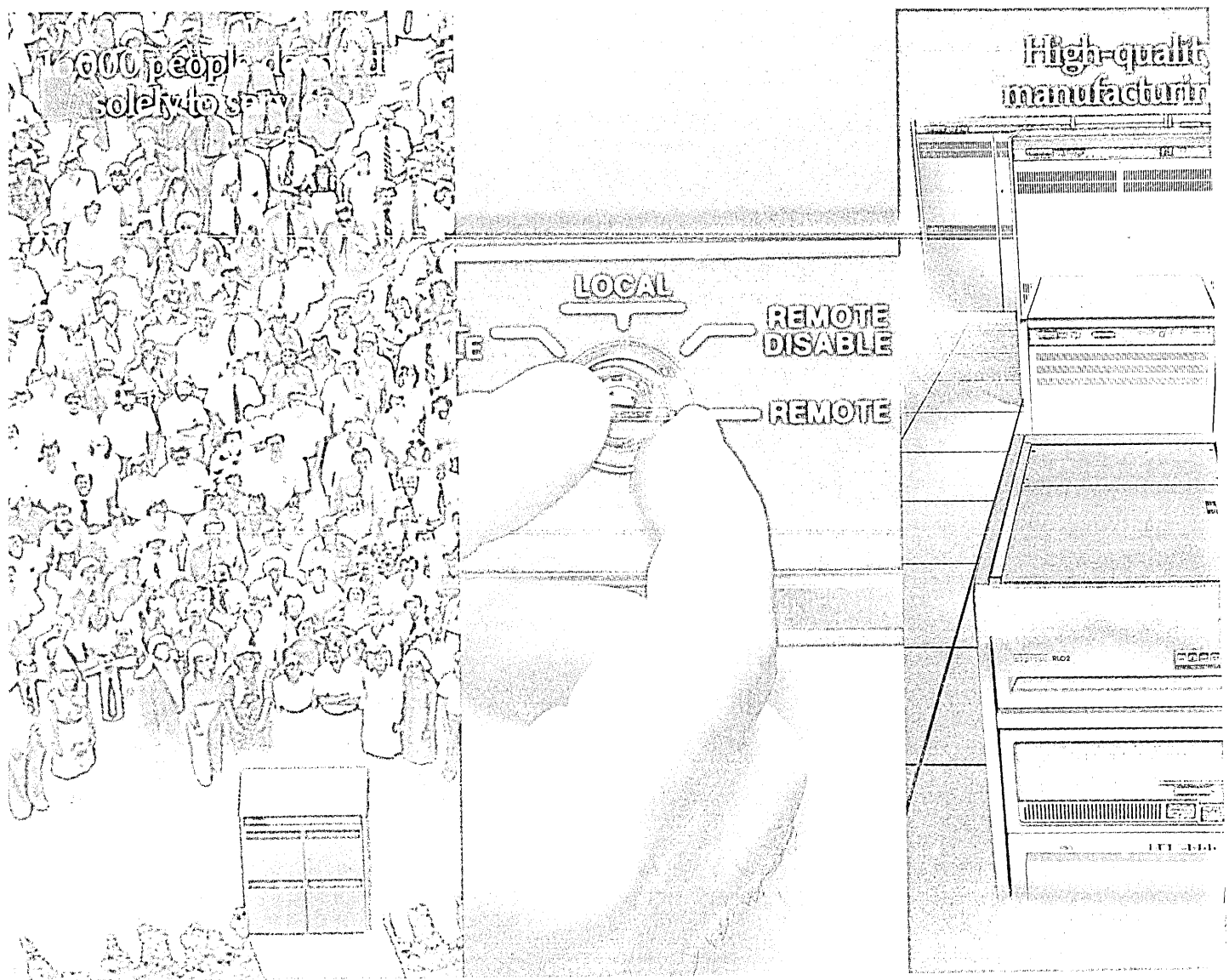


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we also got something back for it."

What GI takes is technology. "What's important to us is not when the company goes public or how much money they make, but whether there is a technology transfer. I don't care if IXO is ever successful from the standpoint of going public. All that I really care about is whether we learn what those entrepreneurs and technology guys started the company from. Did we learn that technology? In the case of IXO, we did a single chip modem for them. We can sell that modem, to Grid, or Osborne, or Apple, or use it in applications of our own. Working with IXO we also learned a lot about how one accesses a terminal onto a phone. They had some very simple and very clever user interfaces. It's like having all these customers that tell you their inside secrets."

What Solomon doesn't want to do is kill a company's entrepreneurial spirit. "In every case we try to do nothing that will inhibit the motivation of the entrepreneurs. In Sytek they are allowed to go public," said Solomon. Another tack GI takes with its stable of technology companies is to work with them through contracts. Solomon believes that the contracts are what help keep the relationship in balance. "If they see us making deals with them that are good for them and not dominated by us, then they view us as a very classy customer. But they also look to us for help," he said.

Looking over GI's technology stable, it is not always evident how each of the companies fits into one or more of GI's three target areas: the direct broadcast satellite effort, local area networking, and interactive home cable-tv systems. SED Systems Inc. of Canada and United Satellite Television are obvious choices for their contribution to GI's direct broadcast efforts.

How Sytek figures into GI's cable efforts is equally clear. Said Solomon, "There must be at least seven contracts between us and Sytek. Our engineers and their engineers are always running back and forth, Sytek doing the network and modem design, with us doing field maintenance and VLSI for them."

As for GI's involvement with IXO, "that one began because we knew the founders," said Solomon. "GI had worked with Jeff Rochlis, now president of IXO, while he was building up Mattel's Intellivision." (GI supplies a number of chips to several video game vendors including Mattel and Atari. Most recently GI began making the circuits for Mattel's Intellivoice speech cartridge.) When Rochlis left Mattel to start IXO and build a small, portable communications terminal, Solomon knew about it and was immediately interested. "We are a terminal manufacturer," he explained, "so anything that leads us to better software or hardware approaches for ease of use is very important to us. Often we are dealing with consumer-related businesses."

GI's Data Systems group makes electronic parimutuel wagering systems both for on-track and off-track betting and for handling lotteries. Solomon estimates that GI's AmTote systems handled about \$14 billion and 4 billion transactions during fiscal 1982. The Data Systems group also makes remittance processing systems and point-of-sale systems that it targets to the top 100 retail organizations.

Another area that GI is forging ahead in is voice synthesis and voice recognition. "Our speech chips come from our own development effort. We ship more speech chips than TI [Texas Instruments]," commented Solomon. "We just make more money, but we're not as famous," he quipped. It's not surprising then that GI took a "small" interest in Centigram, a company with speech synthesis/speech recognition talent. The company is physically located below Sytek's second-story office.

GI's interest in speech-on-a-chip does not stop with its semiconductor group, the group that works most closely with the video game companies. It overflows into almost every other business area within GI, but particularly in the retail and betting systems and the home cable efforts. The same is true of GI's interest in Symbolics and its work on the LISP machines. At present, GI is doing custom VLSI chips for Symbolics.

Symbolics builds LISP computer hardware and operating systems; it does not do expert system program development. It leaves that up to its customers. It's estimated that the company has a backlog of about 100 orders for its new systems, and has shipped about 55 of its first model.

"The reason we made an investment in Symbolics is again because of terminals," began Solomon. "Our terminals have to be friendly and have to be expert. What you want, eventually, is to be able to reduce the labor content behind a wagering or point-of-sale terminal. We could apply AI [artificial intelligence] technology to our software and make the terminals expert in the sense that they don't need a person there to operate them. Think about it. In retail, you know what kind of turnover there is; clerks leave the department all the time. You want to make that POS terminal as smart as you can. We have a shot at using AI for what some people say is a simplistic application. Other people are trying to make expert geologist systems, I want to make an expert wagering terminal. For us, AI is not going to take 10 years or more."

GI appears to have come out of the gate and into the '80s well aware of its strengths and weaknesses. The company holds a leadership position in transaction terminals for wagering operations and large retail chains and in both CATV distribution electronics and subscriber terminals. The company is closing its technology gap at a racing pace. From dark horse to strong contender, GI appears ready to hold its own

with the best in the emerging wired world of two-way communications in businesses and homes.

—Jan Johnson

NO UNIVAC HERE

Sperry chooses Epcot Center dedication day to announce it is dropping the Univac name.

Epcot Computer Central, the electronic heart of Walt Disney Productions' new Epcot Center near Orlando, Fla., (April, p. 98) was dedicated with typical Disney showmanship in mid-October, but not to the glory of the name Univac.

In fact, Sperry, as the company that makes the computers for Epcot wants to be known henceforth, took the occasion of a press conference following the dedication to say it was dropping the Univac name. It will be official April 1, 1983 (no fooling), but the company wants to ease it out before that time.

So, if viewers of the Epcot Computer Central's "Astuter Computer Review" are affected the way both Disney and Sperry hope, they'll take away an image of friendly, helpful Sperry computers.

There were some who questioned the educational value of the 16-minute presentation featuring an English "Pearly," played by Ken Jennings. Some wondered why, when many people in the computer industry are trying to refute the notion that computers and flashing lights are one and the same, the show was so full of flashing lights. To such notions, Jim Fullam, vice president of communications at Sperry, said: "There's a thin line between entertainment and education. The show is only 16 minutes long now, and we're having to cut that down to 10 because the queues are too long."

Said Marty Sklar, vice president of creative development for WED Enterprises, a Disney subsidiary, "We're trying to create turn-ons for the public, to get them motivated to want to know more."

What they might like to know is that the most critical job of the big computer center is protection of the \$1.5 billion in assets. Or they might like to know that Walt Disney Productions, according to vice president of finance Michael L. Bagnall, is anxious to evaluate Sperry's new office automation offering called Sperrylink.

Then again, they might be interested in the fact that within six months Epcot Center is expected to have a total fiber optic network. Or maybe they'll just like watching a two-foot-high Pearly dance around a computer room on Sperry computers.

—Edith Myers

NEWS IN PERSPECTIVE

BENCHMARKS

ENTRANCE: Sperry Computer Systems has entered the much-contested office systems arena with Sperrylink, an integrated machine combining word processing, electronic mail, and personal computing in a desktop workstation. Aimed to sell at first to the firm's large base of 1100 Series mainframe users, the system will eventually be marketed to users of IBM and other mainframes as well, according to Sperry. A typical 30-station system carries a purchase price tag of \$277,000, with first customer shipments scheduled for March 1983. As part of the Sperrylink introduction, the firm said it has signed a nonexclusive agreement to make its new system compatible with Northern Telecom's digital PABXS. Through such a switch, or through a Sperry processor, the desk stations can tie into the Western Union electronic mail network and other such public networks carrying database and other services. H. Glen Haney, vice president of strategic planning and development, said the company expects that by 1990 it will be doing more business in office systems than in its traditional business of mainframe computers.

LOOKING NORTH: The Soviet Union and India have signed an agreement for cooperation in computer technology and electronics, according to the Associated Press. The signing of the agreement came after five days of talks in mid-October between the Soviet Union's Deputy Radio Industry Minister, N.V. Gorshkov, and India's Deputy Electronics Minister, M.S. Sanjeevi Rao. No details were available on the agreement, but it marks a turn by the Indian government to the U.S.S.R. for help in boosting an indigenous computer industry. India kicked IBM out of the country some four years ago after the U.S. company refused to share ownership of its Indian subsidiary with the Indian government. The country's computer industry is fledgling, observers say, but is the focus of increasing interest by government. India is known to be encouraging foreigners to take advantage of its great number of college graduates who can deliver programming services and is understood to be eager to develop manufacturing capabilities.

BELIEVE IT OR NOT: "I expect that this will be looked back upon in 25 or 30 years as the most significant move in the 20th century as far as higher education is concerned. The system will have an unbelievable impact on the amount of communication and interaction that will take place between and among faculty and students." The hopeful speaker is Dr. Richard M. Cyert, president of Carnegie-Mellon University. The system he envisions is a network of some 7,500 high-performance personal computers that IBM Corp. and the

Pittsburgh school recently announced they would develop jointly. The initial implementation of the system calls for about a hundred 68000-based IBM Instruments, Inc. computers to be installed by next fall. CMU plans to put a Unix-based operating system with the FORTRAN, Pascal, and C languages on the \$10,000-and-up IBM machine, which was introduced as a lab workstation last May. Meanwhile, the two organizations will jointly develop future workstations, with the bulk of the nearly \$20 million in funding coming from IBM, according to CMU officials.

FLATTENING: Storage Technology Corp. told the financial community in late October that 1982 earnings won't match those of last year and that a layoff of 400 persons would be made from their U.S. work force of about 13,400. STC has been beset by heavy product development costs as it readies its plug-compatible answer to IBM's 3380 disk drive, which is now shipping in volume, and prepares to enter the cpu market in a year or so. Earnings for 1982 were projected by the company to be in the \$72 million to \$75 million range, down from last year's earnings of \$82.4 million. Revenues for the current year, however, are expected to be up to about \$1.1 billion, compared to last year's sales of \$922 million. Chairman Jesse Aweida attributed the U.S. layoff to a slowing of business due to the "depressed worldwide economy," and said overseas cutbacks may be made as well. For the future, however, the chief executive said he expects 1983 earnings and revenues to be up 10% to 15%, and he anticipates even stronger growth in 1984 and 1985. The firm's project to build and market the STC 8380, a 3380 look-alike, is on schedule, with initial deliveries slated for the first quarter of 1983 and volume shipments to begin in the third quarter of the year.

GROWTH: Asia represents the fastest growing market for telecommunications equipment, according to studies by Arthur D. Little, Inc., the Cambridge, Mass., consultancy. The Asian market is projected to grow over the next five years at about 10% compounded annually, followed by an 8% growth each for Latin America, Africa, and North America; Europe and Oceania will grow an estimated 7%. The figures, along with analysis and product market projections, were presented to the public at a recent Telecommunications Forum in Boston. In projected 1987 market shares, North America will represent 42% of the market, followed by Asia with 28%, Europe with 25%, Latin America with 3%, and Africa with 1%. The North American telecommunications market in 1982 will be \$20 billion, growing to \$29 billion in 1987. The key trend in the world communications market, the company said, is a changing

competitive situation, reflected most dramatically in the U.S. market, where AT&T's deregulation is having tremendous effect. Among the Asian countries spending the most on telecommunications in the next five years will be Japan, India, Thailand, and Malaysia, the latter expected to spend some \$4.5 billion during that period. Despite the advance in technology seen in the U.S., however, telephone equipment will remain the bread-and-butter telecom business for most of the world throughout this decade.

VIDEOTELEX: AT&T and CBS have begun a joint experiment in delivering information to homes through a videotex system in Ridgewood, N.J. One hundred homes in that affluent town will get to test the service free of charge, receiving news, weather, and sports information; advertising from about 80 vendors; home shopping and banking services; and an "electronic notepad" for keeping personal information. The two sponsors hope to evaluate the users' responses and gauge potential sources of revenue such as subscription fees, advertising, and transaction fees. AT&T is the supplier of the home and central office equipment, while CBS is responsible for the content of the services. A second set of 100 homes will test the system starting early next year.

TOPPING OFF: Honeywell Information Systems extended its DPS line of mainframes upwards with a pair of systems incorporating a semiconductor technology it originally unveiled in 1977 with the ill-fated model 66/85. That machine was withdrawn from the market in early 1978 after it became apparent that it would not be marketable at competitive prices. Now the firm has the DPS 88, which is claimed to offer up to eight times the processing power of the previous high-end machine, the DPS 8/70. Single-processor (88/81) and dual-processor (88/82) versions of the machine were introduced, and they run a new version of the GCOS 8 operating system, according to Honeywell. Multics support is to follow. They are said to match the performance of IBM's 3083J and 3081K models, respectively. The basic uniprocessor system with 16 megabytes of memory is priced for purchase at \$2.85 million, while the dual-processor version is \$4.05 million. The primary market for the machines is Honeywell's base of some 3,000 mainframes at 1,800 user sites, although some sales will be sought outside that base, the firm said. Mixed shops appear to be likely targets, but the firm doesn't expect to replace any IBM or other mainframe systems. The system was developed in Phoenix under the code name Orion. Other features include an instruction cache memory, a pipelined architecture, and remote diagnostics capabilities. *

WHICH TWIN HAS THE TANDBERG?

The ergonomic terminal with simplified local editing and software controlled operating features.

If your operators need a stack of manuals and a degree in Computer Science to operate your terminals then, chances are, you haven't yet heard of the new Tandberg Data conversational terminal. The Tandberg terminal's efficient, "friendly" operating features increase productivity and ease the operator's workload while they enhance your distributed data processing capability.

As a full ANSI standard editing terminal, the Tandberg TDV 2220 allows virtually all functions to be performed locally as well as from the host. For maximum flexibility all functional characteristics are prompted from easily understood "English" menus and may be stored in non-volatile memory.

The TDV 2220 will operate in character, line or block mode. Up to eight pages of local memory can be recalled and

amended by page or "window." Sixteen editing functions allow insertions, deletions and erasure of characters, fields, areas, lines or pages while protected and unprotected fields may be defined in ten variations for local checking. Navigation keys permit quick and easy set-up of even the most complex tabular forms and PUSH-keys implement data strings at the touch of one button.

Not only is the Tandberg the easiest terminal to use, it's also the only terminal in the world that meets the stringent 1985 German ergonomic standard—with tilt, swivel and height adjustments, an ultra-low profile, detachable keyboard, all non-reflective surfaces, an anti-reflex tube, et al. Your operators will cheer.

In addition to the advanced performance Model TDV 2220 terminal, the Tandberg TDV 2200 family includes models which emulate the DEC VT 100/VT 52, Datapoint 3600 and 8200, Data General 6053 and D 200, IBM 3101 and others. Firmware development tools and hardware building blocks are also available to the OEM who wants to develop a terminal with its own personality.

So why put up with a terminal headache? The "face" of your computer system that the user sees could be a Tandberg terminal. Call or write today for our new brochure.

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CIRCLE 69 ON READER CARD

Hewlett-Packard on Office Systems

You don't have to buy separate system processing. With the right solution, you

When you stop to think about it, all you really need from any business computer system is words, data, and graphics. And a way to make them available wherever they're needed. That's all there is to it.

At Hewlett-Packard, we think it's counterproductive to use completely separate systems just to get these simple, basic results.

That's why we've developed a solution that puts the power of your data processing computer behind your office equipment. That makes every user's workstation a lot more versa-

tile. And makes our data processing computer the driving force of a network that distributes on-line, interactive information all through your company.

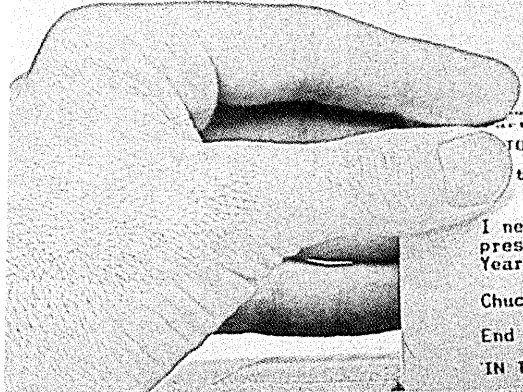
We call this solution The Interactive Office. And we think this is the way office computing will be headed in the future. But you don't have to wait. Because it's available from us right now.

More power at every workstation. More versatility for every user.

Instead of designing The Interactive Office around a computer, we built it around the needs of the user. And

organized it into four functional areas, each centered on the different jobs that come up in everyday business activity.

First, there's Document Management. For creating, revising, printing, and filing text. There's Organizational Communication, which lets you distribute information—including reports, memos, charts and graphs—the instant they're created. There's Decision Support, which makes it easy to get what you need to analyze, interpret, and present information in a clear-cut way. Finally, there's Personal Support, which helps you design a personalized approach to business computing.



Part 1.
TO: Lynn JEFFERSON / HDQTR/05
Part 2.

I need our current production cost analysis for my 2 o'clock presentation. Plus fixed overhead cost projections for Fiscal Year '82. How about a chart?

Chuck

End of Item 1.

IN TRAY >

Subject: Cost Analysis
Sender: Charles TAYLOR / HDQTR/01
Part 1.
TO: Lynn JEFFERSON / HDQTR/05
Part 2.

I need our current production cost analysis for my 2 o'clock presentation. Plus fixed overhead cost projections for Fiscal Year '82. How about a chart?

Chuck

End of item 1.

IN TRAY >

for office automation and data an do it all.

So it doesn't matter if you use the computer for word processing, electronic mail, to generate management reports, or to create charts and graphs. Or to do any combination of those things. In The Interactive Office, you can sit down at one workstation and do it all.

Just to give you one example, a secretary's main responsibility might be word processing. But your secretary can use the same word processing workstation to generate a management report for you, complete with charts and graphs, and then distribute your report electronically to branch offices all over the world.

And that's just the beginning. Because every one of our workstations can share the same valuable network resources: graphics plotters, high-speed laser printers, data bases, communications links, and more.

More flexibility from your computer.

Our largest HP 3000 is powerful enough to process a large transaction like the company payroll, and support up to 100 Interactive Office users at the same time. But to give you even more flexibility, the first HP 3000 we ever built is software-compatible with our newer, faster models. Which makes it possible to upgrade to a bigger, more powerful model. Or com-

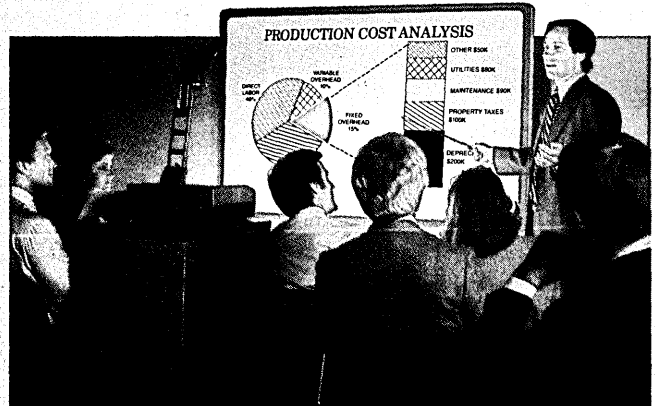
bine several different models into a multinode network. Without changing one line of software.

And besides our powerful office automation functions, we have a full range of software tools for your EDP department. Starting with our IMAGE database, which has won worldwide recognition for its versatility and ease of use. Then, there's our set of tools for programmer productivity, which help make them more efficient at designing, implementing, and maintaining new applications. To reduce the EDP backlog even more, we also have a range of off-the-shelf software solutions for manufacturing, distribution, and accounting.

Even the service and support are totally integrated.

Another good reason to do business with HP is our integrated service which is available from more than 180 facilities all over the world. We'll assign a support team to help you plan your interactive office. They'll get to know your people—and your applications. And, of course, they'll make regularly scheduled preventive maintenance checks.

All of this helps explain why we've maintained a leading position



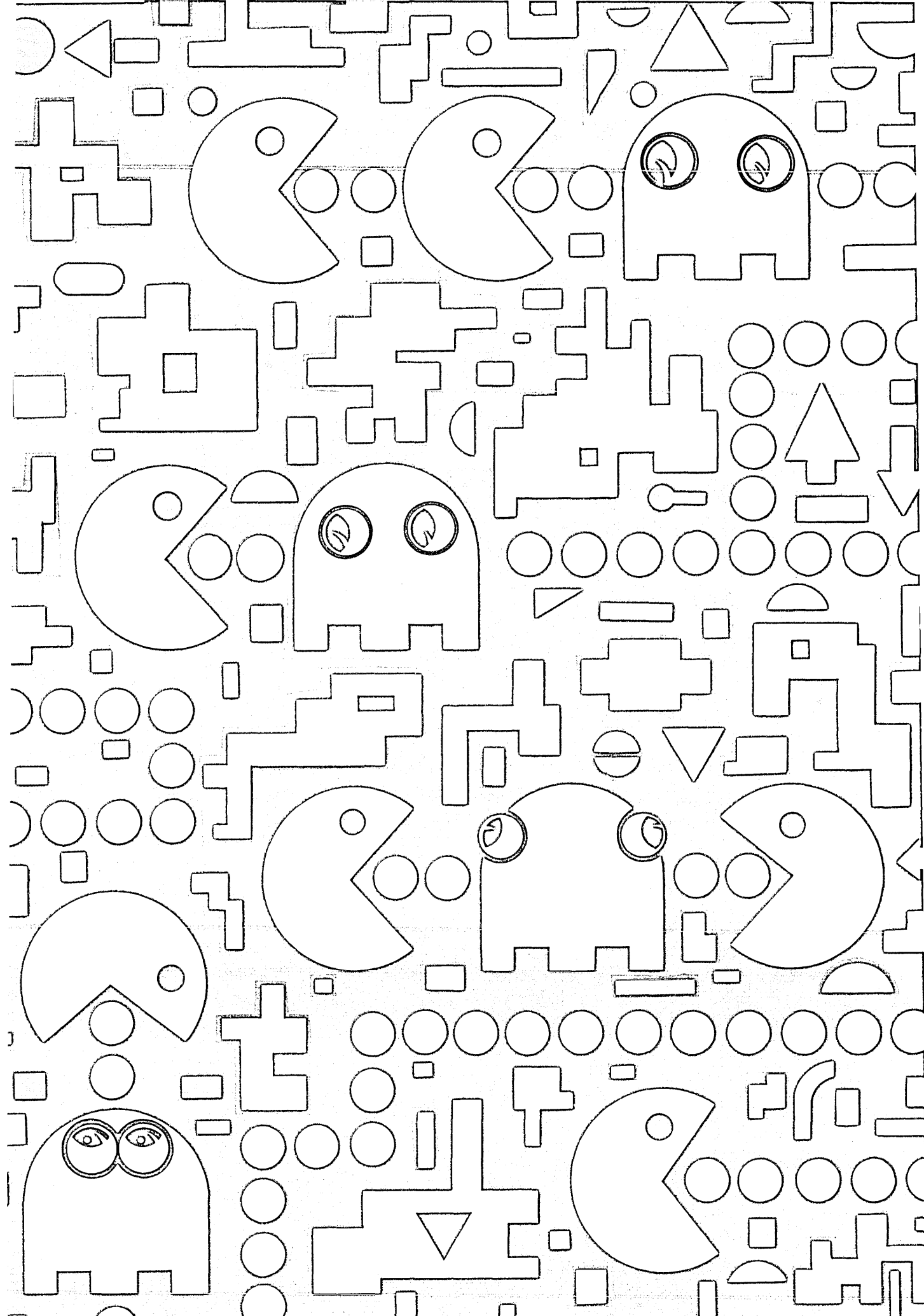
in customer service two years in a row, according to the 1981 and 1982 Datapro surveys, which involved thousands of computer users. And on the subject of reliability, we'll be glad to offer you our Guaranteed Uptime Service, which states that if your HP 3000 is up less than 99% of the time in any three-month period, your next month's service contract on all items covered is absolutely free.

So. If you're looking at a lot of different computer systems for your office, we think you'd do well to see how your company could work if you tied it all together with one efficient, integrated solution.

To find out more, stop by your local HP sales office. Or send for our brochure: The Interactive Office. Just write John Celii, Hewlett-Packard, Dept. 04142, 19447 Pruneridge Avenue, Cupertino, CA 95014.



**HEWLETT
PACKARD**



What are the games-maker's plans for the cash it's currently raking in? More and better games, certainly, but the company is also bent on being a force in the computer business.

ATARI: PLAYING WITH HOUSE MONEY

by Laton McCartney

Participants at a conference put together by microcomputer maven Ben Rosen last summer were asked to rank the companies they believed would dominate the personal computer market by 1985. Most of the people attending had ties to the major manufacturers and their consensus reflected mainstream thinking. IBM came out in first place, followed by Apple, Tandy, and Commodore. Atari was hardly a factor, finishing way down in the seventh slot.

Several of the younger participants, mavericks who came out of the entertainment and video game fields rather than the comput-

er industry, makes an analogy to the photocopier industry. For years the copying business had been dominated by American Photo and the technology employed by that company. Then, along came an upstart concern called Xerox that espoused a radical new approach to copying. Almost overnight, one generation of technology was displaced by another. "The present computer generation may find itself in the same position and wake up to discover those little machines made by Atari have taken over," says Isgur.

Of course, in some quarters this kind of thinking is undoubtedly viewed as thoroughly off-the-wall, the product, no doubt, of too many hours in front of the video screen

DEC's Ken Norris barhopping with a soccer player or cutting a multimillion-dollar deal with a hotshot Hollywood director.

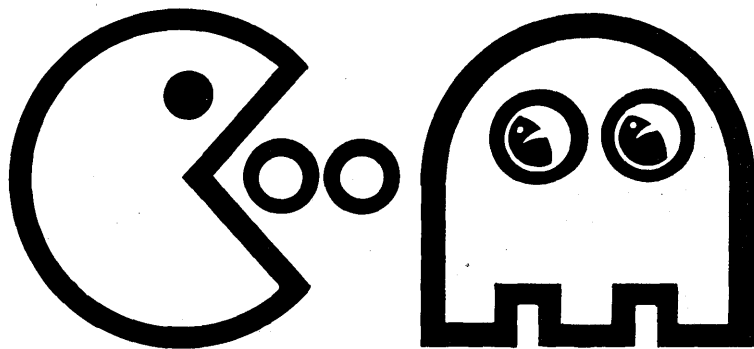
The two executives who really run Atari and are responsible for much of its incredible success, Emanuel "Manny" Gerard, Warner's cochief operating officer, and Raymond Kassar, Atari's chairman and ceo, come from outside the computer field as well. Gerard was a topflight entertainment industry analyst on Wall Street before joining Atari; Kassar a high-level executive with Burlington Industries. Even the newly appointed head of Atari's computer group, John C. Cavalier, has a non-dp background, having served as a paper products marketing executive with American Can Co.

But make no mistake. Atari has set its sights on far more than video games and is mounting what may prove to be a substantial threat to more established computer companies like IBM and Texas Instruments as the battle for the home and educational markets heats up. "With a significant software library based on Atari games and an increasing public awareness of the home computer, Atari has been positioning itself as a home computer company," notes Robert L. Renck Jr., an analyst with Oppenheimer & Co., Inc.

"A lot of people in this business don't know what they're doing," adds Ted Nelson, the author of *Computer Lib/Dream Machines*, who is presently designing interactive systems for Datapoint Corp. in San Antonio. "Atari does. They're going to be very formidable."

The numbers bear this out. Even by the standards of the computer industry, which is accustomed to phenomenal success stories, Atari's growth has been mind-boggling. The company has expanded so rapidly it now occupies between 60 and 70 buildings in Silicon Valley. "It's a wild West show," says one Atari executive, noting that Atari has grown by a factor of 22 in the last four years and is currently doubling in size every eight months.

Acquired only six years ago for \$28



er industry, smiled knowingly at each other after the vote had been tallied. Atari had ranked high up on their lists, and in their eyes the vote had followed a predictable pattern by vastly underestimating the Sunnyvale, Calif.-based manufacturer. Atari is not only capable of competing with the big boys like IBM in the home and personal markets, they believe, but is pioneering technical innovations that may make conventional approaches to computing obsolete. "If you visit Atari's R&D facilities and talk to people like Alan Kay [Atari's chief scientist], you realize something revolutionary is going on," one of the mavericks commented.

Lee Isgur, an analyst with the brokerage firm Paine, Webber, Mitchell Hutchins,

fighting off space invaders or gobbling up energy dots. Take the manufacturer of the home version of Pac-Man, Defender, and Yar's Revenge seriously as a factor in the dp business? One can almost hear the "harumphs" emanating from the IBM boardroom in Armonk. After all, these people are outsiders. The parent company, Warner Communications Inc., makes movies and records and publishes, among other things, *Mad* magazine and DC Comics. Its ceo, Steven J. Ross, looks like Hollywood's ideal of a high-rolling corporate executive, frequents fashionable Manhattan watering holes like Uzie's, and pals around with Giorgio Chinaglia, star of the New York Cosmos, the soccer team Warner's owns. Picture John Opel of IBM or

million, Atari will generate nearly \$2 billion in 1982, it's estimated. That's nearly half of Warner's projected \$4.2 billion total 1982 revenues. Moreover, Atari's computer group, which really is just getting off the ground, will produce between \$300 million and \$350 million in 1982 revenues, putting Atari up there among the top 40 companies in the U.S. According to market estimates, the company already accounts for 10% of all desktop computer sales and as much as 40% of the home computer market. Additionally, Atari has more than 5 million video games in households around the country. "That's a tremendous base to sell into," notes Rob Hunter, a vice president with CBS's video games. "If I were Apple or one of Atari's other competitors in the home computer field, I'd be concerned."

With the deep pockets that accompany this kind of success, Atari can afford to spend big to improve its competitive position. And that's exactly what the company is doing. One high-spending priority is marketing. "Atari understood consumer merchandising from the start," says Hunter, an MIT grad with a marketing background, "whereas its early competitors in the video games business—RCA, Fairchild, and Magnavox—were dismal when it came to marketing and distribution." As a result, Magnavox, which developed the first video game, *Odyssey*, in 1972, lost out to Atari after insisting for years that only Magnavox dealers could distribute the product. It never realized its early potential in the video games market, and RCA and Fairchild dropped out altogether.

Today, with the home computer market opening up significantly, Atari is counting on its marketing and distribution capabilities to provide it with the same kind of competitive edge. It has the largest distribution network of any home computer manufacturer except Radio Shack and spends enormous sums on advertising. *Advertising Age*, the trade magazine of the advertising industry, estimates, in fact, that Warner's is now the 37th largest advertiser in the country, having spent \$159 million last year, a major share of which went toward promoting Atari video games and home computers. By contrast, IBM ranked 98th in the U.S. with an ad budget of \$40 million.

For a machine to succeed in the home computer market, says Renck of Oppenheimer, "the product must have brand identity and be presold by advertising to a relatively unsophisticated consumer without the need for significant selling demonstration. Atari clearly meets these qualifications."

At the same time, Atari is moving to deepen its market penetration outside the home. The company has provided the U.S. Army with a modified version of the game *Battlezone* for training gunners for the

THE HOUSE THAT PONG BUILT

The early years of the Atari story make for lively reading and have been chronicled in some detail in the financial press. The company was the brainchild of an engineer named Nolan Bushnell. Bushnell had been fascinated by computer games since he was a student at the University of Utah. (Alan Kay, Atari's chief scientist, happened to be there at the same time, as a graduate student.) In 1971, when Bushnell was in his late 20s and working as a research engineer in Sunnyvale, Calif., he decided to try to parlay that interest into a commercial success.

Borrowing \$500, he and two other engineers started a video games venture. The company was originally called Syzygy, but Bushnell discovered another California company was already using that name and settled on Atari instead. (Atari is the term used in the Japanese strategy game *Go* when one player has the other in the equivalent of the check position in chess.)

Their first product was a game called *Computer Space*, which proved too sophisticated for the market. Bushnell subsequently came up with a game called *Pong*, which had two important things going for it: it was simple enough so that even an adult could learn to play it quickly, and Bushnell had designed it so that it came in a coin-operated version. Video games had been around for a while—since 1962, in fact, when an MIT student created a program for a game called *Spacewar*—but before *Pong*, no one had manufactured coin-operated versions and placed them in the arcades to compete with pinball machines.

Pong was highly successful—so much so that it soon had dozens of clones that were taking the lion's share of the arcade business. But Bushnell was already working on a home version that could hook onto the tv set.

Army's new, heavily armed M-2 personnel transport. Soldiers score points for destroying enemy tanks and aircraft but are penalized—"The 1812 Overture" plays—when they mistakenly hit a friendly war machine.

Atari has loaned computers and video games to medical centers and universities around the country for experimental research projects that involve everything from using video games to improving the attention span and memory of brain-damaged patients to job training for teenagers. The company has also established an educational center in Sunnyvale—the Atari Institute for Educational Action Research—to foster use of personal computers in education; it is sponsoring the tv series *Discover*; and this year it will give away as much as \$1 million to fund projects at the Future Center of the Capital Children's Museum in Washington, D.C., and the Lawrence Hall of Science Computer Education Project at the University of California at Berkeley.

Concurrently, the company is beefing up its technical capabilities, particularly in

Sears Roebuck was so impressed with the home version that it bought out Atari's entire inventory before the machine even came on the market. Even with Sears's help, however, Atari simply didn't have the capital to stay afloat. Reluctantly, Bushnell and his associates put up the company for sale.

A buyer wasn't easy to find. William Paley of CBS looked over the deal but passed, deciding to go into the cable tv business instead. Disney and MCA also turned thumbs down. Emanuel "Manny" Gerard, a former entertainment industry analyst on Wall Street who had joined Warner's senior management, liked what he saw in Atari, however, and convinced Warner's to pick up the company. The price tag: \$28 million, of which a little more than \$15 million in cash and debentures went into Bushnell's pocket.

After the acquisition, Bushnell stayed on as Atari's ceo, but in the view of some of the Warner people—chief among them Gerard—Bushnell was more of an idea man than a manager. Atari, Bushnell's critics contended, had to be run on a thoroughly businesslike basis and Bushnell was not the man for the job.

"Captain Pong," as Bushnell was known, was ultimately forced out, and Warner's replaced him with a heavyweight operations executive, Raymond Kassar, who had been running an \$800-million-a-year business for Burlington Industries. Atari had joined the big leagues.

One footnote to the story of those early years: Bushnell signed a noncompete agreement when Warner's bought out Atari and that agreement is about to expire. Now Bushnell is gearing up to get back into the video games business and take on the company he originally spawned.

—L.M.

the software area. "Atari probably spends more on software than any of the personal computer companies," says Paine, Webber's Isgur. "By the mid-1980s it will be perceived as a software company."

ACQUIRING OUTSIDE SOFTWARE

In addition to developing a great deal of software in-house, Atari is highly aggressive in acquiring outside packages. A whole subindustry has sprung up of companies like Activision that produce Atari-compatible cartridges. Atari has also set up software centers in Cambridge, Mass., and San Jose, Calif., where anyone who can program can come in and try to develop software, obtaining guidance from Atari staff members and making use of Atari equipment and technical manuals at no charge. The idea, of course, is that Atari will get first crack at software designed by some precocious computer whiz.

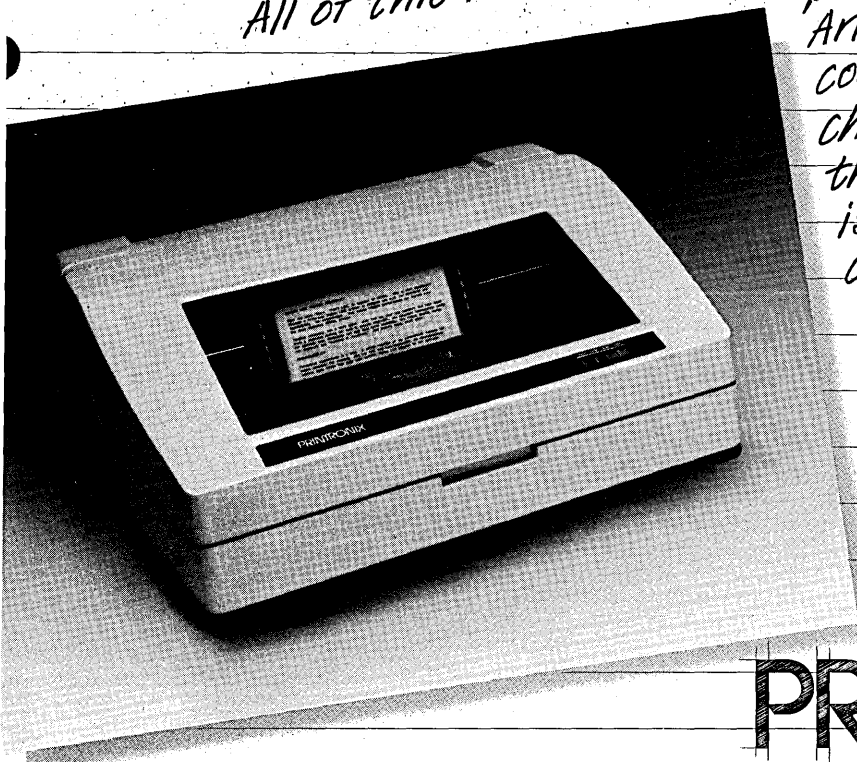
Significantly, too, Atari's sister company, Warner Amex, the interactive cable service Warner's owns jointly with American

*For different needs,
different speeds.*

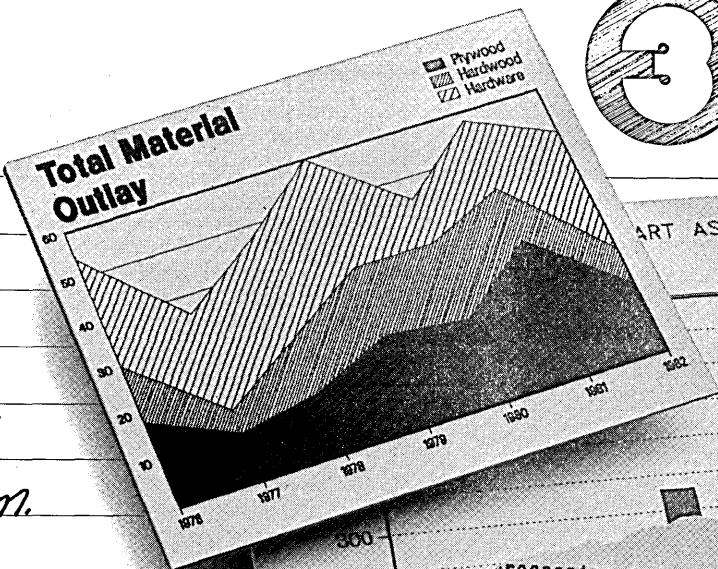
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CIRCLE 71 ON READER CARD

The annual R&D budget has been estimated at between \$60 million and \$100 million.

Express, has been expanding into new areas. "We're concerned with the development of nonentertainment services such as information retrieval, electronic shopping and banking, and private business communications," says Gustave M. Hauser, the company's chairman and ceo.

Warner Amex pioneered two-way cable through its flagship cable system, Qube, and already serves approximately 1 million homes. It is viewed as one of the strongest contenders in the future U.S. videotex market, a fact that has a direct bearing on Atari's long-term viability as a home computer company. "Warner Amex's efforts ensure that when the videotex card is played, Atari will be there," says Clive Smith of the Yankee Group in Cambridge, Mass.

The real key to Atari's future, however, lies in the massive R&D efforts directed by 42-year-old Alan Kay, the company's chief scientist. Hired a year ago from Xerox, where he was a research fellow and one of the founders of the Xerox Palo Alto Research Center (PARC), Kay is a Silicon Valley Renaissance man, a freewheeling, lateral thinker who has done everything from playing jazz guitar professionally to lecturing with the Artificial Intelligence Project at Stanford.

Kay designed some of the first personal computers; was the initial designer of Smalltalk, the programming language; and originated the idea for the Dynabook personal computer. He is a kind of spiritual and intellectual progenitor to people like Apple's co-founders Steven Jobs and Steven Wozniak, with whom he's close friends.

At Xerox Kay had grown disillusioned with what he perceived as an inability to bring products to the marketplace. "Alan's a recognized visionary," a former colleague observes. "When he was at PARC, he was working on all kinds of interesting and innovative products, but he became extremely frustrated at the lack of product implementation he saw there."

Kay had designed a version of Xerox's Star computer as early as 1976. "Star would have been astonishing if it had been introduced then," the colleague asserts. "Now it's simply ho-hum." Kay was also involved in designing a VisiCalc-like simulation kit that predated the introduction of VisiCalc by several years but still hasn't been brought to market. "Xerox was good at funding but lacked the nerve to take any real chances," Kay says now without rancor.

Kay decided to leave Xerox in 1981 and was set to sign on with Hewlett-Packard when he accidentally crossed paths with Gerard and Kassar. At the time, the two Atari executives were looking for a way to extend the company into the future and an individual who would guide the R&D effort needed to get there. Kay had all the necessary credentials

and the chemistry was right. "We hit it off right away," he says. "Gerard and Kassar have no fear. They'll try anything. They're like good gamblers playing with house money. They always act like they're ahead, and they pay incredible amounts of attention to all the things that can go right. It's absolutely the best top management I've ever seen."

AN OPEN R&D BUDGET

Kay signed on and was soon playing with house money too—wads of it. His annual R&D budget has been estimated at between \$60 million and \$100 million. Kay will only say that "within some bounds of reason it's an open budget."

For Kay it seemed an ideal situation, yet even he was initially bothered by the free-form environment at Atari. "For the first few weeks I was put off by the video games mentality here, but then I began to realize there was no reason why all useful things couldn't be fun and games."

Kay's first order of business was to put together the nucleus of a first-rate research group, a process that usually takes as long as five years. "At Atari we're trying to accelerate the process, but you can't hire quickly because there's no real return in taking on people who are simply good," Kay says. "You need people who are great, and, of course, they're very hard to find."

As part of building what Kay describes as the critical mass needed to drive Atari's research effort, the company began strengthening its ties to the academic and scientific sectors. Marvin Minsky, a prominent figure in the artificial intelligence community, was signed on as a consultant. Meanwhile, Atari has established a new lab in Cambridge, Mass., to work with LOGO, the educational software language. It also began funding MIT's Architecture Machine Group, which is carrying on projects in media technology and man/machine interface.

Kay also signed on Tim Galway, the author of *The Inner Game of Tennis*, to work on computer education in Atari's extensive computer camp program. "Tim's extraordinary in working with kids and eliminating the self-doubt and interference that adversely affect the learning process," Kay notes.

Hollywood, too, was drawn into the critical mass when Atari signed a deal with Lucasfilm. For the short term Atari should reap the potential profits of selling cartridges based on such Lucasfilm movies as *Raiders of the Lost Ark* and *Revenge of the Jedi*. More significant over the long term, however, is Atari's plan to incorporate Lucasfilm's highly advanced interactive graphic capabilities into its future line of commercial and entertainment products. Imagine, for example, a VLSI chip that inexpensively implements high-quality, real-time 3-D for new games

and simulation. "This graphic capability should provide Atari with a real edge over its competitors," asserts Clive Smith of the Yankee Group.

To carry out its research and perform prototype software development Atari has purchased half a dozen Symbolics 3600 LISP computers and appears to be working in two principal development areas: information sharing and fantasy. The first involves communications-oriented products designed to facilitate the exchange of information and ideas; the fantasy products are designed to allow the user, Kay says, "to go to simpler, more controllable environments, little microworlds." Like their video cassette predecessors, these microworlds may be games oriented, or they may reflect sports, science, or the theater.

Keys to the success of Atari's future products are what Kay describes as vehicles or metaphorical fantasies. To wit: in Kay's view VisiCalc is a superb vehicle that enables the user to perform electronic spreadsheeting. Xerox's Star computer, in turn, explores the fantasy of an automated desktop. The vehicle or fantasy represents the user-friendly bridge between user and technology.

The technologies that will be incorporated into this next generation of Atari products are likely to include voice synthesis, artificial intelligence (in the form, say, of a natural language interface), interactive graphics, animation, and 3-D. In fact, the key to Kay's fantasy concept may well be dynamic 3-D animation whereby the user or a surrogate figure can participate directly in the environment. Atari has long had an interest in 3-D, having announced (but never introduced) a handheld 3-D game several years ago. It subsequently has acquired most of the consumer-oriented holographic patents in the U.S., and today Kay's group is experimenting with holograms as well as alternate means of incorporating 3-D into future products.

Kay emphasizes that Atari should not be perceived as a manufacturer of home computers or even video games as such, but as a company that deals directly in the user interface business, be that entertainment, electronic publishing, or computer-based education. The distinction is more than a semantic one. It sums up what differentiates Atari from many of the more established computer companies. "The railroads suffered enormously because the railroad people simply couldn't grasp the fact that they were in the transportation business and not the railroad business," Kay says. He and Atari are gambling big that history is about to repeat itself. #

Laton McCartney, a former managing editor of DATAMATION, is currently a free-lance writer in New York and a regular contributor to this magazine.

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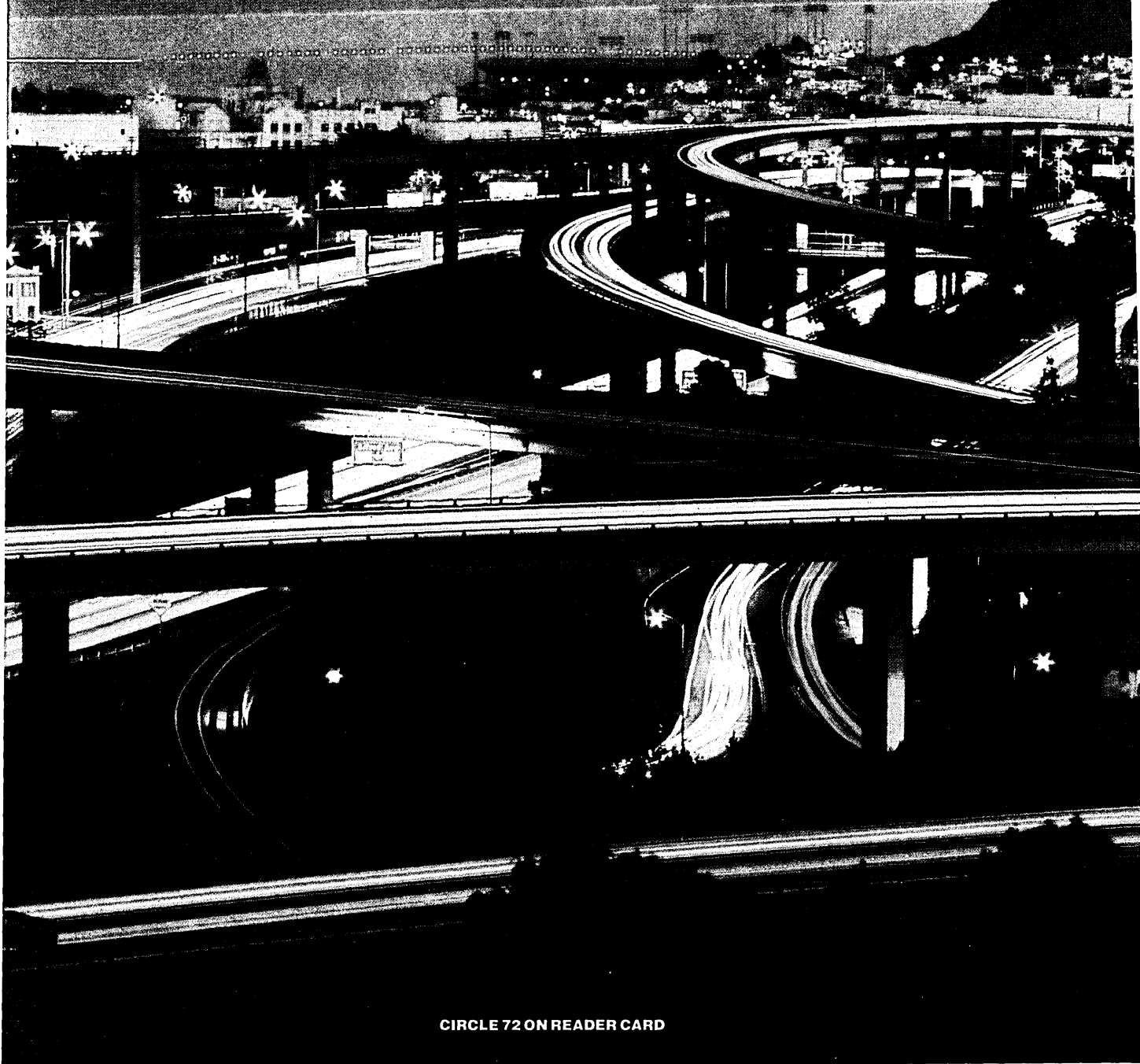
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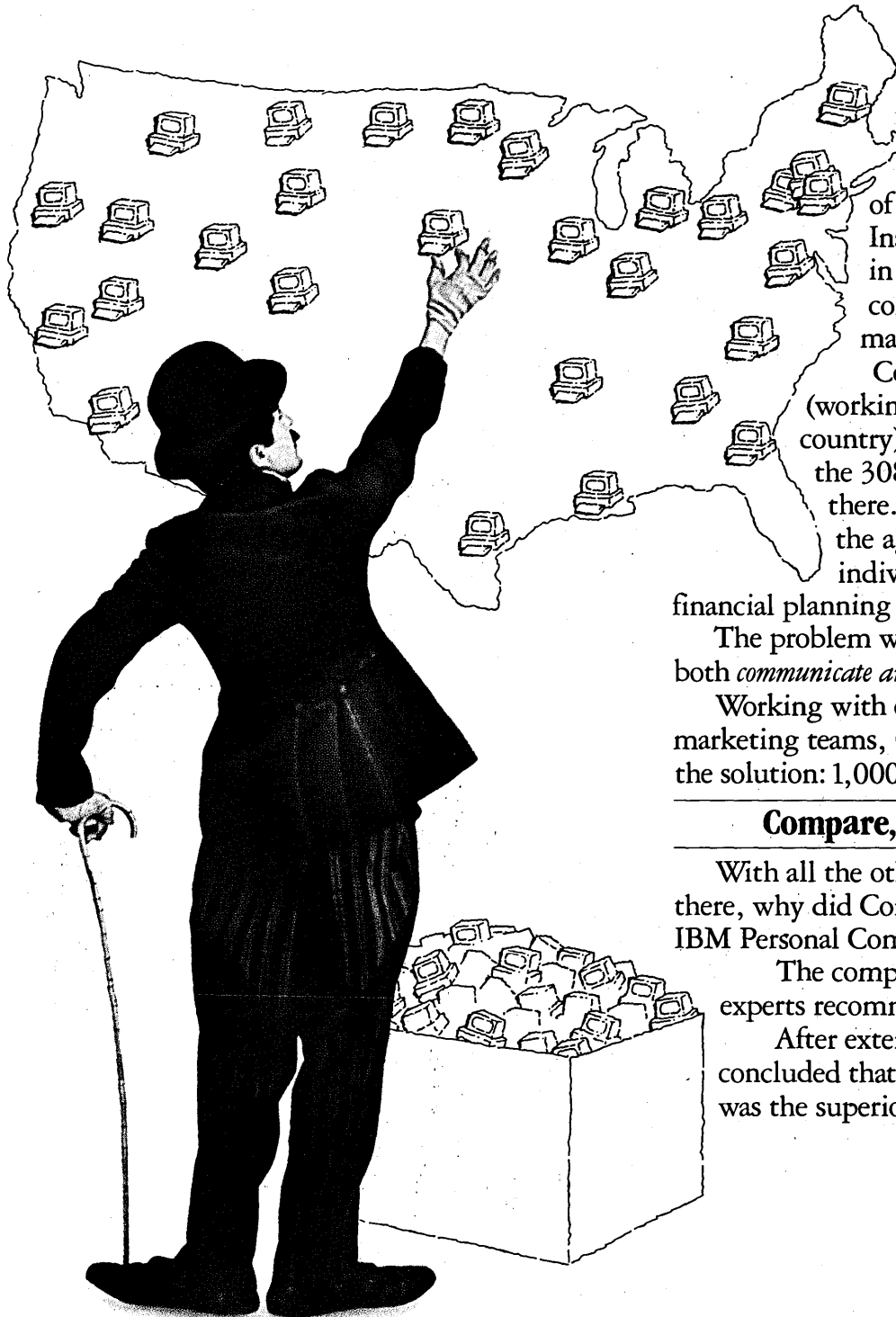
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CIRCLE 72 ON READER CARD

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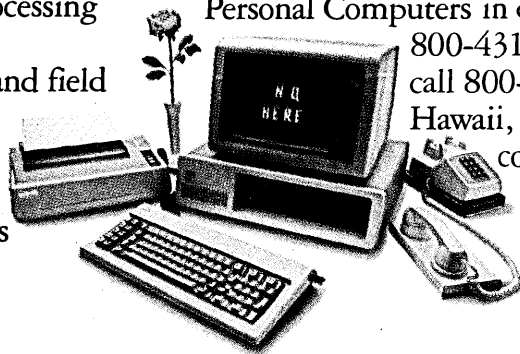
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Auxiliary Memory 2 optional internal diskette drives, 5¼", 160K bytes or 320K bytes per diskette	Languages BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL	<i>Graphics mode:</i> 4-color resolution: 320h x 200v* Black & white resolution: 640h x 200v* Simultaneous graphics & text capability*
Keyboard 83 keys, 6 ft. cord attaches to system unit*	Printer Bidirectional* 80 characters/second 12 character styles, up to 132 characters/line* 9 x 9 character matrix*	Communications RS-232-C interface Asynchronous (start/stop) protocol Up to 9600 bits per second
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About 80% of the users said software features and functions were a major influence in buying packages.

the packages. The value of these experiences and opinions is directly related to the sample size. As long as the quality of the sample items is good and consistent, the validity of any survey's results is strictly a function of the sample size relative to the size of the sample universe.

To meet established standards for statistical validity, Data Decisions set a lower limit of 15 active-user responses. Since a response rate of 40% to 50% was anticipated, this limit initially excluded many packages listed in the CI file with site counts of less than 30, and it later excluded additional packages for which responses totaled less than 15. Given these restrictions, the surveyed universe was naturally populated, in part, by older packages whose importance to the acquisition-minded vintage 1982 user may be marginal. Conversely, several recent state-of-the-art packages had to be excluded because their site or response counts were too low to yield statistically useful results. This is unfortunate, of course, because these packages are also important, or at least very interesting, to any user assembling a system.

The goal of this survey is to present users' evaluations of systems software for the majority of readers, who are concerned primarily with proven products whose utility and reliability have been well established. To be meaningful, this kind of evaluation needs a strong statistical foundation. To those readers who do not find their favorite packages in this survey, we apologize for our conservatism. But for those who are looking for proven products, that same conservatism contributes to the credibility of the evaluations.

Questionnaire

Users were asked to rate a specified systems package with respect to stated features, functions, and performance criteria. Four types of questions were asked. One type required only a yes or no response. The second asked users to select a phrase or phrases that defined the how, why, or other criteria of software performance. The third type weighted user responses on a simple three-part scale. The fourth and most specific type required the user to assign a performance rating based on a scale ranging from 10 to 9 for "superior" down to 2 or 1 for "inadequate" in relation to characteristics concerned with package use and operation, vendor service, and overall satisfaction.

Results and Conclusions

A synthesis of the responses from 2,508 active users of systems packages showed the following:

Buying Influences. Several factors influenced the acquisition process. For the average package, 80% of the users indicated that software features and functions were a

major influence; 74% stated that compatibility with existing installed software was of major importance; 44% considered the overall "presence" or reputation of the software vendor important; and 45% rated the costs and time associated with modifying and implementing the software in-house a major influence in acquiring the systems package. On the other hand, 81% of the users indicated that recommendations from third parties or consultants were of minor or no import. In addition, 78% cited the results of benchmark runs as having little or no influence, and 70% cited experiences with other packages from the same vendor as having minor or no impact.

Alternate Packages. Overall, 48% of the users of the average package studied stated that they had evaluated alternative packages before making an acquisition decision. Such evaluations ranged from a high of 73% for users of telecommunications monitors to a low of 29% for users of the average report writer.

Computer Systems. The average systems package was installed on the following medium to large mainframes: IBM, 76%; Burroughs, 8%; Amdahl, 4%; NAS/Itel and Sperry Univac, 3% each; DEC, Hewlett-Packard, Honeywell, and Magnuson, 2% each; Control Data, 1%. (Because some packages are run on more than one system at a given site, the total adds up to more than 100.)

Time Installed. The average package installation period was 45 months. At the extremes of the response, 7% of the packages had been installed for less than a year and 5% for more than eight years. The survey, therefore, samples a very mature base of systems software users.

Maintenance. An overwhelming 87% of the packages were supported by the software vendor. Only 5% of the respondents employ a third-party support organization and 6% use in-house staff support.

Package Value. When users were asked to characterize the value of the features and capabilities of the average systems package, the following results were obtained:

- 34% Excellent Value—outstanding features and capabilities at prices comparable or below competitive software;
- 19% Excellent Value—good features and capabilities at prices substantially below competitive software;
- 8% Good Value—outstanding features and capabilities at prices higher than competitive software;
- 30% Good Value—good features and capabilities at prices comparable to competitive software;
- 2% Good Value—important features and capabilities are missing but prices are below those of competitive software;
- 1% Poor Value—good features/capabili-

ties, but prices above competitive software; ●2% Poor Value—important features and capabilities are missing and prices are comparable to or above competitive software.

Replacements. Only 15% of the users of the average package indicated that they were actively considering its replacement. Of this number, only 11% (or 2% overall) characterized the package as generally unsatisfactory, and only 10% (2% overall) stated that slow execution speed was the reason for replacement. The main reason cited for considering replacement for 37% (6% overall) was the need for features not presently incorporated into the package; 26% (4% overall) cited system upgrades where the new host and/or operating system would be incompatible with the package.

Performance vs. Promise. In one of the study's most interesting findings, an overwhelming 89% of the users stated that the package they rated either exceeded or met all vendor promises with respect to installation time, features and capabilities, performance, speed, and efficiency. Only 2% of the users said that vendor promises had not been met with regard to any of these factors.

Overall Satisfaction. Users were asked to state their overall satisfaction with the package on a superior (10 to 9), very good (8 to 6), acceptable (5 to 3), and inadequate (2 to 1) scale. Among users of the average package, 28% rated the product as superior in meeting or exceeding most requirements and 54% rated it as very good in meeting or exceeding most requirements. A total of 16% rated overall satisfaction as acceptable (the product met many requirements), while 2% rated overall satisfaction as inadequate (it met few requirements).

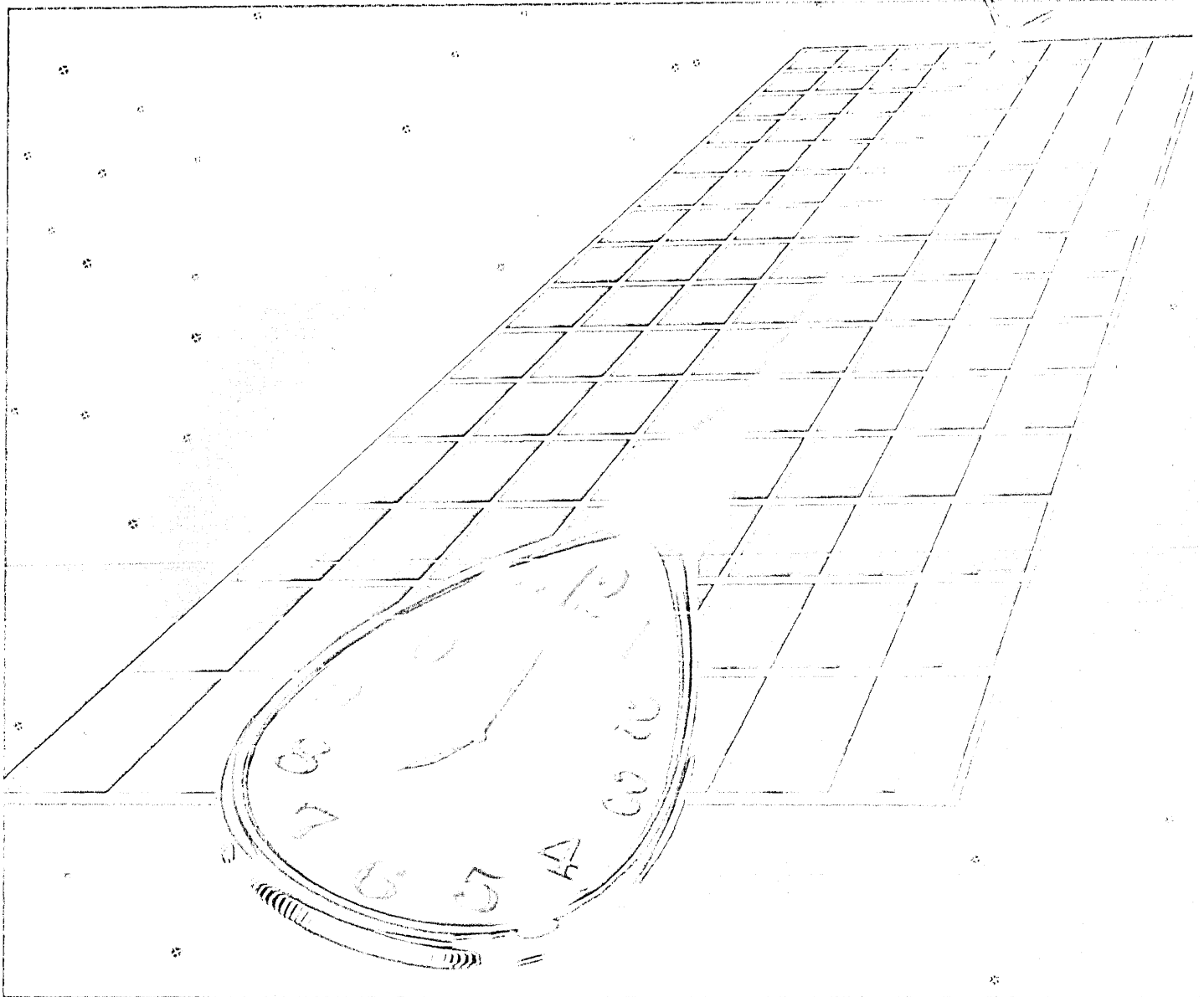
Package Groups

User responses have been grouped into these seven topic areas for more meaningful averaging and comparison among products:

- Database Management Packages
- Report Writers
- Telecommunications Monitors
- Other Communications Packages
- Operating Systems/Systems Support Packages
- Systems Management Aid Packages
- Programming Utility Packages

Group and Package Ratings

The following list highlights the overall satisfaction ratings for the seven systems software groups studied. Also included are the ratings achieved by the individual packages in each group. The mean user ratings relate to a superior (10 to 9), very good (8, 7, or 6), acceptable (5, 4, or 3), and inadequate (2 or 1) rating scale. For each group, the ratings are presented in numerical order from



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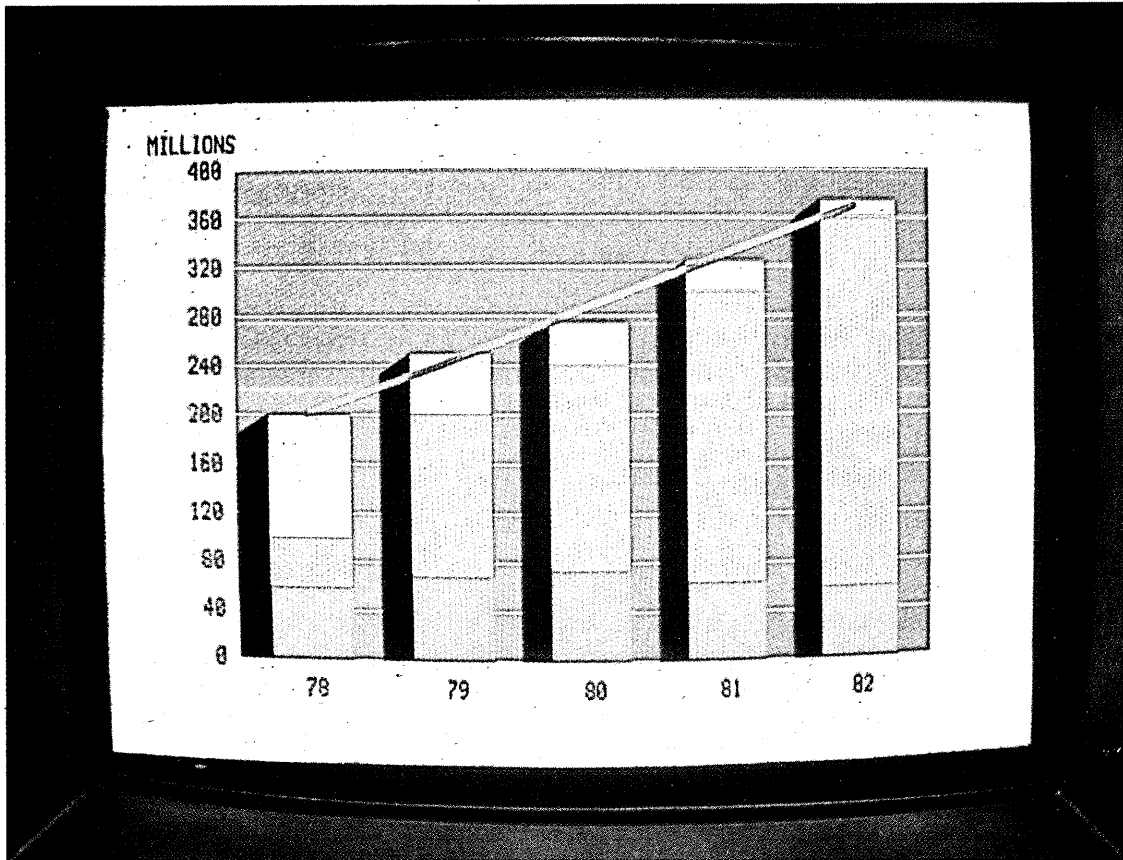
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CIRCLE 75 ON READER CARD

An overwhelming 89% of users said the package they rated either exceeded or met all vendor promises.

highest to lowest. Complete graphic presentations on all group packages are included in the bar charts that accompany this report.

DATABASE MANAGEMENT PACKAGES—21 packages studied.

Mean Score

- 8.4—SAS SAS
- 8.2—SSS Quick Job II
- 8.0—Burroughs CANDE, Pansophic Easytrieve, Software AG ADABAS
- 7.9—Cullinane IDMS
- 7.8—Hewlett-Packard Image/Query
- 7.5—Burroughs DMS II
- 7.4—Honeywell DM-IV
- 7.2—Group Average, ADR Datacom/DB
- 7.1—UCC UCC-TEN
- 7.0—Mathematica RAMIS II, Univac DMS
- 6.9—DEC Datatrieve
- 6.8—IBM IMS
- 6.7—IBM DL/1, IBM VSAM
- 6.6—Univac IMS

6.2—Intel System 2000

6.1—Cincom Total

5.7—Burroughs Forte

REPORT WRITERS—9 packages studied.

Mean Score

- 8.3—Hewlett-Packard View
- 8.2—Dylakor DYL 260, Dylakor DYL 280
- 8.0—Visicorp VisiCalc
- 7.7—Group Average
- 7.6—Burroughs ODESY
- 7.5—Cullinane Culprit/Auditor, On-line WYLBUR
- 7.0—IBM BRADS II/BRADS III
- 6.7—Burroughs Reporter

TELECOMMUNICATIONS MONITORS—10 packages studied.

Mean Score

- 7.9—Westinghouse Westi
- 7.4—Altergo Shadow
- 7.1—IBM CICS
- 7.0—ADR Datacom/DC

6.7—Mathematica MPGSWIFT

6.6—Group Average, Software AG Complete

6.4—SDA Intercomm

6.3—SDA Minicomm

5.4—Cincom Environ/1

4.8—TSI Task/Master

OTHER COMMUNICATIONS PACKAGES—14 packages studied.

Mean Score

- 8.3—IBM HASP
- 8.2—ADR VOLLIE
- 7.7—Burroughs NDL, Compuware Abend-Aid, IBM JES 3
- 7.4—ADR Roscoe
- 7.3—Burroughs GEMCOS, IBM TSO
- 7.2—Group Average
- 7.0—IBM CMS, IBM JES 2, IBM VTAM
- 6.6—IBM NCP
- 5.9—IMB ICCF, IBM MTCS

OPERATING SYSTEMS/SYSTEMS SUPPORT—26 packages studied.

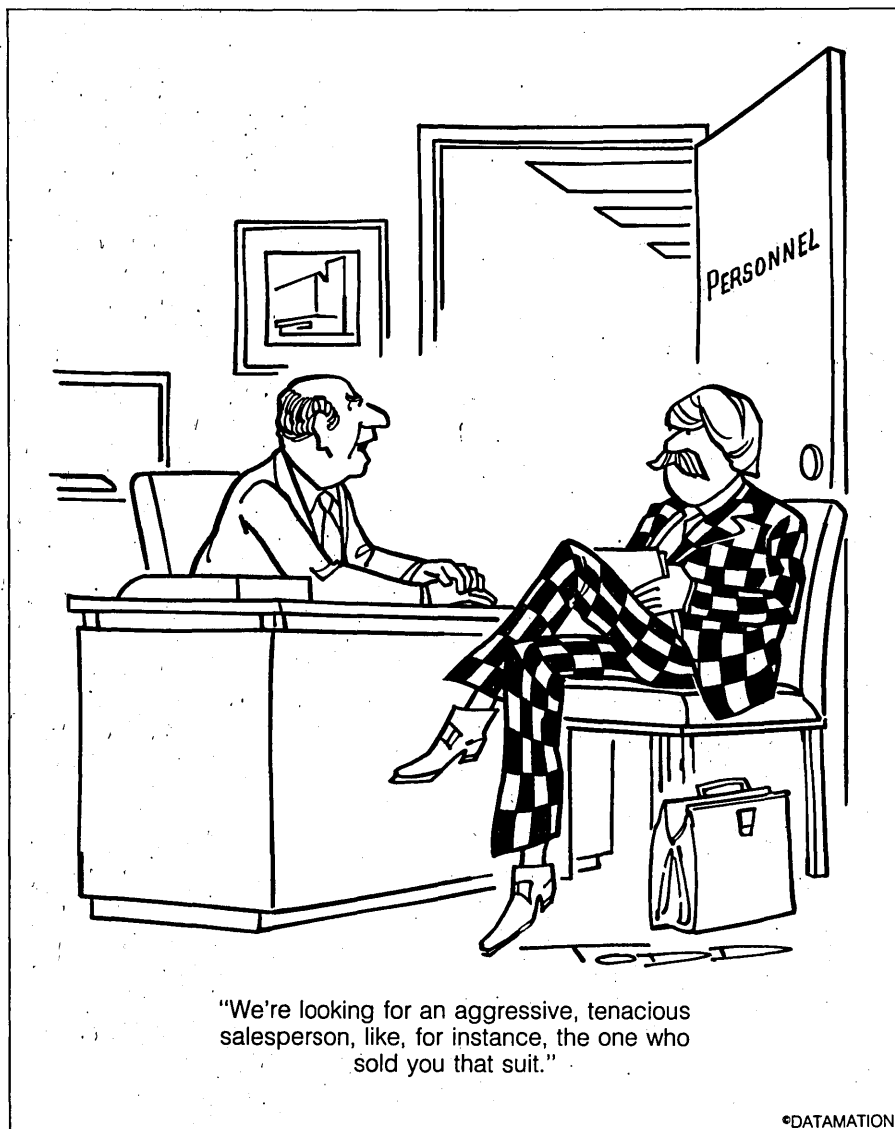
Mean Score

- 8.9—Goal FAQs
- 8.8—Software Pursuits DOS/MVT
- 8.7—Syncsort Syncsort
- 8.6—Goal FLEE/FLIM
- 8.4—Computer Associates CA-Sort, Innovation FDR
- 8.3—Westinghouse DOS/Dump-Restor
- 8.2—Pansophic Panvalet
- 8.1—Altergo Space/Manager, IMSL Library-SYS
- 8.0—UCC UCC-ONE
- 7.9—IBM Utility
- 7.8—Cambridge Systems ASM2
- 7.7—Group Average
- 7.6—Capex TLMS, IBM Power, NCI Slick
- 7.4—ADR Librarian
- 7.3—Tower DFAST, Tower TFAST
- 7.2—SPSS SPSS
- 7.0—Computer Associates DYNAM/D
- 6.8—Universal ADAS
- 6.7—Computer Associates DYNAM/T, UCC UCC-Three
- 6.2—SDI EPAT
- 5.5—Value Valu-Lib

SYSTEMS MANAGEMENT AIDS—14 packages studied.

Mean Score

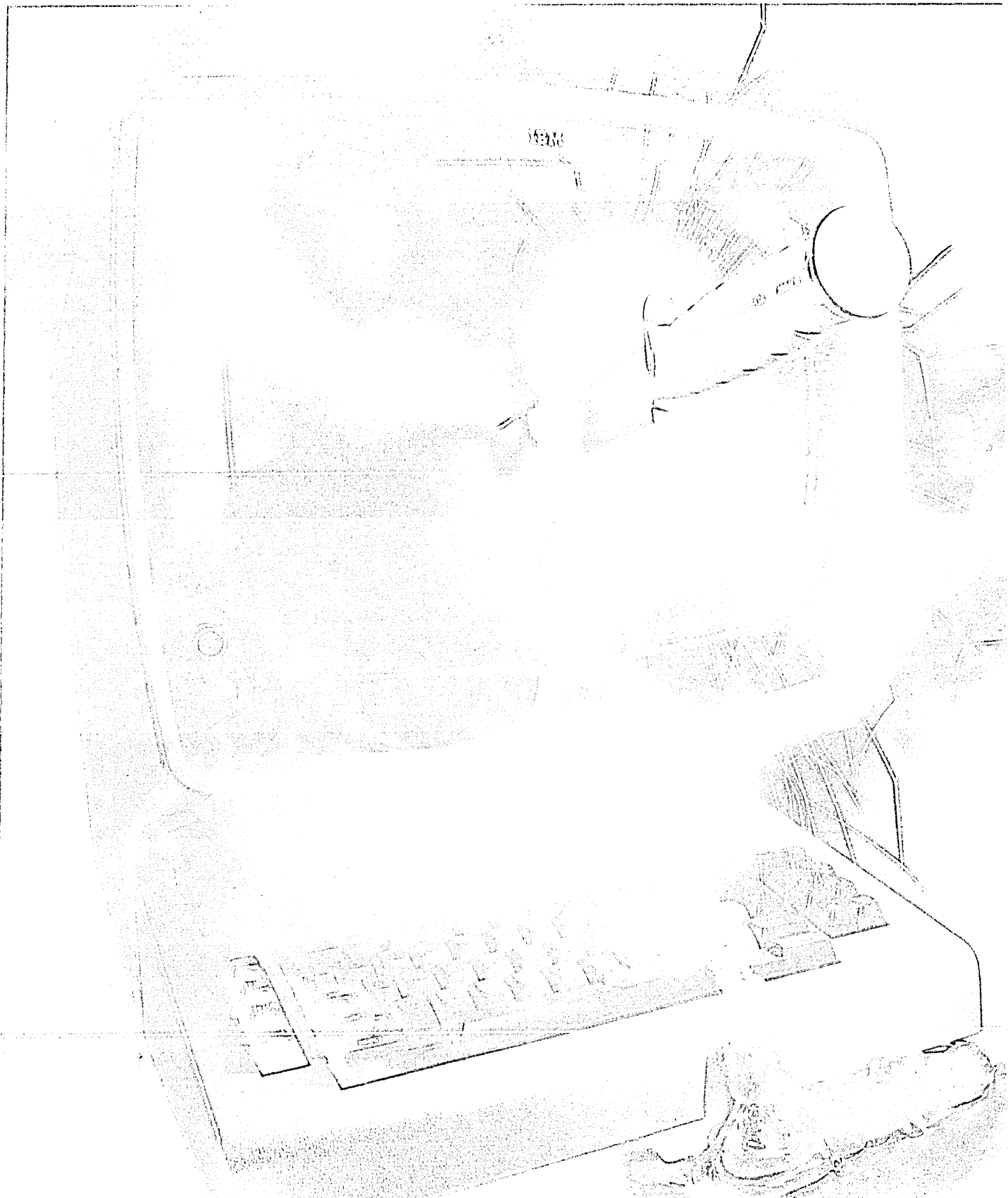
- 8.7—Candle Omegamon
- 8.3—Capex Plan IV
- 7.9—Cambridge Systems ACF2
- 7.8—ADR Look, Foresight Foresight
- 7.7—Boole & Babbage Resolve
- 7.6—IBM Ditto
- 7.2—Group Average
- 7.0—Johnson JARS, UCC UCC-15
- 6.9—Westinghouse Job Monitor
- 6.7—Computer Associates Jasper
- 6.3—Pace Komand
- 5.9—Value Comput-a-Charge
- 5.5—IMB DMS



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CIRCLE 76 ON READER CARD

AV. TOLERANCES FOR 68% CONFIDENCE LEVEL

SAMPLE SIZE	OVERALL SATISFACTION			SPECIFIC ATTRIBUTE RATINGS			
	6.0 or Under	7.0	8.0 or Over	6.0 or Under	7.0	8.0	9.0 or Over
40 or more	.25	.25	.20	.30	.30	.25	.20
30 to 39	—	.30	.25	.35	.30	.30	.20
25 to 29	.45	.35	.30	.40	.40	.30	.25
20 to 24	.45	.35	.30	.45	.40	.35	.25
15 to 19	.50	.50	.35	.50	.50	.40	.30

Table Reads: The chances are approximately two in three that a reported rating differs by no more than the indicated tolerance from the rating that would have been obtained had all eligible sites been enumerated. For example, suppose a sample of 30 sites gives a software package rating of 7.0 for Overall Satisfaction. The table indicates a tolerance of .30 on this estimate. Thus, the chances are two in three that the interval 6.70 to 7.30 includes the rating that would have been obtained had all eligible sites been enumerated.

METHODOLOGY

Universe and Sample

Because the focus of the study was on users' perceptions of specific systems packages, the sample was selected from a universe of known users of each package. A list of installations maintained by Computer Intelligence Corp., La Jolla, Calif., was the sample source. For systems packages in use at more than 100 installations, a sample of 100 names was selected on an "nth" name basis. For packages in use at 100 or fewer installations, an effort was made to collect data from all known users of the package. Packages installed at fewer than 30 sites were excluded from the survey.

Mailing

In total, 8,239 questionnaires were sent to known users of 98 different software packages at 6,267 sites. Questionnaires were addressed to a specific individual at the location—most often the data processing manager. A sweepstakes offer for a trip to London was included with the mailing to stimulate response.

A total of 2,659 questionnaires from 2,023 sites were returned; 38 questionnaires, addressed to 29 sites, were undeliverable by the post office. To increase the overall response rate and ensure an adequate response base for each individual package, telephone interviews were conducted among those who did not respond to the mail survey. The questionnaire used in the telephone interview was identical to that used in the mail survey.

The sample for the telephone interviews was selected to provide a minimum 40% response for each systems package included in the survey. A total of 868 telephone interviews were completed. This brought the total number of survey responses to 3,527, for a 43% response rate. Included in the 3,527 responses were 1,019 respondents who indicated that the specific package was not currently in use at their installations.

Questionnaire

The survey questionnaire on which this report is based first qualified the re-

spondent as a user of the specific package being discussed and then explored various dimensions of the package's acquisition and use:

- The environment in which the package is used, including length of time installed, how it is supported, and host computer;
- The purchase process, including whether alternative packages were considered before the purchase and how the perceived importance of selected factors affected the buyers' decisions;
- Users' ratings of the package on nine features covering package installation, initial use, service, and operations. A 10-point scale was used in all questions along with verbal guides to augment the numerical values: 10 and 9 were identified as superior; 8, 7, and 6 as very good; 5, 4, and 3 as acceptable; and 2 and 1 as inadequate;
- Users' perception of the value of the package, with value defined as the package's capabilities and features relative to those of competitive packages and to competitive package costs;
- Whether users are considering package replacement, and if so, why;
- Users' overall evaluation of the package, including the extent to which performance met or exceeded vendor promises, and overall satisfaction with the package.

Findings

The findings presented in this report reflect user perceptions of package performance in response to the dimensions probed in the survey questionnaire. These are not intended to be all-inclusive, nor do they necessarily produce evaluations comparable to those that would be obtained under conditions of a controlled engineering test or experiment.

As in all sample surveys, the numbers reported are estimates within a range of what would have been obtained had all user sites in the survey universe been similarly enumerated. The margins of sampling variation or tolerances applicable to ratings of individual aspects of performance are given in the table.

PROGRAMMING UTILITIES—4 packages studied.

Mean Score

8.1—Capex Optimizer

7.6—UCC UCC-Two

7.5—Group Average

7.4—NCI Owl

6.8—Informatics Mark IV

Rating Bars

The following bar charts provide a graphic representation with respect to questions on overall satisfaction, installation and initial use, vendor service and support, and operations criteria. Graphs are presented for all 98 systems software packages that were sampled.

Bar charts are also included for both the total survey and for the individual systems software group averages. Additional information included with each bar chart cites the total number of responses, the number of users rating the package as outstanding, the number actively considering replacing the package for any reason, and the number seeking replacement for generally unsatisfactory performance. The bar charts show ratings of superior (10 to 9), very good (8 to 6), and acceptable (5 to 4). Ratings under 4 are not graphed.

The *Overall Satisfaction* bar encompasses factors such as satisfaction with package features, capabilities, and utility with respect to user requirements; the frequency of failures requiring extra effort for recovery; and vendor installation, documentation, modification, and training support.

The bar labeled *Installation and Initial Use* represents a composite that includes freedom from bugs/errors; time required for initial installation; ease of implementation; and quality of documentation and training.

The bar labeled *Vendor Service* gauges the vendor's speed and thoroughness in fixing bugs/errors, the quality of vendor program modifications, and the frequency of package updating.

The *Operations* bar is a measure of the package's ability to handle expanding processing volumes and an evaluation of initiation/calling and backup/recovery procedures.

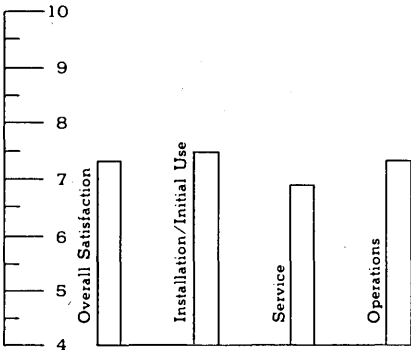
Special note: in split bar presentations, the solid bar indicates the package's scores; the open bar denotes the common group average.

This systems software survey is based on a forthcoming report in Data Decisions' Software Service, a loose-leaf monthly updated reference service covering systems and applications software. A trial review is available from Data Decisions, 20 Brace Rd., Cherry Hill, NJ 08034; (800) 257-7732; in New Jersey, (609) 429-7100.

■ **OVERALL SUMMARY**

Average—All Packages • 98 packages

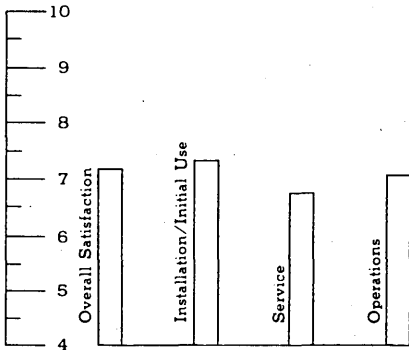
2,508 responses • 41% judge features/capabilities outstanding • 15% considering replacement, 2% due to unsatisfactory performance.



□ **DATABASE MANAGERS**

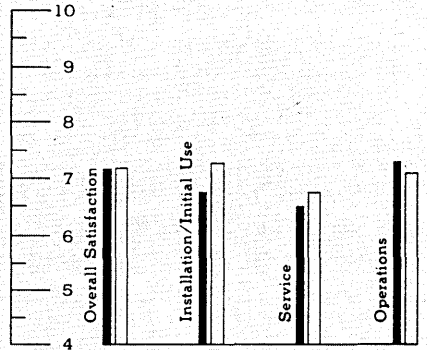
Group Average • 21 packages

616 responses • 40% judge features/capabilities outstanding • 14% considering replacement, 1% due to unsatisfactory performance.



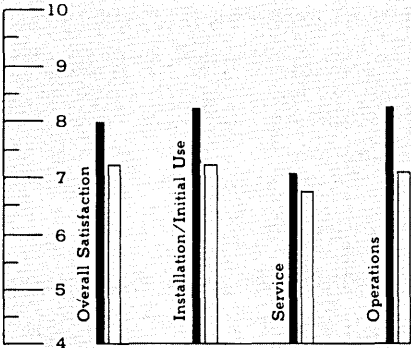
ADR DATACOM/DB • Applied Data Research, Route 206 & Orchard Rd., Princeton NJ 08540 • 201-874-9000

20 responses • 40% judge features/capabilities outstanding • 5% considering replacement, 0% due to unsatisfactory performance.



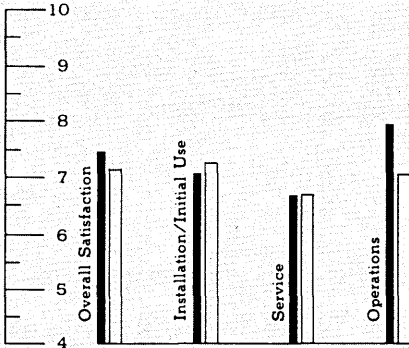
BURROUGHS CANDE • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 313-972-7000

41 responses • 46% judge features/capabilities outstanding • 2% considering replacement, 0% due to unsatisfactory performance.



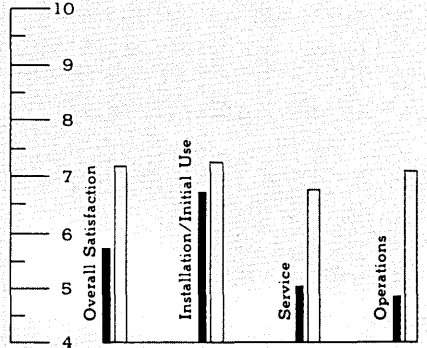
BURROUGHS DMS II • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 313-972-7000

41 responses • 49% judge features/capabilities outstanding • 12% considering replacement, 0% due to unsatisfactory performance.



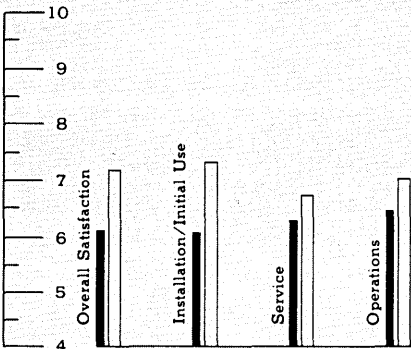
BURROUGHS FORTE • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 313-972-7000

27 responses • 26% judge features/capabilities outstanding • 78% considering replacement, 15% due to unsatisfactory performance.



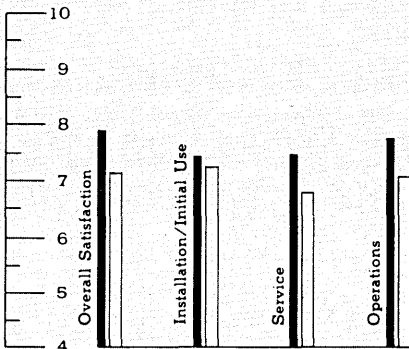
CINCOM TOTAL • Cincom Systems Incorporated, 2300 Montana Avenue, Cincinnati, OH 45211 • 513-662-2300

21 responses • 29% judge features/capabilities outstanding • 52% considering replacement, 10% due to unsatisfactory performance.



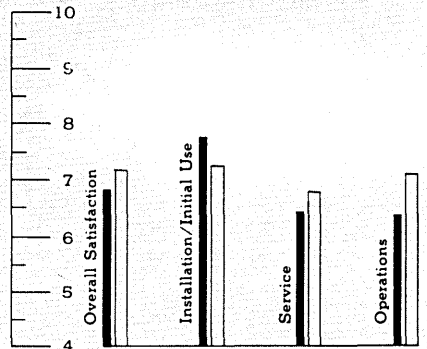
CULLINANE IDMS • Cullinane Database Systems, 400 Blue Hill Drive, Westwood, MA 02090 • 617-329-7700

29 responses • 55% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



DEC DATATRIEVE • Digital Equipment Corp., 146 Main St., Maynard, MA 01754 • 617-897-5111

24 responses • 29% judge features/capabilities outstanding • 25% considering replacement, 0% due to unsatisfactory performance.



**DIRECTION:
BEFORE
CHOOSING YOUR
SOFTWARE SYSTEM,
CHOOSE YOUR
STRATEGIC
SOFTWARE
PARTNER.**

Today, it's evident that software has surpassed hardware as the key strategic element of the corporate information system.

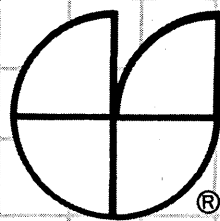
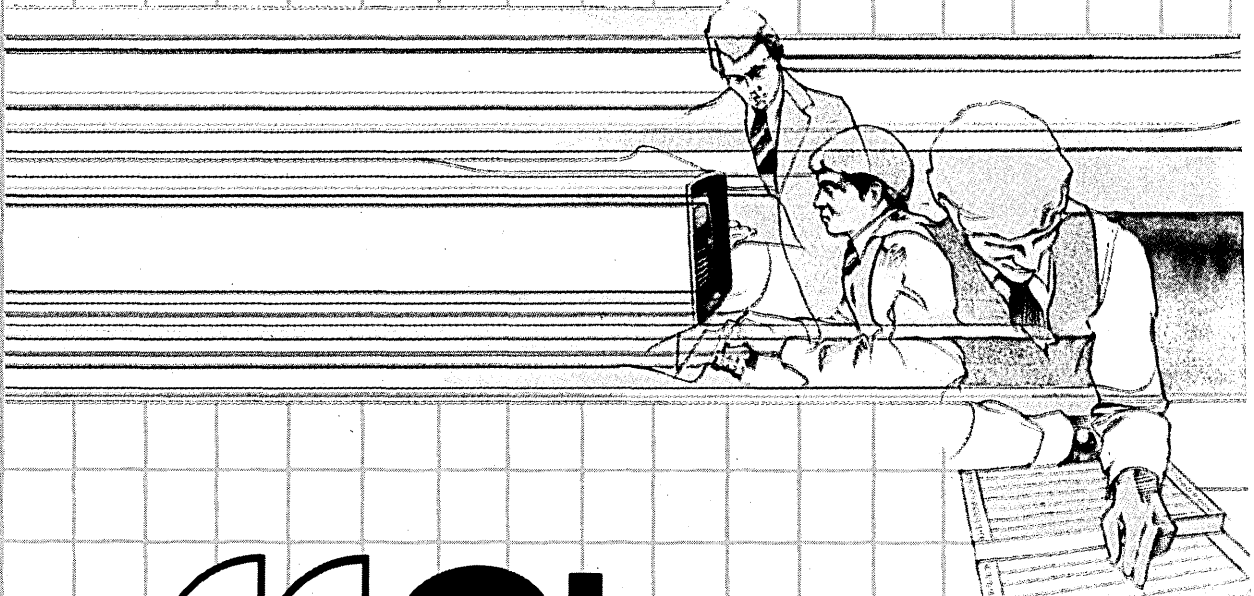
But a software strategy built upon patchwork, multi-vendor approaches is simply another form of the outmoded hardware orientation. Direction in software begins with choosing a single supplier that can "partner" with you in building the software infrastructure you need to support all systems requirements.

Your software partner should be one that can:

- Create and deliver new software, not just provide enhanced or repackaged old technology.
- Support multiple hardware and operating environments to satisfy your complete needs now and in the future.
- Demonstrate a concern for investing in R&D to meet your growing needs, rather than with optimizing its revenues from old technology.

CINCOM: YOUR FIRST STEP IN THE RIGHT DIRECTION.

As the leader in advanced software technology, Cincom Systems is uniquely qualified to



Cincom

come your strategic software partner. In the first four years, we've developed a complete range of new software technology that obsoletes all previous approaches. The scope of these systems encompasses the needs of the largest to the most modest-sized environments.

The foundation is an entirely new generation data base technology. The new foundation captures the data structuring power and performance levels necessary to support truly integrated systems. Which, in turn, can support virtually all usage requirements.

From this base, we provide a host of innovative software tools to assist both data processing

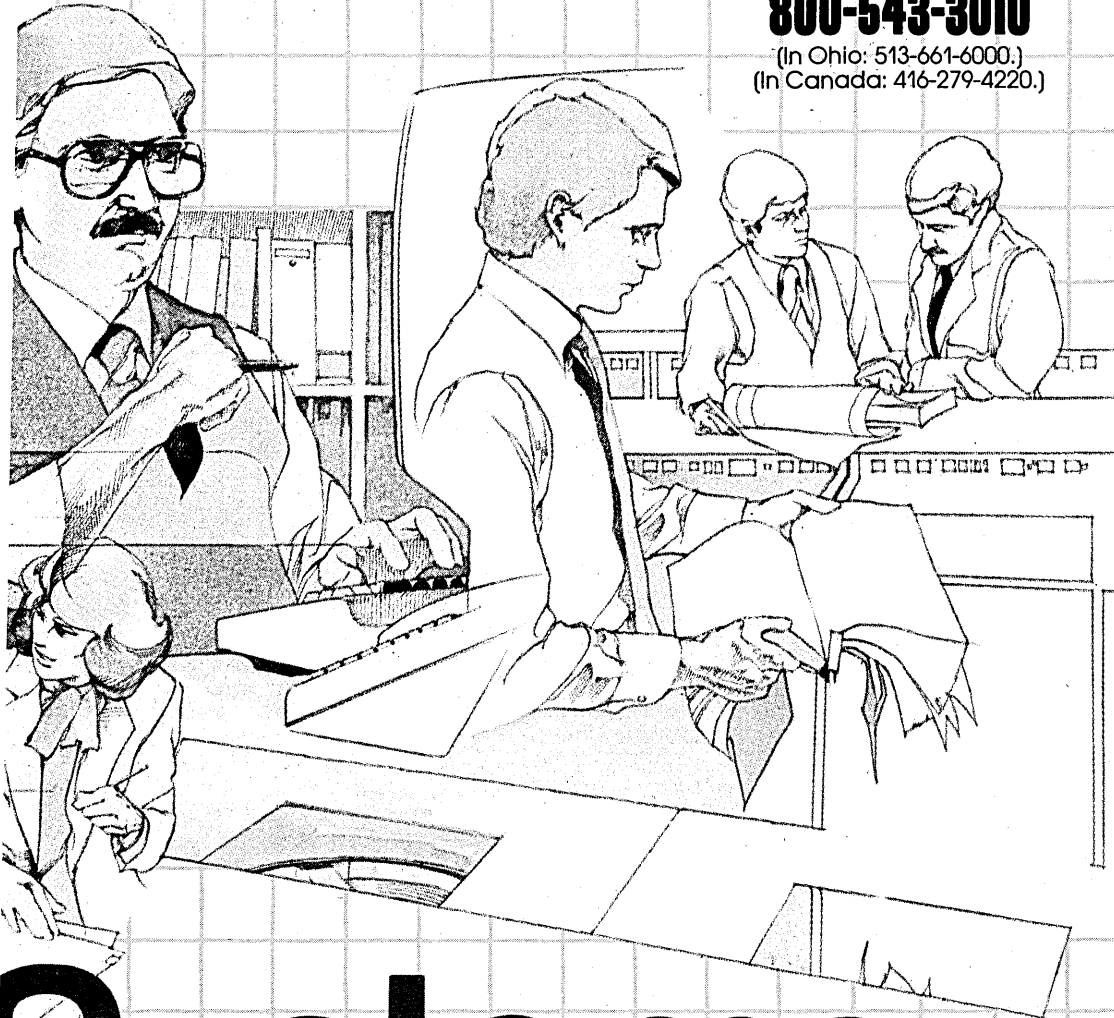
and the end-user in achieving their objectives. And we help you reach out to functional areas—such as manufacturing and finance—to help them control their environments.

Cincom Systems. We provide more than products. We provide business solutions through advanced software technology. That's the essence of a strategic software partner.

Your first step in the right direction? Select Cincom Systems as your strategic software partner. Contact our Marketing Services Department, 2300 Montana Ave., Cincinnati, OH 45211.

800-543-3010

(In Ohio: 513-661-6000.)
(In Canada: 416-279-4220.)



Systems

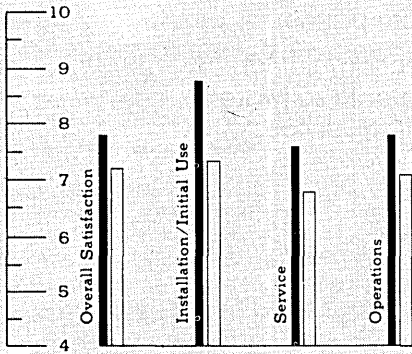
Your strategic software partner.

CIRCLE 77 ON READER CARD

SYSTEMS SOFTWARE SURVEY

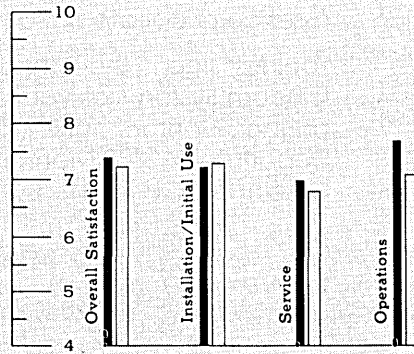
HP IMAGE/QUERY • Hewlett-Packard, Data Systems Division, 11000 Wolfe Road, Cupertino, CA 95014 • 408-257-7000

29 responses • 52% judge features/capabilities outstanding • 7% considering replacement, 0% due to unsatisfactory performance.



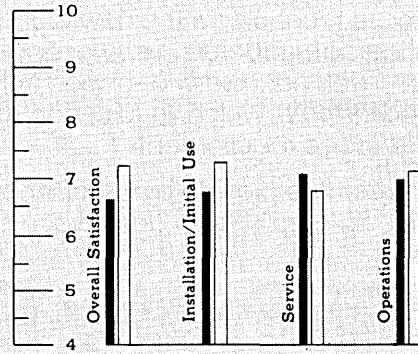
HONEYWELL DM-IV • Honeywell Information Systems, 200 Smith Street, Waltham, MA 02145 • 617-890-8400

23 responses • 52% judge features/capabilities outstanding • 0% considering replacement.



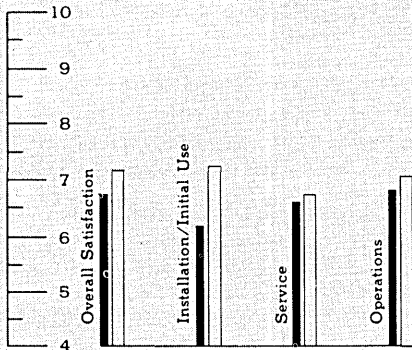
IBM DL/1 • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

30 responses • 23% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



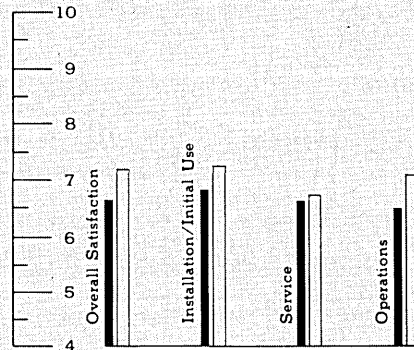
IBM IMS • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

15 responses • 40% judge features/capabilities outstanding • 13% considering replacement, 0% due to unsatisfactory performance.



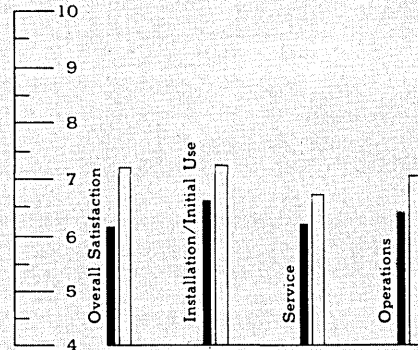
IBM VSAM • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

37 responses • 41% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



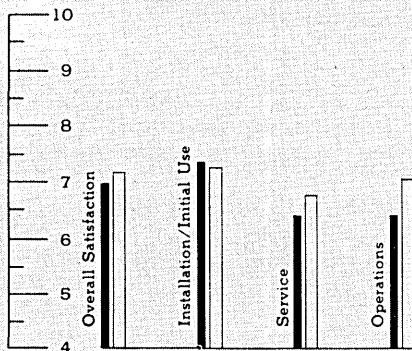
INTEL SYSTEM 2000 • Intel Systems Corp., 12675 Research Blvd., Austin, TX 78766 • 512-258-5171

24 responses • 38% judge features/capabilities outstanding • 25% considering replacement, 4% due to unsatisfactory performance.



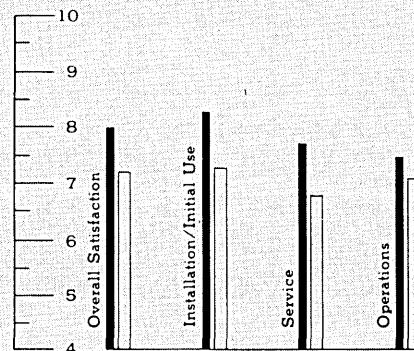
MATHEMATICA RAMIS II • Mathematica Products Group, P.O. Box 2392, Princeton, NJ 08540 • 609-799-2600

15 responses • 47% judge features/capabilities outstanding • 7% considering replacement, 7% due to unsatisfactory performance.



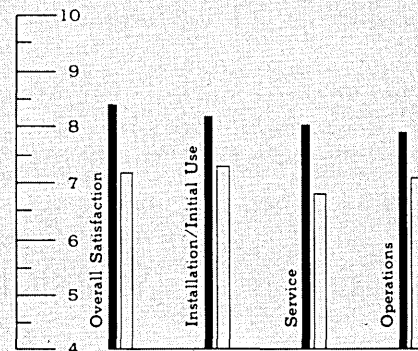
PANSOPHC EASYTRIEVE • Pansophic Systems, Inc., 709 Enterprise Drive, Oakbrook, IL 60521 • 312-986-2260

32 responses • 44% judge features/capabilities outstanding • 6% considering replacement, 0% due to unsatisfactory performance.

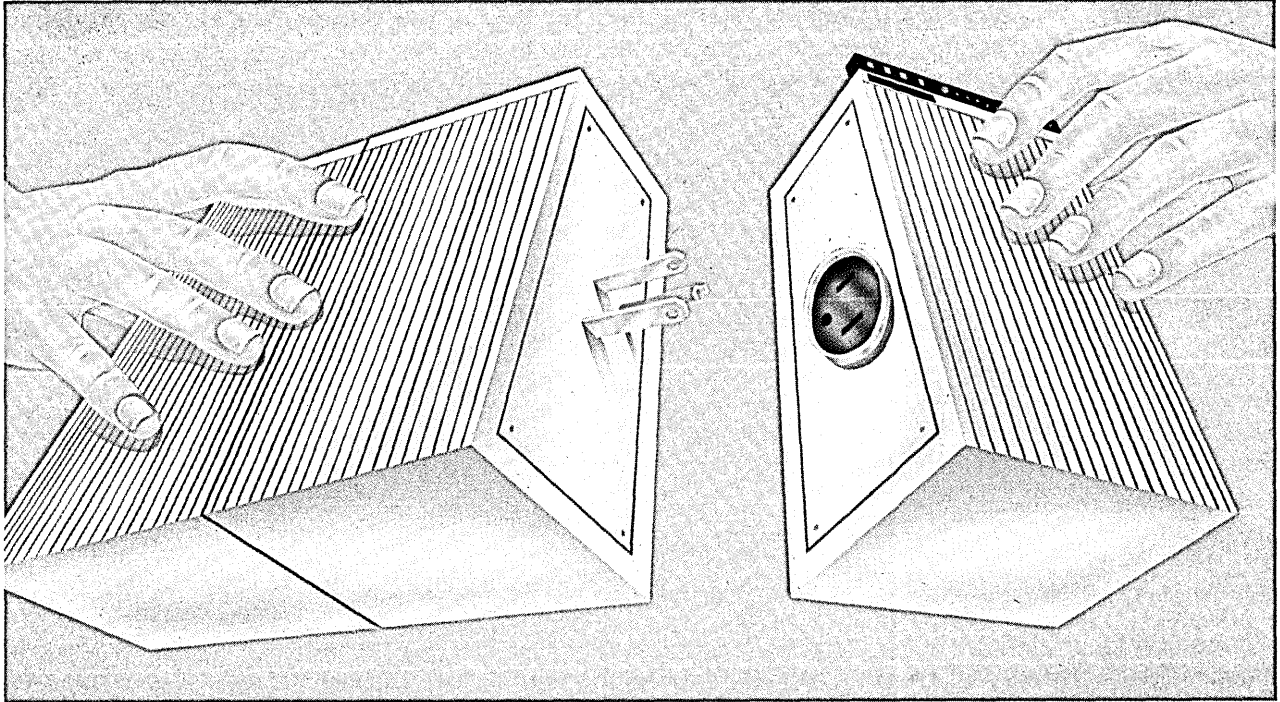


SAS SAS • SAS Institute, Inc. SAS Circle, Cary, NC 27511 • 919-467-8000

34 responses • 50% judge features/capabilities outstanding • 0% considering replacement.



At last, plug-in parallel processing in a 32-bit supermini system.



Perkin-Elmer announces the Model 3200 Multiple Processing System, an exciting new concept for demanding real-time applications.

Room to grow

The Model 3200MPS gives you extraordinary system expandability. You can start with a host CPU and one auxiliary processing unit (APU). Then as your needs grow you can plug in more performance by adding as many as eight additional APUs.

Should you need even more horsepower, plug-in parallel processing lets you add exactly what you need as you need it—from a single APU to a whole fleet of multiple processing systems.

And no matter what the size of your configuration, a central point of control and management is pro-

vided by a single copy of our field-proven OS/32 operating system.

Design flexibility

With parallel-processing APUs you can take advantage of application segmentation and structured programming techniques to speed system development. You can segment your application into multiple task modules, with each APU performing a set of related functions. To further optimize system performance, you can easily re-allocate tasks among the APUs.

Your Model 3200MPS provides maximum flexibility for software development, reliability, and system maintenance. To incorporate new design changes or correct problem modules, simply work on the problem module while your system continues to operate. And the

Model 3200MPS can be structured to permit continued system operation though one or multiple APUs may fail. When so structured, the APUs can receive immediate maintenance attention while the system continues to run or they can wait for routine scheduled maintenance.

And our state-of-the-art universally optimizing FORTRAN VIIZ enables you to use modular programming techniques without sacrificing real-time efficiencies.

To find out more about how you can plug into all the advantages of plug-in parallel processing minis, mail the coupon or call today:

The Perkin-Elmer Corporation,
Two Crescent Place, Oceanport,
NJ 07757.

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201-870-4712.

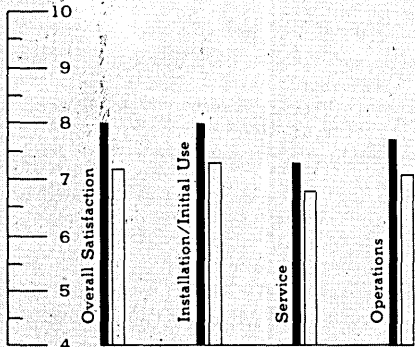
PERKIN-ELMER

CIRCLE 78 ON READER CARD

SYSTEMS SOFTWARE SURVEY

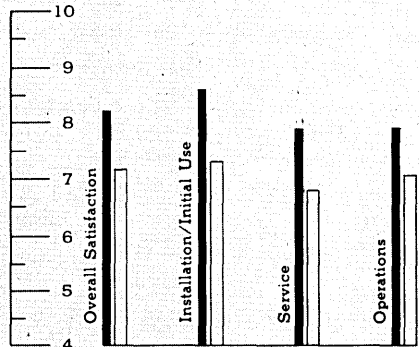
SOFTWARE AG ADABAS • Software AG Systems Group • 11000 Sunrise Valley Drive, Reston, VA 22091 • 703-860-5050

39 responses • 62% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



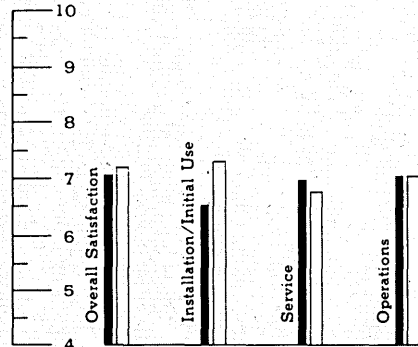
SSS QUICKJOB II • System Support Software, Inc., 5230 Springboro Pike, Dayton, OH 45439 • 513-435-9514

41 responses • 46% judge features/capabilities outstanding • 10% considering replacement, 0% due to unsatisfactory performance.



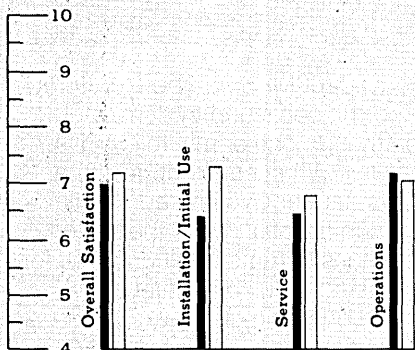
UCC UCC - TEN • University Computing Company, UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

16 responses • 25% judge features/capabilities outstanding • 13% considering replacement, 0% due to unsatisfactory performance.



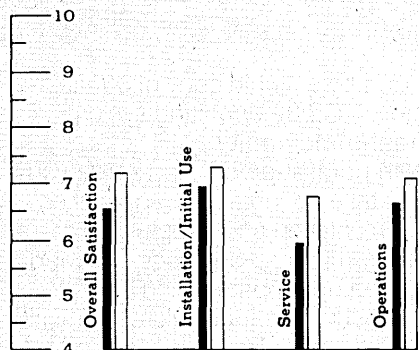
UNIVAC DMS • Sperry Univac Division, Sperry Corp., P.O. Box 500, Blue Bell, PA 19422 • 215-542-4011

37 responses • 35% judge features/capabilities outstanding • 8% considering replacement, 0% due to unsatisfactory performance.



UNIVAC IMS • Sperry Univac Division, Sperry Corp., P.O. Box 500, Blue Bell, PA 19422 • 215-542-4011

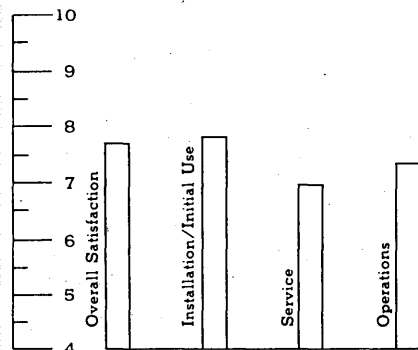
41 responses • 22% judge features/capabilities outstanding • 27% considering replacement, 0% due to unsatisfactory performance.



REPORT WRITERS

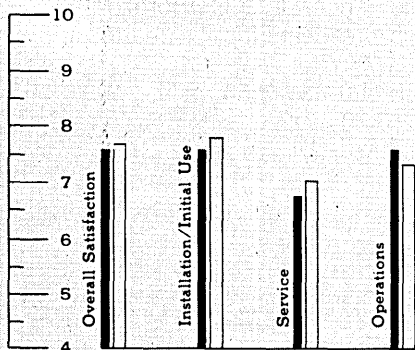
Group Average • 9 packages

246 responses • 46% judge features/capabilities outstanding • 13% considering replacement, 2% due to unsatisfactory performance.



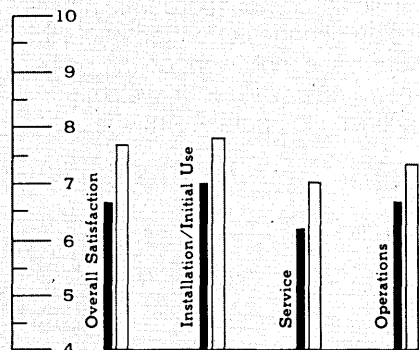
BURROUGHS ODESY • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 714-731-5100

29 responses • 34% judge features/capabilities outstanding • 17% considering replacement, 3% due to unsatisfactory performance.



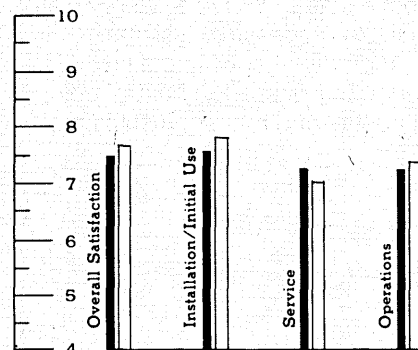
BURROUGHS REPORTER • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 714-731-5100

21 responses • 33% judge features/capabilities outstanding • 10% considering replacement, 5% due to unsatisfactory performance.

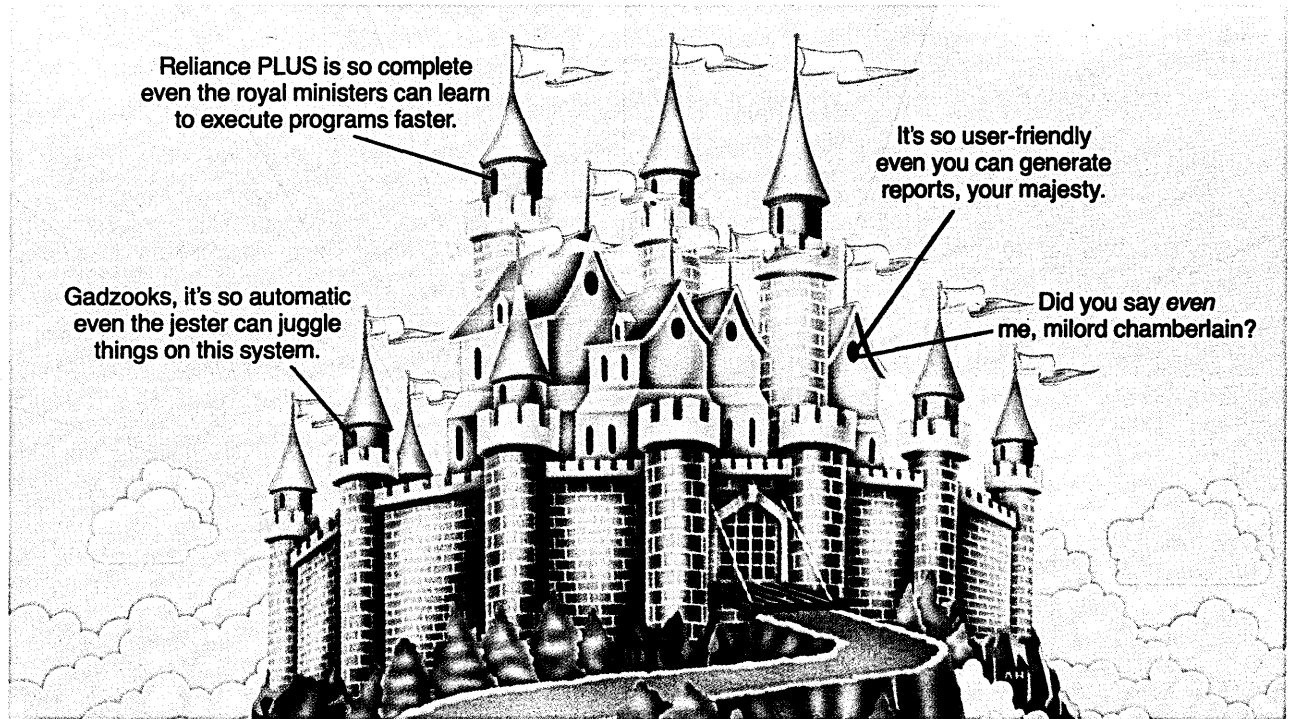


CULLINANE CULPRIT/AUDITOR • Cullinane Database Systems, Inc., 400 Blue Hill Drive, Westwood, MA 02090 • 617-329-7700

35 responses • 43% judge features/capabilities outstanding • 6% considering replacement, 3% due to unsatisfactory performance.



Now, a DBMS with features that make everyone in the corporate empire more productive.



Reliance PLUS is so complete even the royal ministers can learn to execute programs faster.

It's so user-friendly even you can generate reports, your majesty.

Gadzooks, it's so automatic even the jester can juggle things on this system.

Did you say even me, milord chamberlain?

© 1982 The Perkin-Elmer Corporation

The wizardry of our new Reliance PLUS reaches to every corner of the realm. It's Perkin-Elmer's complete high performance, fully integrated DBMS. With more automatic features than anyone else offers.

The programmers are the first to feel its magic.

Reliance PLUS takes care of all the support functions automatically. Concurrency control. Automatic rollback and recovery. On-line reorganization. Database integrity. All features to cut production time, leaving programmers free to concentrate on the application itself.

The most for the least.

Reliance PLUS gains its all-pervasive power by being the most complete package for transaction processing today. Check out these features:

- Transaction controller

- Relational DBMS
- Data Dictionary
- Query/Report processing

Each one is making news throughout the industry. Some vendors offer some of these components. Some vendors offer others. But only Reliance PLUS delivers them all, fully integrated. All for a lower price than the closest competitor.

And you get 32-bit software performance with a relational DBMS—everything you need for application development—from one vendor!

Fast and friendly.

Another unique feature of Reliance PLUS is its layered approach to data access. Your customer can choose higher performance, directly accessing the database. Or he can choose easier develop-

ment and maintenance, using relational views.

The system is so user-friendly, even the operator with no programming knowledge can design screen forms. Inexperienced users can query the database for reports unassisted. Training for both operation and development shrinks. Costs plunge and productivity soars throughout the realm.

Don't lose the magic.

Write or call now for more on this new advance in on-line data management. Reliance PLUS is available immediately on our full line of 32-bit superminis and includes a year of free software maintenance. The Perkin-Elmer Corporation, Two Crescent Place, Oceanport, NJ 07757.

Tel: 800-631-2154.

In NJ, 201-870-4712.

PERKIN-ELMER

CIRCLE 79 ON READER CARD



WC CONSTRUCTION, INC.
San Francisco

Office Memo

To: Jack Burns, Division Manager
From: Tom Donohue, President
Subject: Computer recommendations

Date: November 10, 1982

Your purchase request for six personal computers just reached my desk.

What gives?

I thought you understood our growth plans, Jack, but the computers you've recommended are dead ends. They might do the job today, but what about tomorrow? They don't connect together to form any kind of functional system. The 8-bit models aren't compatible with the 16-bit models. And I doubt the software that runs on the computers you want will be of any use later when we're forced to buy computers that work together.

You saved us a little now, Jack, but your decision will cost us a bundle as we grow into the future. We are growing, Jack, and I'm sure that you want to be part of that growth.

See me before you go home tonight.

Tom

How to avoid this memo.

If you don't want your boss to limit your growth, don't limit the growth of the company.

Consider small business computers that can keep up with your business by giving you options for expansion in the future.

With TeleVideo Systems, Inc. you get what no other small business computer can offer...

choices for future growth. Choices that allow the computers you spend good money for today to be part of your growing system tomorrow.

For example, any TeleVideo small business computer can be used as a stand-alone computer.

Then, because you need flexibility for growth, your TeleVideo computer gives you a choice of ways to grow. Because you can add more TeleVideo 8-bit computers. Or TeleVideo 16-bit computers. Or both, to form a single system with up to 16 stations.

Since you need more than computers for a complete system, TeleVideo gives you a choice of peripherals.

Including printers, terminals, disk and tape drives.

And unlike other small business computer systems, TeleVideo has a CPU for every user.

So you can add computers without slowing down the performance of the system as it grows.

Yet no matter what form your TeleVideo system takes as it grows, the CP/M® software you initially invest in for your stand-alone computers can be used on your future multi-user systems. (Thanks to MmmOST™, TeleVideo's unique executive program.)

So you can choose from the largest library of software applications—including graphics—without making a new software investment every time you reconfigure your system.

TeleVideo computers are serviced by TRW's nationwide support network and by TeleVideo's distributors around the world. Easy to understand training packages are also available.

If you're evaluating small business computers, choose the only ones with a future: TeleVideo.

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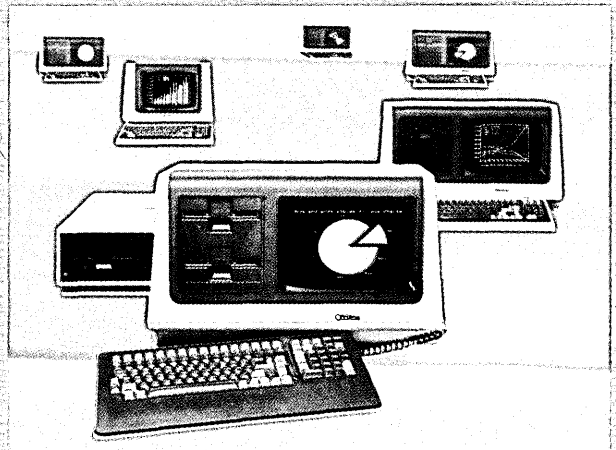
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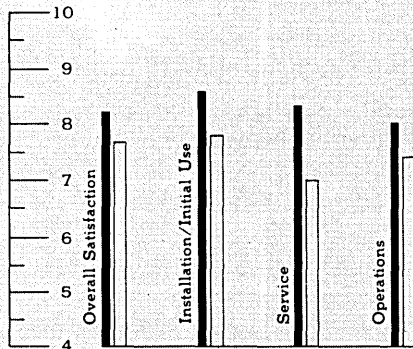
 **TeleVideo Systems, Inc.**

CIRCLE 80 ON READER CARD

SYSTEMS SOFTWARE SURVEY

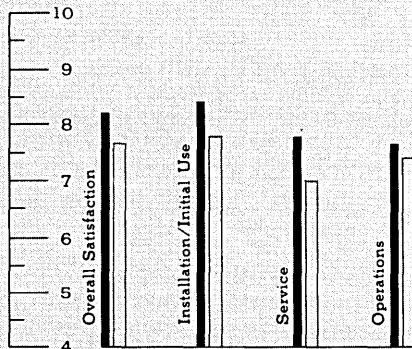
DYLA KOR DYL-260 • Dylakor, 17418 Chatsworth Street, Granada Hills, CA 91344 • 213-366-1781

31 responses • 61% judge features/capabilities outstanding • 10% considering replacement, 0% due to unsatisfactory performance.



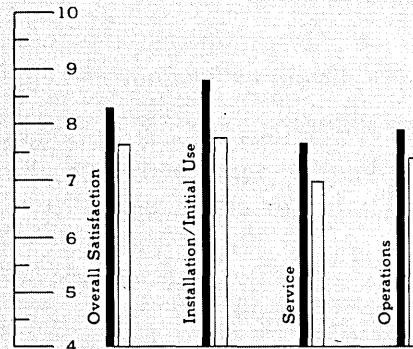
DYLA KOR DYL-280 • Dylakor, 17418 Chatsworth Street, Granada Hills, CA 91344 • 213-366-1781

39 responses • 39% judge features/capabilities outstanding • 5% considering replacement, 0% due to unsatisfactory performance.



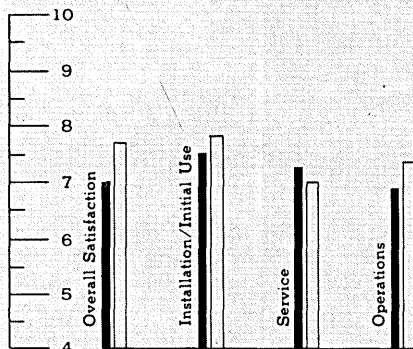
HP VIEW • Hewlett-Packard, Data Systems Division, 11000 Wolfe Road, Cupertino, CA 95014 • 408-257-7000

22 responses • 59% judge features/capabilities outstanding • 3% considering replacement, 5% due to unsatisfactory performance.



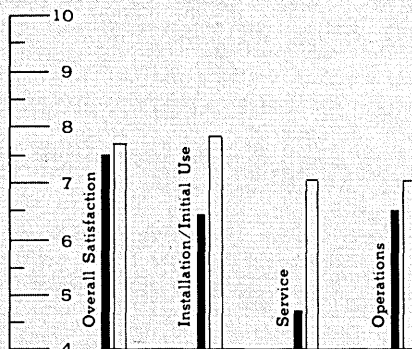
IBM BRADS II/BRADS III • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

15 responses • 46% judge features/capabilities outstanding • 0% considering replacement.



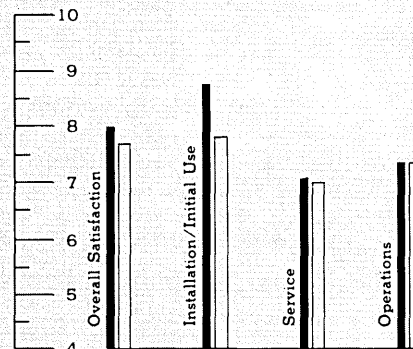
ON-LINE WYLBUR • On-Line Business Systems, Inc., 115 Sansome Street, San Francisco, CA 94104 • 412-931-7600

15 responses • 40% judge features/capabilities outstanding • 40% considering replacement, 0% due to unsatisfactory performance.



VISICORP VISICALC • VisiCorp, 2895 Zanker Rd., San Jose, CA 95134 • 408-946-9000

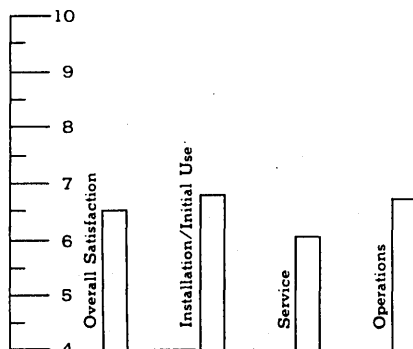
39 responses • 56% judge features/capabilities outstanding • 18% considering replacement, 0% due to unsatisfactory performance.



TELECOMMUNICATIONS MONITORS

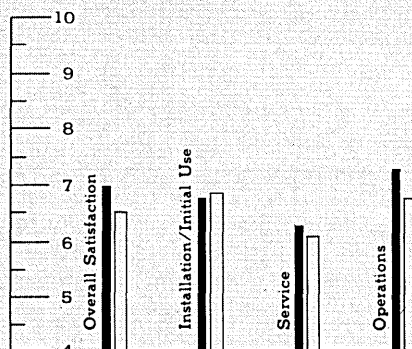
Group Average • 10 packages

206 responses • 32% judge features/capabilities outstanding • 37% considering replacement, 9% due to unsatisfactory performance.



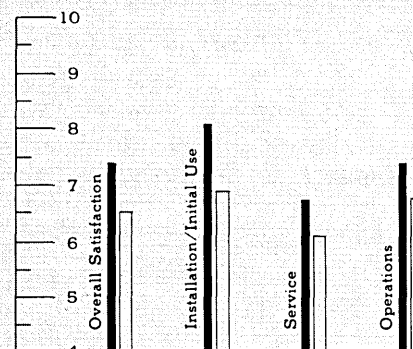
ADR DATACOM/DC • Applied Data Research, Route 206 & Orchard Road, Princeton, NJ 08540 • 201-874-9000

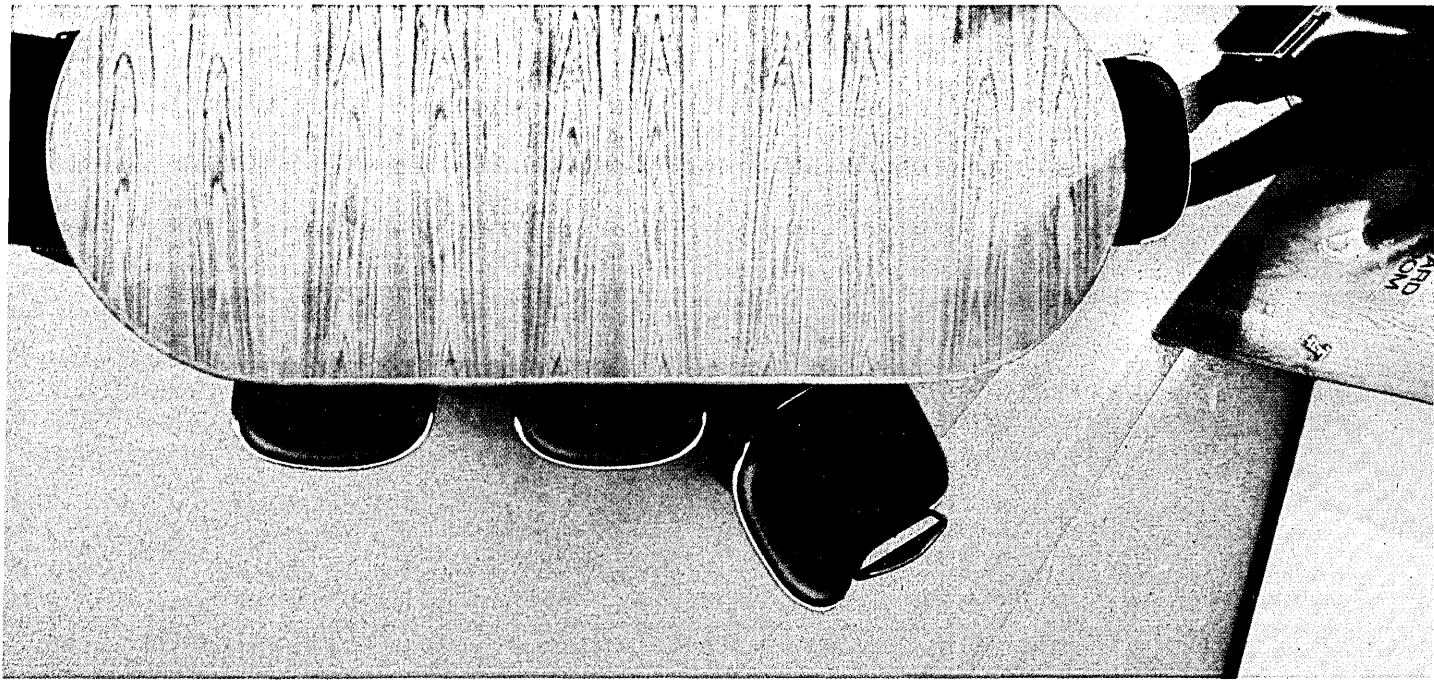
18 responses • 33% judge features/capabilities outstanding • 11% considering replacement, 0% due to unsatisfactory performance.



ALTERGO SHADOW • Insac Software, Inc., 2300 Peachford Road, Suite 3235, Atlanta, GA 30338 • 404-452-7676

34 responses • 38% judge features/capabilities outstanding • 32% considering replacement, 3% due to unsatisfactory performance.





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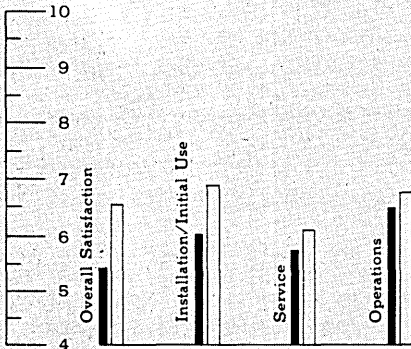
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CIRCLE 81 ON READER CARD

SYSTEMS SOFTWARE SURVEY

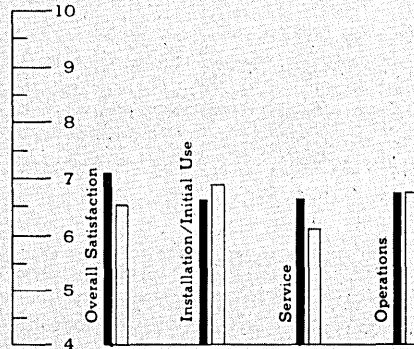
CINCOM ENVIRON/1 • Cincom Systems, Inc., 2300 Montana Avenue, Cincinnati, OH 45211 • 513-662-2300

26 responses • 31% judge features/capabilities outstanding • 46% considering replacement, 15% due to unsatisfactory performance.



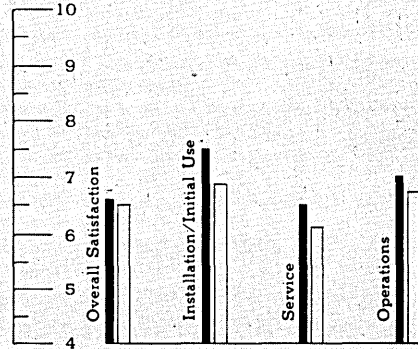
IBM CICS • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

21 responses • 38% judge features/capabilities outstanding • 0% considering replacement.



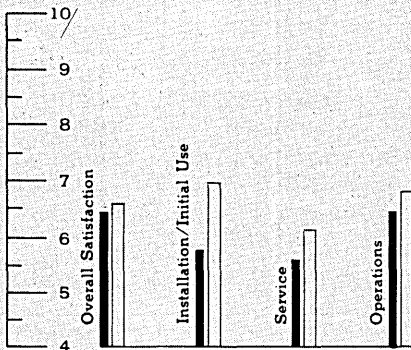
MATHEMATICA SWIFT • Mathematica Products Group, P.O. Box 2392, Princeton, NJ 08540 • 609-799-2600

15 responses • 40% judge features/capabilities outstanding • 40% considering replacement, 0% due to unsatisfactory performance.



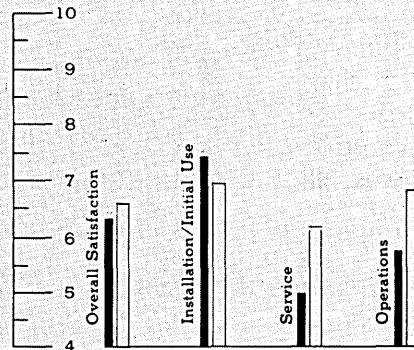
SDA PRODUCTS INTERCOMM • SDA Products, Inc., 475 Park Avenue, 26th Floor, New York, NY 10016 • 212-481-6800

17 responses • 18% judge features/capabilities outstanding • 35% considering replacement, 18% due to unsatisfactory performance.



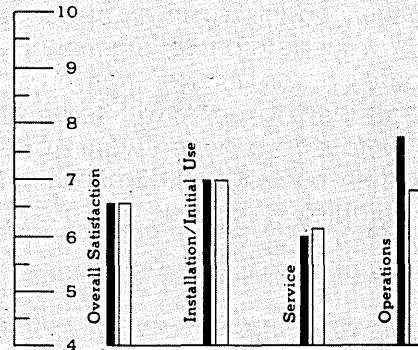
SDA PRODUCTS MINICOMM • SDA Products, Inc., 475 Park Avenue, 26th Floor, New York, NY 10016 • 212-481-6800

15 responses • 13% judge features/capabilities outstanding • 87% considering replacement, 13% due to unsatisfactory performance.



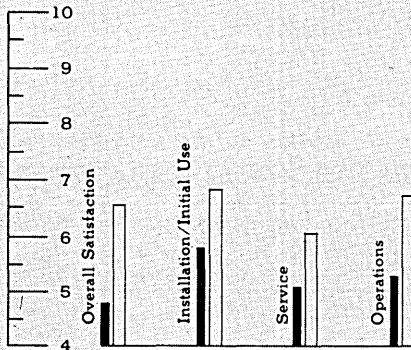
SOFTWARE AG COM-LETE • Software AG of North America, 11800 Sunrise Valley Drive, Reston, VA 22091 • 703-860-5050

15 responses • 47% judge features/capabilities outstanding • 20% considering replacement, 13% due to unsatisfactory performance.



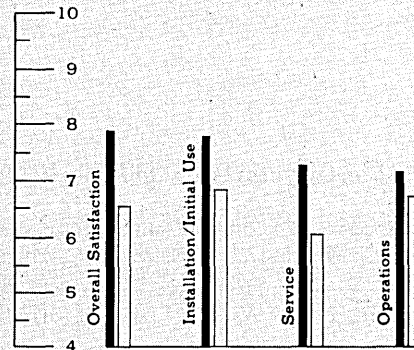
TSI TASK/MASTER • TSI International, 50 Washington Street, Norwalk, CT 06854 • 203-853-2884

19 responses • 11% judge features/capabilities outstanding • 63% considering replacement, 37% due to unsatisfactory performance.



WESTINGHOUSE WESTI • Westinghouse Electric Corp., 2040 Ardmore Blvd., Pittsburgh, PA 15221 • 412-636-3100

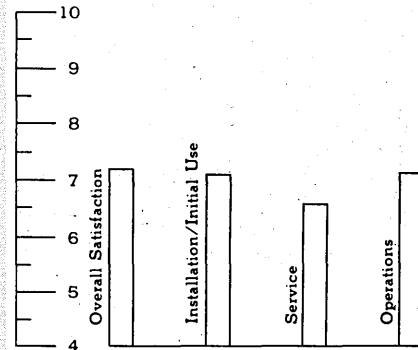
26 responses • 46% judge features/capabilities outstanding • 35% considering replacement, 4% due to unsatisfactory performance.



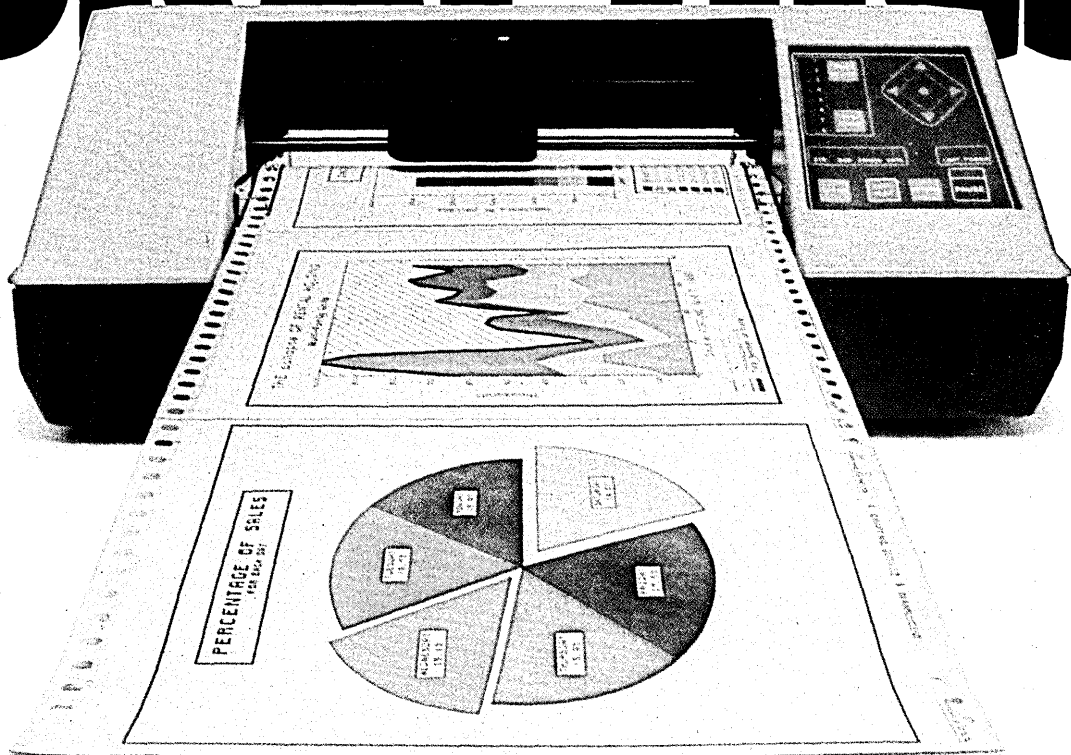
OTHER COMMUNICATIONS PACKAGES

Group Average • 14 packages

380 responses • 44% judge features/capabilities outstanding • 12% considering replacement, 2% due to unsatisfactory performance.



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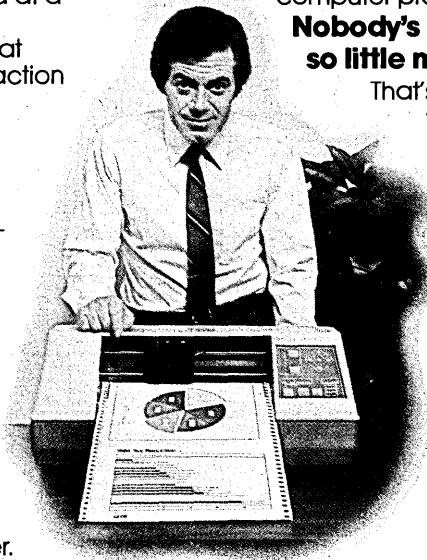
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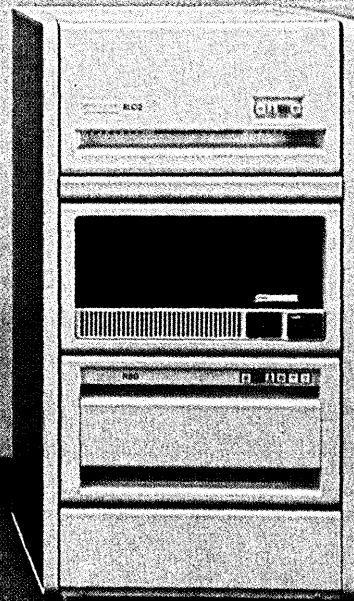
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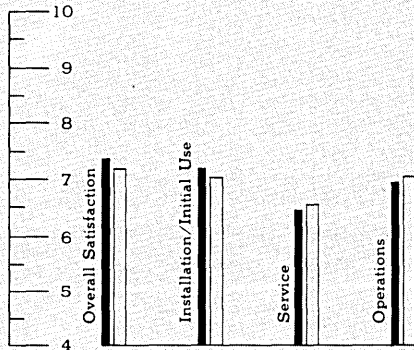
Photo from San Francisco Opera's production of Samson et Dalila heard nationwide on NPR stations.

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CIRCLE 84 ON READER CARD

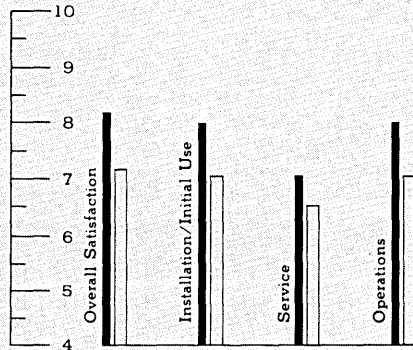
ADR ROSCOE • Applied Data Research, Route 206 & Orchard Road, Princeton, NJ 08540 • 201-874-9000

26 responses • 50% judge features/capabilities outstanding • 15% considering replacement, 0% due to unsatisfactory performance.



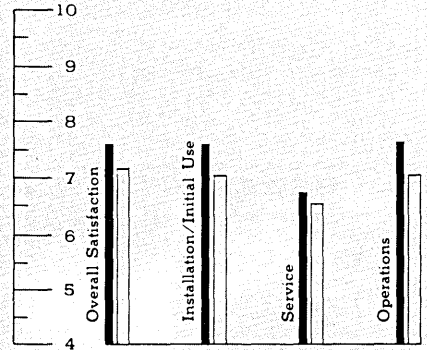
ADR VOLLIE • Applied Data Research, Route 206 & Orchard Road, Princeton, NJ 08540 • 201-874-9000

65 responses • 72% judge features/capabilities outstanding • 0% considering replacement.



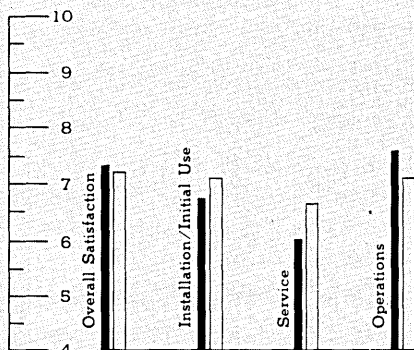
BURROUGHS NDL • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 714-731-5100

35 responses • 51% judge features/capabilities outstanding • 9% considering replacement, 0% due to unsatisfactory performance.



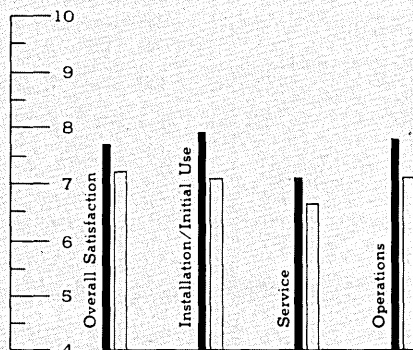
BURROUGHS GEMCOS • Burroughs Corp., Burroughs Place, Detroit, MI 48232 • 714-731-5100

27 responses • 41% judge features/capabilities outstanding • 4% considering replacement, 0% due to unsatisfactory performance.



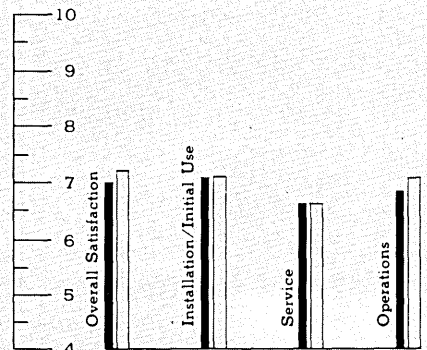
COMPUWARE ABEND-AID • Compuware Corp., 29433 Southfield Rd., Southfield MI 48076 • 313-559-0890

23 responses • 43% judge features/capabilities outstanding • 0% considering replacement.



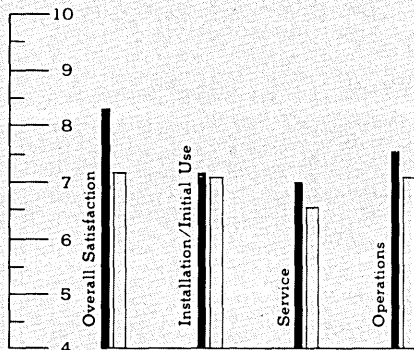
IBM CMS • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

20 responses • 60% judge features/capabilities outstanding • 5% considering replacement, 5% due to unsatisfactory performance.



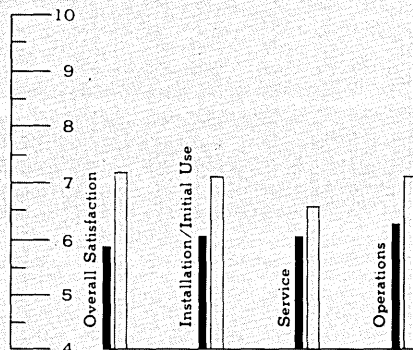
IBM HASP • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

20 responses • 30% judge features/capabilities outstanding • 40% considering replacement, 15% due to unsatisfactory performance.



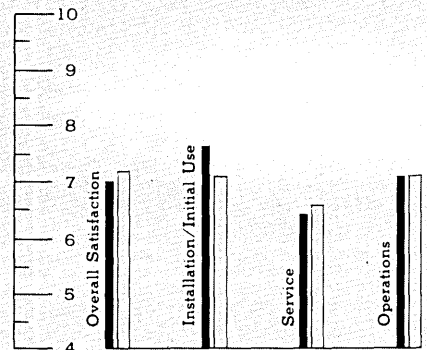
IBM ICCF • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

47 responses • 21% judge features/capabilities outstanding • 17% considering replacement, 9% due to unsatisfactory performance.



IBM JES 2 • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

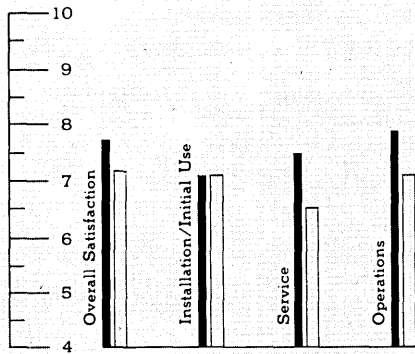
25 responses • 44% judge features/capabilities outstanding • 8% considering replacement, 0% due to unsatisfactory performance.



SYSTEMS SOFTWARE SURVEY

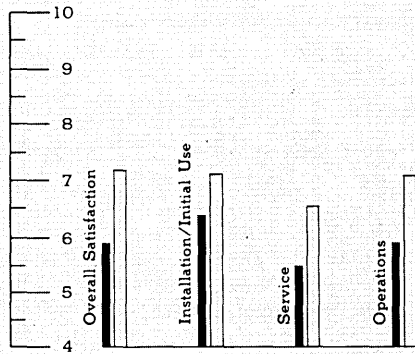
IBM JES 3 • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

23 responses • 74% judge features/capabilities outstanding • 0% considering replacement.



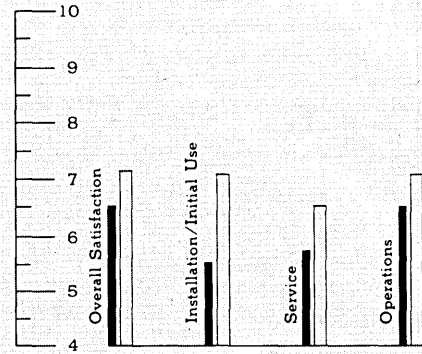
IBM MTCS • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

18 responses • 6% judge features/capabilities outstanding • 56% considering replacement, 11% due to unsatisfactory performance.



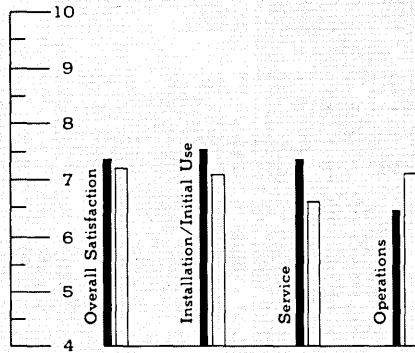
IBM NCP • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

15 responses • 27% judge features/capabilities outstanding • 0% considering replacement.



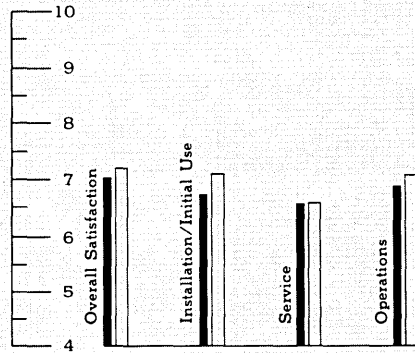
IBM TSO • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

16 responses • 50% judge features/capabilities outstanding • 13% considering replacement, 0% due to unsatisfactory performance.



IBM VTAM • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

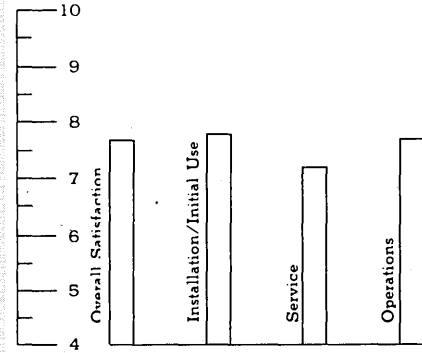
20 responses • 45% judge features/capabilities outstanding • 0% considering replacement.



OPERATING SYSTEMS/SYSTEM SUPPORT

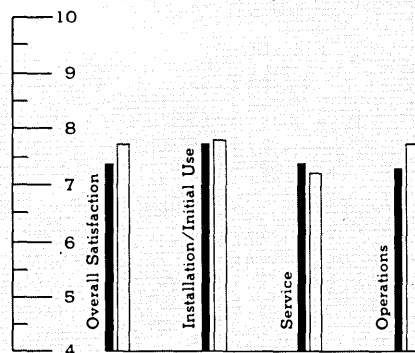
Group Average • 26 packages

683 responses • 50% judge features/capabilities outstanding • 8% considering replacement, less than 1% due to unsatisfactory performance.



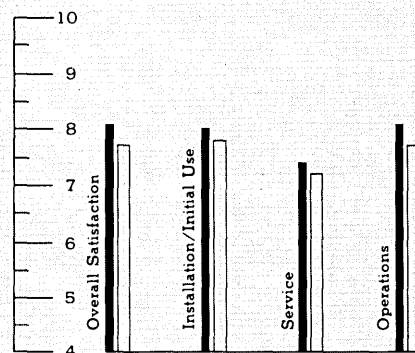
ADR LIBRARIAN • Applied Data Research, Route 206 & Orchard Road, Princeton, NJ 08540 • 201-874-9000

27 responses • 59% judge features/capabilities outstanding • 7% considering replacement, 4% due to unsatisfactory performance.



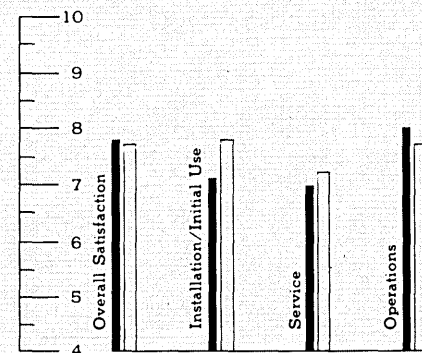
ALTERGO SPACE/MANAGE • Insac Software Inc., 2300 Peachford Road, Suite 3235, Atlanta, GA 30338 • 404-452-7676

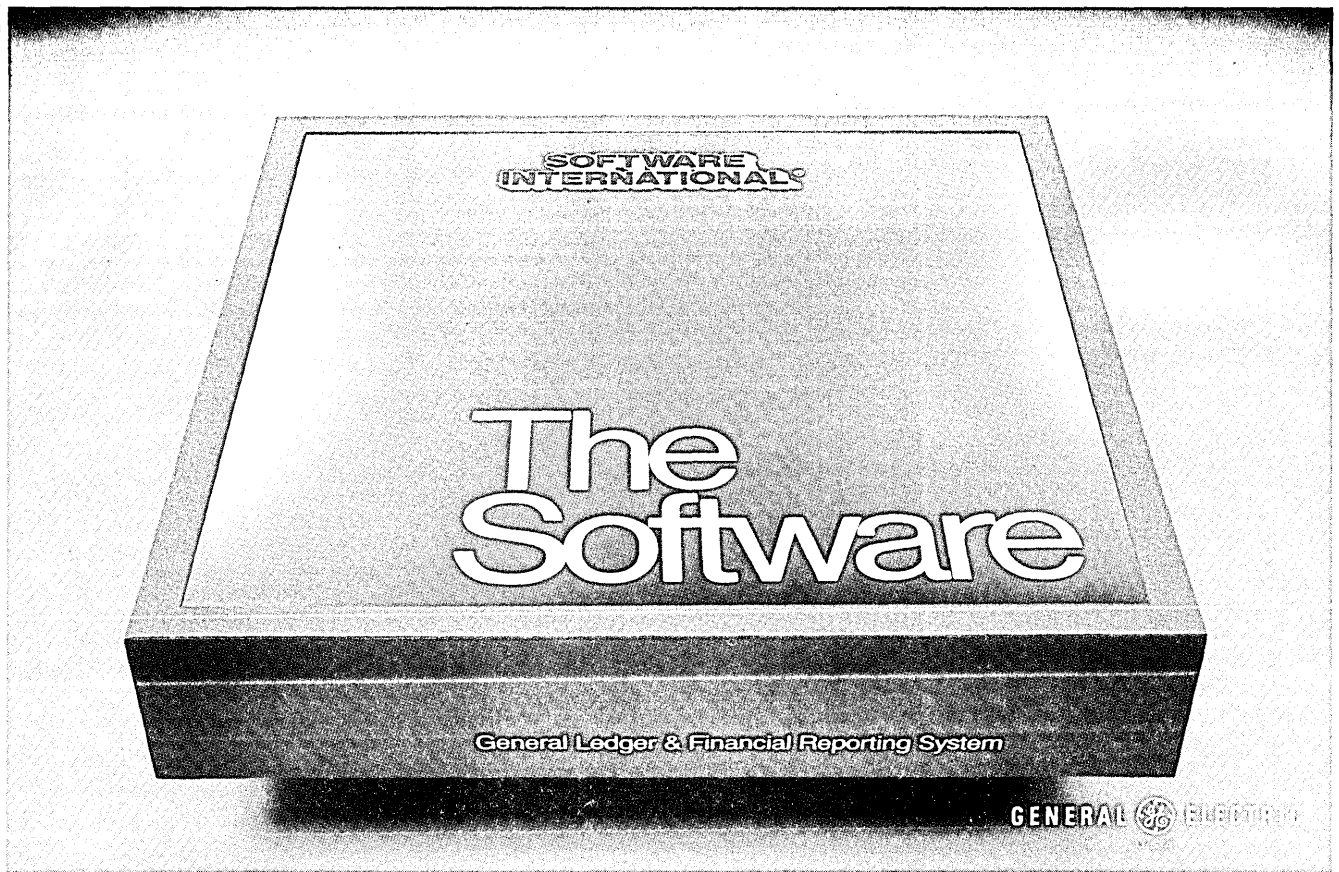
16 responses • 75% judge features/capabilities outstanding • 0% considering replacement.



CAM-SYSTEMS ASM2 • Cambridge Systems Group, 24275 Elise Court, Los Altos Hills, CA 94022 • 415-941-4558

23 responses • 70% judge features/capabilities outstanding • 4% considering replacement, 0% due to unsatisfactory performance.





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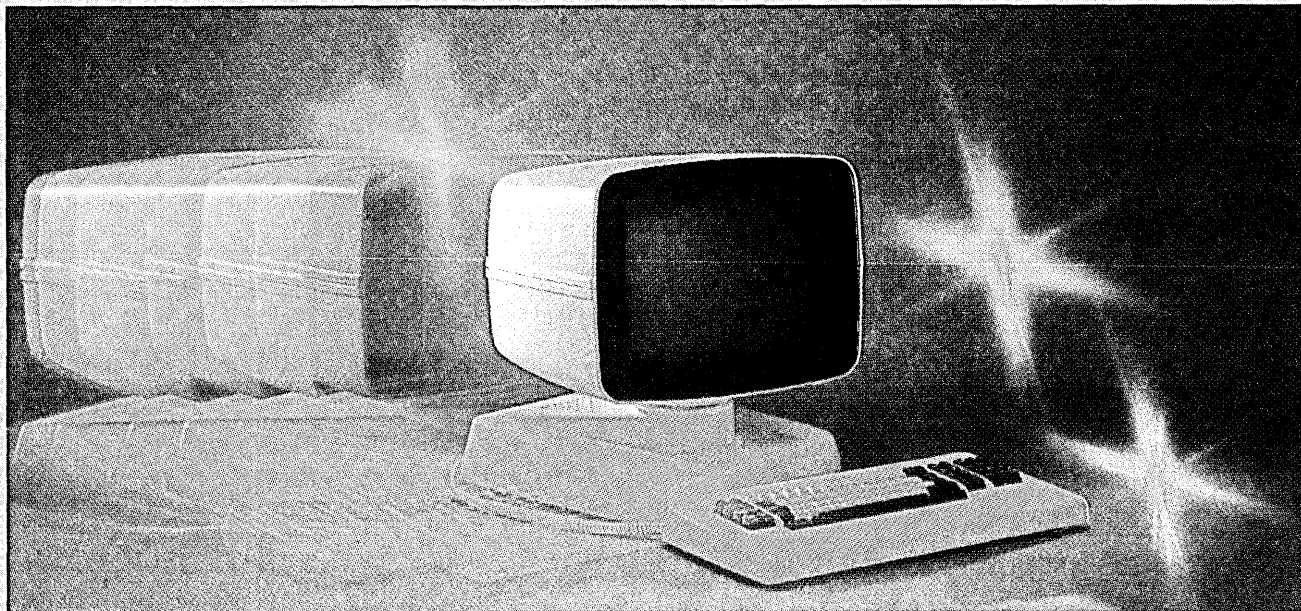
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- Display is lightweight, only 31 lbs.
- Display is also compact, with a base footprint of only 14" x 16".



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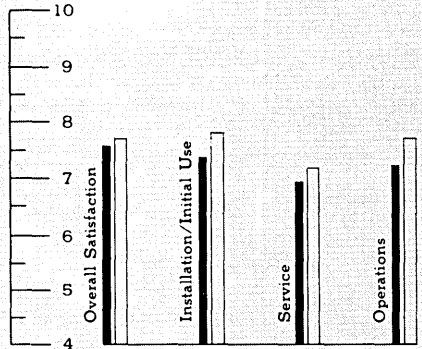
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SYSTEMS SOFTWARE SURVEY

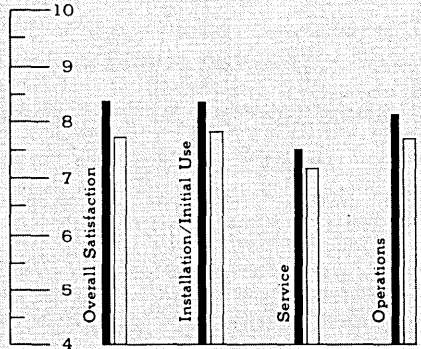
CAPEX/GULF TLMS • Capex Corp., 4125 North 14th Street, Phoenix, AZ 85014 • 602-264-7241

19 responses • 53% judge features/capabilities outstanding • 0% considering replacement.



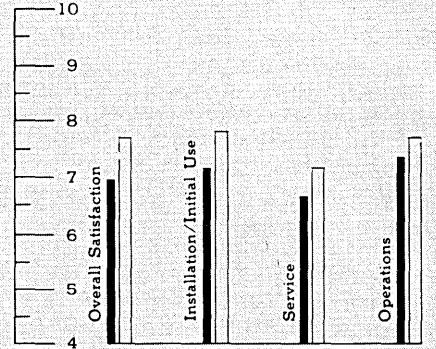
COM-ASSOC CA-SORT • Computer Associates, Inc., 125 Jericho Turnpike, Jericho, NY 11753 • 516-333-6700

24 responses • 58% judge features/capabilities outstanding • 8% considering replacement, 0% due to unsatisfactory performance.



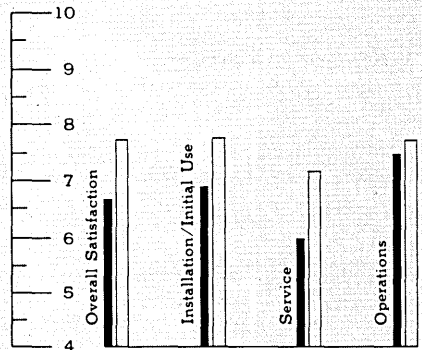
COM-ASSOC CA-DYNAM/D • Computer Associates, Inc., 125 Jericho Turnpike, Jericho, NY 11753 • 516-333-6700

30 responses • 40% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



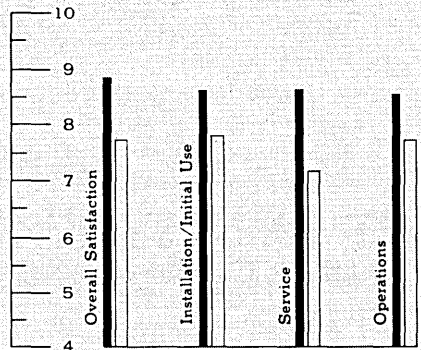
COM-ASSOC CA-DYNAM/T • Computer Associates, Inc., 125 Jericho Turnpike, Jericho, NY 11753 • 516-333-6700

25 responses • 40% judge features/capabilities outstanding • 4% considering replacement, 0% due to unsatisfactory performance.



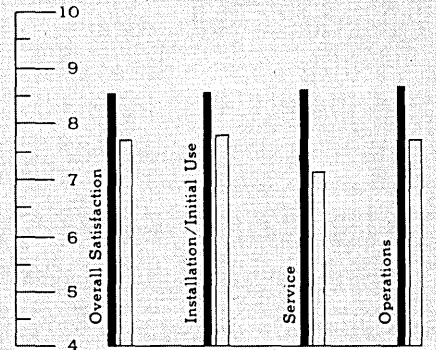
GOAL FAQs • Goal Systems International, P.O. Box 29481, Columbus, OH 43229

16 responses • 69% judge features/capabilities outstanding • 0% considering replacement.



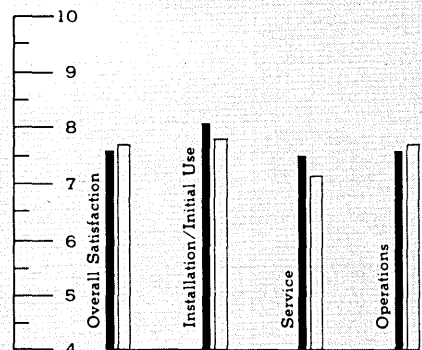
GOAL FLEE/FLIM • Goal Systems International, P.O. Box 29481, Columbus, OH 43229

33 responses • 79% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



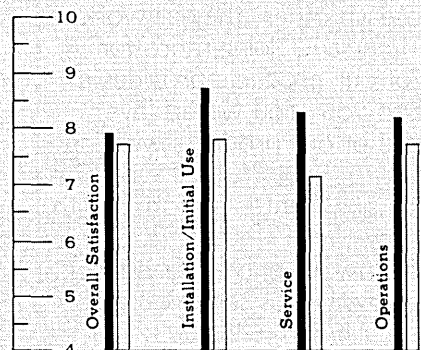
IBM POWER • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

27 responses • 44% judge features/capabilities outstanding • 0% considering replacement.



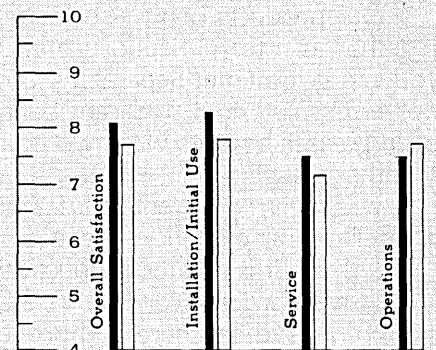
IBM UTILITY • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

44 responses • 50% judge features/capabilities outstanding • 2% considering replacement, 0% due to unsatisfactory performance.



IMSL LIBRARY - SYS • IMSL, Inc., NBC Bldg., 7500 Bellaire Blvd., Houston, TX 77036 • 713-772-1927

21 responses • 62% judge features/capabilities outstanding • 5% considering replacement, 0% due to unsatisfactory performance.





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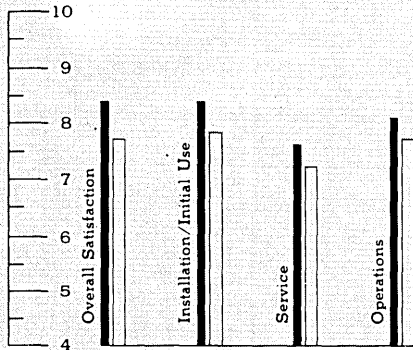
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SYSTEMS SOFTWARE SURVEY

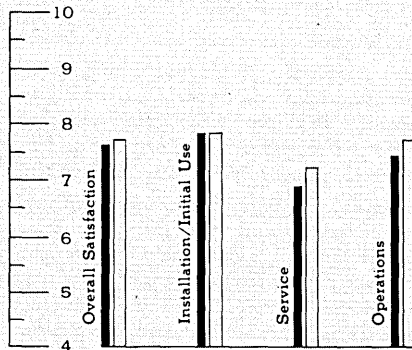
INNOVATION FDR • Innovation Data Processing, Inc., 970 Clifton Avenue, Clifton, NJ 07013 • 201-777-1940

29 responses • 52% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



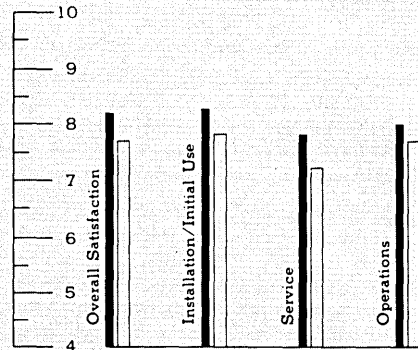
NCI SLICK • NCI, Inc., 3720 Longview Drive, Atlanta, GA 30341 • 404-451-7455

29 responses • 38% judge features/capabilities outstanding • 21% considering replacement, 0% due to unsatisfactory performance.



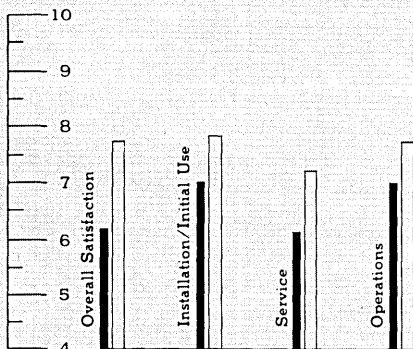
PANSOPHIC PANVALET • Pansophic Systems, Inc., 709 Enterprise Drive, Oakbrook, IL 60521 • 312-986-2260

31 responses • 49% judge features/capabilities outstanding • 7% considering replacement, 0% due to unsatisfactory performance.



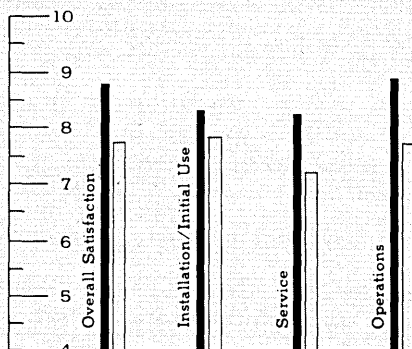
SDI EPAT • SDI, 1700 South El Camino Real, San Mateo, CA 94402 • 415-572-1200

26 responses • 23% judge features/capabilities outstanding • 23% considering replacement, 12% due to unsatisfactory performance.



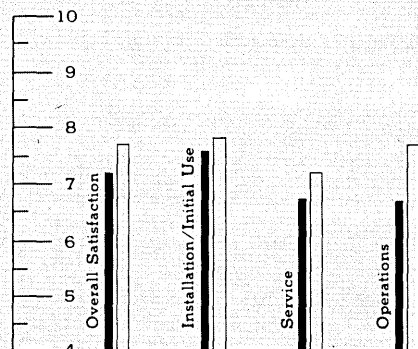
SOFT-PURSUIT DOS/MVT • Software Pursuits, Inc. 444 Market Street, Suite 800, San Francisco, CA 94111 • 415-392-7171

31 responses • 84% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



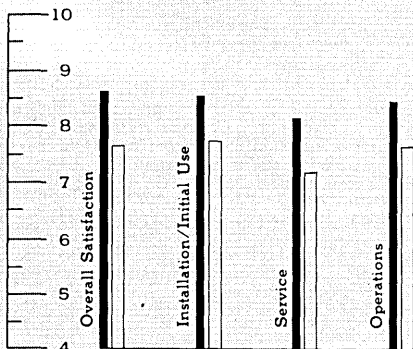
SPSS SPSS • SPSS, Inc., 444 N. Michigan, Ste. 3000, Chicago, IL 60302 • 312-329-2400

43 responses • 35% judge features/capabilities outstanding • 14% considering replacement, 0% due to unsatisfactory performance.



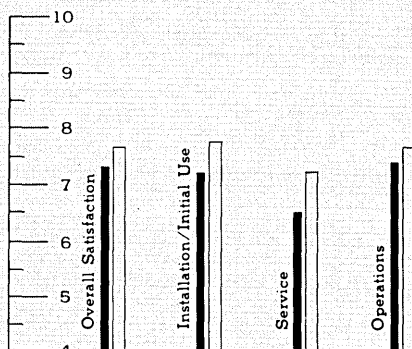
SYNCSORT/WHITLOW SYNCSORT • Syncsort, Inc., 560 Sylvan Avenue, Englewood Cliffs, NJ 07632 • 201-568-9700

34 responses • 71% judge features/capabilities outstanding • 3% considering replacement, 0% due to unsatisfactory performance.



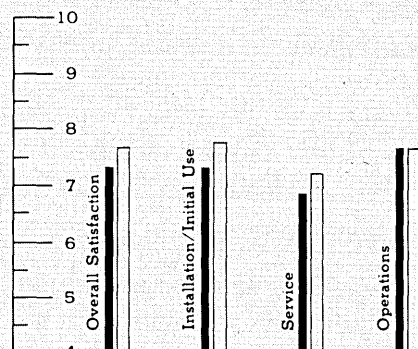
TOWER/OXFORD DFAST • Tower Systems, Inc., 19782 MacArthur Boulevard, Suite 365, Irvine, CA 92715 • 714-752-8263

27 responses • 52% judge features/capabilities outstanding • 22% considering replacement, 4% due to unsatisfactory performance.



TOWER/OXFORD TFAST • Tower Systems, Inc., 19782 MacArthur Boulevard, Suite 365, Irvine, CA 92715 • 714-991-9460

22 responses • 32% judge features/capabilities outstanding • 5% considering replacement, 0% due to unsatisfactory performance.



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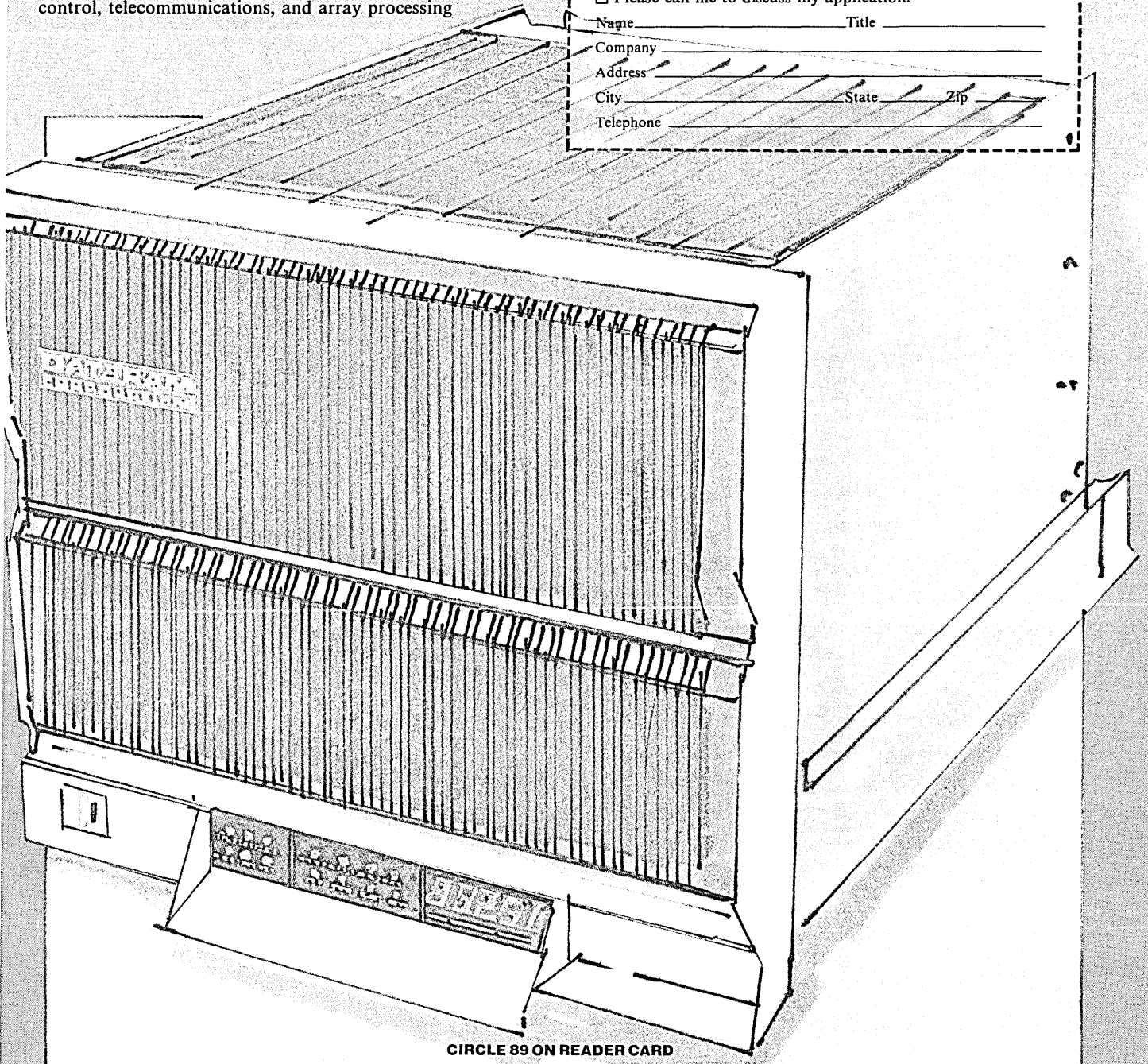


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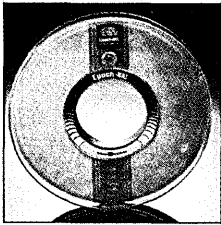
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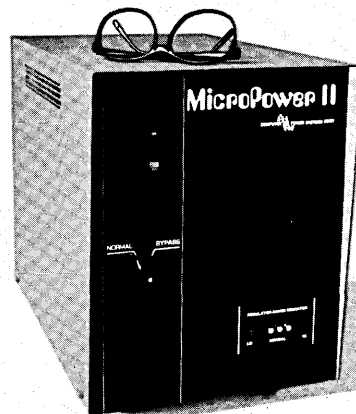


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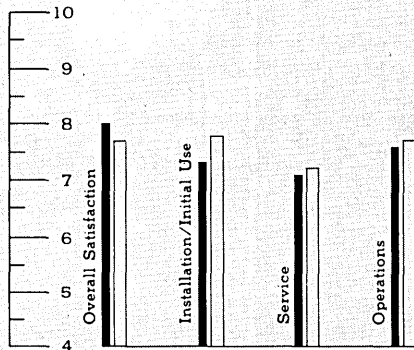
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SYSTEMS SOFTWARE SURVEY

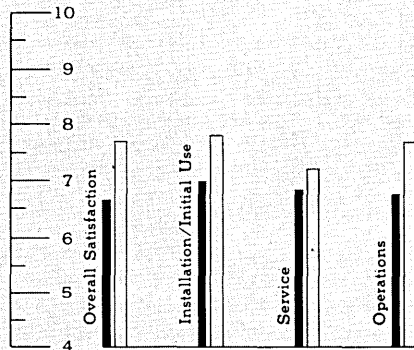
UCC UCC-ONE • University Computing Company, UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

33 responses • 64% judge features/capabilities outstanding • 0% considering replacement.



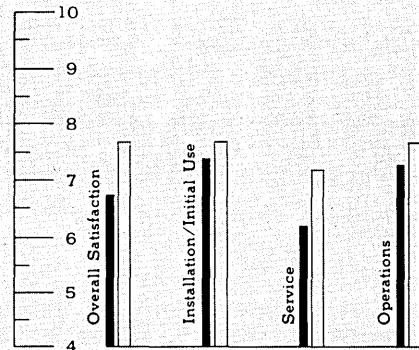
UCC UCC-THREE • University Computing Company, UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

27 responses • 19% judge features/capabilities outstanding • 11% considering replacement, 0% due to unsatisfactory performance.



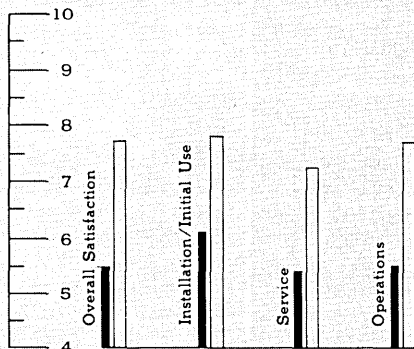
UNIVERSAL ADAS • Universal Software, Inc., Brookfield Office Park, Brookfield, CT 06804 • 203-792-5100

16 responses • 31% judge features/capabilities outstanding • 38% considering replacement, 6% due to unsatisfactory performance.



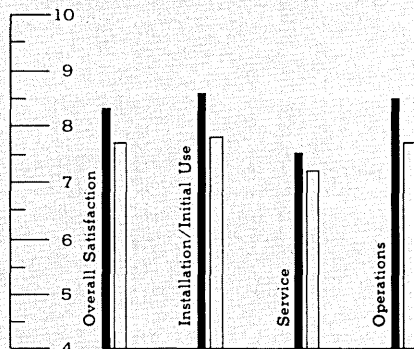
VALUE VALU-LIB • Value Computing, Inc., 498 Kings Highway, Cherry Hill, NJ 08034 • 609-482-2500

15 responses • 0% judge features/capabilities outstanding • 7% considering replacement, 0% due to unsatisfactory performance.



WESTINGHOUSE DOS DUMP/RESTOR • Westinghouse Electric, 2040 Ardmore Blvd., Pittsburgh, PA 15221 • 412-636-3100

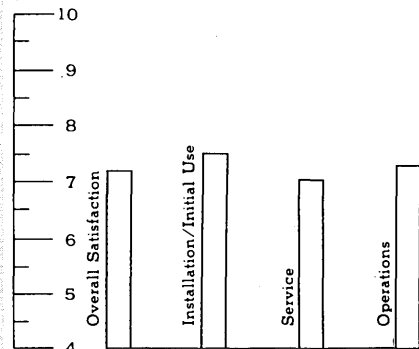
15 responses • 60% judge features/capabilities outstanding • 7% considering replacement, 0% due to unsatisfactory performance.



SYSTEM MANAGEMENT AIDS

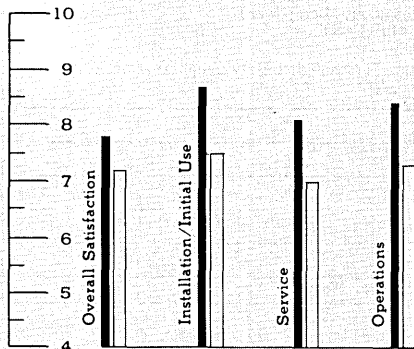
Group Average • 14 packages

278 responses • 34% judge features/capabilities outstanding • 10% considering replacement, 1% due to unsatisfactory performance.



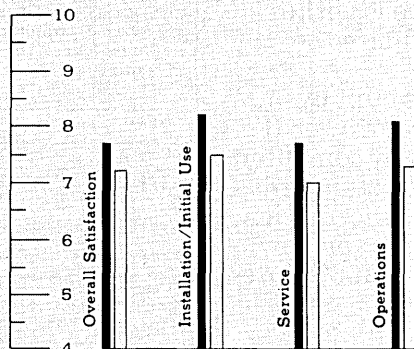
ADR LOOK • Applied Data Research, Route 206 & Orchard Road, Princeton, NJ 08540 • 201-874-9000

20 responses • 45% judge features/capabilities outstanding • 10% considering replacement, 0% due to unsatisfactory performance.



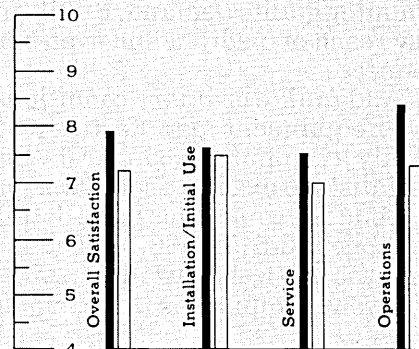
BOOLE & BABBAGE RESOLVE • Boole & Babbage, Inc., 510 Oakmead Parkway, Sunnyvale, CA 94086 • 408-735-9550

15 responses • 40% judge features/capabilities outstanding • 0% considering replacement.

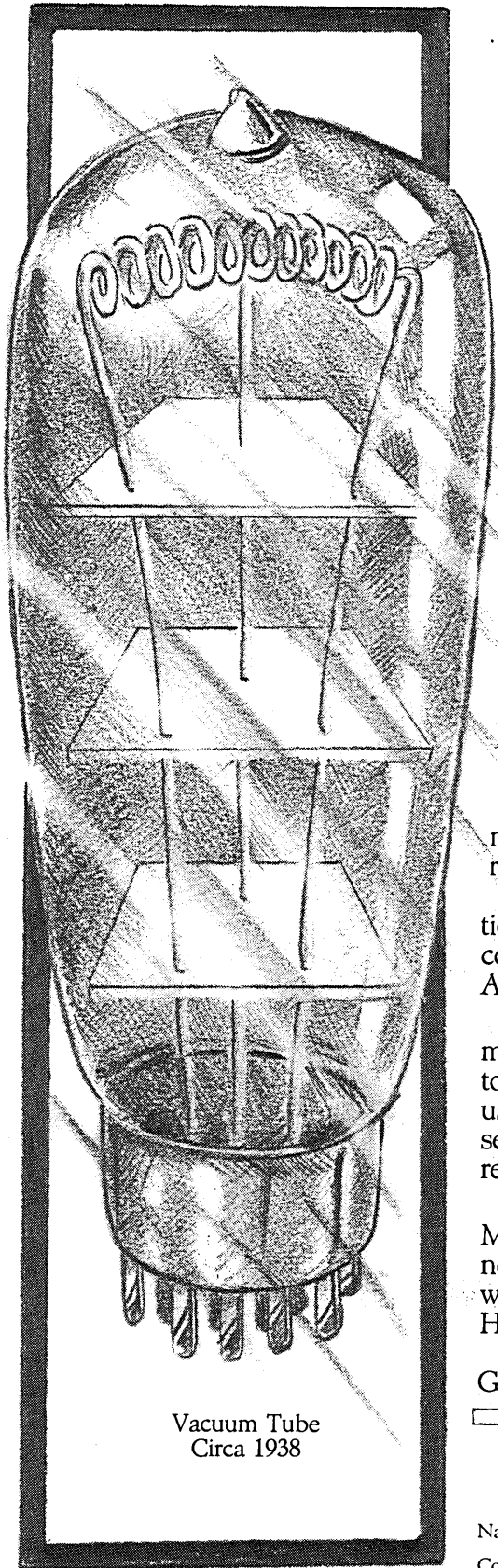


CAM-SYSTEMS ACF-2 • Cambridge Systems Group, 24275 Elise Court, Los Altos Hills, CA 94022 • 415-941-4558

16 responses • 62% judge features/capabilities outstanding • 0% considering replacement.



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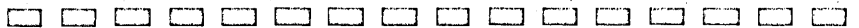
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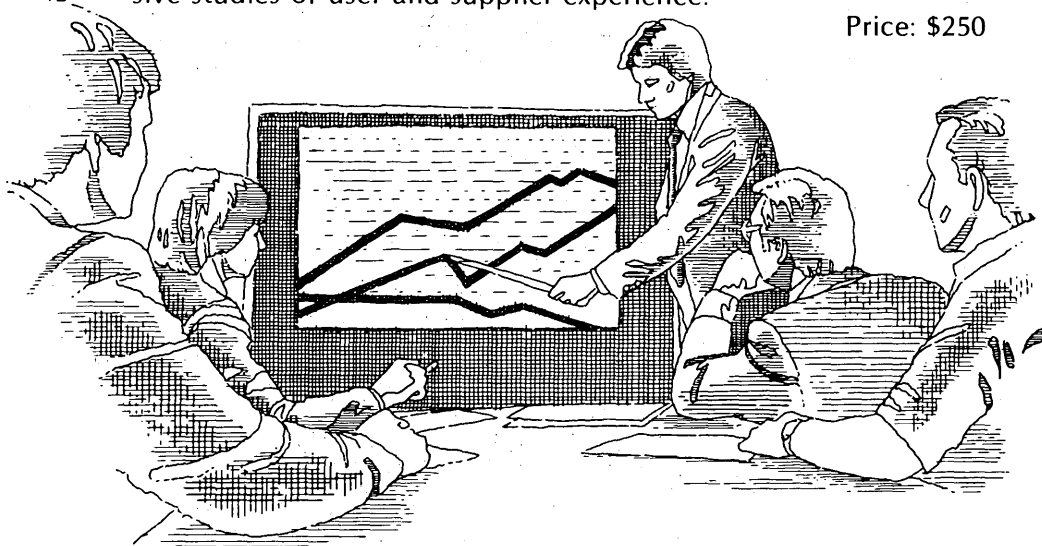
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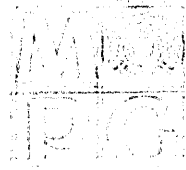
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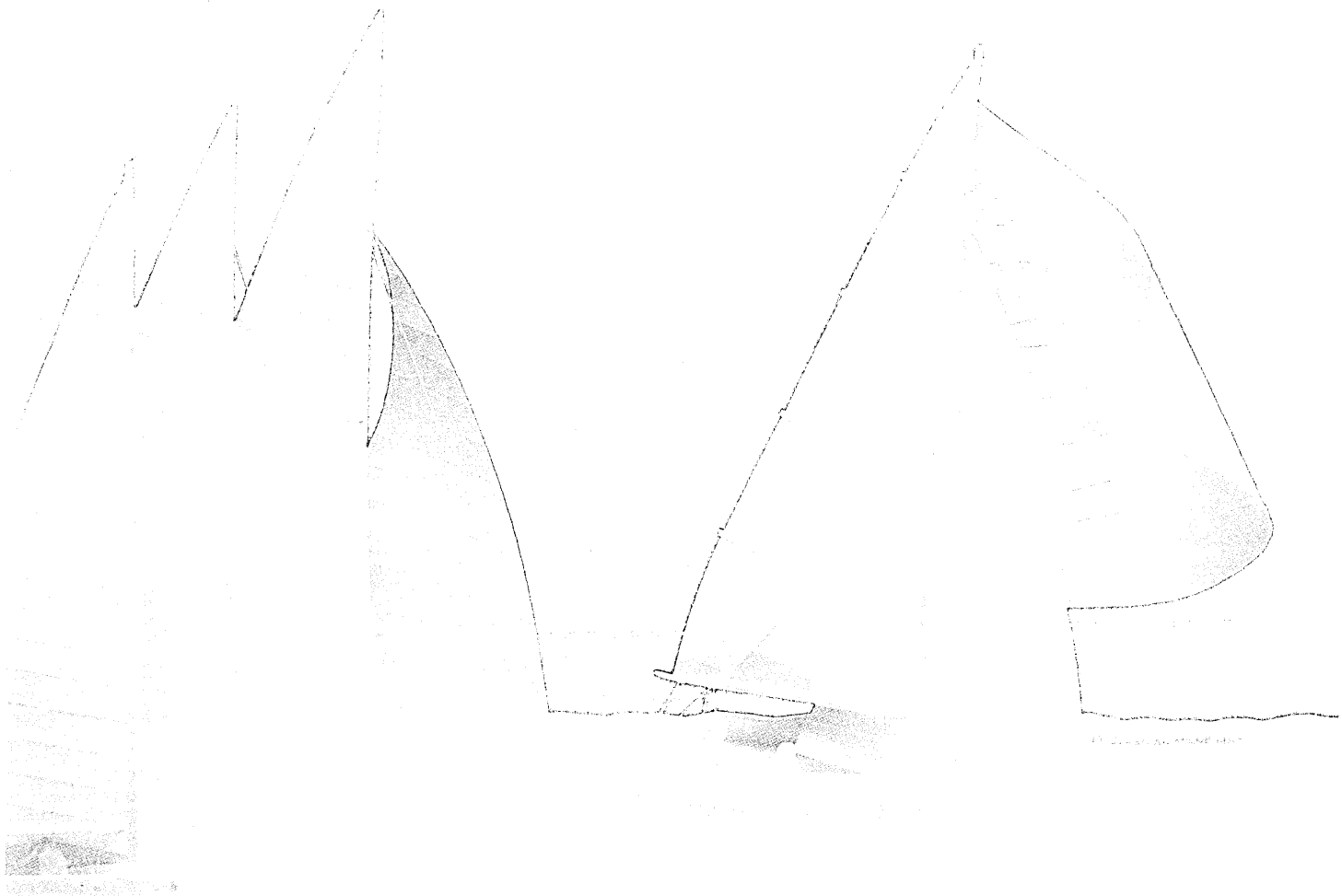
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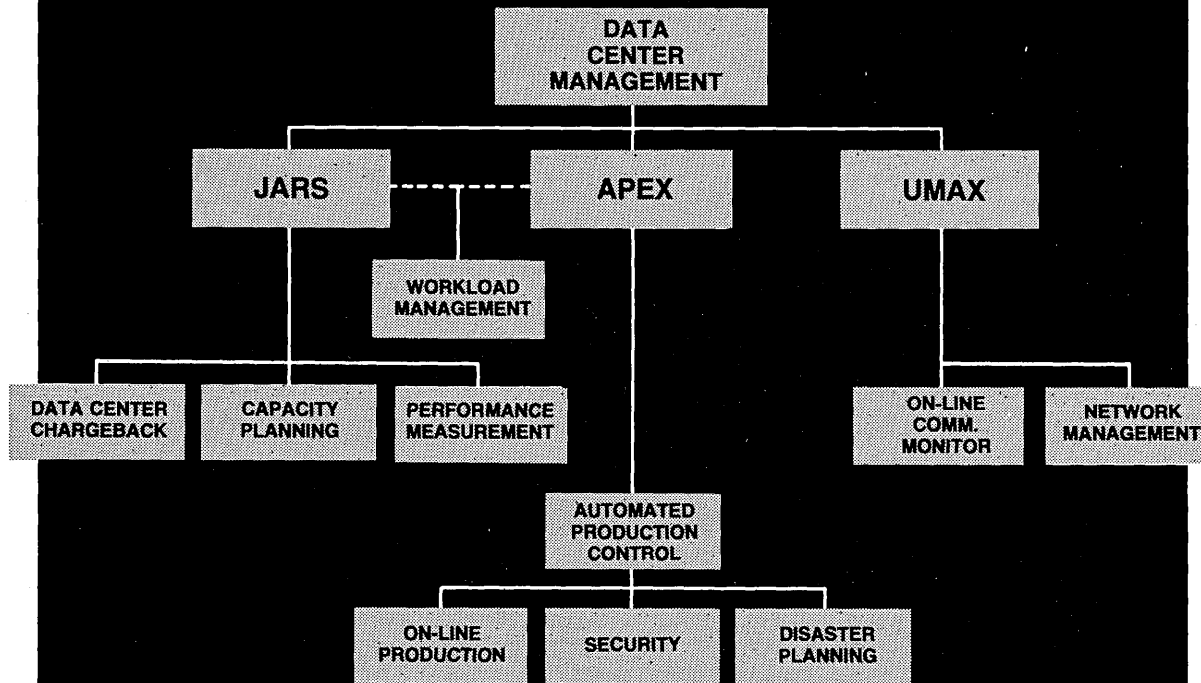
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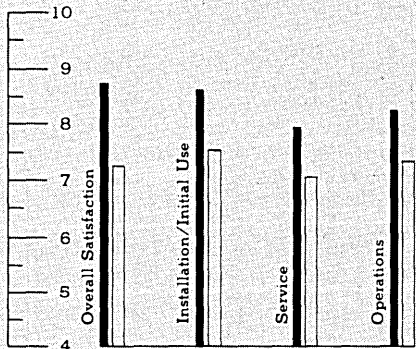
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JARS CIRCLE 100 ON READER CARD, UMAX CIRCLE 101 ON READER CARD, APEX CIRCLE 102 ON READER CARD

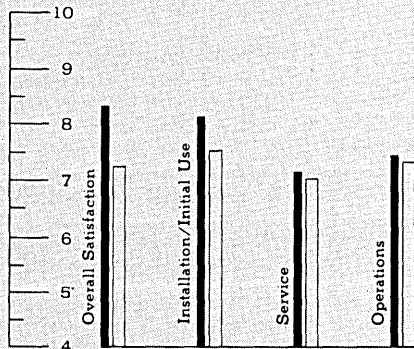
CANDLE OMEGAMON • Candle Corp., 4676 Admiralty Way, Marina del Rey, CA 90291 • 213-821-2902

27 responses • 66% judge features/capabilities outstanding • 0% considering replacement.



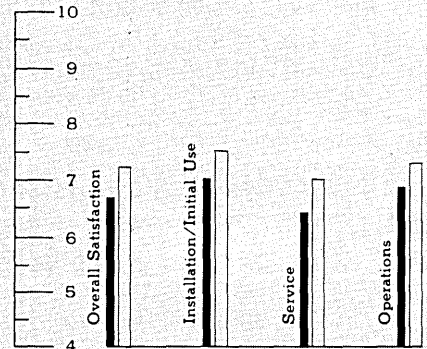
CAPEX PLAN IV • Capex Corp., 4125 North 14th Street, Phoenix, AZ 85014 • 602-264-7241

16 responses • 38% judge features/capabilities outstanding • 0% considering replacement.



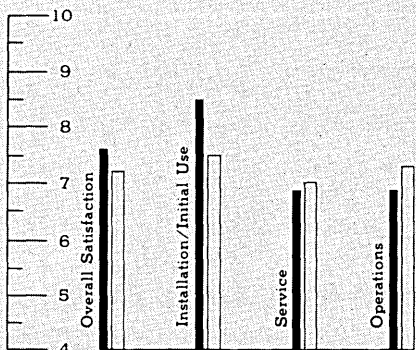
COM-ASSOC JASPER • Computer Associates, Inc., 125 Jericho Turnpike, Jericho, NY 11753 • 516-333-6700

28 responses • 32% judge features/capabilities outstanding • 14% considering replacement, 7% due to unsatisfactory performance.



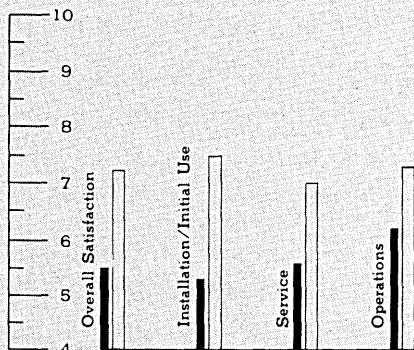
IBM DITTO • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

21 responses • 33% judge features/capabilities outstanding • 0% considering replacement.



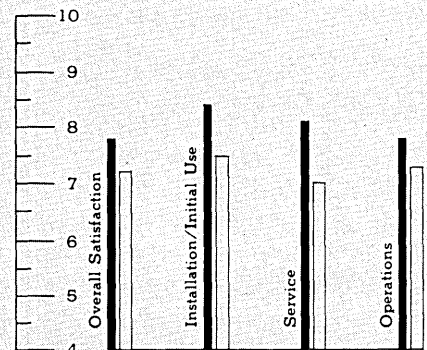
IBM DMS • IBM Corp./Information Systems Group, National Accounts Division, 1133 Westchester Ave., White Plains, NY 10604 • 914-696-1900

27 responses • 4% judge features/capabilities outstanding • 15% considering replacement, 7% due to unsatisfactory performance.



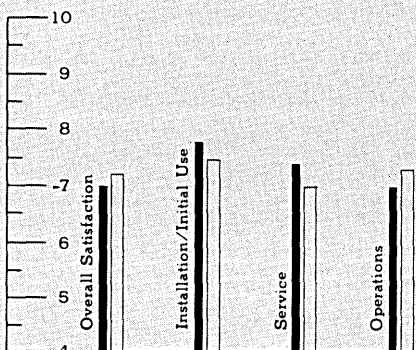
UNITED COMPUTING FORESIGHT • United Computing Systems, Inc., 2525 Washington St., Kansas City, MO 64108 • 816-221-9700

15 responses • 33% judge features/capabilities outstanding • 27% considering replacement, 0% due to unsatisfactory performance.



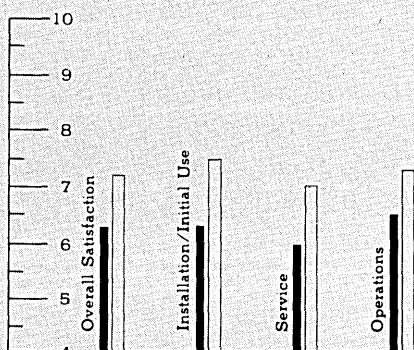
JOHNSON JARS • Johnson Systems Inc., 7923 Jones Branch Drive, McLean, VA 22102 • 703-821-1700

25 responses • 32% judge features/capabilities outstanding • 4% considering replacement, 0% due to unsatisfactory performance.



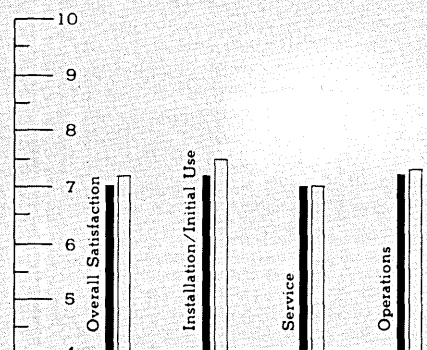
PACE KOMAND • Pace Applied Technology, Inc., 7900 Sudley Rd., Manassas, VA 22110 • 703-369-3200

16 responses • 13% judge features/capabilities outstanding • 19% considering replacement, 6% due to unsatisfactory performance.



UCC UCC-15 • University Computing Company, UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

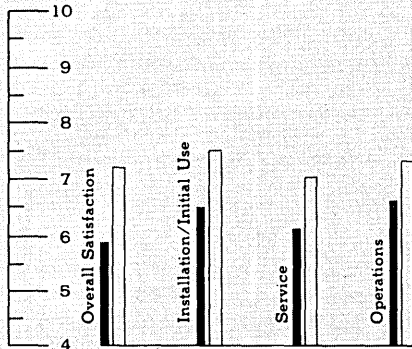
17 responses • 29% judge features/capabilities outstanding • 12% considering replacement, 0% due to unsatisfactory performance.



SYSTEMS SOFTWARE SURVEY

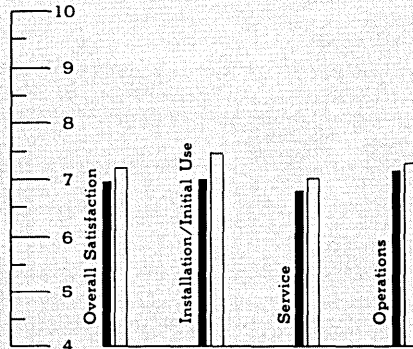
VALUE COMPUT-A-CHARGE • Value Computing, Inc., 498 Kings Highway, Cherry Hill, NJ 08034 • 609-482-2500

15 responses • 20% judge features/capabilities outstanding • 33% considering replacement, 7% due to unsatisfactory performance.



WESTINGHOUSE JOB-MONITOR • Westinghouse Electric Corporation, 2040 Ardmore Boulevard, Pittsburgh, PA 15221 • 412-636-3100

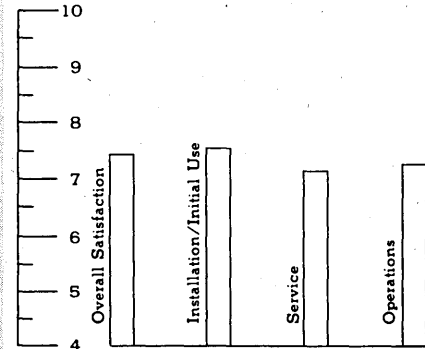
20 responses • 30% judge features/capabilities outstanding • 5% considering replacement, 0% due to unsatisfactory performance.



PROGRAMMING UTILITIES

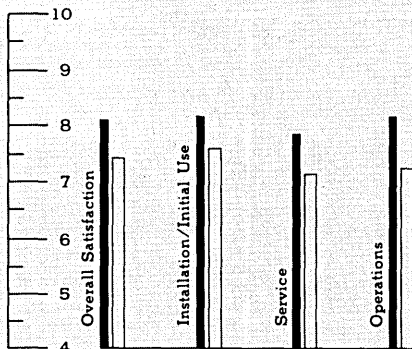
Group Average • 4 packages

99 responses • 39% judge features/capabilities outstanding • 10% considering replacement, 1% due to unsatisfactory performance.



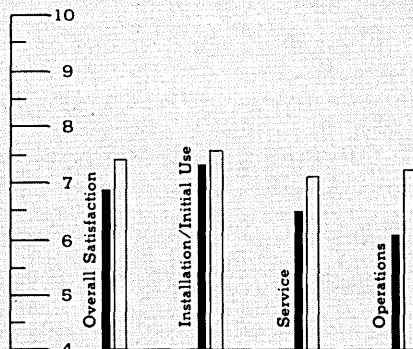
CAPEX OPTIMIZER/OPTIMIZER II • Capex Corp., 4125 North 14th Street, Phoenix, AZ 85014 • 602-264-7241

16 responses • 25% judge features/capabilities outstanding • 0% considering replacement.



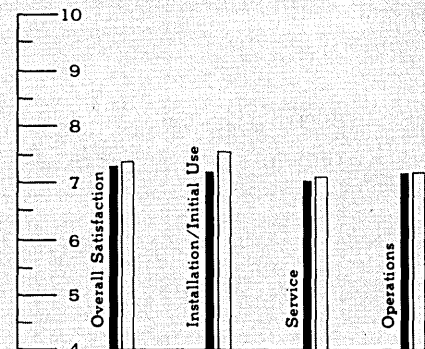
INFORMATICS MARK IV • Informatics, Inc., Software Products Division, 21050 Vanowen Street, Canoga Park, CA 91304 • 213-887-9121

20 responses • 40% judge features/capabilities outstanding • 20% considering replacement, 0% due to unsatisfactory performance.



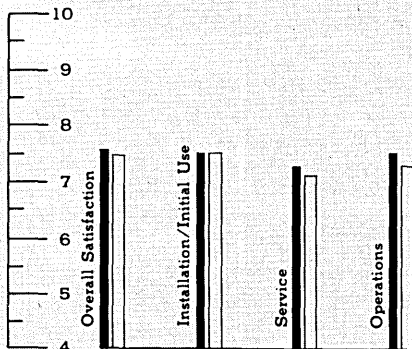
NCI OWL • NCI, Inc., 3720 Longview Drive, Atlanta, GA 30341 • 404-451-7455

37 responses • 57% judge features/capabilities outstanding • 8% considering replacement, 0% due to unsatisfactory performance.



UCC UCC-TWO • University Computing Company, UCC Tower/Exchange Park, Dallas, TX 75235 • 214-353-7100

26 responses • 34% judge features/capabilities outstanding • 11% considering replacement, 4% due to unsatisfactory performance.



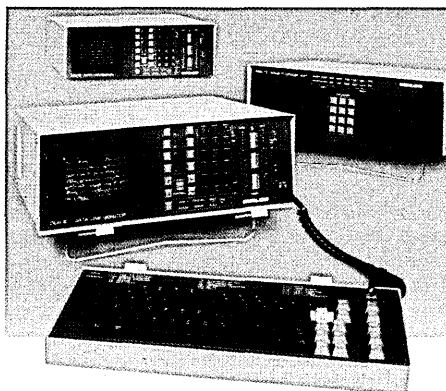
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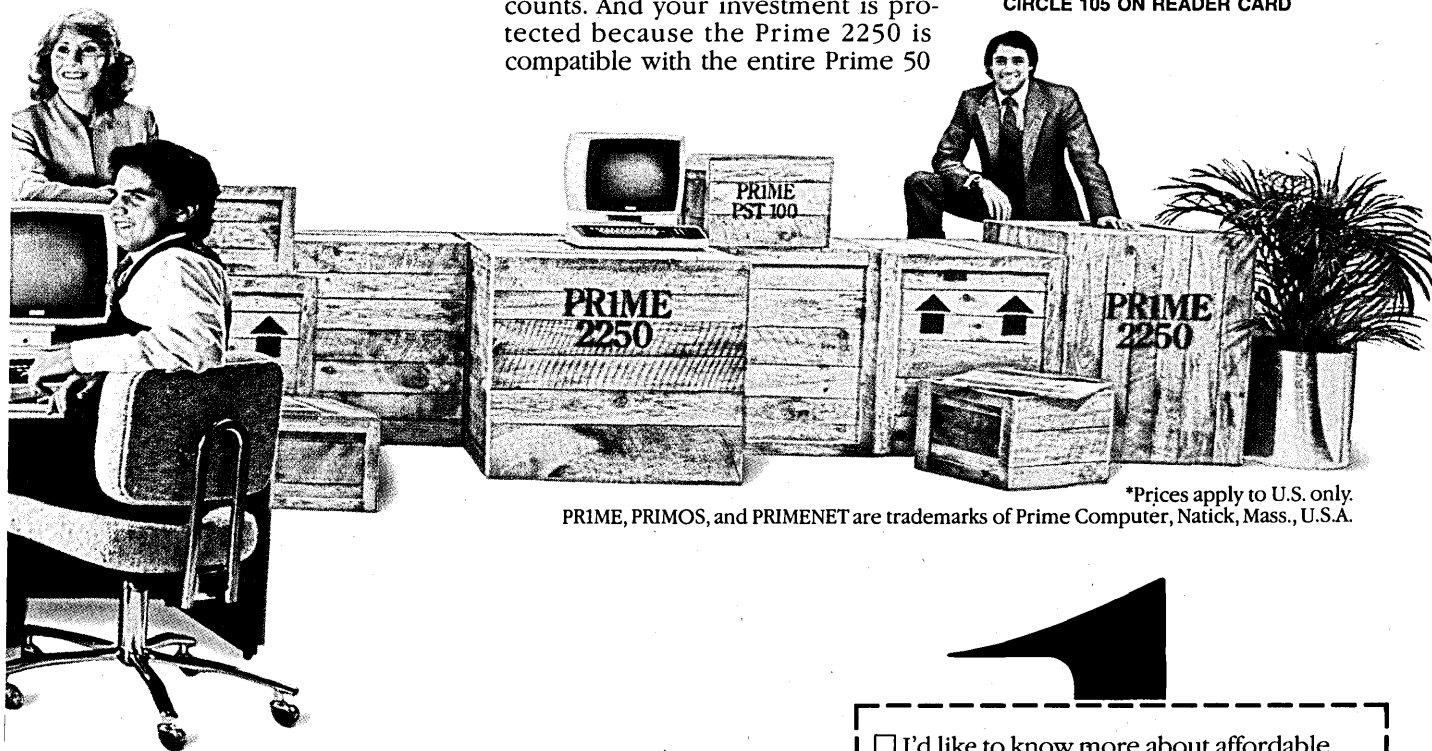
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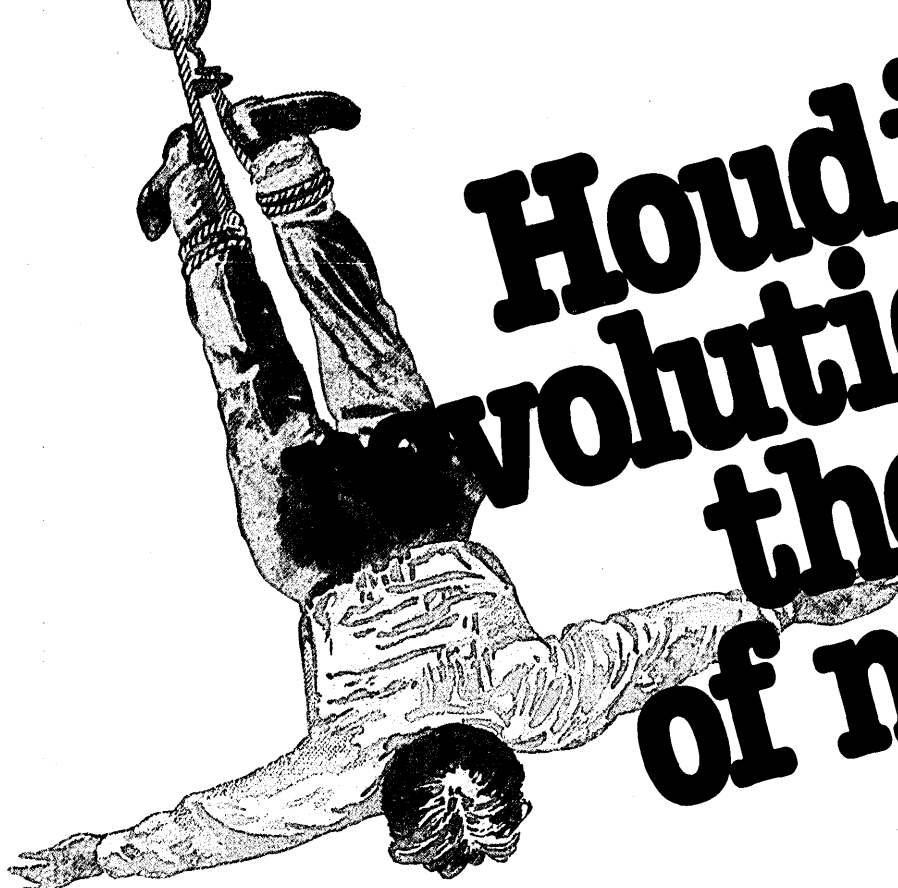
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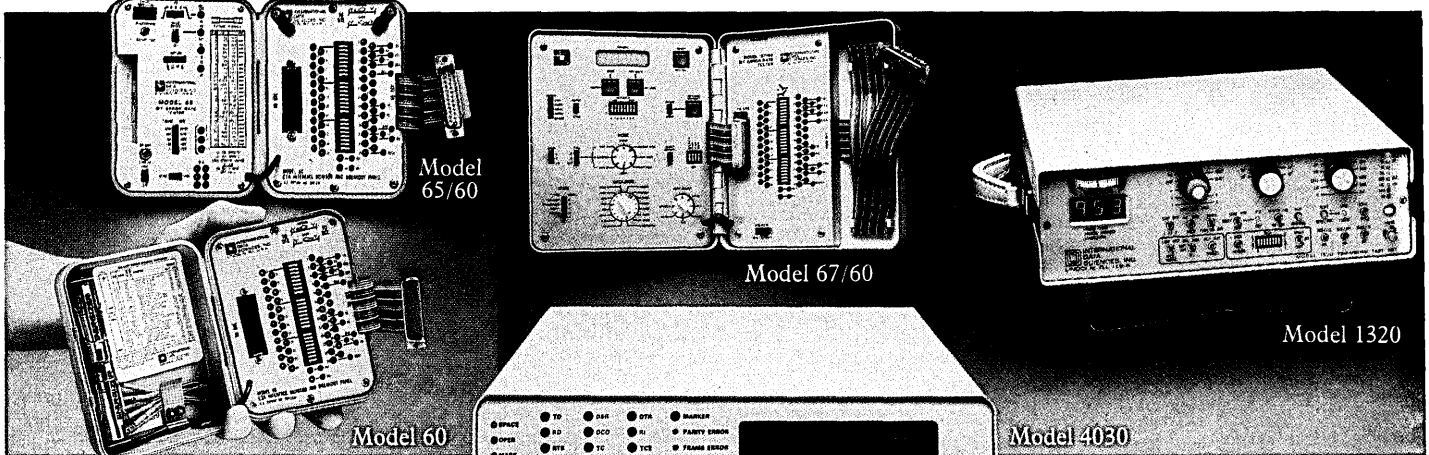
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In which Amdahl, Cray, Poor, and Thornton comment on the direction of computer technology and offer a glimpse of the destinations they have in mind for us.

FOUR EXPERT OPINIONS

by Jan Johnson

Whatever else they may have in common, Gene Amdahl, Seymour Cray, Victor Poor, and James Thornton have all been successful in the computer industry by recognizing a particular market and using technology to carve a niche for themselves there. In the process, they have made significant technical contributions, a fact that gives them the authority to speak on the evolution of technology firsthand. Yet because of the different niches they occupy, each brings a different perspective to any discussion of computing. DATAMATION recently sat down with each of them to discuss their views of the growth of computer technology: where have we been, where are we going, and how are we going to get there?

Gene Amdahl, founder of Amdahl Corp. and Trilogy Ltd., is generally recognized as the father of the plug-compatible market. Seymour Cray started Cray Research and with it the supercomputer field; he now serves as lead consultant on the Cray 2 project. Victor Poor, vice president of research and development for Datapoint, was the lead designer for the original microprocessor—the one that ultimately became the Intel 8008—and is now involved in the small business system/office automation market. James Thornton is the founder of Network Systems, the first commercially marketed superspeed network. Thornton, like Cray, worked in the 1950s with William Norris at a pioneer company called Engineering Research Associates. ERA was bought out by Univac, and when Norris left to start Control Data Corp., Cray, Thornton, and several other ERA-era cronies left with him. Cray made his mark at CDC with his work on the 6600 and 7600 before leaving to start his own venture. Thornton worked on the Star project, which was the forerunner to the 203 and later the 205—CDC's challenge to the Cray.

We held separate interviews with each of these four innovators and asked each the same set of questions. The edited responses to each question are grouped together so that a comparison of their highly individual viewpoints can easily be made.

DATAMATION: What technological develop-

ments in the past five to 10 years have had the biggest impact on your niche of the computer industry?

Amdahl: Large-scale integration both in memory and logic; it reduced costs, permitted higher performance, and in most cases also provided for much greater architectural flexibility. Amdahl was able to get into the business so fast because it did its own technology development in the area of LSI ECL chips. We had our first working ones in September 1971.

Poor: Whatever it is, it's got to be on the semiconductor side of the business. Cheap memory and high density make all the recent breakthroughs possible. Nowhere is there as dramatic a development as has occurred in the semiconductor industry and its steady evolution. The best example at the moment is the new National 16000 16/32 chip. It's a good marriage of semiconductor technology and computer architecture.

Thornton: Of course, the semiconductor technology has affected all of us. I think that the development of the design schemes to make LSI parts is in itself a whole new technology. The microprocessor is one of the

most complex parts ever made and we can now talk of extending beyond that. With the advances in density and gates, applications and algorithms can be built into a chip. There have been major developments in software, too. Software has turned out to be a much bigger part of high-speed networks than we thought.

Fiber optics is another new technology that will have an effect on us in the future. We don't view it as a takeover technology: co-ax will still be there as an important medium in 10 years, too. In networking, there is an argument between cable tv techniques and baseband contention techniques. I believe the way the argument will be settled—and it probably will settle out nicely within the next year—will be that several things, including PBX, will coexist. If you need video, for example, broadband has merit. So we will have a hierarchy of competing technologies. There is all this confusion as to which technology is the best, but it's the investment community that is all shook up. They assume that they have to pick one because there is only going to be one winner; that's simply not true.

Cray: I guess there haven't been any.

DTM: No developments in mathematics, architecture, or in new ways of looking at things?

Cray: Well, the problem I have with probably most of these questions is that I don't pay much attention to what is going on in the world. I just do my own kind of work, so if there were something new in mathematics, I wouldn't know about it.

DTM: What have been some of the driving forces behind the changes in your niche of the industry?

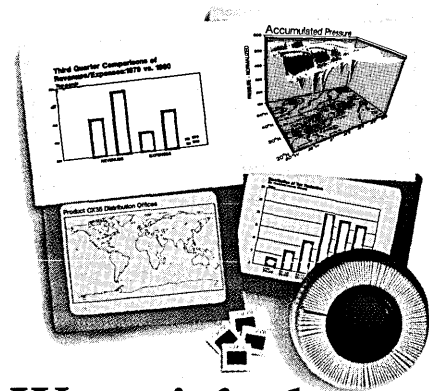
Amdahl: IBM. The idea in the plug-compatible business is not to match what IBM is putting out, but to match what the IBM customer has written in software. The software is written to run on last year's machine, not today's, because it takes a long time to write a piece of software and check it out.

Poor: The forces are always the same: pure, raw competition, trying to outdo the other



Gene Amdahl

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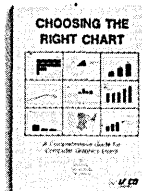
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Cray: "The U.S. technology has been locked into silicon because the manufacturing facilities are locked in."

guy before he outdoes you. Technology also seems to be driving our business. Once the technology becomes available, the next thing you know users are pounding on the door for you to produce it for you. Invention is the mother of necessity, no other way around it. I'm rarely asked to do something that we haven't already heard about.

Thornton: I believe the advances in semiconductors and gate densities are driving the push toward new equipment. We can now exploit the idea of really specializing and not be overcommitted to the past general purpose nature of equipment. Software has also begun to stabilize and become available for implementation in new ways. I see software going back into hardware as it is stabilized. Chip design is also undergoing standardization in that certain cell designs are being put in a library and can be called up for use in various designs. Basically, you won't have to know how to design the circuit, only how to use the circuit or the software that is embedded in it. There will be a shift from the classic semiconductor supplier to a new silicon foundry. The ideal way is to put the design tube in the hands of the user and let the user design the custom chip. The question is, can cells be standardized and still live in this new world?

Amdahl: I don't think that [specialization of hardware] will be a very significant trend because the cost of specialization is highly unlikely to pay back, compared to a general purpose computer running specialized software or a slice of time for use of a general purpose machine to run a specialized function. Of course, there are systems houses building their own semiconductor facilities. We have constructed one already. But in general the rate at which technology is progressing keeps undercutting the economics of an endeavor like a specialized machine.

DTM: Is the semiconductor industry one of the forces driving you forward, or is it holding you back?

Cray: If Fairchild would quit trying new technology out on us, we'd get our parts a lot faster. They are always giving us this new technology and of course it doesn't work, so they have to keep trying it again. It seems like a real deterrent to getting our job done because it's never necessary to have the new technology.

DTM: What do you call state of the art?

Amdahl: I never worry about that. It is too dependent on each person's view of what he is trying to achieve.

Cray: I suppose that it is whatever you can do.

Poor: I haven't thought about that. I suppose



Seymour Cray

it's something you feel and understand, but can't define. It's what you know you are capable of doing but something that may not have been accomplished.

Thornton: State of the art today is coaxial cable, contention networks, and separate function equipment, versus built-in, under-the-hood functionality like Xerox. State of the art tells you where you are and what you can do. But in the local network turmoil, what everyone does is highly undefined.

Fiber optics is not state of the art yet. It's usable, but barely off the ground. That will take some time. The holdup there is connectors. Fiber optics also has to fight for recognition against well-developed competing technologies. State of the art in terms of usage of networking equipment is very rudimentary so far. We've been ahead of our market and it is just now coming on-stream reasonably. I don't think I can point to more than one or two isolated examples of different customers doing the same thing with our networking equipment. That's a sign of a large market and broad application, and it's a confirmation that the communications world is one of niches. But it's also a sign of a lack of focus of application.

DTM: Do you believe the days of big advances in computing technology are gone?

Thornton: Most advances are evolutionary. But how evolutionary does it have to be before it becomes revolutionary? I suppose the microprocessor would be regarded as revolutionary. I think today we are doing some things with such concepts as dedicated applications and mixed machines working together that are fairly revolutionary in nature. People will be doing their work entirely differently in about a decade.

All the while, the semiconductor in-

dustry continues to make advances in gate density. It was the underlying semiconductor industry that brought the computer industry to a point where equipment designers can now exploit this gate density by moving algorithms into hardware.

Poor: Big advances aren't gone. I don't think we've scratched the surface, not on the hardware side and certainly not on the software side. For instance, local networks have emerged, but they have a long way to go yet. And if there are any breakthroughs to be cited in software, it is on the business side, how software is created and sold. Datapoint uses more and more outside software companies because developing software in the bowels of the company is not an efficient way to do it. I look at software as a profession, as I do law or medicine. I see it as a competent group of individuals who create and sell a service. In practice, it is working and it leverages the development costs among many customers.

Amdahl: The opportunity for big advances is still with us. I see software continuing to become a lot more complex than hardware, particularly in architecture. Advances made in one area allow for changes to occur in other areas.

Cray: Looking at my own work, since I have such a narrow view of things here, the advances don't seem to be any different than they ever were. Between the Cray 1 and the Cray 2 the clock rate dropped from 12.5 ns to 4 ns. That's the same sort of geometric progression we've had in the past. Performance of the machine is six to 12 times the previous model, which is more aggressive than it has been in the past. It seems that we are progressing at about a constant rate. I don't see that changing in the next machine, either.

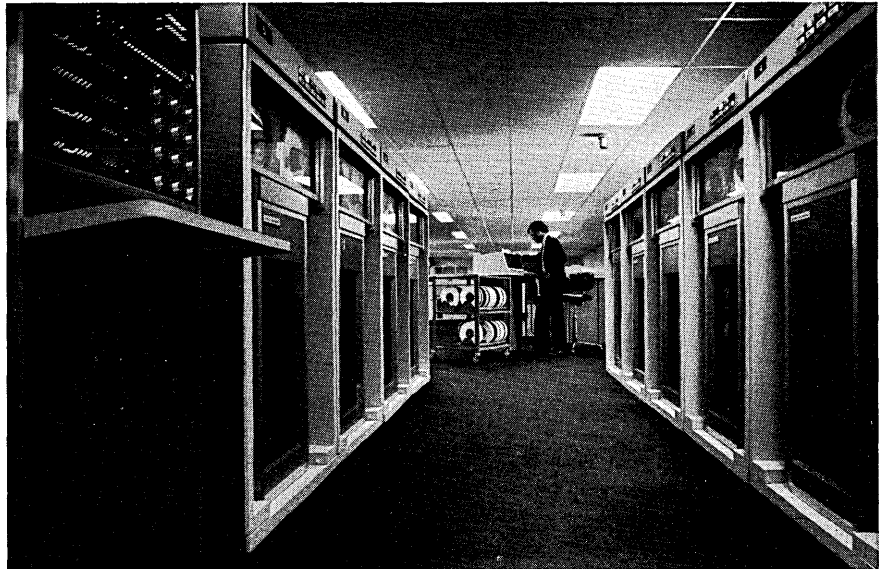
DTM: What do you see as the next big advance in your part of the industry?

Amdahl: The question that always has to be asked is whether the solution to a problem is worth the price of that solution. Actually, since most of my work is in the IBM-compatible area, I can't be trying to jump ahead in architecture or my customers won't follow me; I'd be too incompatible. Therefore, I don't look around too much.

Poor: Software productivity is where some big advances are needed. Hardware and networking architecture is outstripping the ability of software generators to make the most of what we have. The latent potential of the hardware system goes way beyond what can be wrung out of the software. Our problems are not how to execute the software, but how to generate an efficient program. We are still in a relatively primitive stage when it comes to software generation; yet we keep

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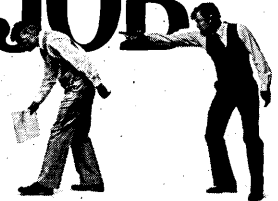
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Poor: "The forces are always the same: pure, raw competition, trying to outdo the other guy before he outdoes you."

coming out with a new generation of hardware that makes the old software run faster.

So who's doing the research to seek new ways to improve this situation? It's not coming out of companies or schools. Progress is too painful, takes too long, and costs too much money. I don't see a light at the end of the tunnel for this problem. Part of the problem seems to be the social order that surrounds software development in large companies and schools: it's very peculiar. And we don't understand the creative process that goes into software development at all. The problem is not one that will be solved with money, but through sheer genius.

Thornton: Once machines are linked together, we will be able to allow for dedication of function. Then engineers will start designing machines that don't have to carry all the trappings of everything with them. As a result, special purpose machines will make a major thrust in the future. We already see indications of this in computer aided design. Though CAD machines are general purpose computers, they are used for a specialized function now. I see the chance to expand on that specialized function in the future. You also see a trend toward specialized machines in vector machines such as the Cray, CDC's 205, and the Floating Point machine. The Britton Lee database machine is yet another example.

This is only the tip of the iceberg. People will take certain applications and throw them into hardware. I very much believe that with the stabilization of software, algorithms will be built into specialized machines. When you start loading certain software into a general purpose computer and leaving it, then why not design that machine to optimize the running of that software? Ultimately, we might have specialized machines that don't get programmed. You program it only in the sense that you drive a car: you feed it information. This all relates back to the idea that when you have such specialization, you need support for it.

Actually, though, I don't see any big hardware or software advances coming in the local network arena. A lot of the technical effort is done; certainly the conceptual work is completed.

Cray: I guess the big change we need now is in materials. We have a project investigating areas in chemistry. We need different materials than silicon. The U.S. technology has been locked into silicon because the manufacturing facilities are locked in. We can't break out and create new directions into anything else because everything has been set up. It's the same problem as in the automobile and steel industries. Right now, there are a lot of management people in the large

semiconductor companies who are getting nervous about this situation. They can see the situation being a locked-in one. But they have just recently recognized it. They should have recognized it four or five years ago. Now they don't have time to make the conversion to meet my purposes. My effort is not going to be so inhibited; I can find no one to help me, so I am proceeding with gallium arsenide. It's not my choice; the only place we can buy is in Japan, and I don't want to do that. All the Japanese machines are going to be gallium arsenide.

DTM: So you're making the chips?

Cray: That's what I'm saying. It's not my choice.

DTM: How far away do you think your project is?

Cray: The first delivery is in fall of 1986 and it's a three-year program. So we have to develop it in '83 to ship it in '86.

DTM: What problems do you find in working with gallium arsenide?

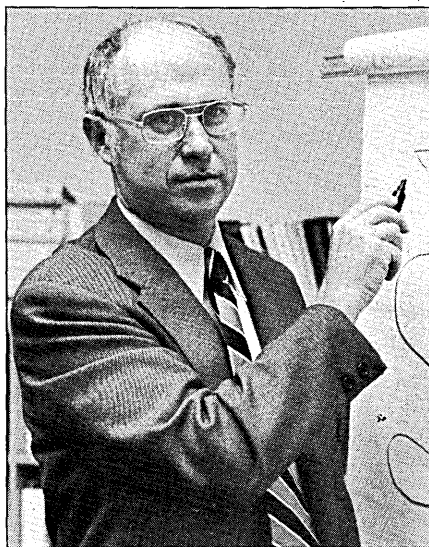
Cray: Well, it's hard to pronounce. Once you get over that . . .

DTM: What do you run into?

Cray: Indium phosphide.

DTM: What do you see down the road for high-speed networks?

Thornton: We picked a speed and purpose that has thus far not spawned any competitors. CDC has support gear for its 205 that is like ours, but they have not embarked on a big marketing program for it. For the most part, 50 megabits is close to overkill. Speed has not turned out to be a big issue now or in



Victor Poor

the future—but neither is it a problem for us to move up from 50Mb. We intend to expand the number of units that can be connected to a piece of co-ax. As it gets more crowded we get more sophisticated in linking and making gateway products. But there is no pressure in that area yet either. We are covering it pretty well.

DTM: Where do you expect Datapoint to be in five years?

Poor: God knows.

DTM: What have been some limitations you've encountered in your niche of the industry?

Poor: Printers have been a limitation. I don't know why. They are still almost totally mechanical machines. They're little better than beating a piece of paper with a hammer. Yet within the industry there are alternatives; Datapoint introduced a laser printer. But that's not the problem. It's an expensive machine, and so are the others. But look at copiers, like those sold at Sears and Radio Shack. There's a big gap there that has not been filled. Good printers are slightly more than copiers; they should use that kind of technology.

Another limitation we have run into is disk technology. Disk drives basically are also mechanical processors. Thin film is not yet commercially feasible. Disks are quite slow compared to the computer driving them. You feel the pinch in the access time when you go to large chunks of data.

Software is way behind. It has not come anywhere near making steady technological advances comparable to those in computer architecture or even peripherals design. There has been little in the way of innovation in software technology; we still design compilers the same way we designed the original FORTRAN compiler in the '50s. We just put a lot of window dressing on them and call them improvements. Software is very expensive to write, and management of a major software project is a most expensive component. Maybe it isn't possible.

Cray: I suppose the limitations are just the visions of the designer; there aren't any physical limitations. I can't see very far ahead, so I just take small steps—and I keep taking small steps because I don't want to retire yet. For myself, it's always been a matter of not being able to communicate well enough with other people to get any help from them; so I do it myself. My limitations, then, are what I can do in my own personal time. I don't use special tools when I design except paper and pencil.

If you are looking for barriers, I don't think there's any one physical barrier. It's only the ability to conceive of the next step. It's always easy to do the next step and it's

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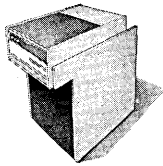
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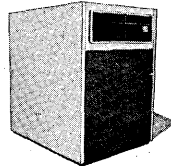
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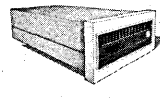
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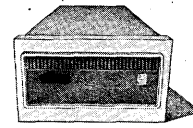
For LSI-11/23 Q-BUS: 64 MB Fixed/Removable Emulates DEC RK06/07



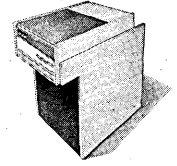
For PDP-11/04-60 UNIBUS: 675 MB Fixed Emulates Two DEC RM05s



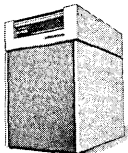
For PDP-11/70 CACHE BUS: 80 MB Fixed Emulates DEC RM03



For VAX UNIBUS: 160 MB Emulates DEC RM03



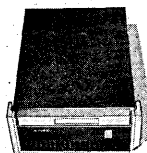
For VAX-11/750 CMI: 80 MB Removable Emulates DEC RM03



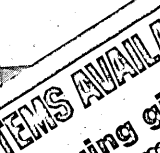
For LSI-11/23 Q-BUS: 300 MB Removable Emulates DEC RM05



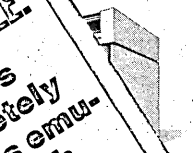
For LSI-11/23 Q-BUS: 96 MB Fixed/Removable Emulates DEC RK06/07



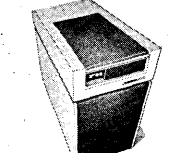
For PDP-11/04-60 UNIBUS: 32 MB Fixed Emulates Two DEC RM03s



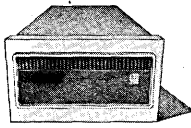
For PDP-11/70 CACHE BUS: 80 MB Fixed Emulates Two DEC RM05s



For VAX UNIBUS: 160 MB Emulates DEC RM03



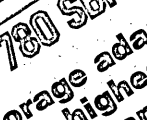
For VAX-11/750 CMI: 300 MB Removable Emulates DEC RM05



For LSI-11/23 Q-BUS: 80 MB Fixed Emulates DEC RM03



For LSI-11/23 Q-BUS: 96 MB Fixed/Removable Emulates DEC RK06/07



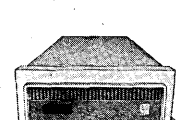
For PDP-11/04-60 UNIBUS: 32 MB Fixed Emulates Two DEC RM03s



For PDP-11/70 CACHE BUS: 80 MB Fixed Emulates Two DEC RM05s



For VAX UNIBUS: 32 MB Fixed/Removable Emulates DEC RK07



For VAX-11/750 CMI: 80 MB Fixed Emulates DEC RM03



For LSI-11/23 Q-BUS: 160 MB Fixed Emulates Two DEC RM03s



For PDP-11/04-60 UNIBUS: 300 MB Removable Emulates DEC RM05



For PDP-11/04-60 UNIBUS: 96 MB Fixed/Removable Emulates DEC RK06/07



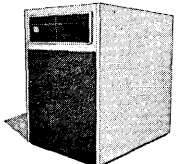
For VAX UNIBUS: 80 MB Removable Emulates DEC RM03



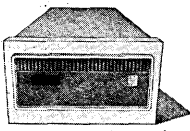
For VAX UNIBUS: 64 MB Fixed/Removable Emulates DEC RK07



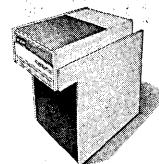
For VAX-11/750 CMI: 160 MB Fixed Emulates DEC RM80 or Two RM03s



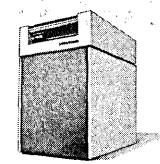
For LSI-11/23 Q-BUS: 675 MB Fixed Emulates Two DEC RM05s



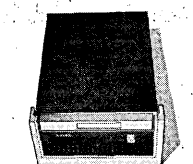
For PDP-11/04-60 UNIBUS: 80 MB Fixed Emulates DEC RM03



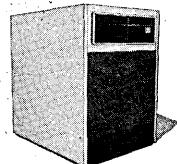
For PDP-11/70 CACHE BUS: 80 MB Removable Emulates DEC RM03



For VAX UNIBUS: 300 MB Removable Emulates DEC RM05



For VAX UNIBUS: 96 MB Fixed/Removable Emulates DEC RK07



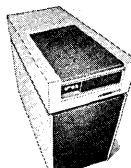
For VAX-11/750 CMI: 675 MB Fixed Emulates Two DEC RM05s



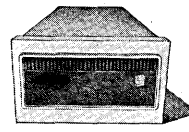
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Thornton: "The limitation is in our understanding the full dimensions of what our customers are doing to our equipment."

always impossible to do two steps at a time. I think it's appropriate to say that each step is rather evolutionary, so of course you use what you learn from the previous step. I don't think I've done anything very radical in my entire career. It's just been a series of small steps. It's just a matter of having the imagination to do the next step.

Amdahl: Many of our limitations have to do with what *IBM* does. We have to watch what we are doing. You can no longer put everything that *IBM* markets into neat little categories. They are beginning to blend more. Their systems are getting more complicated, so many pieces get tied together. Basically, you have to view it as a combined sale. There is one big thing that is different about *IBM*: they are not losing market share. Other companies are.

DTM: Do you see the Japanese as a threat to U.S. computer makers?

Amdahl: The Japanese are just another set of competitors with uniquely powerful capabilities. It's wishful thinking about software being culture-bound. But I don't know who would be protected by setting embargoes; *IBM* thinks it should be protected.

Thornton: One of the biggest limitations we ran into was that we couldn't put a big computer center together to run a test. We had to do our testing in the field. Another limitation was learning and understanding how a contention occurs. What we did differently from Ethernet was to use a priority back-off if there was a collision. There is a pecking order for who gets in first in that kind of situation. That priority back-off method stabilized everything for us.

We also had some problems with long distance transmissions. There are ways to accept and deal with the physical laws like delay. Much of the work has taken place in protocols and architecture. With *SBS*, the delay is about half a second, and we have developed protocols that accept these delays and still push traffic through. By avoiding telephone lines we avoid slow speeds, high error rates, and the telecommunications access methods. Telecommunications software has a slow rate because the software is geared to check every character or two and to retransmit small amounts of data. In a steady error rate and steady noise environment like telephone lines, there is a lot of retransmission going on. There is a lot of software overhead. In microwave, fiber optics, or satellites, you might lose a whole block of data, but not an error here or there. Systems can support blocked data situations very readily with low software overhead. They are checking messages, not every character.

From a competitive point of view, I



James Thornton

think the limitation is in our understanding the full dimensions of what our customers are doing to our equipment in the long term. Introducing networking is a lot like the early computer days. *IBM* would come in and say, "This machine can do practically anything anyone can conceive, but you will have to make it do that, because we don't know what you do."

DTM: What has surprised you most in how your products are used? What are you learning about the use of your products?

Amdahl: Computers are being used more and more as on-line interactive systems. Computers have become an integral part of an organization, so much so that an organization is now strongly affected by the behavior of its system.

Thornton: We are changing the way people do computing by allowing machines to be specialized and dedicated. But it takes software to support dedicated applications, and to support more than one machine in a coordinated environment. Even in this little company we have a number of Apple computers that are semidedicated, more dedicated than the bigger machines tend to be. Right now we are throwing floppies around. We don't use our own product, but we will.

Poor: One of the biggest surprises to me is the company as a whole, the fact that we're as big as we are. When we started, our goal was to reach \$100 million a year.

On the marketing side, there have been some surprises, too, particularly in the way customers apply our products. They use them in ways we never expected when we designed the product. The whole history of the company is a series of surprises about

how people use our products. The 2200 programmer terminal device, for instance, would emulate any number of terminals. The customers paid no attention to that and started using it in standalone computing operations. We brought this thing out without a compiler because it was made only to run terminal emulations. But from day one users were writing software with only a primitive assembler in the machine. Very few companies will admit this is the way products get developed—really. They always tell you their product was planned.

Arcnet evolved from a customer application. Once we realized users were writing applications with an intelligent terminal, we saw the market as being in distributed processing. When we used the words, we called it geographically distributed processing. When we looked at our customer installations, the typical customer had all the processors in the same building, on the same floor, and often in the same room. Yet the intercommunications were designed to run over telephone lines. What we really needed was the ability to share common databases directly.

Cray: I just design these things for myself. I'm always surprised when other people use them. I don't know what all this supercomputer talk is about. They certainly aren't supercomputers; they are kind of simple, dumb things.

DTM: But they run fast and apparently that is making a big impression.

Cray: Apparently that is important.

DTM: What has surprised you most about your competitors?

Cray: You mean there are some of those? There probably are—I just haven't looked.

DTM: When you take a look at the industry today . . .

Cray: I never look back and I never look sideways.

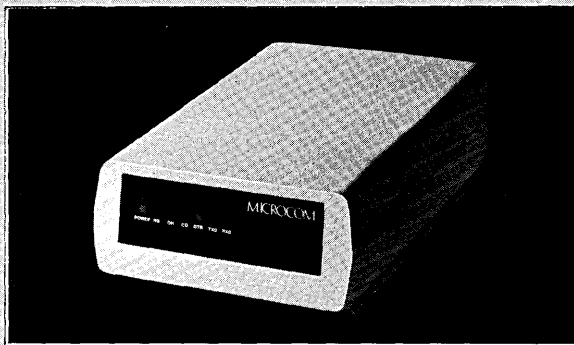
DTM: Do you ever worry or think . . .

Cray: Never, never!

DTM: What has surprised you most about your market?

Cray: I certainly have been surprised by the market. We keep selling computers to the same old people and they are getting old at the same rate that I am. We don't even need introductions when we come out with a new computer because we already know the people. It's just the same market for us over and over again. We sell a machine a month. We've always sold a machine a month. Pretty soon those people are all going to start dying off—then what's going to happen?

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Variance:

$$\begin{aligned}
 V(Y|X) &= V\left(\sum_{j=1}^K \beta_j X_j + \epsilon\right) = V\left(\sum_{j=1}^K \beta_j X_j\right) + \sigma^2 \\
 &= \sum_{j=1}^K X_j^2 V''(\beta_j) + \sum_{i=1}^K \sum_{j=1}^K X_i X_j \text{cov}''(\beta_i, \beta_j) + \sigma^2
 \end{aligned}$$

[*]



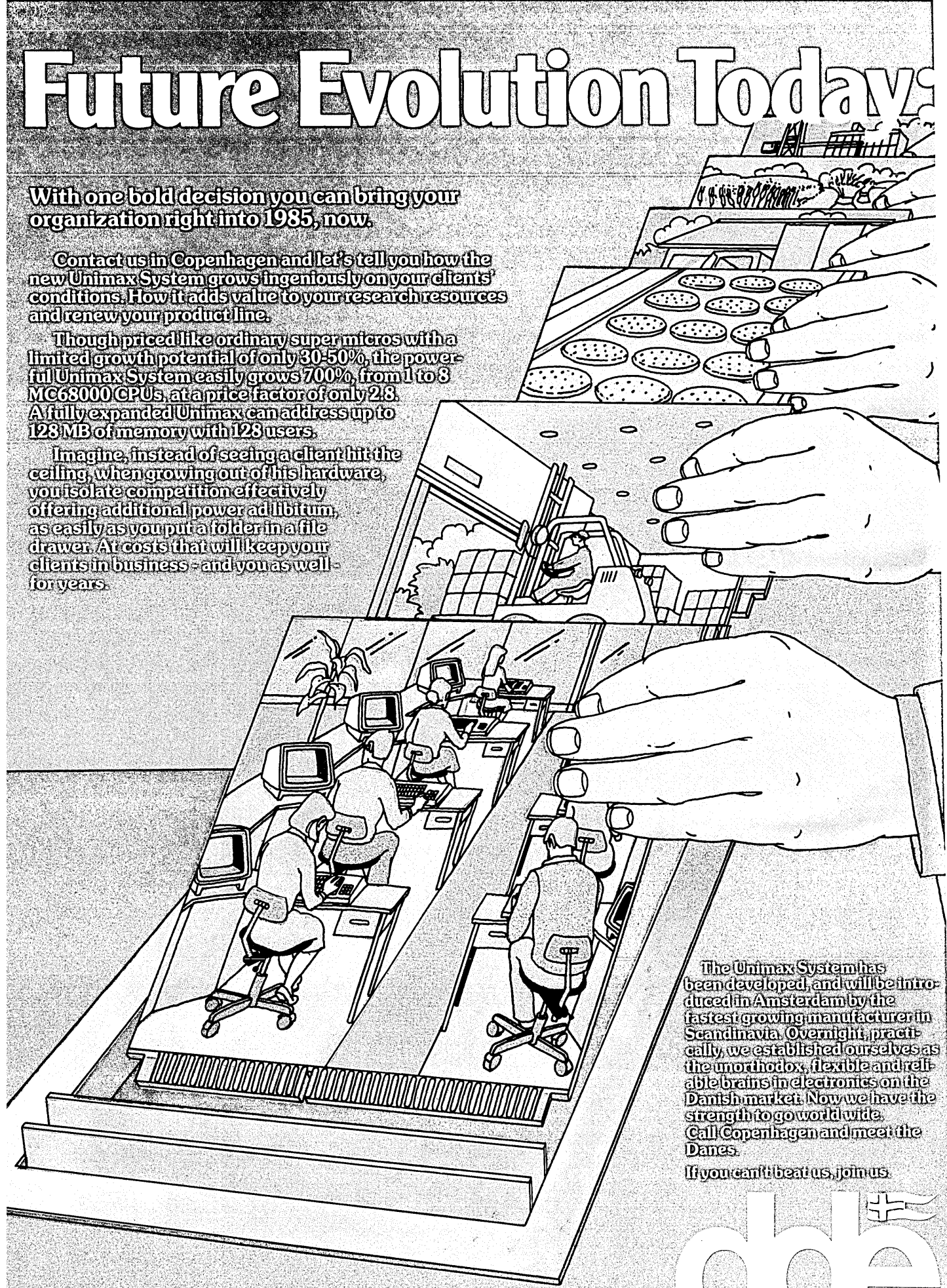
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Mini MIPS aren't mainframe MIPS. Keep that in mind when you plan for distributed processing or you'll find you've been led astray by . . .

MINICOMPUTER CAPACITY OPTIMISM

by Ronald D. Emrick

The trend toward distributed data processing, coupled with the decreasing cost of minicomputer systems, has led to a proliferation of minicomputers directly into the users' domain. The movement toward distributed intelligence—putting data and computing capability closer to, or in the hands of, the end user—may be a good thing. It is certainly the current trend, and it does offer convenience and data accessibility not usually available from centralized data processing. But there can be problems, too. Consider the following scenario:

A newly developed data processing application was recently implemented on a minicomputer within a user department that is part of a district office of a large corporation. The implementation seemed justified because the minicomputer hardware cost much less than the estimated billing for the same service if performed at the corporation's computer center at headquarters. Also, there would be no communications costs or headaches.

The data processing department's application development staff was asked to design and code the application, since the user department employed no data processing professionals. The user department and application development supervisor jointly chose a minicomputer from a reputable vendor that described the product as a 2 MIPS machine, making it almost as powerful as the company's mainframe. Also, the machine was capable of supporting 64 terminals, far more than the 22 terminals that the user department anticipated.

After this initial installation, the application system is scheduled to be placed in the same functional department in other district offices. This system automates an extensive manual system. It features an on-line database with data entry and inquiry terminals connected locally, in addition to some remote inquiry terminals.

Since the system was implemented, management in the user department constantly complains that it doesn't function proper-

ly. Work is nearly at a standstill because terminal response time can be measured in minutes. Also, the computer is experiencing frequent downtime, which the vendor blames on inadequate air conditioning and "dirty" power in the office environment. The user department has made it clear it considers the applications development staff responsible for solving this problem.

Upon investigation the applications developer finds that:

1. The user department has installed eight more terminals than anticipated at the remote locations. Also, another department determined it could use the system, so additional terminals were installed for access to the database. No one knows for sure what their usage is, although the total number of terminals is still well within the maximum of 64 that may be connected.

2. The user department decided to retain an information flow procedure similar to the one it used for its manual system, instead of the flow recommended by the dp department. The system will accommodate this change in procedure, but data entry transactions are increased by approximately 50%.

3. The former filing clerk assigned to operate the minicomputer has had some difficulty understanding the recovery procedures the vendor recommends after unscheduled outages.

In addition to wondering how to solve the problems here, the applications development supervisor wonders how the system will run in some of the other divisions where the departmental workload is 50% heavier. It is an especially worrisome problem since the minicomputer chosen is the top of the vendor's line and an upgrade is not possible.

This scenario may sound farfetched to some, but others will think it was written about their companies. The problems can be especially acute when one group develops a system that will be under the operational controls of another group.

This article examines the difficulties that can arise from this division of responsibility, in addition to the difficulties inherent in minicomputer application sizing. While

this narrative may appear to be critical of minicomputer applications, the intent is simply to point out observed problems. If the pitfalls discussed here are avoided, minicomputer applications in the hands of the end user can be immensely successful.

CAUSES OF CAPACITY OPTIMISM

Most problems associated with implementation of minicomputer applications can actually be expressed by one blanket term—capacity optimism. The groups involved in minicomputer application designs (e.g., the dp applications development department and the user department) typically have high hopes regarding the capability or capacity of the chosen hardware. Once full production status is attained, however, the hardware capacity may prove insufficient to process the application. This can occur for the following reasons, all of which are related to capacity optimism.

- Lack of expertise (within end-user and application development departments) concerning the minicomputer system's architecture, coupled with the understandable optimism of the vendor's sales force, may lead to unrealistic undersizing for the application demand.
- The end user may exercise the application in a manner different than anticipated during the design process, and additional applications competing for computing resources may be installed on the minicomputer.
- The user of the system may lack the technical expertise to operate it efficiently.
- No rigorous measurements of minicomputer capacity were made within the industry until recently, and those have been performed by only a few large users. The results of such activities are typically not widely shared.*
- Formal forecasting procedures (simulation of the application, with the resource requirements specifically tied to business driving elements or natural forecasting units) are usually not followed for minicomputer applications. And while sizing exercises performed

*Suggested references are "Capacity Planning for Minicomputers," presented by Ivan Loffler of GTE at INTELCOM 80, November 1980, and Loffler's "Capacity Planning for Large Minicomputers," presented at the International Conference on Computer Capacity Management, April 1982.

Even when hardware measures indicate that capacity optimism is unwarranted, the findings may not be taken seriously prior to implementation.

by the minicomputer vendor may be useful, such efforts are usually sales related and may produce biased results. Any vendor effort to size an application should be performed with the assistance of in-house dp personnel knowledgeable in the techniques employed.

Thus, capacity optimism pervades most minicomputer applications development projects. Even when hardware measures indicate that the optimism is unwarranted, the findings may not be taken seriously prior to implementation because they run counter to preestablished beliefs, often implanted by the vendor.

A common contributor to this exaggerated impression of minicomputer capacity is the quotation of MIPS ratings (millions of instructions per second). Sales personnel may tell prospective customers that their minicomputer has a MIPS rate of 1.0 or 1.5, or whatever. They go on to explain how that compares favorably with such mainframes as an IBM 4341. Based on an absolute comparison of the numbers, that may be so. Vendor representatives, however, often do not understand the difference in architectures between their machine and the one with which they are making the comparison.

A 16-bit minicomputer may require three or four instructions to perform the same function that one instruction performs on the 32-bit mainframe. Robustness of the instruction set, the extent of microcoding, pipelining, and many other design differences account for the ability of the typical mainframe to perform more actual work per instruction executed than the typical mini. The 32-bit minicomputers have closed this gap somewhat, but differences still remain.

The data processing trade press often contributes to this misconception by quoting minicomputer instruction rates without qualification. The reader's natural inclination is to compare the quoted rate with a mainframe MIPS rate with which he is familiar. A 1 MIPS minicomputer, however, may only have the equivalent power of 0.15 to 0.5 mainframe MIPS. The company considering such an acquisition may have a 5 MIPS mainframe on which most applications run and users who are accustomed to the high level of output commensurate with such computing power. It is difficult for applications development personnel and end users alike to realize that the selected minicomputer may only be 3% to 10% as powerful as the mainframe to which they are accustomed.

MAINFRAME VS. MINI SIZING

While it is not uncommon to misjudge hardware capacity requirements for mainframe applications, the impact of poor application sizing is much more severe for minicomputer applications.

For example, assume there is a choice between running a new application on a mainframe or on a minicomputer that has 5% of the mainframe's power. Furthermore, assume the application is estimated to consume 3% of the mainframe's capacity. Simple arithmetic will show that the application would then consume 60% of the minicomputer's capacity. Consider the consequences if the application, when installed, actually requires twice the estimated capacity (not an unusual circumstance). With a mainframe, the estimating error may go virtually unnoticed; it could likely support the additional unplanned 3% workload without difficulty. This is a typical example of "large mainframe slop" and attracts little attention. With a minicomputer, however, the error looms much larger, because the machine's total capacity would fall 20% short of the application's 120% requirement.

The solutions to the minicomputer capacity problem are one of the following: an immediate unplanned expense for a more powerful mini (if available), acquisition of multiple minicomputers of the size originally installed with partitioning of the application across these multiple systems (if possible), or system redesign to permit the application to run on a different minicomputer architecture (if possible). The trouble is that all of these solutions are reactive in nature, may not be technically possible in a limited amount of time, and are likely to cost the users a lot of money.

Capacity optimism, together with a lack of appreciation for the difficulties inherent in multidepartmental undertakings, may lead to certain omissions or misjudgments during the design and hardware selection process. For example, application development groups may not have traditionally developed estimates of resource requirements (due to "large mainframe slop" mentality). The possibility that the application may not fit on the hardware is simply not considered. It is imperative that some method of estimating application resources be developed. Resource estimates can be based on complex simulations, but may be of equal accuracy if based on simple path-length estimates or on initial test runs of the application code.

Also, the business-dependent elements must be identified and taken into account. This process may require much interaction with the user, but should be natural fallout of systems analysis. For example, a particular human resource application may be estimated to consume 10 cpu hours for every 1,000 employee records processed. To arrive at total cpu capacity required, the total number of employees to be processed must be known (i.e., if 3,000 employee records must be processed, then $3 \times 10 = 30$ cpu hours). Also, it would be critical to proper hardware

selection to know that the number of people employed in two years will be double the current level.

With today's mainframes providing seemingly endless cpu power and memory capacity, many systems analysts become engrossed in issues of functionality. But a minicomputer system that functionally does a terrific job while providing 30-minute response time (because resource requirements weren't estimated) is of little benefit to the end user.

A large-computer orientation can complicate things further. Most dp departments have become accustomed to application portability, with little requirement for change, throughout a line of mainframes. Minicomputer vendors have similar capabilities, put within a narrower range of power. The minicomputer chosen may be the top of a model line, providing no possibility for growth without some degree of reprogramming or even redesign to adapt the application to a more powerful range of processors. If the capacity of a top-of-the-line mainframe is exceeded, it is often possible to couple processors via hardware and/or software techniques, permitting an application to run over multiple machines. Similar coupling of multiple minicomputers is rarely an alternative because many vendors lack the software and hardware to support this capability. Certain vendors may announce more powerful minicomputers in established families, but there is no assurance that a given minicomputer family will continue to expand. In fact, it should be expected that older families will not expand, and that growth will appear in totally new lines that may provide only limited upward compatibility (most 16-bit lines are not expanding, and conversion to a vendor's 32-bit mini may not be straightforward).

TRAINING LAGS BEHIND

The rapid growth of most minicomputer manufacturers, coupled with rapid changes in technology, has meant that certain support functions, such as training, have lagged behind the offerings by mainframe manufacturers. Some vendors compensate by attempting to convince the user that in-depth technical knowledge of minicomputer systems is not required. The training they offer in such areas as hardware architecture and system support software (operating system, database manager, etc.) is usually much more limited than that offered by large mainframe vendors.

Many users of minicomputers have accepted this approach. This is not unlike the mainframe situation during the 1960s. Even the minicomputer vendor's support personnel will typically not exhibit the same depth of knowledge as their mainframe counterparts.

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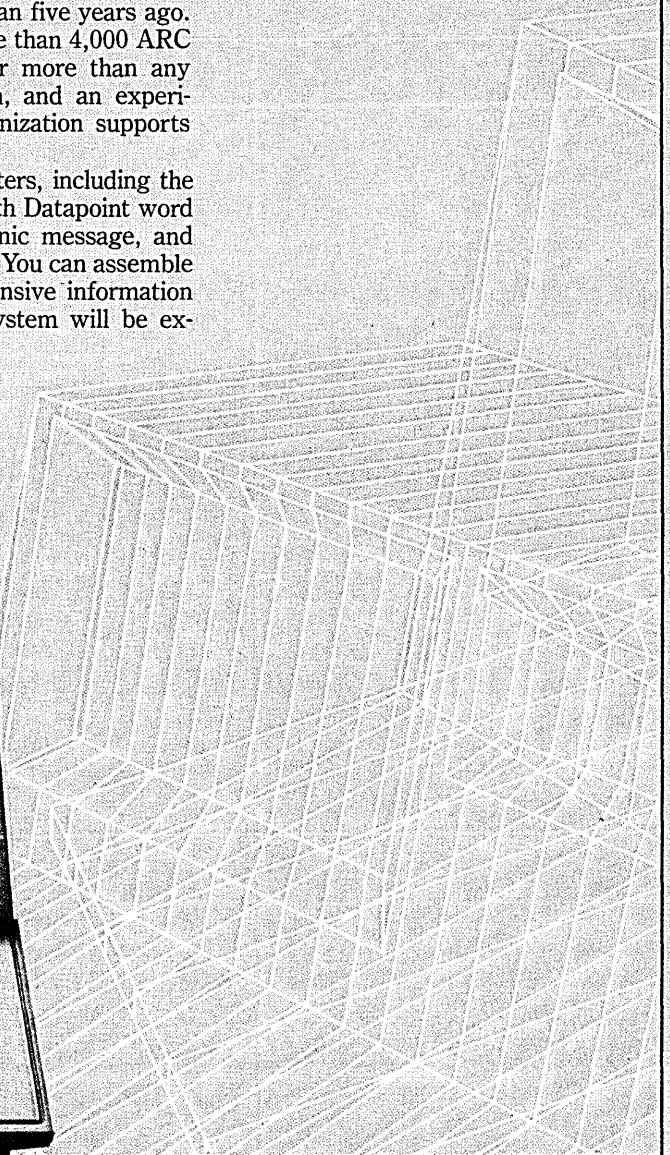
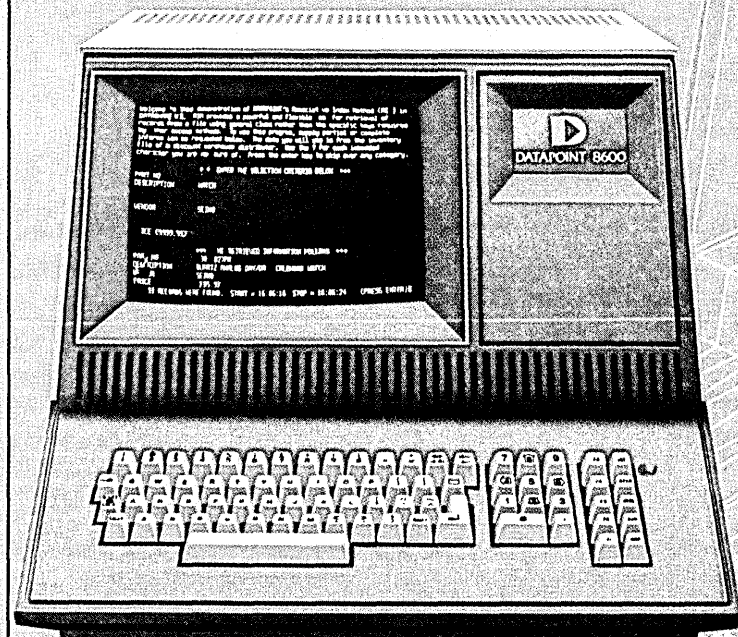
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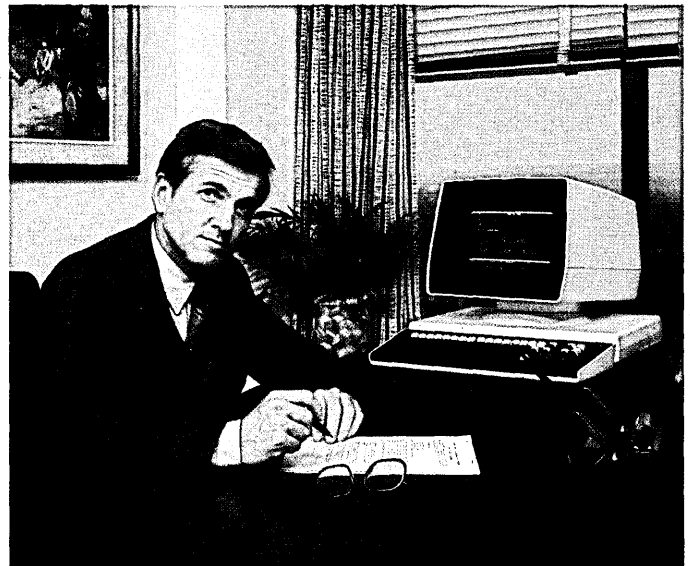
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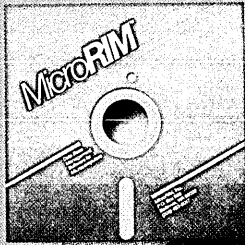
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A mini system that functionally does a terrific job while providing 30-minute response time is of little benefit to the end user.

en minicomputer are usually the members of the application development group working with that particular mini. The support groups may not have expertise in the various minicomputer architectures, since they can't be expected to maintain expertise on all potential architectures. Therefore, applications development personnel generally have no one to call on for support except the vendor.

The end-user department's operations personnel also may not be given the depth of training normally afforded personnel in a large mainframe data center. Systems programming expertise may be totally lacking or may be limited to one individual who has responsibility for several diverse systems. This keeps overall cost down, and an individual system may not require expert attention very often. But when the system crashes, who has the expertise to restore normal operation?

Other minicomputer capacity problems may stem from the fact that the user's service level expectations regarding response time, throughput, etc., are not formally established in advance. How often has an on-line application been developed on a minicomputer that can reasonably be expected to support 20 terminals when the user fully intends to attach 30 terminals?

The number of active terminals that can be simultaneously supported is a critical constraint for on-line minicomputer applications. While technically it may be possible to attach 64 or even 128 terminals to a given minicomputer, this is nothing more than a connection capability. The actual number that can be supported is application dependent and can be determined through a detailed simulation or a benchmark of the application. A reasonably powerful minicomputer may be capable of delivering acceptable response time while simultaneously supporting 40 or 50 terminals engaged in simple inquiry or data entry. Transactions such as complex edits or queries, however, which may require numerous database accesses, may prohibit simultaneous support of more than 10 to 20 terminals.

Also, it is very difficult to gain agreement that the application is performing as it should after implementation. Of course, the same difficulty is experienced with many mainframe applications. The consequences, however, are usually more severe for minicomputer applications. Early in the design process a contract should be agreed on by the application's developers and the user. Response time, by transaction type, and throughput requirements must be agreed on by both parties. After implementation, when these levels of service are met, all interested participants must agree that the system is performing satisfactorily. A companion problem is the typical lack of vendor measurement

tools to provide service level information. Simple measurement by stopwatch is usually acceptable to both user and system developer and is certainly preferable to no measurement at all.

Since many of these systems will be operated within a user department, the system's performance will be greatly influenced by the user's method of operation. Operational criteria may not be clearly specified by the application designers, or the user may choose to ignore them. The techniques for database backup and recovery from system failures must be clearly expressed and adhered to by the user. Poor operational procedures can lead to database integrity problems and system response-time problems, which are likely to be blamed on the system's designers.

Also, it is necessary that the designers clearly state the configuration requirements and that the users agree to comply. It is not unheard of for a user to purchase a hardware configuration that differs from the one required by the application's design. It may be possible to compensate with systems software changes. These changes must then be carried forward through all subsequent system software releases for the life of the application at that particular location, an exercise that is clearly counterproductive.

EXPECTED USES OF SYSTEMS

Agreements bounding the expected use of the systems may also be lacking. This is a concern that may also cause problems in large mainframe applications. Minicomputer applications are especially vulnerable because of their inherently low processing power. Not only may a given user find unanticipated requirements for on-line data, but a user may implement procedures that would stress the system differently than originally anticipated.

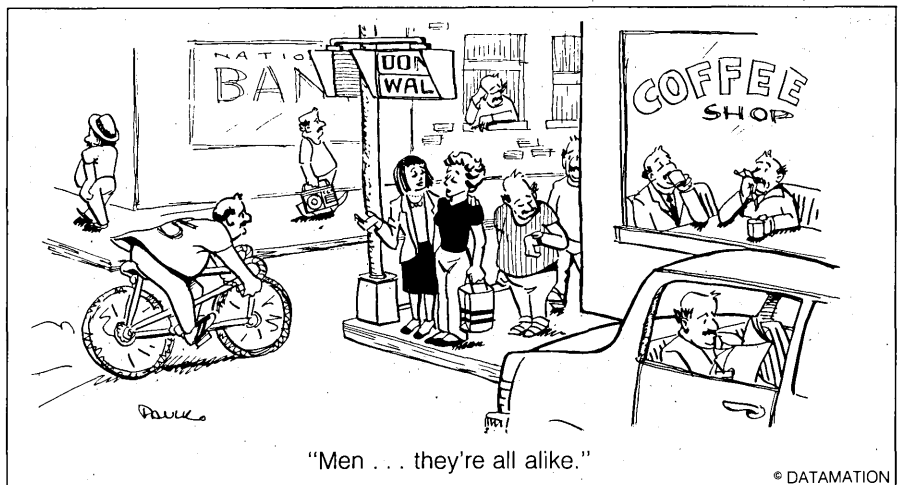
A written agreement between systems designer and end user regarding restrictions makes good business sense. ("An order entry

system designed to provide five-second response time must be used only for those order entry functions named in the initial specifications. Otherwise, any agreements concerning expected response time are invalidated.") With this agreement, the user is less likely to complain if response-time degradation occurs after he adds a message switching application onto the same minicomputer hardware.

Since some unanticipated additional use is a common phenomenon (even within specified bounds) for newly implemented applications, it is wise not to plan initially for more than 50% cpu utilization.

Designers and users also have to agree on support responsibilities. We have recognized that certain kinds of support help us realize the full potential of mainframe systems. For example, mainframe data centers employ large staffs of specialists in operating systems and teleprocessing support systems. Minicomputer users, on the other hand, typically feel (or are led by vendors to believe) that such support is unnecessary. Except for certain turnkey applications, this is a misconception. Minicomputers may not require as much support as mainframes, and this is one of their attractions. But they do require some technical support, making it necessary for at least one person in the user department to receive in-depth training on the system.

In lieu of a clear-cut understanding of who is responsible for which support functions, the application development team may be called upon to provide ongoing assistance it would never provide for large mainframe applications. The user may feel justified in requesting this support because he has been led by the vendor to believe that operation and maintenance of the system require limited technical understanding. In fact, the monetary savings associated with not providing high-level technical support may have figured prominently in the decision to acquire the minicomputer system. This problem is



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CIRCLE 119 ON READER CARD

easily solved by up-front education of the user.

While most of the problems discussed here relate to the broader issue of capacity optimism, some are commonsense business concerns that should be addressed whenever multiple groups are involved in an endeavor. The steps that can be taken to avoid these pitfalls are:

- Size the application (through simulation or some other formal procedure) and estimate the resource requirements for a given environment, using a realistic estimate of the minicomputer's capacity. (The selected mini can be benchmarked against a mainframe with a known power rating to arrive at the minicomputer's capacity.)
- Select hardware with growth potential, design applications so they may be partitioned, or select hardware with 50% or more reserve capacity.
- As part of the contract with the minicomputer vendor, negotiate certain technical training to be provided to personnel in both applications development and staff support groups in the dp department, in addition to personnel in the end-user department.
- Define the service levels that the user expects (and an agreed upon measurement mechanism) for a specific environment and have a sign-off procedure when it is shown that they are met.
- State in writing the operational environment and procedures the user must adhere to, and note any restrictions on the system's use for each installation.
- Define in writing the support responsibilities of all interested departments and any remuneration for service provided beyond the defined responsibilities.

When the user fully understands the requirements of operating a minicomputer data center (which he is more likely to understand if the previously defined steps are followed), he may opt for facilities management by the data processing department. If he chooses to control his own operation he will at least understand the capacity of the hardware and the limitations under which it must be operated. Also, if the user adds an application load beyond that which had been originally agreed to, the system developer will not be held accountable for poor service levels.

Application designers and end users have to work together to avoid capacity problems. The replacement of blind capacity optimism with intelligent planning and commonsense business arrangements will permit an organization to reach the full promise offered by distributed intelligence minicomputer applications. *

Ronald Emrick is a capacity planning supervisor within GTE Service Corp.'s Information Management staff in Tampa, Fla. He holds a BSEE from Purdue University and an MEA from the University of South Florida. His 20 years of engineering and data processing experience include eight years in performance analysis and capacity management.

SCIENCE/SCOPE

Two communications satellites made history as the first to be launched from NASA's space shuttle. The first, SBS-3, is operated by Satellite Business Systems and will carry high-speed data for many U.S. companies. The second, Anik-C, is operated by Telesat Canada and will improve telephone, television, and data service in Canada. The satellites are versions of Hughes Aircraft Company's HS 376, the world's most widely purchased communications satellite. Hughes now has built 70% of the world's operating commercial communications satellites and has more successes than all other companies combined.

A safety device that snuffs out explosions in the blink of an eye, originally developed for the military, is being applied commercially where fire poses an immediate threat to human life. The Dual Spectrum™ sensing and suppression system has been evaluated in New York Transit Authority toll booths. It detects fire bomb explosions set off by criminals, and suppresses them in one-tenth of a second -- before transit employees can be injured. The system could be applied almost anywhere fire explosions occur within an enclosed area. It was developed by the Santa Barbara Research Center, a Hughes subsidiary.

A computer center for improving productivity is one special feature of a new 500,000-square-foot facility at Hughes for manufacturing sophisticated electro-optical devices for the military. The computer-aided manufacturing center serves several purposes. It allows engineers to design tools and fixtures with the aid of computer graphics. It also lets them write specifications, planning procedures, and test procedures -- and be checked automatically by computer. By gathering data from automatic test equipment, the center gives engineers insight into every facet of manufacturing, including production rates and quality.

Five new IMPATT diodes, with the highest power outputs at their respective frequencies offered to date, have been added to the Hughes line of solid-state millimeter-wave transmitter products. Included among the devices are Ka-band and Q-band units with output power of 500 milliwatts and a V-band CW device of 400 milliwatts. In addition, 140 GHz IMPATTs, with 20 milliwatts output in the CW version and 1 watt in the pulsed version, have been added, marking the first time that IMPATT diodes at D-band have been offered in a sealed packaged.

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Office Systems Design/Development Specialist

We need Specialists and Senior Specialists to recommend, develop and implement office automation procedures, concepts, and training programs. BS degree or equivalent professional experience required, plus three to five years professional experience in office automation, telecommunications, or microprocessors (with office automation concepts work) and top communications skills required.

Programmer Analyst/Senior Programmer Analyst

Develop and transform user requirements in applications with documentation for real time and/or batch systems, including testing. You'll need a BS in Computer Science, Math, Engineering, Business or equivalent professional experience plus three to five years of programming experience in systems development (using IBM systems if possible) and demonstrated skills in more than one language. Project coordination skills required for senior level.

Systems Programmer/Senior Systems Programmer/Associate Systems Programmer

Install, maintain, evaluate current and new computer systems, addressing problem determination, systems control and operational procedures. You'll need a BS or equivalent professional experience plus 0-4 years in systems programming in a large IBM shop, plus knowledge of several of the following: MVS, JES2, VS1, IMS, VM, COBOL, PL/1, FORTRAN and IBM utilities.

Programmer/Senior Programmer/ Programmer Trainee

Prepare for all phases of applications programming for real time or batch systems, working from functional specs. You'll need a BSCS or one year of programming experience and programming skills in one or more systems development languages.

Telecommunications Engineer/ Senior Telecommunications Engineer

Forecast requirements, optimize current voice systems capacity, and implement voice systems expansions. You'll need a BSEE or equivalent professional experience plus two to four years of professional experience in communications or computer systems engineering - electronic systems theory, design, implementation, voice switches/transmission, and excellent communications skills.

Technical Advisor/Systems Development/ Microelectronic Software

Provide technical expertise to project groups, defining, reviewing applications and ensuring timely projects completion. Coordinate activities between users and data personnel, and lead on selected projects. You'll need a BSCS or equivalent professional experience (for System Development: BS also in Math, Engineering, or Business) and seven years of professional experience, along with top human relations and communication skills.

Data Communications Specialist

Install and maintain equipment and documentation for the \$4.5 million Network Control Center, providing technical assistance to communications technicians and trainees. You will need a technical trade school diploma in a computer related field plus four years of data communications networking/communications experience and excellent verbal and human relations skills.

EDP Auditor/Senior EDP Auditor

Assist with audits of data systems functions to verify internal controls. Perform operational audits for all data departments to determine efficiency of operations and procedure compliance. You'll need a BS in Accounting, Finance, or Data Processing or equivalent plus three years of auditing experience and solid background in EDP hardware configurations for IBM systems.

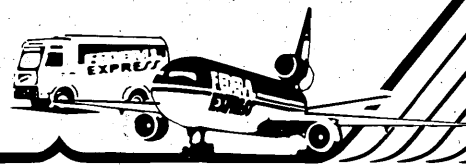
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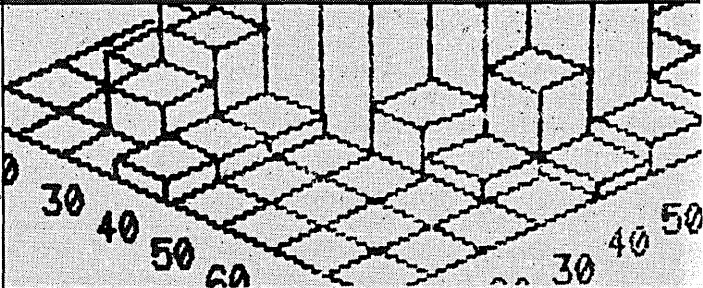
CIRCLE 125 ON READER CARD

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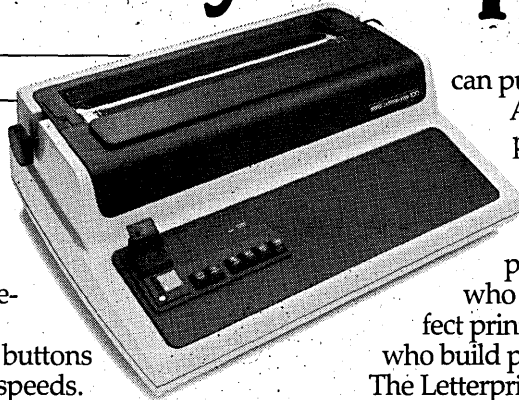
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Digital's new Letterprinter 100 gives you the versatility of four separate printers in one printer. Yet it costs the same as many ordinary single-purpose printers.

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HARDWARE

OFF-LINE

The newest micro to come from Quasar Data Products, the QDP-300, was designed from the bottom up to be a CP/M and MP/M compatible system; the result is that bottlenecks commonly associated with the popular operating systems are greatly reduced. The Z-80-based system comes with 128K RAM and two 8-inch double sided, double density floppy drives, with a hard disk available. The computing engine -- you need a terminal to use it -- starts at \$3,700.

Magnuson's M80/20 entry-level mainframe seems to have a price/performance advantage over the comparable IBM 4321 system. The plug-compatible machine includes 512KB of processor storage and two channels, which can be expanded to 8MB and six channels. The \$59,000 system is fully upgradeable.

Hewlett-Packard has paired two HP-100 systems into a fault-tolerant Systemsafe/1000, intended for use in industrial and communications applications. The manufacturer has also announced the fastest real-time member of the HP-1000 family, the 3 MIPS A900 technical computer. The \$24,000 system can perform a typical mix of floating point instructions at 560,000 instructions per second, and can support up to 6MB of 64KB RAM system memory.

Raytheon's RDS-200 series of information processors combines the word processing features of its predecessors (the RDS-1202 and RDS 1303) with personal computing, data processing and communications capabilities. Following the lead of IBM's Displaywriter, the RDS-200 is CP/M compatible and can be used for spreadsheet, DBMS, and BASIC functions. Three versions of the product are now available, starting at \$6,500.

ION DEPOSITION PRINTER

The Mercurion I is billed as the first nonimpact computer printer system based on ion deposition imaging. The 60-page-per-minute letter quality system can act as a replacement for impact line printers without software modification. It is plug compatible with most mini and mainframe computers.

The ion deposition imaging works like this: a noncontact ion projection cartridge, containing a mix of electrodes, charges a dielectric image drum with ions in a fine dot pattern. As the drum rotates, magnetized toner is attracted to the charged dot pattern. Paper and toner are then pressed together between the drum and a pressure roller in a transfixing process, completing the printing. Toner residue and electrostatic charges are then removed. This technique is said to be two steps shorter than laser xerographic printing. The technique is also reliable, with mean copies between failure in the 500,000 range and mean time to repair about 30 minutes.

A pushbutton control panel is used to set margins, select up to eight character fonts (which may be intermixed on a line basis), program the number of copies (up to 255), and handle self-testing. Standard features on the \$60,000 machine include 1,500 sheet capacity, multiple copy select switch, line printer VFU compatibility, and digital status display. Options include more character fonts, logo/signature printing, form sorting, and binding equipment. SOUTHERN SYSTEMS, INC., Fort Lauderdale, Fla.

FOR DATA CIRCLE 301 ON READER CARD

PERSONAL COMPUTER ETHERNET

EtherLink is a hardware/software package that connects IBM Personal Computers to an Ethernet local area network. The hardware consists of a single circuit board which plugs into an expansion slot on the P.C. Included on the board is an Ethernet transceiver that connects directly to thin Ethernet cable. This cable is identical to conventional coaxial cable except that it is less shield-

ed, limiting the maximum distance between two computers on the network to 1,000 feet. A standard Ethernet transceiver connector is also provided for users who plan to use EtherLink with an external transceiver.

The software sets up a communications channel with any other computer on the network. When this channel has been established, users can read or write any file on the remote computer's diskette, which appears as a virtual diskette. Printers and peripherals can be shared in the same way.

The EtherShare network server can also be put on the network. It includes a 10 or 20 megabyte Winchester drive (which appears to P.C. users as a virtual floppy diskette), a 1MB 5¼-inch floppy drive, Ethernet network interface, software, and an administrator's guide.

EtherLink requires an IBM P.C. with at least 64KB, a diskette drive, DOS, and an available expansion slot. User installation requires a screwdriver and is driven by menu prompts once the hardware is plugged in. Documentation includes a three-ring binder user's guide. 3COM CORP., Mountain View, Calif.

FOR DATA CIRCLE 302 ON READER CARD

PERPETUAL PROCESSING

The Power 5 systems family is designed to combine common hardware architecture, a high-speed local area network, and a common operating system to provide a range of transaction-oriented never-fail computers aimed at commercial applications. The first member of the family is the Power 5/20, an entry-level machine that can function as a single processor system or as a distributed subsystem within a perpetual processing configuration of several machines.

The Power 5/20 includes a proprietary cpu based on the MC68000, with up to 4MB of ECC memory, a 35MB or 70MB hard disk, a 20MB streamer tape, and the capacity to handle up to 32 RS232C communications ports. Additional communications options include mixes of RS232 and RS422; RS232 and RS422 with either modem con-

HARDWARE

trol or parallel ports; or links with the Data Highway network.

All Power 5 systems will run the proprietary PERPOS operating system, which was designed to accommodate a high-volume, high-throughput transaction environment in never-fail mode. The computers also support UNIX, FORTRAN 77, COBOL 74, C, and BASIC languages; database management systems; multivendor networking capabilities; and the Office Power office automation system. Availability for the Power 5/20 is January 1983. Prices range from \$20,000 to \$37,400, with quantity discounts available. The Power 5/55 distributed processing system, in which each 5/20 acts as a subsystem, will range from \$162,000 to \$448,000 when it becomes available in June. COMPUTER CONSOLES, INC., Rochester, N.Y.

FOR DATA CIRCLE 303 ON READER CARD

16 MIPS MINICOMPUTER

Three minicomputers rated from 3 million to 16 million instructions per second are upward compatible with Data General's Nova family. Using microprogrammed

firmware, bit-sliced 16-bit technology, and the PCOS operating system, the PolyComputers provide user-transparent multiprocessing and virtual memory operations in multiple batch, timesharing, and real-time modes.

The smallest system, model 301C, is rated at 3 MIPS and contains 3 cpus, 576KB of memory, a 34MB Winchester disk, quarter-inch streaming tape drive, high-speed printer port, eight RS232 communications channels, and cabling and power supplies. Software for the system includes the PCOS operating system, one compiler (BASIC, COBOL, FORTRAN, or Pascal), utilities, and a debugging facility. The system costs \$37,000.

The nine processor model 903A contains 2.1MB memory, 158MB Winchester disk, half-inch magnetic tape drive, 16 communications channels, and software, for \$66,000. The fully expanded system has 17 cpus and 4MB of MOS memory. It can support up to 100 users and 1.2 gigabytes of Winchester storage for less than \$100,000.

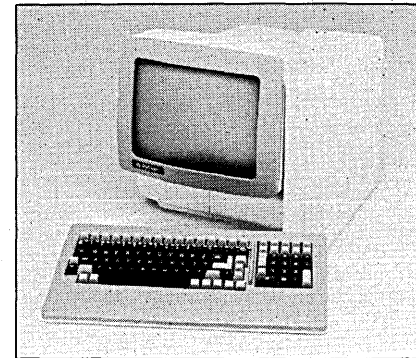
Three application packages are available as options to any of the systems: a

screen formatting/data entry/data verify package for on-line transaction processing, a word processor operating in the timesharing environment, and a general ledger package. POLYCOMPUTERS, INC., Irvine, Calif.

FOR DATA CIRCLE 306 ON READER CARD

INTELLIGENT WORKSTATION

The 970 intelligent workstation is a plug-compatible replacement for DEC VT100 terminals that meets all ANSI x.364 compatibil-



ity standards. The machine, priced at the top of the vendor's line, is designed for data entry, word processing, programming, and financial analysis applications.

The 970 represents a radical design change from other smart terminals, the vendor says, in that terminal electronics are housed vertically in a vented "tower" that allows efficient cooling without a noisy fan. The cooling method is expected to extend the life of the terminal's electronics by an estimated 60%.

A 14-inch crt gives a 132-column x 25-line display on a high resolution green phosphor screen. The crt is cradled next to the screen and "floats" on two pivot points. Users can easily adjust the screen to a comfortable angle.

The 970 includes "set and forget" programmable function keys that people in each office can tailor to their own needs. Other attributes, such as baud rates, are selectable from a setup menu and are held in nonvolatile memory. The terminal costs \$1,495 in single-unit quantities, but oem discounts are available. Deliveries are slated to begin next month. TELEVIDEO SYSTEMS, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 304 ON READER CARD

IBM P.C. COMPATIBLE PORTABLE COMPUTER

Once it's put on a desk, the Compaq computer can run all of the major software packages written for the IBM Personal Computer, including the MS DOS operating system, without any modifications. The computer, which is also completely hardware compatible, costs \$3,000, less than the IBM P.C.

It's also portable. The entire self-contained unit weighs 28 pounds and measures 20 x 15.3 x 8.5 inches. The 16-bit machine has 128KB of RAM, which can be expanded to 256KB on the main system

HARDWARE SPOTLIGHT

COMPUTER AIDED ENGINEERING

The SCALDsystem (Structured Computer Aided Logic Design) consists of a set of hardware, procedures, and programs that can reduce design time for a digital electronic system by a factor of 10, the vendor says. The system is configured around interactive, real-time graphic design stations for schematic editing; the stations can share application programs with a mainframe and exchange data at 800Kbps.

The engineer using the system can begin a design with a block diagram comprised of a few functional items. These can then be subdivided, with added detail, until each block is described on the screen in terms of actual components. After the drawings have been created, using a graphics editor in the Unix environment, the

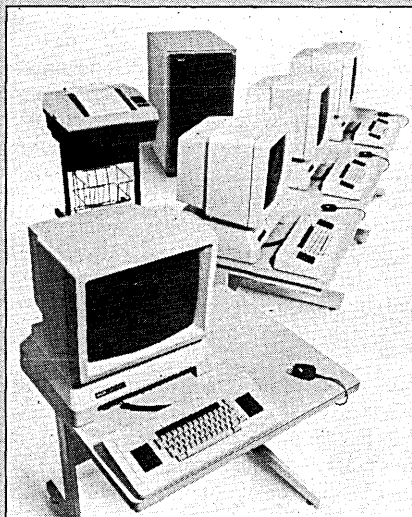
SCALD compiler expands the design and checks interfaces to ensure consistency.

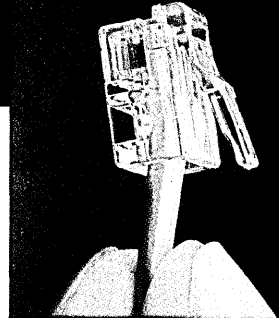
A timing verifier assists the engineer throughout the design process in detecting logic-level timing errors such as races, clock glitches, setup and hold violations, and pulse width errors. A logic simulator provides interactive simulation at speeds faster than conventional gate-array simulators, the vendor says. The simulator makes it possible to debug microcode firmware and software as well as hardware. A graphics design database is included in the package, and by operating the logic simulator on the database the need to define and maintain a separate high-level model for a design is eliminated. An interface from the design database to physical design systems, as well as to other analysis and testing tools, is provided by a post processor.

Hardware elements of the system include a desktop graphics design workstation based on the Intel 8086 microprocessor and a cluster controller designed around the MC68000 microprocessor. The controller can support up to four design stations in a cluster configuration and link clusters to a network or host mainframe.

Each design station consists of a 20-inch crt with 1,024 x 768 resolution, full ASCII keyboard with programmable function keys, a graphics tablet, and two microprocessors. The raster scan display has a refresh rate of 60 Hz with four intensity levels. The SCALDsystem design stations are \$35,000 apiece or \$138,000 for a four-station system. VALID LOGIC SYSTEMS, Sunnyvale, Calif.

FOR DATA CIRCLE 300 ON READER CARD





Why install cables for data when there's a network...

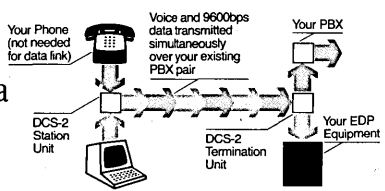
right under your nose! If you're tired of the endless hassle of expanding your local area network—not to mention the expense of installing cable and limited distance modems—Teltone has some very good news for you.

It's called the DCS-2 Data Carrier System, and it lets you use existing PABX wires to carry both voice and data traffic *simultaneously*.

That's right. Up to 9600 BPS of dedicated-channel, full duplex asynchronous data can be transmitted or received by any ASCII terminal in your system—and the data won't interrupt phone service.

With the DCS-2 your PABX becomes a common communications network, where making a computer hookup is as easy as plugging in a phone. It's fast, FCC Part 68 registered, and it won't cost you the roof over your head.

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For users of DEC, Prime, Data General, Tandem, IBM Series/1, H-P and other asynchronous computers.

CIRCLE 126 ON READER CARD

HARDWARE

board. The unit has a standard 320KB 5¼-inch floppy disk drive and an optional second 320KB floppy. It also includes a color video monitor port; a composite video port (for text and graphics on the same monitor, impossible on the IBM P.C.); a port for connection to a standard tv through an RF modulator; a parallel printer interface; and a socket for an Intel 8087 coprocessor. An asynchronous communications interface and a serial printer adapter are optional.

Compaq has three hardware expansion slots, two more than a similarly equipped P.C. These allow for additional memory or any other peripheral add-on devices. The machine's 9-inch display offers the same 25 × 80 character format and high resolution graphics as the IBM P.C. COMPAQ COMPUTER CORP., Houston, Texas.

FOR DATA CIRCLE 305 ON READER CARD

THREE-WAY P.C.

This product adds IBM Personal Computer compatibility to the vendor's "all in one" personal workstation. The workstation emulates both the DEC VT100 terminal for asynchronous communication to non-IBM systems and the IBM 3278 terminal for access to that vendor's cpus. Files can be transferred among the P.C. look-alikes, the IBM systems, and the DEC (or other non-IBM) systems transparently to users.

The personal computing capability is handled as an add-on unit to the personal workstation. It contains an Intel 8088 processor, 128K of program memory, a single 5¼-inch floppy disk drive, a display interface, a printer interface, and four expansion slots. Optional equipment includes a second floppy disk drive and 256K of on-board memory. Future expansion is expected to include a 5MB or 10MB Winchester drive. The hardware runs all IBM P.C. software.

The display workstation can be an 80- or 132-column monochrome terminal or one of four color terminals. An optional 80-column matrix printer is available as well. The basic personal computer unit costs \$2,733, and deliveries are expected to begin next month. LEE DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 307 ON READER CARD

FIBER OPTIC LAN

Fiber Optic Net/One is billed as the first fiber optic Ethernet-compatible local area network. The product is the result of a collaboration between Ungermann-Bass, Santa Clara, Calif.; Codenoll Technology Corp., Yonkers, N.Y.; and Siecior/FiberLAN, Research Triangle Park, N.C.

Ungermann-Bass developed the Ethernet compatible Net/One network interface units and the communications software. Codenoll designed the fiber optic Ethernet transceivers, and Siecior/FiberLAN supplied the fiber optic transmission subsystem, including a transmissive star coupler. The general purpose local area net-

work is available in two baseband versions and one broadband CATV compatible version.

The fiber optic network is not susceptible to electromagnetic radiation interference, which is often found near factories with heavy machinery or radar sources. Fiber optic cable is also more difficult to tap surreptitiously than conventional cable. It can work with existing CSMA/CD local area networks, so that Ethernet users can preserve their hardware and software investments. UNGERMANN-BASS, INC., Santa Clara, Calif.

FOR DATA CIRCLE 308 ON READER CARD

REMOVABLE WHITNEY

Described as the first in a series of rigid 8-inch drives for microcomputers, the Arapahoe 7110 is a fixed/removable disk drive with 25MB of data storage fixed in a sealed enclosure and 25MB in an ANSI standard removable cartridge. The Whitney technology drive, similar to the IBM 3370/3380 drives, includes an advanced performance



head suspension and a high density encoding method. The thin film heads characteristic of IBM Whitney drives are not available on the 7110, however.

The Whitney read/write techniques enable a packing density of 10,000 bits per inch, with a flux density of 6,700 frpi. The 50MB configuration incorporates the functions of system I/O, backup, data interchange, and off-line storage in a form-factor identical to an 8-inch drive. With the 8-inch drive profile, two Arapahoes in horizontal configuration or three in vertical configuration will fit into a standard RETMA 19-inch rack.

The 7110 drive carries a unit price of \$3,215 in quantities of 100. AMCODYNE, INC., Longmont, Colo.

FOR DATA CIRCLE 309 ON READER CARD

HARD DISKS FOR APPLE

The DataFile series of hard disk subsystems is designed to operate as mass storage media for the Apple II. The Winchester systems include intelligent controller, power supply, cabinetry, and software, as well as up to 20MB of memory. A 5MB system increases Apple II system memory from 288

pages of text to 3,400 pages; the 10MB unit increases memory to 6,800 pages, and the 20MB unit increases memory to 14,000 pages.

The DataFiles include software that supports the ADOS, CP/M, and Pascal operating systems on the Apple. The subsystem can be added to the Apple II without any hard wiring. The interconnection is accomplished by means of an interface board that is installed in an available slot of the card cage. A ribbon cable connects the Apple II and DataFile.

The subsystem can be booted up from an installation floppy disk. Complete documentation is provided as part of the system, which is available from dealers of Apple, Sanyo, and Xerox computers. Prices range from \$3,000 to \$4,000. THOUGHT WORKS, Phoenix, Ariz.

FOR DATA CIRCLE 310 ON READER CARD

52.5-INCH PLOTTER

The 8252-A electrostatic plotter can plot 52.16 inches wide on 52.5-inch paper to meet special automotive design requirements. A 72-inch plotting width is also offered. Plotting resolution is 200 dots per inch. Rated speed of a quarter inch per second delivers 5.4 square feet per minute. The 8252-A prints 652 columns of standard ASCII characters in a 16 × 20 matrix at 120 lines per minute.

Design features include a wide vacuum channel that removes excess toner, enabling consistent high contrast plotting at high speed. Toner applicator fountain and turbulent flow toner system maintain toner contact with paper to produce even, solid black areas. Electrically biased backrest reduces toner signature during midplot pauses, improving start-stop and remote output quality.

The plotter can be interfaced to most computers and terminals through standard controllers. Options include paper winders, character sets (a 96 ASCII character set is standard; 124-character scientific/engineering and custom sets are available), vector-to-raster converters and random element processors, plotting workstation, I/O multiplexors, test exercisers, and supplies. The system costs \$83,000 and is available 60 days ARO. VERSATEC, Santa Clara, Calif.

FOR DATA CIRCLE 311 ON READER CARD

DECISION-MAKING ARRAY PROCESSOR

The AP500 32-bit floating point array processor can perform many of the decision-making and input/output tasks that traditionally burden a host minicomputer or mainframe in computation intensive applications. The compact unit is rated at 9 million floating point operations per second.

Depending on the application, the unburdening of the host affords increased system performance as well as a more economical host. The host can download a

How do you create a microcomputer to match the power of the UNIX™ operating system?

Imagine. You are perfecting a revolutionary operating system. In about two years, it will be the system of choice for 16-bit microcomputers. It will be called the UNIX operating system.

But the breakthrough features of this operating system are going to make stringent demands on the computer.

The microcomputer developed specially for the UNIX operating system more than two years before its commercial distribution is called ONYX™.

ONYX will live up to every demand and expectation.

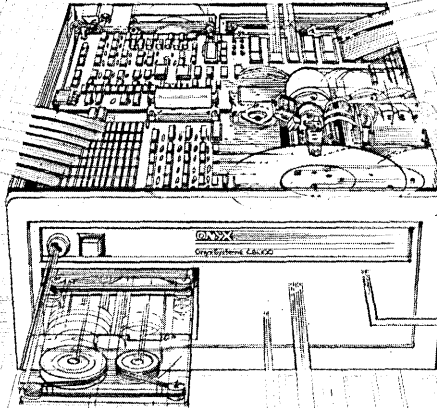
To achieve the ultimate flexibility, simplicity, efficiency and productivity, the UNIX operating system will incorporate a file system of highly uniform lists and sub-sets of directories, arranged in a tree-like hierarchical structure.

And flexible directory and file protection modes, allowing all combinations of "read," "write," and "execute" access, independently for each file or directory, or for a group of users.

But these advantages will require intensive disk access, and superior memory management. In simple language, disk access must be as fast as possible, and the disk must have an unusual capacity to maintain complex systems on-line at all times.

Floppy disks with their low capacities and high access times won't do.

Winchester disk drives that utilize slow-moving stepper motor head positioning devices won't do.

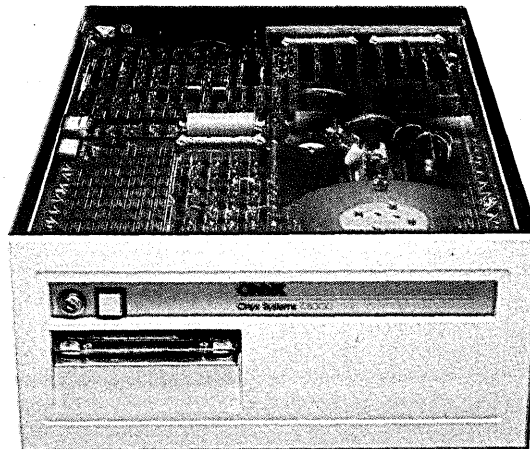


ONYX's IMI Winchester disk storage system, with its servo-driven voice coil head positioning, is more than twice as fast!

So, obviously the ONYX C8002 will do.

And, as developed, the ONYX C8002 features expandable memory up to 1 Mbyte, and disk storage up to 160 Mbytes on-line. Its cartridge tape backup offers cyclical redundancy checking on every backup. Both the Winchester disk storage system and the cartridge tape backup are *internal*.

In the UNIX operating system environment, the disk becomes an extension of main memory. "Swapping" programs between the disk and main memory



increases the number of operations that can run concurrently. ONYX's memory management system utilizes "scatter" instead of "contiguous" allocation, and the more efficient swapping minimizes demand on the disk channel. That's why ONYX assures a highly efficient environment for the UNIX operating system.

Now it's 1982. The UNIX system's pre-eminence among 16-bit operating systems is established. And ONYX is the only company that has significant production experience with UNIX systems.

ONYX has installed over 1500 UNIX systems.

Today there are a lot of systems being developed to operate UNIX (and "look-alike") operating systems. But there are many reasons why you should consider ONYX and the UNIX operating system as inseparable.

System III available now for immediate delivery.

Phone this special number: (408) 946-6330 Ext. 251. Ask about these System III enhancements, including:

- Multi-key index sequential files under RM COBOL;
- "Term Cap" capability that supports a wide variety of terminal interfaces;
- Enhanced printer handling capability;
- SCCS to maintain edit histories in text management applications.

*UNIX is a trademark of Bell Laboratories.

Make the Connection

ONYX UNIX

OPERATING SYSTEM

Onyx Systems Inc., 25 East Trimble Road, San Jose, CA 95131

CIRCLE 127 ON READER CARD

HARDWARE

complete, major subtask of the AP500, which can then operate autonomously. The unit offers standard and optional I/O interfaces that enable its use as a peripheral attached to a local or remote host, as a co-processor, or as part of a local area network. For some applications, users can build a complete instrument based on the AP500, without a host processor.

The system is based on the MC68000 $32\frac{1}{2}$ -bit chip operating at a 12.5 MHz clock rate. It has 128KB of program memory in the basic memory, expandable to 256KB. Standard data memory is 16K \times 32-bit words, expandable to 528K words in the standard chassis or to 912K words in a taller version. The processor is tailored for all DEC minicomputers, the HP-1000, and the Data General Nova and Eclipse series of computers. Domestic prices start at \$25,000 and delivery is 10 to 12 weeks. ANALOGIC CORP., Wakefield, Mass.

FOR DATA CIRCLE 312 ON READER CARD

CURRENT SWITCHED NETWORK MODEM

The AJ 4048 is a full duplex, originate/auto answer modem for communications at 4,800 bps over dial-up or two-wire unconditioned leased lines. The modem eliminates the need for dedicated lines in many applications and doubles the data throughput in others. Full duplex 2,400 bps fallback speed is standard. Local and remote diagnostics assure reliability and system control.

Standard features include selectable synchronous or asynchronous operation, data terminal interface via RS232C connector, extensive front panel display indicators, and membrane front switches. The unit is available for either standalone or rack-mounted applications.

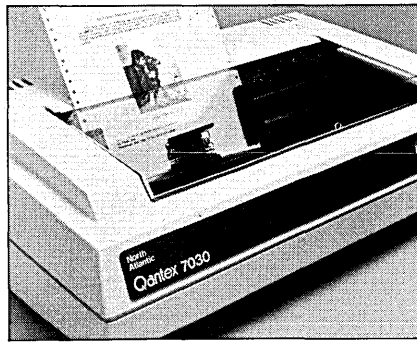
The 4,800 bps data rate over two-wire lines is made possible by incorporating a new band-separation technique, the vendor says. Near-end echo is suppressed via an adaptive cross and echo canceller, while far-end echo is removed through digital filtering. An automatic, continuously adaptive equalizer helps assure high performance.

Diagnostics on the \$5,000 modem include CCITT-recommended local analog and remote digital loopback as well as local and remote self-testing. The modem uses standard interfaces to terminals and switched networks. It is based on the AMD 2900 processor for signal processing and the Z-80 for control functions. ANDERSON JACOBSON, INC., San Jose, Calif.

FOR DATA CIRCLE 313 ON READER CARD

MULTIMODE PRINTER

The Model 7030 printer features a dot-addressable graphics mode with programmable resolution up to 144 vertical and horizontal dots per inch. Any combination of six contiguous vertical dots can be select-



ed by the transmission of an ASCII character. The graphics mode buffer capacity is 4.7KB. The printer also supports 32 ASCII code-selectable line drawing graphics characters at 150 or 180 characters per second.

The printer also has a word processing mode, which includes high-density, letter-quality printing, proportional spacing, justification, auto underline, overprint, and bold. Up to 40 letter-quality fonts are capable of being stored on-line. In addition to a conventional character set, the printer is capable of printing character sets of Germany, France, Norway/Denmark, Sweden, Finland, and Spain.

Communications are provided via a switch-selectable parallel or serial interface. The printer offers adjustable bottom and front paper feed; a heavy-duty print-head rated at 500 million characters; 6-part form capability; and vertical line spacing of 2,3,4,6,8, or 12 lines per inch. The printer costs \$2,000. QANTEX DIV., NORTH AMERICAN INDUSTRIES, INC., Hauppauge, N.Y.

FOR DATA CIRCLE 314 ON READER CARD

16-BIT PERSONAL COMPUTER

Occupying about as much desk surface area as a three-ring notebook, the HP Series 200 model 16 is the vendor's first 16-bit personal computer. It is based on the MC68000 microprocessor with an 8 MHz system clock. The model 16 consists of a 9-inch diagonal crt, detached ASCII keyboard, and a choice of $3\frac{1}{2}$ -inch microfloppy disk drives.

A standard 128KB of system memory is expandable to 768KB, and with an external expander to 4.6MB. The model 16 has built-in graphics, and the crt has an 80-character \times 25-line display and graphics resolution of 300 \times 400 pixels. The



keyboard includes five user-definable soft keys (10 with shift) and a special rotary control knob for fast editing of programs, cursor positioning, analog control of instruments, and other applications requiring linear input. Communications capabilities are standard through an HP-IB IEEE-488 port and an RS232C serial port.

Three disk drive options are available: a single 270KB drive, a dual drive system with 540KB of formatted information storage, and a single 270KB floppy drive combined with a 4.6MB Winchester disk. The base price of the model 16 is under \$4,000 and with peripherals can run to \$9,000. The disk drive packages range from \$1,250 to \$4,950. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 315 ON READER CARD

"EIGHT SCREEN" TERMINAL

If a user wanted to access several business applications, each of which required a different screen size or format, the only apparent solution was usually to provide several terminals. With the 701 terminal, up to eight different screen sizes can be supported: 25 \times 80; 28 \times 132; 44 \times 80; 33 \times 80; 14 \times 80; 31 \times 64; and 14 \times 40. Users can perform all 3270-series applications at one station through this capability.

Users can also switch between sessions running on one or two computers without logging off, increasing the operator's flexibility in accessing a range of computers and applications with a minimum initial investment.

The 12-inch crt is capable of reverse video, blinking, underscore, and some color. Up to four character sets are available. Two phone numbers are stored locally for auto dial-up, and a third can be entered from the keyboard. The 701 costs \$1,750 with quantity discounts available. ICOT CORP., Mountain View, Calif.

FOR DATA CIRCLE 316 ON READER CARD

EMULATING TERMINAL

The Visual 330 display terminal emulates both the DEC VT52 and Data General D200 terminals. Menu-selectable emulation of Lear Siegler's ADM-3A and Hazeltine's 1500 terminals is also possible. The terminal's ergonomic design includes tilt-and-swivel capabilities, 12- or 14-inch nonglare screen, 7 \times 9 dot matrix characters, and detached low profile keyboard.

Standard functional features on the terminal include block and character transmission modes; 12 user-programmable, nonvolatile function keys, each capable of storing 32 characters; blink, underline, reverse, bold, and blank video attributes; line drawing character set; and split screen viewing. The terminal is compatible with others in the vendor's product line and costs \$1,150, with volume discounts. VISUAL TECHNOLOGY, INC., Tewksbury, Mass.

FOR DATA CIRCLE 318 ON READER CARD

The IBM Modem: high availability with rock-steady reliability.

A modem is only as good as its signal quality and its availability. The IBM Modem, thanks to an advanced IBM microprocessor, offers excellent signal quality, high availability and rock-steady reliability.

It shows its ability on networks large and small, especially the complex kind that present the toughest operating problems.

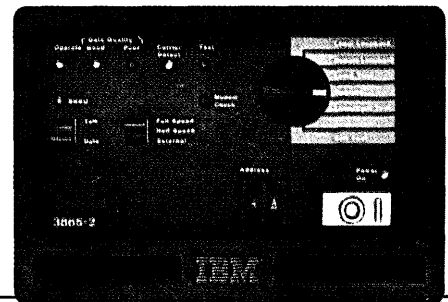
The IBM Modem helps you manage your network. For example, it continuously analyzes telephone line quality. If a line degrades, the modem adapts its signal so that data transmission is maintained. And, working with IBM software available for many host systems, it alerts the operator and pinpoints the source of the problem.

The IBM modem family includes the 3863, 3864 and 3865, with a line speed range of 2400 to 9600 bps. They work on standard, unconditioned lines, including switched lines. In point-to-point and multi-point configurations. With fast turnaround at all speeds.

Combine all this with IBM service and quantity discounts and you'll agree, IBM has the modem to meet your data transmission and network management needs.

For a free brochure or to arrange to have an IBM representative call you, telephone us toll free at 1 800 631-5582 Ext. 82. In Hawaii or Alaska, 1 800 526-2484 Ext. 82.

Try a set of IBM Modems for up to four weeks through the special IBM Modem trial program.



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- Please have a representative call me.
- Please start me on the four-week trial.
- Please send me more information on IBM Modems.

Name _____

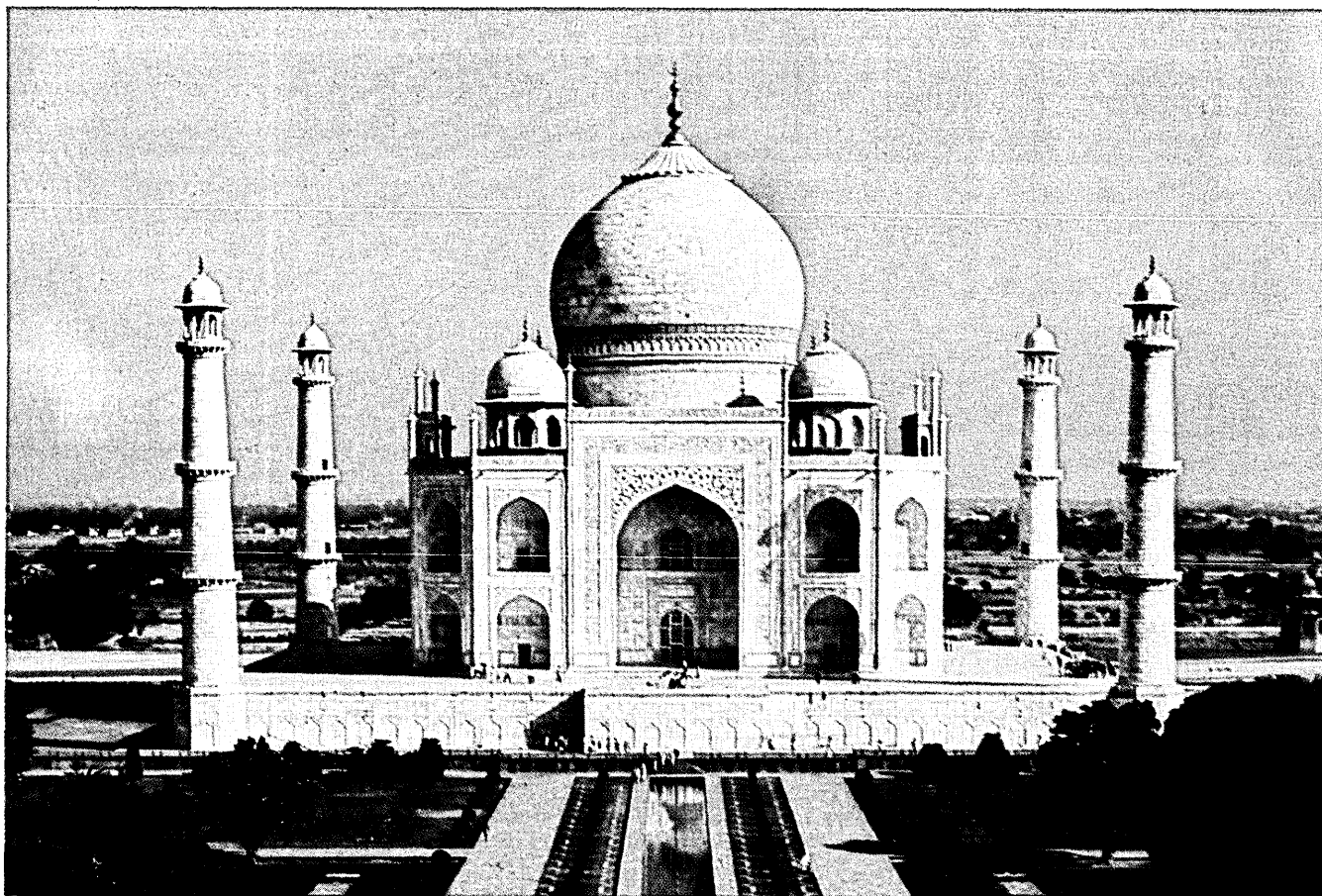
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Company _____

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City _____ State _____ Zip _____

CIRCLE 128 ON READER CARD

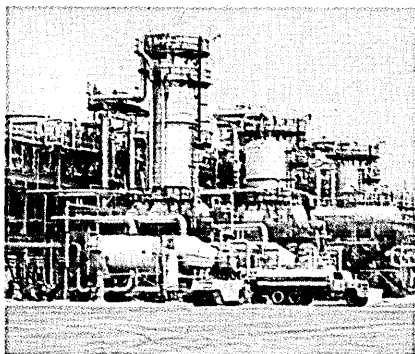


With 40 days' paid vacation every year, Aramco people can see the heart of Asia, from Delhi to Bangkok to Hong Kong, and still have time for an African game park, Paris in the spring, or ski trips in the Alps.

The money isn't the only reason so many top people are going to Saudi Arabia with ARAMCO

As great as the money is, it is the travel opportunities, the challenge, and the casual lifestyle in familiar hometown neighborhoods that make Aramco people stay on.

Aramco employees in Saudi Arabia have travel opportunities that most people only see in daydreams. They get 40



Over 5,000 North Americans work for Aramco in Saudi Arabia. They're helping the Kingdom develop energy resources that are being used all over the world.

days' paid vacation every year. And in Saudi Arabia they are already halfway to wonderful places in Europe, Asia and Africa.

Equally as important as money and travel are the challenging jobs and secure, comfortable living conditions.

Aramco is the world's largest oil-producing company. Our projects and operations are huge, complex and professionally rewarding. Many are the largest of their kind ever undertaken.

We need more first-rate people to join the over 5,000 North Americans who work for us.

North Americans and Saudi Arabs have worked together for over 40 years.

Since the early 1930's, North Americans have worked very closely and successfully with their Saudi hosts in developing the energy resources and infrastructure of this friendly, conservative nation.

These North Americans live in a foreign country, yet they still find it a very comfortable place to live and work. The

homes, neighborhoods, schools, medical services and recreation facilities have a hometown feeling that have prompted a long line of Aramco professionals to stay on and on.

What kind of compensation package accompanies all this? Aramco employees earn a competitive base salary, plus a cost-of-living differential. They also get an expatriate premium of 40 percent on the first \$30,000 of base salary and 20 percent premium on the next \$20,000, plus a one-time bonus of up to \$5,000, for signing up for overseas work.

Challenging opportunities

If you are a degreed engineer with at least ten years' experience in the petrochemical industry, send your résumé to Aramco Services Company, Z2060-2, P.O. Box 53607, Houston, Texas 77052.

ARAMCO
SERVICES COMPANY
CIRCLE 129 ON READER CARD

SOFTWARE AND SERVICES

UPDATES

We're about to get the Yellow Pages of the personal computer industry, courtesy of Redgate Publishing Co. They are publishing *List*, a compendium of all known software for personal computers, segmented by industry application, system, and geographic region. Vendors can pay \$200 to be included in the listings, which should become available in early 1983.

Commodore has donated some 656 educational computer programs to the public domain. The programs, which are the product of 20 man-years of effort, have been cataloged and recorded on a set of 50 disks. The company is supplying sets to each of its U.S. dealers and education resource centers for distribution to public and private educational institutions, organizations, and foundations.

If you live in the New York area and you buy a Zenith desktop computer, you will receive a coupon worth \$110 in training at the Erin Computer Learning Center on Long Island. The motivation behind this arrangement is to provide personal computer buyers with the same level of training and support as mainframe and mincomputer customers. Time will tell if other vendors follow suit or if the idea fizzles out.

Computer Pictures Corp. sells Trend-Spotter, a graphics analysis and reporting package; Execucom Systems Corp. sells the interactive financial planning language IFPS. The two companies have decided to integrate their products, allowing IFPS to run on Trend-Spotter. Management will then be able to access and analyze financial information and display it in color graphics formats. The cost for that ability runs from \$120,000 to \$205,000 for both packages and the interface between them.

AGRICULTURE SERVICE

The AgriStar service is designed to provide instantaneous communications among farmers, ranchers, and others in the agriculture business, as well as access via any microcomputer terminal to an array of business, financial, marketing, weather, and news information. All information is continuously updated from several thousand electronically linked sources worldwide.

The Commodity News Service, Inc. will provide financial and commodity market information, which will be edited and formatted by the vendor for use by farmers. Other information is provided by major agriculture industry publishers, meteorological services, commodity brokerage houses, and selected agricultural corporations, associations, and colleges. Market analysis and recommendations from a range of economists and analysts are also available.

AgriStar is an interactive system that uses a home or office phone to connect the microcomputer to the system's data center in Milwaukee. The StarGram electronic mail service is provided for communication among users. The system is compatible with most microcomputers and terminals. Terminals and printers can be leased from the vendor for \$32 a month each. The service itself carries a \$433 annual fee and a \$25 an hour connect-time fee. The service is being marketed through Tandy Corp. AGRIDATA RESOURCES, INC., Milwaukee, Wis.

FOR DATA CIRCLE 326 ON READER CARD

ADA COMPILER

The Ada 432 Version 1 compiler system is the vendor's first production offering of a high-level language compiler for its IAPX 432 Micromainframe computer system, and one of the first Ada compilers that matches all of the specifications of the Defense Department. The compiler was designed to aid users in applications development on the IAPX 432 operating system, which is written entirely in Ada.

The compiler includes Ada features

such as separate compilation, generics, and "in-lines." With separate compilation, different programmers can compile program units individually without losing the benefits of compile-time error checking and reporting. They need not wait until other program units are complete, and compile-time error checking speeds the error identification and correction process.

The generics feature allows users to write parameterized, off-the-shelf program units for use in a number of applications programs. Generic modules are written and debugged once, and can then be tailored by the compiler for a variety of applications. "In-lines" are facilities whereby the compiler can place code generated by one programmer directly into the programs of other programmers. This reduces the number of requirements for subroutine calls and the compiler and operating system overhead associated with such calls.

The Ada compiler system is available for \$30,000 in single quantities, which includes an update to the validated compiler. Quantity discounts are also available. INTEL CORP., Aloha, Ore.

FOR DATA CIRCLE 327 ON READER CARD

MICRO-MAINFRAME LINK

This product provides users of the IBM Personal Computer or the Apple II or III computers with the ability to access host mainframe data files, SNA networks, and hard disk storage through the vendor's SyFA network processors. CASyFA (for the IBM) and CAPPLE (for the Apples) essentially convert the micros into interactive SyFA workstations or into 3270 terminals.

Attachment to a SyFA network may be remote through telephone lines and dial-up asynchronous modems, or local by direct connection with twisted pair cable. Full duplex communication with speeds up to 2,400 baud is supported. Additional software, provided through function keys, supports IBM 3270 terminal emulation for connecting to SNA networks.

This product allows personal com-

SOFTWARE AND SERVICES

puters to be used either as standalones or as terminals, but the functions are not integrated; information on the diskettes of the personal computer cannot be accessed when the machine is acting as a terminal.

The IBM version is written in Microsoft BASIC and the Apple version is in Applesoft. The products carry a \$2,500 one-time charge per network, although Apple users must also acquire about \$300 to \$500 of screen and keyboard enhanced features to implement the product. The diskettes containing the software are compatible with all minifloppies, single and double sided, currently available on the IBM P.C. and Apple II and III. COMPUTER AUTOMATION, INC., Irvine, Calif.

FOR DATA CIRCLE 328 ON READER CARD

IMS SERVICE

The IMS Standards Manual Service is designed to assist IMS users in the development of IMS systems standards, usage procedures, and corresponding IMS user reference manuals. The service commences when the vendor's consultants visit the client site to gather information about operating standards and uniformity goals. The client then receives a preliminary draft of the manual, which defines what tasks are to be performed, who is to perform them, how they are to be executed for optimum efficiency, and why those standards were chosen. Draft revisions will also be submitted, if necessary, to ensure that the rules and guidelines meet with the client's approval.

The final product, the vendor says, is a conveniently tabbed, concise, and easy-to-read user's standards manual that can increase programmer productivity by eliminating the need for trial and error programming and lessen errors and disagreements between individuals and departments. Additional benefits include more efficient use of computing resources and the elimination

of costs associated with altering on-line systems originally designed or programmed inefficiently. Established IMS standards also form a natural training structure for new personnel, the vendor says.

The service costs about \$35,000. An IMS handbook of simplified IBM documentation is also available for \$35. Similar services for CICS environments cost \$19,000 and \$35, respectively. ON-LINE SOFTWARE INTERNATIONAL, Fort Lee, N.J.

FOR DATA CIRCLE 329 ON READER CARD

WP VENDOR INTEGRATION

The Alien Text Information System is a hardware/software package that enables documents created on one word processing device to be transmitted to—and edited on—an "alien" device from a different manufacturer. The system was designed to permit users to maintain flexibility in developing automated offices by enabling them to utilize their current wp devices without limiting future equipment choices.

Formerly, users with word processors from different manufacturers were lacking in editing transparency—that is, a document created on an IBM Displaywriter could not be edited on an NBI word processor unless the operator was willing to rekey at least 30% of the document, the vendor says.

The software element of the package consists of Alien Turnkey Information Processing word processing modules written for individual word processors (currently supported are the Displaywriter, NBI, Microm, Wang, Xerox, Lanier, and Lexitron) and TIP data processing programs. Hardware elements include the word processing devices and a TIP minicomputer under the control of the TIP dp software. Text is transmitted from one word processor to another via the minicomputer, where the word processing modules alter the text files for the

second word processor. TURNKEY INFORMATION PROCESSING, INC., New York, N.Y.

FOR DATA CIRCLE 330 ON READER CARD

VLSI MANUFACTURING AID

This software was developed for on-line data transmission from a CAD system to an electron beam (EB) exposure device for manufacturing VLSI chips such as 64K RAMs. Instead of transmitting design data from the CAD system to the EB device via magnetic tapes, as is currently the practice, this product enables direct data transmission to the EB device from the CAD system. The EB device interprets the data to make masks or form patterns directly on a silicon wafer.

The direct transmission software enhances reliability by eliminating errors caused by mishandling of magnetic tapes. It also makes development and manufacturing cycles shorter, the vendor says, by enabling processing of a volume of data beyond the capacity of magnetic tapes and by facilitating easy verification of CAD and EB data.

Data can be sent from the host computer to the exposure system at 1Mbps. Data files can be transmitted among all disks through instruction at any terminal on the system. Distributed processing at the communication controller or at CAD system nodes is possible in case of excessive load or malfunction at the host.

The system is adaptable to different types of electron beam exposure systems and can be expanded to include the wafer manufacturing process; this would provide a flexible manufacturing system suitable for developing ECL and CMOS gate arrays. The software package is currently being licensed in this country to Varian Associates. MITSUBISHI ELECTRIC CORP., Tokyo.

FOR DATA CIRCLE 331 ON READER CARD

SOFTWARE SPOTLIGHT

RESERVOIR SIMULATION

Two petroleum reservoir simulation programs that maximize the vector processing capabilities of supercomputers are available through the Cybernet data services network or as packages for users with their own Cyber 176 and 200 series systems.

The Vectorized Implicit Program (VIP) is a numerical reservoir simulation program that enables engineers to predict the response of an oil- or gas-producing property to a variety of operating conditions or development plans. The Miscible Implicit Program (MVIP) numerically models the secondary recovery of oil using miscible flooding—adding various combinations of solvent, gas, or water to the well or field to sustain production.

With VIP, engineers are able to design drilling programs for desired oil production rates, determine incremental oil to

be recovered with water or gas injections, evaluate the feasibility of storing gas in an aquifer, and solve similar problems. MVIP calculates the underground flow of oil, gas, solvent, and water with finite difference methods using up to three-dimensional grids. Either rectangular or cylindrical grid networks can be chosen.

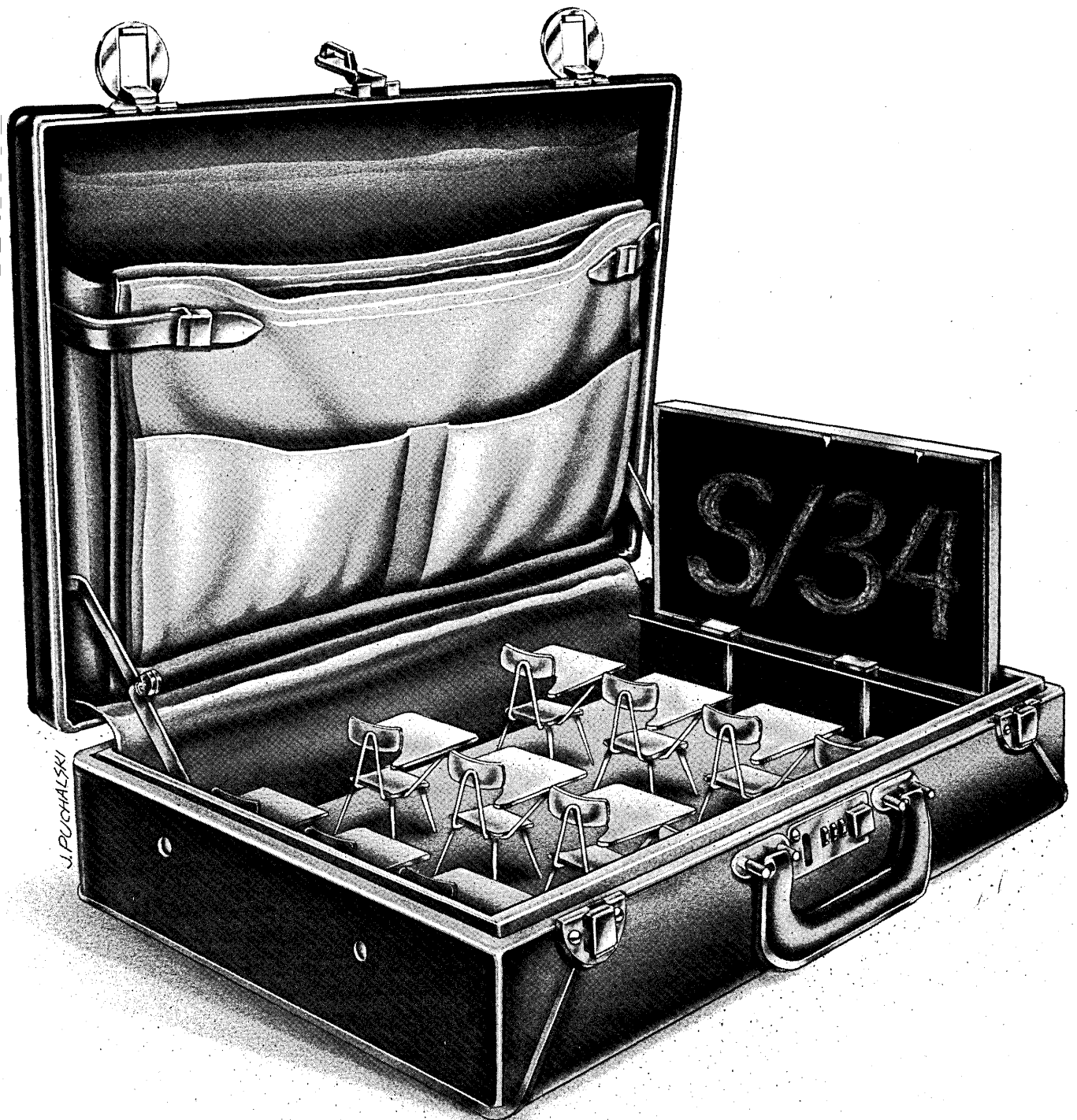
Both programs, which are written in FORTRAN, are available in scalar or vector form. They employ free-field format, special array input options, and table handling procedures to make data preparation easier and to help eliminate data entry errors. VIP costs \$150,000 for a scalar version and \$200,000 for a vector version (\$40,000 or \$50,000 for a one-year lease); MVIP costs \$175,000 for scalar or \$225,000 for vector (\$44,000 or \$56,000 to lease). CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 325 ON READER CARD

GRAPHICS COMMUNICATIONS

Space Communications allows the IBM Personal Computer user to transmit a three-dimensional drawing through telephone lines to another user and then to rotate, scale, or move the image on the screen while the other user instantly sees the manipulations on his own screen. With the touch of a button, control of the image can be shifted from one user to the other. Keyboard text messages can be transmitted to clarify the drawings on both screens.

If both users have the complete Space Tablet/Space Graphics CAD system manufactured by the same vendor, interactive editing of points in three dimensions is also possible using the \$500 software package. Other capabilities of the software in the CAD system include composing new models by linking together individual components and calling up three orthogonal views at once in a split-screen format. A similar system is also available for the Apple II computer, and software for other pop-



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CIRCLE 130 ON READER CARD

SOFTWARE AND SERVICES

ular micros is expected sometime next year. MICRO CONTROL SYSTEMS, INC., Vernon, Conn.

FOR DATA CIRCLE 332 ON READER CARD

FORECASTING DATABASE

The Citibank Forecast Database, an on-line version of the bank's quarterly *United States Economic Forecast*, is available on the vendor's remote access computer system. The service provides a five-year forecast, by quarters, for 200 economic indicators, including fixed business investment, corporate profits, employment, energy, Gross National Product, housing, industrial production, interest rates, monetary aggregates and credit, personal income, prices, wages and productivity, and balance of payments.

The service can be combined with the vendor's array of analysis, reporting, modeling, and forecasting capabilities to integrate forecast values into computerized applications.

The database is offered in conjunction with the print services of the Citibank Economic Forecast Service or is available separately for users who already subscribe to the CEFS print publications. Subscribers receive the database, the printed versions of the *U.S. Economic Forecast*, the monthly *Forecast Update*, the *United States Industry Forecast*, the *Industry Rate Forecast*, the *Regional Review and Housing Forecast*, the *Economic Week* newsletter, the "Sound of the Economy" monthly audiocassette, and telephone liaison service. The annual subscription is \$4,900, or \$2,400 for the database alone. The fee is in addition to standard computer service costs. RAPIDATA DIV., NATIONAL DATA CORP., Fairfield, N.J.

FOR DATA CIRCLE 333 ON READER CARD

ON-LINE NEWSLETTERS

To keep executives aware of developments in the small systems computer market, the "Mini/Micro Bulletin" provides news of developments in the mini and microcomputer hardware and software marketplace. The on-line, electronically distributed newsletter will also feature news on systems, peripherals, and software from major mini and micro vendors, so that executives can plan and select cost-effective systems, sort out vendor claims, analyze the competition, and spot industry trends.

The "Computer Market Observer," also a weekly on-line newsletter, reports marketing, financial, and personnel developments in the computer industry. It also covers contract awards, joint agreements, mergers and acquisitions, and earnings reports.

The two newsletters will be distributed via the NewsNet electronic distribution and retrieval system. Current subscribers to the publisher's other publications already have a validated access number to the system. Any terminal or communicating

word processor can be connected to the NewsNet system. NetsNet charges a \$24-an-hour access fee for all of the newsletters (about 100) on the system, with a \$15 minimum monthly charge. The monthly minimum has been waived for "Computer Market Observer" and the "Mini/Micro Bulletin." AUERBACH PUBLISHERS, INC., Pennsauken, N.J.

FOR DATA CIRCLE 334 ON READER CARD

3081 TRAINING

The IBM 3081 System Operation and Problem Resolution training package is designed to give users a better understanding of the 3081 computer—its layout, what its various status indicators mean, what happens when the various facilities are used, what to look for when problems develop, and similar information. The aim of the course is to reduce system downtime by training students in recognizing, recording, and recovering from system failures.

The student is led at his own pace through any of the 10 courses in the package, with periodic quizzes. No human instructors are needed. The package contains 17 videotape modules and four machine exercises. Course titles include "Computer Numbering Systems," "370/3081 System Architecture Overview," "3081 Hardware/Software/Firmware," "Real and Virtual Storage Concepts and Utilization," "Interrupt Processing," "Multiprocessing," "The 3081 Console Complex," "The 3082 Processor Controller," "System Initialization," and "Problem Status Recording." Since the course is taught off-line on video playback machines, no cpu time is used for on-the-job training.

Each of the 10 courses costs \$1,500; the complete package costs \$9,600. Lease and rental options are available and the package can be used repeatedly—without added expense—to train new operators or as a refresher course. COMPUTER SYSTEMS RESEARCH, INC., Avon, Conn.

FOR DATA CIRCLE 335 ON READER CARD

INCOME PORTFOLIO

The IR/S (Income Records for Securities) program is one of a series of Portaid utility programs for investors. Using the program on an Apple computer, investors are able to maintain detailed records of dividends and interest income and support their reporting under the new tax law.

The user develops a complete and detailed journal of dividends and interest payments received during the year. A summary report, by security holding, is current and immediately available for supporting Tax Schedule B. (Capital gains/loss data is prepared using the older Portrac module.)

The IR/S program separates nontaxable and taxable security income. In addition, the user may define codes and produce reports by convenient categories, such as types of bonds, types of stock, broker, etc.

The coding facility can alternatively be used for tracking withholding from dividends and interest.

The software operates with a 32K Apple II Plus, DOS 3.3, at least one disk drive, and an optional printer. The program costs \$30, including diskette and manual. PORTWARE, INC., Edina, Minn.

FOR DATA CIRCLE 336 ON READER CARD

MANUAL MAKER

Designed to assist in the creation and production of system user manuals, the Manual Maker visually prompts a user through the designing, outlining, and writing steps of manual development. The system provides guidance on what to include in the documentation and on how much explanation to provide. The actual operating description of the system is supplied by the user.

In addition to the user manual, documentation for the Manual Maker includes *The Writer's Guide*, a book detailing effective manual planning, writing, and publishing. The book, which can be used with or without the Manual Maker, provides documentation development techniques and experience to allow the nonprofessional writer to improve overall manual quality. Included is an eight-point rating system used to evaluate manuals.

The \$245 program is compatible with CP/M-based computers, including the Apple II with Microsoft Premium Card. The user's manual and *The Writer's Guide* are an additional \$45. PROMPTDOC, INC., Colorado Springs, Colo.

FOR DATA CIRCLE 337 ON READER CARD

STOCK ANALYST

The Stockvue program is designed for brokers and individual investors who want to analyze the effects of possible investments through "what if" questions. Included in the program's spreadsheet display are calculations of dividends, interest (margin trades), trade commissions (based on the user's choice of full-service or discount broker), and exact opening cost. These calculations, as well as all of the functions of the program, are performed in accordance with Securities and Exchange Commission rules on margin requirements.

The program is designed to be user friendly so that novices can calculate potential profit and risk on investments. The investor plugs in information related to the opening trade, a hypothetical closing date and a likely price for the stock on that future day. The program posts results, including bottom-line net return on investment. When input variables are changed, the package recalculates and displays the new predictions.

The program automatically figures the break-even point and exact margin requirements for stock trades, and it can help the investor project the upside potential and downside risk of any position for the dura-

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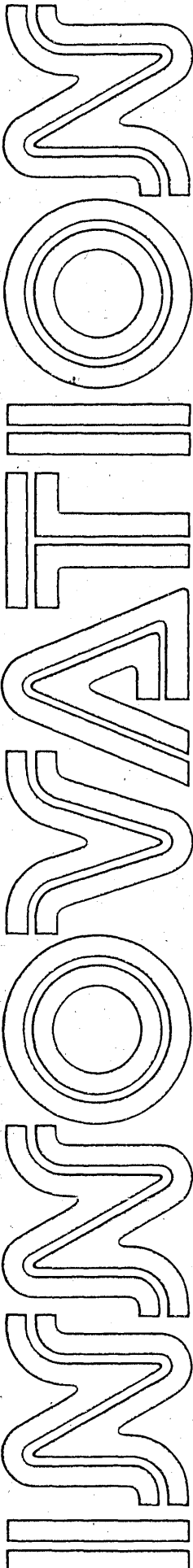
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MESSAGE	ID	UCB	LABEL	LOCATION	LENGTH	RETRIES	ACTION
● FATS204	TAPEZ	281	987654	1607 FT	4 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1607 FT	8 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1608 FT	13 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1608 FT	17 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1608 FT	21 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1609 FT	26 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1609 FT	30 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1609 FT	34 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1610 FT	39 IN	10	PERM DATA CHECK
● FATS204	TAPEZ	281	987654	1610 FT	43 IN	10	PERM DATA CHECK

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SOFTWARE AND SERVICES

tion of the holding period. An optional program calculates trading option spreads, straddles, and combinations; another option assesses the fair market value of call and put options. The \$130 price tag includes shipping and handling charges. STAR VALUE SOFTWARE, Austin, Texas.

FOR DATA CIRCLE 338 ON READER CARD

DATA ENCRYPTION

C-Cryptic protects sensitive data by converting them into ciphers bearing no resemblance to the original data. The program protects entire files or critical sections from unauthorized disclosure and will not allow false data to be inserted unnoticed. It uses one or more of three encryption methods in each use.

The Data Encryption Standard is based on the National Bureau of Standards' approved algorithm, providing multiple substitution and transposition operations. Transposition Encryption requires one user-supplied key to encrypt and decrypt the data; C-Cryptic produces different ciphers from the same input when different keys are used. Public Key Encryption, based on the RSA algorithm, uses two separate keys, one of which is public and the other private. This allows multiple sources to send but not read each other's encrypted information.

C-Cryptic operates on any IBM S/370 and compatible equipment using the MVS or

OS/VS1 operating systems. It can be implemented to meet the precise needs of any installation; it is designed for data stored on easily transported storage media, data transmitted over telephone lines, sensitive portions of generally available databases, and information covered by the Privacy Act of 1974. The program is available with high-level interfaces for COBOL, PL/I, and FORTRAN programs, as well as documentation and a year's maintenance and enhancement, for \$7,960. Discounts are available for multiple sites or cpus. CIRCLE SOFTWARE CORP., Downer's Grove, Ill.

FOR DATA CIRCLE 339 ON READER CARD

FILE MAINTENANCE

Alphalist is designed to replace Honeywell's MASLST product for GCOS file maintenance on Honeywell's L/66, 66/DPS, and DPS 8 computer systems. Alphalist alphabetizes all user catalogs and files for easier access than was provided by the Honeywell product. In addition, the reports are formatted for terminal output, encouraging on-line usage. This provides users with up-to-date information.

Alphalist also provides additional statistical and summary reports for more effective management and control of the user file system. The package resides and executes in 60K words of memory on the Honeywell machines. Output can be direct-

ed to the on-line printers or to timesharing terminals. Software requirements include any standard supported GCOS release, timesharing, and appropriate communications software. The product is available on a paid-up license basis for \$3,550 with \$750 annual maintenance after the first year. INFORMATION SYSTEMS CONSULTANTS, INC., Phoenix, Ariz.

FOR DATA CIRCLE 340 ON READER CARD

FINANCIAL PLANNING

Astra Plan is an interactive financial planning system for the vendor's Astra series of business computer systems. It offers financial functions such as loan amortization, depreciation, net present value, ratio analysis, growth functions, and compound interest, all of which are accessible with several keystrokes.

The package's output, column and row editing, as well as the manipulation and totaling of rows and columns, are designed to make the system easy to use even with complex models. The system is intended to be flexible in movement of information among various reports; this should allow for easy roll up of several divisions or subordinates into another model for further planning and roll ups.

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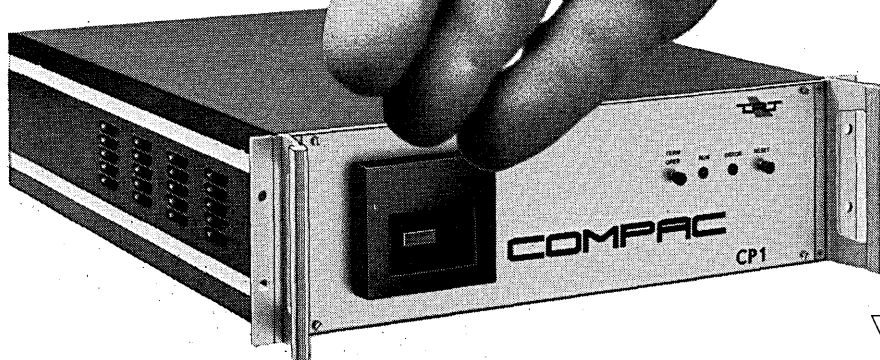
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SOFTWARE AND SERVICES

The impact of potential changes and the results of implementing various options can be measured based on the program's analysis. The \$500 program runs on all models of the Astra series and is available immediately. NEC INFORMATION SYSTEMS, INC., Lexington, Mass.

FOR DATA CIRCLE 341 ON READER CARD

MANUFACTURING PACKAGE

The Standard Product Routing (SPR) package is written in DIBOL for the DEC PDP-11 computer series. The package, a part of the vendor's Manufacturing System, facilitates effective routing by handling data concerned with operations, tools, and notes used in standard product manufacture.

The program takes advantage of space-saving techniques like general routings and route numbers to allow the user to route several products efficiently on the same primary routing or to share common operations between products. SPR supports "same as except" routings. If used in conjunction with the Shop Floor Control package, SPR allows routing to be copied into a shop order.

SPR supports interactive data entry and editing, handles routings for multiple locations per item, provides tooling information control, and accumulates operation costs (standard labor) to the part level. Notes are stored by operation, making them

valuable for operational instructions. The system supports multiple vendors, offers password security, and accesses all features through menus.

The package requires the vendor's Inventory Management package and can interface to other packages in the Manufacturing System. Source code licenses for SPR are \$2,000 for 10 uses. MINI-COMPUTER BUSINESS APPLICATIONS, INC., Montrose, Calif.

FOR DATA CIRCLE 342 ON READER CARD

CASH MANAGEMENT

The Cash Management System is an automated checkbook for the IBM Displaywriter that consists of all necessary shell documents, stored file setups, and file descriptions that allow operators to report cash functions to management. The system runs completely on Reportpack, the IBM-supplied feature of the Displaywriter, with no need for languages or operating systems.

Management reports in the system include an automated checkbook, a printout by account name for accounting summaries, a printout by payee for vendor analysis, and a printout of deposits by account number for revenue reporting. The system is intended for use by businesses, fraternal organizations, and civic groups, but personal checking accounts can also be maintained.

The system retails for \$65. SCOPE SOFTWARE PRODUCTS, Maitland, Fla.

FOR DATA CIRCLE 343 ON READER CARD

THREE CAT PACKAGES

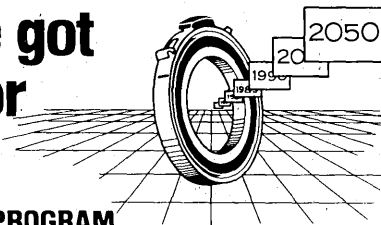
Software packages designed to bring telecommunications, billing control, and text editing capabilities to court reporting firms using computer aided transcription (CAT) systems are available from a CAT hardware vendor.

Roving Reporter lets the court reporter in the field transmit steno notes produced on the vendor's Transcriptor to a Transcription Center using a telephone adaptor. At the center, the notes are translated, edited, and printed. The Remote Printer facility allows edited notes or other data to be sent to a printer in the field, where the reporter can pick them up.

The Billing Control System handles client billing, accounts receivable control, and reporter fee distribution. The system can maintain and modify records for firms with up to 100 reporters, 1,000 clients, and 2,000 open invoices. The SuperType text editor, developed for the court reporting firm with users both on- and off-line, in effect transforms the vendor's Transcription Satellite into an electronic typewriter for data entry, with no translation capabilities. BARONDATA, San Leandro, Calif.

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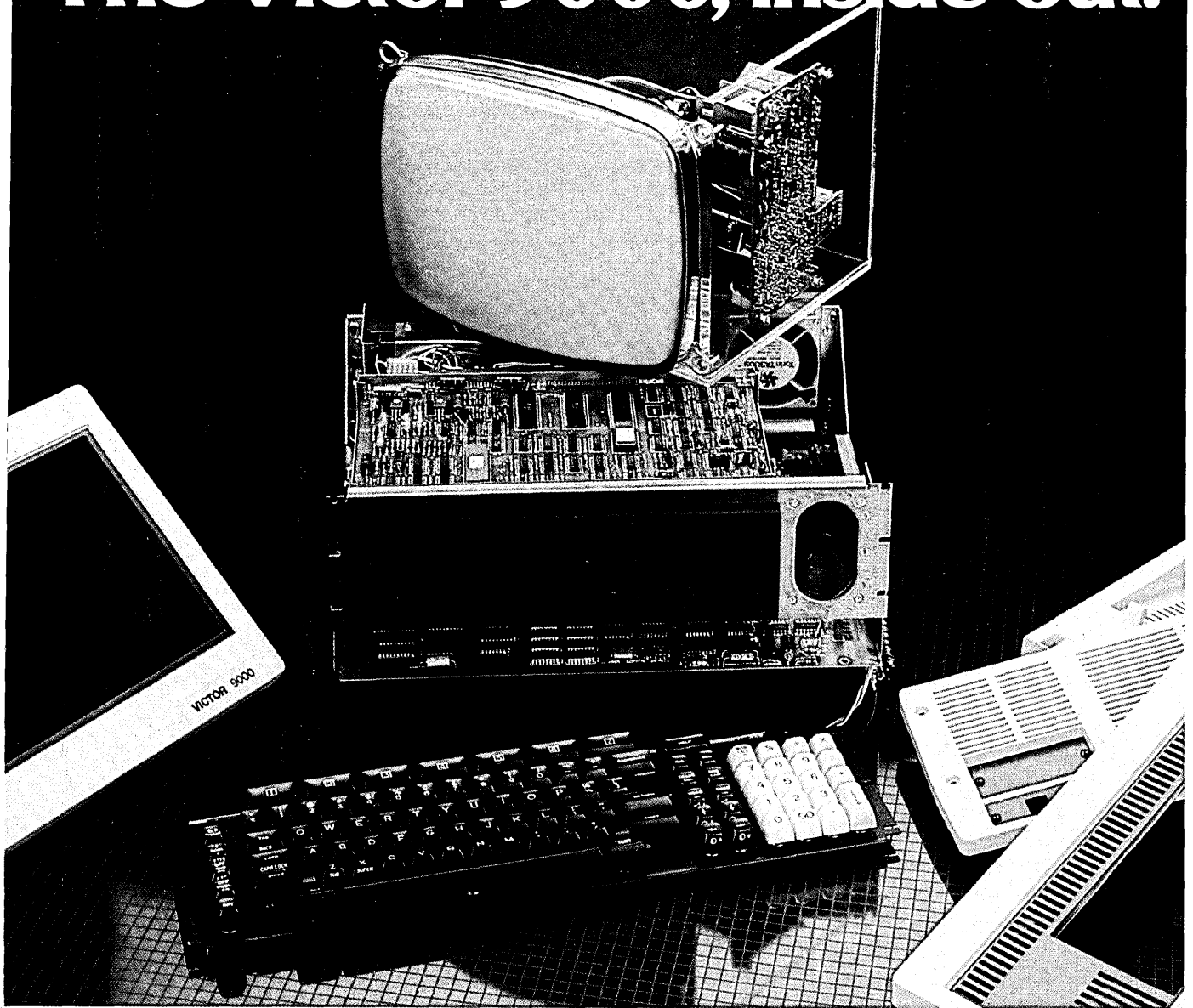
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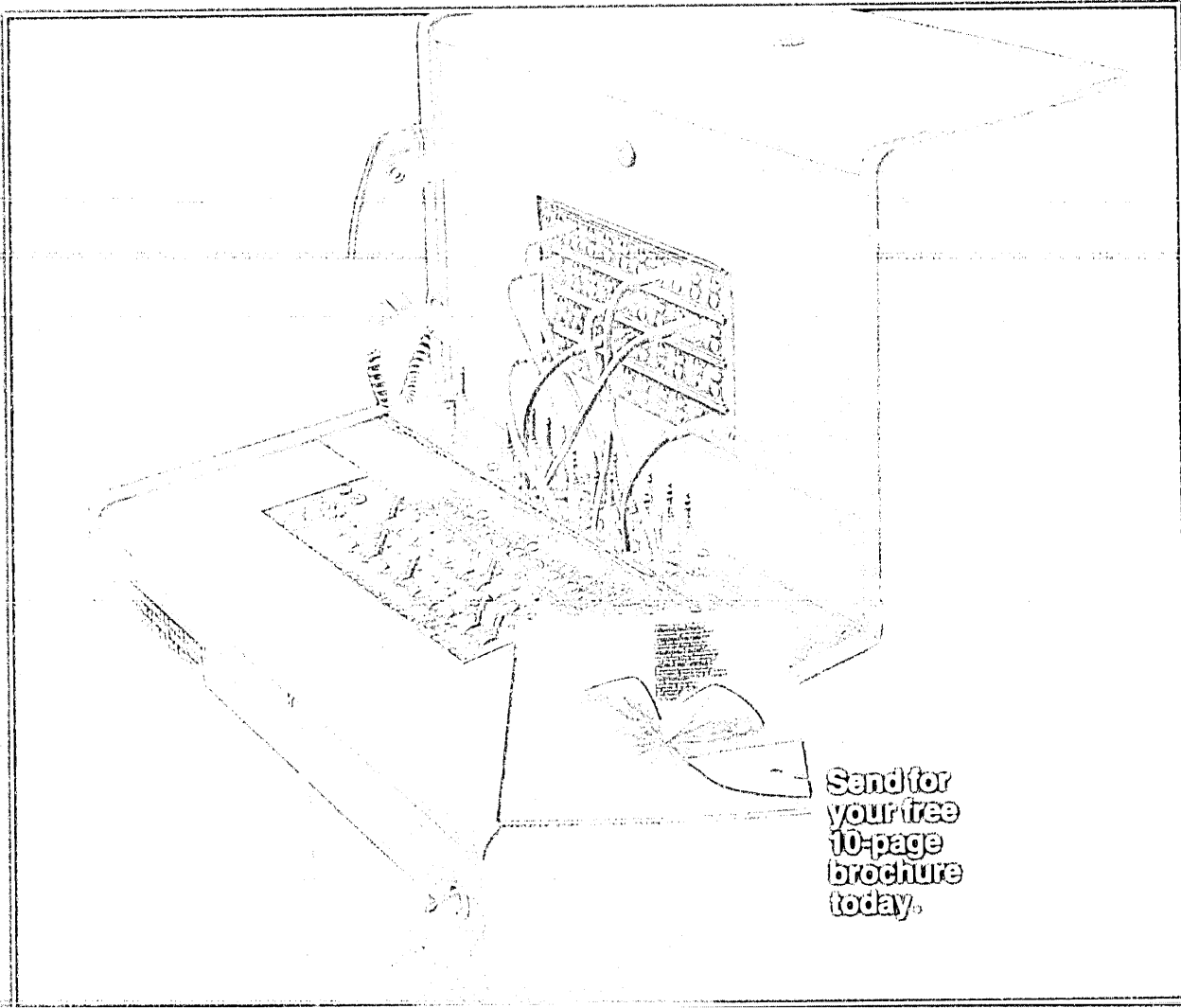
CIRCLE 139 ON READER CARD

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BOOKS

WIRED
by Harry Hellerstein
SILICON VALLEY
by Michael Rogers
SILENT WITNESS
by Ed Yourdon

What was an occasional trickle in the past has become a flood. It is hardly surprising that as information technology spreads through all phases of American life, novels in which the computer or computer people play a lead role should begin to appear in regular batches.

Technical details, usually laughably wrong a few years ago, today are done in a rigorous way. Even future inventions do not seem totally impossible. One must still be a bit amazed at the multiple skills of the computer genius hero types to whom all things are possible. Interestingly enough, in each of these three books, the hero is a badly dressed system programmer who appears to understand all the bits and bytes. Applications programmers and systems analysts are dismissed as bland folks who wear coats and ties, and worse yet, talk to end users.

Crimes? In three slim volumes the list includes theft, kidnapping, fraud, embezzlement, murder, conspiracy to commit almost everything, and a fistful of others. Among computer-related crimes, the least of the ones cited are theft of services, misappropriation of computer time, illegal use of telephone company services, selling corporate databases, and a few other odds and ends.

The obligatory sex scenes are played out in all these books although sometimes the level of detail is scanty. Perhaps these authors know more about FORTRAN than about the human condition.

Of the group, Yourdon's *Silent Witness* is by far the best. Under the skin of a database and system analysis expert, not to mention a long-ago system programmer, Ed Yourdon must have the soul of a novelist. He writes well. His book holds together and is as tight as a one-card loader.

Briefly, *Silent Witness* deals with the tracking of criminals using interrelated databases. The clever hero does the job in a

neat, tidy way. The bad guy chews up 40 hours of time on a large-scale IBM computer. Yourdon's personal bias for DEC systems shows. While purists may decry the portions of the book that describe in an elementary way things all DATAMATION readers know (what programming is, what a compiler is, how a system works, etc.), that material is necessary for the typical reader. Yourdon handles it well, pitching it appropriately to the level of the bright policewoman with no computing background but an evolving interest in the hero.

Silicon Valley begins soundly and runs along quite smoothly while telling how the small companies of the area get started, build up, run into problems, and then get themselves acquired. The early technical materials are on the solid side; only later on do things become farfetched. One can only assume that the author was sold a bill of goods by the artificial intelligence community as he postulates a level of system quite a long way into the future.

Buried in *Silicon Valley* are some apt descriptions of computer hackers, a fascinating telephone trick for stealing one's way into another's machine, descriptions of computer music as it may be in the near future, and some rather lovely approaches to the computer games of the next few years. Rogers uses a *New York Times* reporter as the outsider off whom explanations are bounced.

Wired is far out. The plot defies description, involving as it does a disco on Alcatraz Island, people living in trash bins, computerized implants to receive electronic music, a private robot whose functions are too pornographic for description here, a gas-rich Arab kingdom, and control of the world by the minions of International Industries. Mercifully, we will skip the assorted cast of characters, which includes a San Francisco transvestite, a 260-pound black CIA type, a cheerleader known as "Ice Cream" because of her unpronounceable Polish name, and a heroine called "Twisted Tulip." The evil Rita Spark sounds almost normal compared to the other folks in this volume.

Wired we can all mercifully consign to the circular file. It will doubtless turn up on the racks of second-class bookstores and

on airport newsstands. Don't bother with it.

Silicon Valley beats doing paperwork on a long flight to San Francisco. Rogers has a good idea of what goes on and is only a short way into the future. One suspects that he has a pretty good feel for the hardware side and how the business works, but is a little less sure of his ground with software. His "Ultrachip," Ultra Large Scale Integration, isn't that far ahead, although he is a little vague about the gate count. Unfortunately, a valid Turing test, even using a self-teaching program (called SOCRATES) devised by Stanford's AI geniuses, is still some years away.

Silent Witness is worth looking over. DATAMATION readers will enjoy the book. The people and places sound real. The only gross New York error is adding some floors to 2 Penn Plaza. Yourdon's description of a meeting of the NYC chapter of ACM, SCAMP in the book, rings very true, right down to the soggy chicken. And for once, the good guys win and the bad guys lose.

There will be more and more computer-related novels in the future. The path defined long ago by Clarke, Asimov, Heinlein, Hoyle, and the classic sci-fi writers has become a well-trodden highway. It is fervently to be hoped that newcomers making the trip look back and see what good writers their predecessors were. It takes more than a plot, an IBM reference manual, and a word processor to produce a first-class novel. Yourdon has come very, very close. His next book should be interesting. *Wired*, St. Martin's Press, New York (1982, 249 pp., \$12.95); *Silicon Valley*, Simon & Schuster, New York (1982, 254 pp., \$15.50); *Silent Witness*, Yourdon Press, New York (1982, 177 pp., \$12.95).

—Philip H. Dorn

THE EMERGING NETWORK MARKETPLACE

by Herbert S. Dordick, Helen
G. Bradley, and Burt Nanus

This study is both timely and dated. Readers of this magazine are familiar with the proliferation of public and private network information services (NIS). This new industry has by no means assumed its final form. Therefore, efforts to catalog hardware and

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services and to describe the regulatory and competitive environment of the new industry are obsolete upon publication.

Nevertheless, Dordick and his associates have produced a useful book. They bill it as an exploration of "how the NIS industry might evolve . . . and what actions could be taken now in both the public and private sectors to improve the beneficial impacts of the NIS industry on the economic and social fabric of the nation." While the particulars might require updating, the resulting study is useful as a strategic map.

The Emerging Network Marketplace is an exercise in futures research—a mix of market planning and policy analysis tempered by a sociological imagination. A Delphi panel was the heart of the project. Thirty-seven industry experts were asked to plot the diffusion of NIS technology and services over the next fifteen years.

No fundamental obstacles appear to obstruct the spread of NIS. Although the authors concede that pockets of social and cultural resistance to the new technologies do exist, they predict that rationality will prevail. NIS will be recognized as an "appropriate" response to global, environmental, economic, and political crises. In any case, a shake-out of generations eliminating cultural barriers will result in a steady increase in demand.

Business demand will continue to

drive the near-term growth of the NIS industry. Interactive technologies offer businesses the ability to respond "sensitively" to small submarkets and market fluctuations. Increased flexibility and control over records and other business information mark it as an invaluable management tool. If it has solved problems of standardization and system reliability as thoroughly as it claims, then American Bell has also met the formidable problem of equipment cost.

Costs will come down further, the authors argue, because of order-of-magnitude in computer performance. The Delphi experts view us on the upswing of the microelectronic learning curve. Advances in logic and memory technologies and input and output devices will increase speed, carrying capacity, and system transparency. They will be instrumental in creating and then meeting an explosion in demand.

The authors question whether present regulatory logic is an adequate vehicle for shaping the NIS market. That logic, they argue, is product oriented, while NIS is in fact an ensemble of services and technologies that may require more comprehensive regulations. The authors point out, for instance, four levels of NIS service: a communications link to connect users of the services at their terminal station; switching mechanisms and procedures to make interconnections; computers and terminals that

activate the network into performing desired transactions; and the provision of services, information, and products.

Predictable regulatory problems follow from the fact that "telephone companies are vertically integrated providers of all four levels of services." Keeping costs down by reckoning with the "final mile" interconnection charge, preserving free entry into the terminal equipment market, and separating the production of information from common carriers are their major concerns. Beyond clearing the way for the industries, legislators must engage the less tractable issues of privacy and equity.

There is good reason to call individual privacy the "archetypal issue of the information society." Existing codes of conduct and relevant statutory laws are inadequate in the face of "'conceptual changes' in economic, social, and political processes caused by new information and communications capabilities." Consider recent privacy legislation. Laws in California, Wisconsin, and New York don't protect the subscriber to interactive cable services from illegal third-party intrusions. The more NIS services spread to new areas of business and geography, the harder it will be to guarantee data security and therefore privacy.

Raising questions of equity at this early stage of NIS growth may appear to be fanciful. However, a market is a market is a market. The absence of public policy assuring equitable access to network information service will divide the society. The authors write that "thoughtful observers have expressed the fear that the emerging information society will produce a new class of information elite, and, indeed, there do exist two classes of people and business: the information users and the information used."

The authors and Delphi experts predict an attempt to define "universal service" sometime during the present decade. It will be a daring project. The definition may involve the formation of a Universal Service Compensation Fund and it is certain to require new and extraordinary regulatory reform. The very act of defining "universal service" was estimated by the Delphi experts to add 20% to the cost of the new services while expanding the market by 30%.

Universal network services will emerge through an interaction of developments in technology, the market, and public policy. If left to itself, a technology-driven future will result in information inequality bred of the "concentration of the components of the marketplace." A marketplace is limited by high entry costs and relatively high costs of telecommunications. Both run up against the current policy vacuum regarding the local loop. In a policy-driven future, government assumes responsibility for securing the local distribution system. Technology, market forces, and public

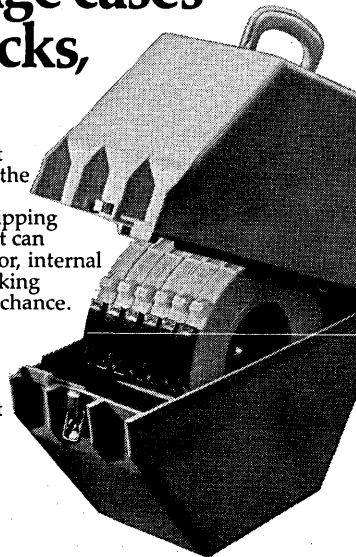
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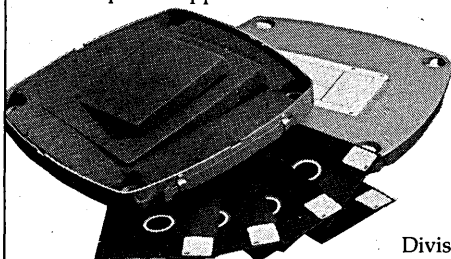
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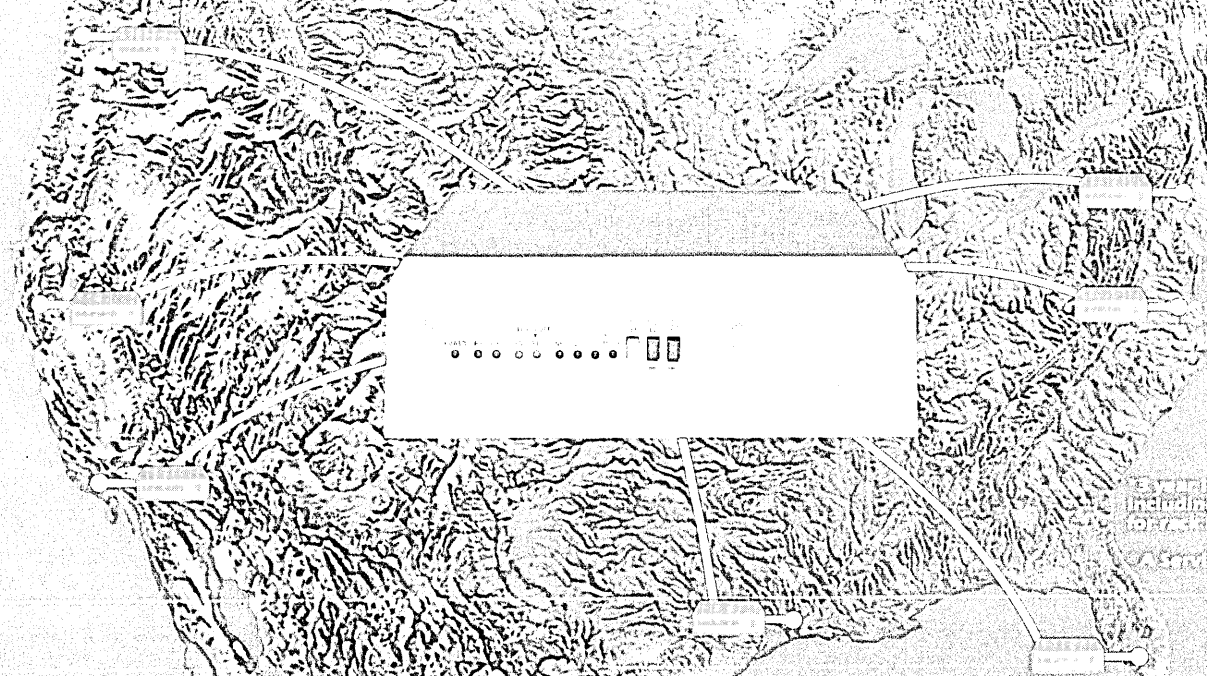
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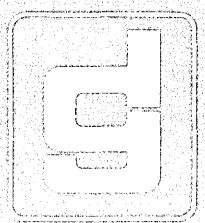
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policy will combine to produce equity as a positive social value.

This study is impressive for its creativity and vision. The authors paint their canvas in very broad but always discernible strokes. It is a useful picture for corporate planners, policymakers, and readers concerned with the public interest. Unfortunately, the book is an inelegant production. There are proofreading mistakes on every other page. Far too many pages were unevenly typeset. The prose is frequently repetitious, and the book is approximately one third longer than necessary. The editor

should be embarrassed. ABLEX Publishing Corp., Norwood, N.J. (1981, 334 pp., \$32.50).

—Kenneth R. Donow

REPORTS & REFERENCES

A LEARNING EXPERIENCE

Founded in 1923, American Management Associations is "the world's largest management education organization." Its latest course catalog, November 1982-June 1983, containing hundreds of courses and course descriptions is now available. There are 10

major sections to the catalog, broken down by the various course topics. Each one is described, and the prices, dates, and locations are listed. The catalog sells for \$4.25, and can be obtained from AMA, 135 W. 50 St., New York, NY 10020.

SCORE

The Service Corps of Retired Executives scores high when rated on community helpfulness. Last year, this nationwide organization gave free advice on starting and running small businesses to over 250,000 "clients." SCORE is a nonprofit organization, sponsored by the U.S. Small Business Administration. All SCORE counselors work on a voluntary basis. If you or someone you know would like to participate in this program, SCORE's New York Chapter can be reached at 26 Federal Plaza, Room 3130, New York, NY 10278, (212) 264-4507.

COMPUTER ERA

Six dollars and ninety-five cents isn't a bad price for a calendar these days, especially one that is informative as well as entertaining. It is not a particularly beautiful calendar, except perhaps to the true computer aficionado. The Computer Era 1983 calendar pictures the LGP-30 mini, the Monromatic calculator, and the Manchester Mark I, just to name a few of the older machines. You can also find out when who patented what, and when such biggies as Charles Babbage, Jay Forrester, John Atanasoff, and John Mauchly were born. Also, there is a short listing at the bottom of each page showing the various conferences that will take place that month, and a glossary of computer terminology and abbreviations is featured on the last two pages. Send \$6.95 (quantity discounts are available) plus 5% of the total bill for postage and handling costs to MOCO, Inc., 5 Champlain Dr., Hudson, MA 01749, (617) 562-9000.

9 TO 5

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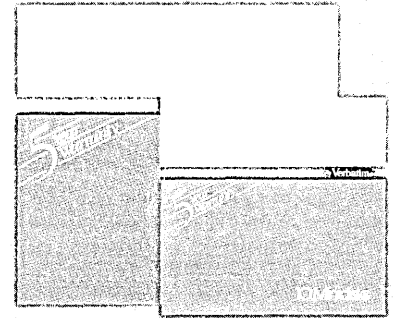
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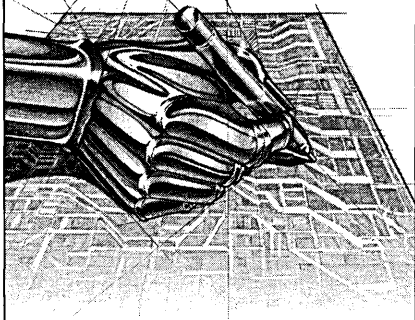
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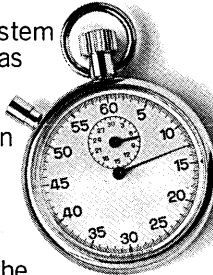


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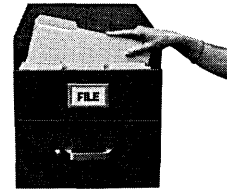
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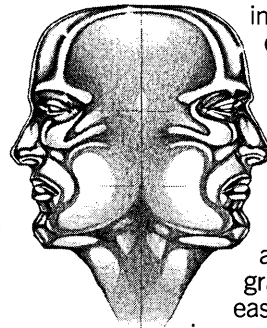
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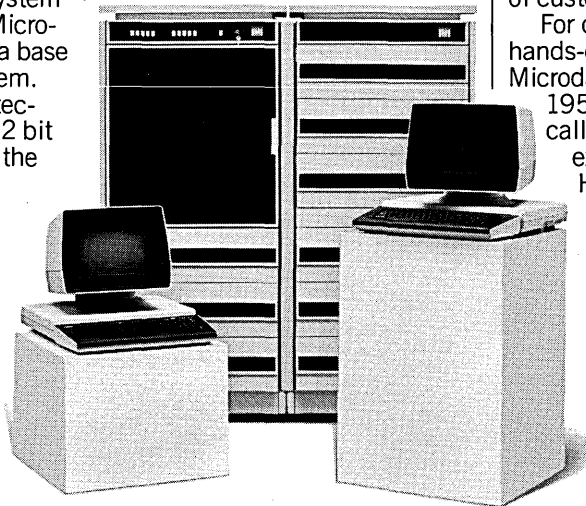
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VENDOR LITERATURE

GETTING DEBUGGED

"Bugs and Taps and What to Do About Them," is a free report available from Ross Engineering Associates, a technical surveillance countermeasures service firm. "The report will be mailed in an envelope that in no way reveals the nature of the contents." ROSS ENGINEERING ASSOCIATES, Adamstown, Md.

FOR DATA CIRCLE 350 ON READER CARD

COME TO TERMS

The vendor's seven-page glossary explains the terminology most frequently used to describe programmable controllers and related systems. Terms such as bit rotate function, dump, register, and transitional contact are defined. GOULD, INC., Troy, Mich.

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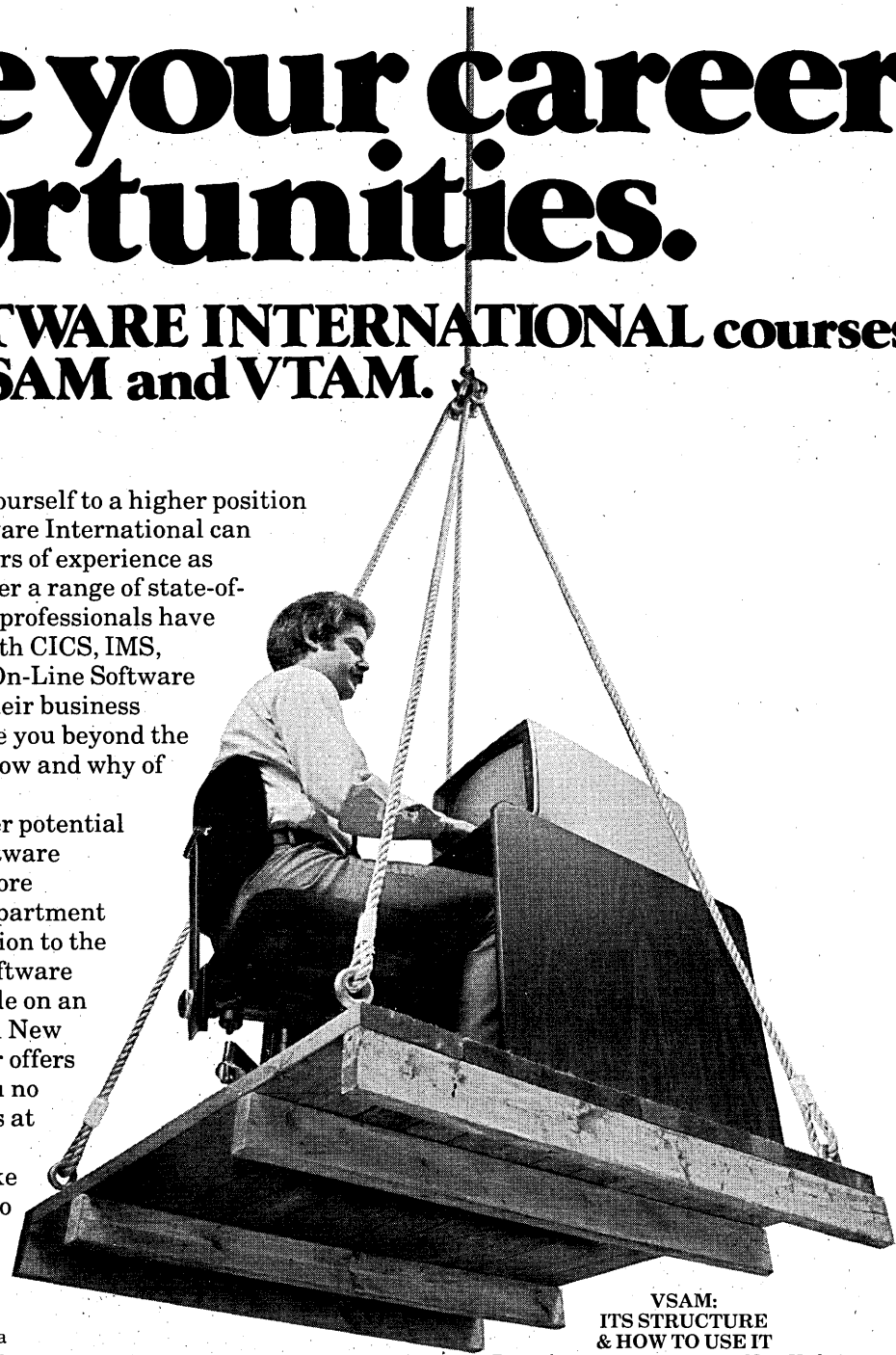
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COMPUTER SHOW OBSERVATIONS

I wonder if many of the vendors who displayed their wares at the recent New York INFO '82 show realize that they wasted their money by being there. Not that INFO is a bad conference; in fact, I have been associated with the show's promoters as a speaker and a member of their program advisory staff since 1977. I have always been impressed with the professionalism displayed by the Clapp & Poliak staff. The problem that I observed at this year's INFO (New York Coliseum, Oct. 11-14) concerned those who manned the vendor displays on the exhibition floor.

For the past 15 years, I have attended many national computer shows. In the early days of the Joint Computer Conferences and the first National Computer Conferences it was the fad to man the booths with comely young ladies whose main purpose was to lure men into their respective displays, using the oldest of techniques. Once in the booth a vendor rep would take over, extolling the values of his product.

During the last 10 years, a good part of these "snare tactics" have been replaced with more professional approaches. The attractive ladies have not gone away (nor am I suggesting they should), but I believe a large part of the intellectual content of the sales pitches is missing. Even the ladies hired for the old shows were much better briefed on the salient features of the equipment. (In fact, I've been very impressed with the job that many of these local ladies have done.)

These brief observations led me to my comments on INFO '82. To many of the vendors who exhibited at the show, I ask: "Where did you get the people who manned your booths?" Why do I ask? I'll let some of my personal experiences from the exhibition floor answer that.

• Mannesmann Tally Corp.: I have a project that could use a small printer with the ability to print bar codes. Recently, I received literature on just such a printer manufactured by Tally. Thinking that I could get more specific info on the product, I stopped at the booth.

The booth was deserted, except for what seemed to be three vendor reps working there. I gathered this from the conversation they were having among themselves. Even though two of the three saw me, it was about five minutes before one of them decided to talk to me.

I inquired about the bar code printer. I was told that none of the printers on display could print bar code.

"But do you have any literature on your bar code printers?" I asked.

"We don't make any bar code printers," said one of them.

"But I have literature on. . . ."

"These are the printers we have," he interrupted.

I left.

To Mannesmann Tally: what about your M series?

• Commodore Business Machines: I first saw the new B/BX series of Commodore microcomputers at the spring NCC in Houston. I must admit that I was very impressed with the styling, power, and value of this new product line. I wanted to show this equipment to my associate who had accompanied me to INFO '82.

A B series machine was on display at one end of the booth. The computer was being demonstrated by a gentleman who seemed preoccupied by a small television crew roaming around the booths, presumably from a local news show. We were unable to get much out of him except the price of the unit he was standing near. We were told it was \$1,695. Since this soon-to-be television star wasn't terribly cooperative, we left and decided to return the next day.

The next day we ventured again to the Commodore booth, hoping to get more specific info on the B computer. Our budding star was demonstrating the B when we arrived, but there was another gentleman standing by the machine with a "Commodore" badge on. We approached him.

"Do you know anything about the B/BX computers?"

"Sure. What can I tell you?"

Finally, some good information.

"How much are the different models of the series?" we asked (there are three models).

"We haven't priced them yet," was his reply.

Interesting, I thought.

"I thought that this computer was \$1,695," I said, pointing toward the B.

"Nope. We haven't set prices."

"When will you know, and can you give us an idea of price?"

"We won't know until early next year. The price will be under \$3,000."

We left.

To Commodore: according to your personnel at INFO '82, the prices are: P series at \$995, B series at \$1,695, and BX series at \$2,995. Also, the word is that you are going to step up product-pushing in the U.S. Well, the first thing you should do is get all your people to tell the same story about the prices of your products.

• National Cash Register: NCR was showing a new desktop computer at its booth. It looked like a low-end product to complement NCR's Convergent Technologies-based systems. We were interested in finding out more about this product but couldn't get close to the display (many others were also interested). A lady was demonstrating one of the C-T systems to an empty house so we decided to ask her about the new computer.

"Could you tell us how much the new computer will sell for?"

"I don't know a thing about it. You will have to talk to

READERS' FORUM

someone over there," motioning to the crowd.

Don't misunderstand. The lady was polite—but uninformed. She did tell us that the smaller of the C-T systems would be going up in price after the first of the year, so if we were interested, we should buy now. We left.

To NCR: don't introduce new products without informing your people about price. Also, the trend in small computer prices seems to be down, not up!

- Raytheon Data Systems: Raytheon had a small computer that looked interesting. We approached.

"Hi. Could I help you?" said the professional-looking lady.

"Yes. How much is this computer?" I pointed to the machine of interest.

"How much will you give me?" was her reply, obviously kidding. "Seriously," she said, "I don't work in the commercial division. I am in government sales."

"But how much would you guess?" I responded.

"Oh, somewhere around \$2,500, I would say."

"Thanks."

We left.

To Raytheon: ditto my NCR and Commodore comments.

- Honeywell: Honeywell was showing a new desktop word processor. It looked interesting. We stopped.

"Could you tell us about this computer?"

"We will be putting on a demo in about 15 minutes."

"I really don't want to wait. Could I get more information?"

"Sure. See the lady at the desk."

"By the way, how much is the system?" I asked.

"Oh, about \$6,000," was the reply.

We went to the desk.

"Could we get information on the new word processor?"

"Do you have a card so we can mail some information to you?" she asked.

"No. Don't you have information here?"

"No. Sorry. But we would be glad to send you some."

"No, that's okay."

We left.

To Honeywell: "about" pricing doesn't tell me anything except that it will probably be "about \$8,000" before I'm done. I

realize that advertising literature costs money, but the lack of it also costs money.

I have never attended a computer exhibition that had so many vendor representatives who knew so little about their products and had so little interest in helping potential customers at the show. What is happening to our industry? Are we growing so fast that we cannot get enough qualified people to market our products? Or are we introducing products so fast that the marketing people cannot understand a product before another one is introduced? Can there be a market for all this equipment? I think the industry needs to do some serious soul-searching about its future.

—Larry D. Woods
Moline, Illinois

DESIGNING FOR USERS

For 25 years, dp managers have concentrated their efforts on the technical aspects of developing software systems. This preoccupation with the technical side of systems has often neglected management's major concern, namely, that systems be built to meet user requirements. During the past decade techniques have been developed that reduce technical uncertainty by providing structured approaches to software development (i.e., analysis, design, and programming).

In addition, there are now many packages offering fourth generation languages that further reduce the need for sophisticated application programs and allow more time for requirements analysis and logical design of systems. Fourth generation languages are nonprocedural languages that allow the user to specify what is to be done but not how to do it. Thus, they eliminate the need for programs that navigate a path through the database, and they can be used by nontechnicians.

Meanwhile, software engineering has emerged as an approach to building software using methods that provide predictable, high-quality results. It is a rigorous approach to software development, combining structured development methods with concepts of project management and quality assurance. An important feature of software engineering is the addition of structured testing to current software development techniques; thereby establishing user acceptance of a system as the driving force for quality control of software.

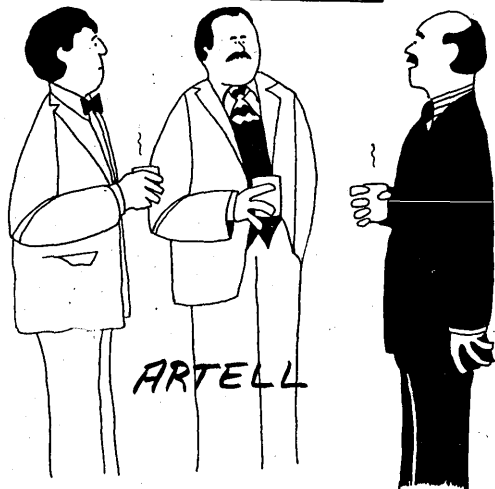
In our work at the Bureau of Labor Statistics we have observed the technological changes that have swept through the computer industry. We feel it is now possible to formulate a new view of software management, based on the emergence of software engineering and fourth generation languages. Software development has matured to the point that managers can now redirect their attention from systems design and development toward planning for the changes ahead in technology and user requirements.

Dp management can now emphasize planning and control of software projects and be fairly certain that the staff will be able to develop workable programs within reasonable design parameters. In the future, the emphasis of software development will be on articulating clear, unambiguous user requirements for the functions the computer is to serve.

The systems development process must focus greater attention on the rapid pace of technological change and the need to design systems for flexibility and maintainability. This shift should also include use of prototype systems to quickly establish functionality and set the stage for rapid development of succeeding system generations.

Software managers will become more involved in systems planning, with greater emphasis on understanding and anticipating user requirements. Greater opportunities for user participation in

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"Well . . . considering marketing has announced a product, the distributors are taking orders for it, and the support people are stocking the spare parts, I think the least we should do is develop something."

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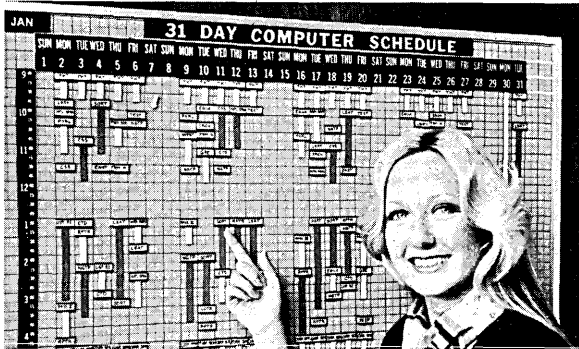


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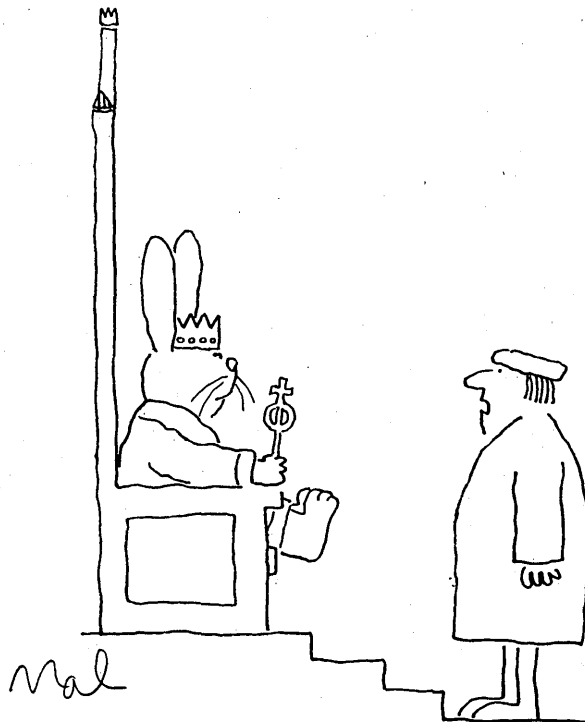
systems development will be possible, especially in logical design and acceptance testing. More time should be devoted to maintaining a keen awareness of trends in computer technology. Those software managers who are aware of technical possibilities and adequately positioned with staff skills and organizational flexibility (including use of project management techniques) will be better prepared for the future.

Use of structured methods for software development and fourth generation languages reduces the burden of software maintenance and modification. Applications developed using fourth generation languages have smaller maintenance requirements, are less abstract, and have less program code than applications written in COBOL or PL/1. A lower maintenance burden on the systems staff allows dp managers to reduce the backlog of user requirements.

The most important long-run implication here is the change in skills required to design and develop software systems. This does not mean that a less skilled staff will be needed to develop software in the future, but rather that a staff with different, less technical skills will be able to do the job. There will be a greater need for information or "subject matter" analysts who can articulate user requirements in a form leading directly to logical systems design. Specialists who can work miracles in debugging or can follow the logic of labyrinthine programs will not be as valuable as experts in implementation who work closely with the systems staff and user community to develop the training and documentation for new systems.

Beyond these changes in skills, there are potential adjustments to the structure of organizations that develop and maintain software. If the focus of software development shifts to emphasize systems planning and user requirements, it may be necessary to alter the structure of many organizations designed years ago where the software life cycle was performed by the same staff, with users removed from the process.

The new view of software management suggests that the software life cycle can be broken between the analysis and design phases. Dp management should direct information analysts to work with users to identify requirements and work with the technical



"Beg pardon, sir, we're looking for an heir to the throne. . . ."

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CARTOON BY MALCOLM HANCOCK

READERS' FORUM

staff to keep abreast of available computer technology. The result is an approach that meets user needs while remaining flexible to adjust to changing circumstances. The logical design can drive development of the application following thorough (and structured) analysis of user requirements. Software development will no longer be hostage to code writing; instead it will follow a planning process focusing on user needs and available technology.

A commitment to the new view must be accompanied by recognition of an implied cultural revolution for the systems environment. Every organization develops a particular way of viewing itself and the outside world. The staff develops feelings of self-importance and even indispensability that, to an extent, can be healthy. Unfortunately, these same feelings often discourage many changes that question the perceived value of skills painstakingly developed during long careers.

The new view of systems management calls for restructuring the attitudes and behavior that pervade the systems shop—beginning at the top. All supervisors should receive training in the concepts and approach implied in the new view. An organizational setting is needed that is both isolated and insulated, where the philosophy of the new view can be taught, used, and reinforced. The staff and organization should be large enough to offer many opportunities for discussion and afford management the chance to identify those who can serve as key performers for future change.

—J. Harvey Trimble Jr.
Jay Miller
Washington, D.C.

MACHIAVELLI ON CONSULTING

Niccolò Machiavelli was a consultant in his day. His clients were tough and they really could go into early retirement if they botched up in their line of work. Some of Nick's work consisted of writing a little guidebook entitled *The Prince*. It told his prospective clients how they should handle themselves in tight situations, how to take advice, give rewards, and so forth. It's still good reading, but it's a little short on advice particular to office managers in the dp field. I wish to extend the old master's work in this regard.

What is a consultant? A consultant is a creature who depends upon the office manager for his livelihood. The office manager does not depend upon the consultant and should never place himself in that position either by error or by the plots of enemies within the company.

A consultant is not to be confused with a moonlighter. A moonlighter has other employment, which means that his time is not his own to sell, and that removes him from your control.

A consultant is not to be confused with a freelancer. A freelancer does not carry the required status, but might elevate himself to the consultant level with much effort.

A proper consultant must be chosen from among other consultants. The wise office manager guides his decision by the need to impress that part of his company that should be impressed for the goals he wishes to pursue.

Almost always, the consultant should come from far away. He might wear a very costly three-piece garment or wear a full beard and have bare feet. The wise office manager must judge which image from among the many will best impress those who are to be impressed.

Sometimes the office manager does not see a problem but is forced to solve one anyway. There is an old Czech folktale about an old woman who went to visit a great doctor in Prague. The great doctor was so flattered that the old woman had traveled so far to visit him that he handled her case free of charge. He prescribed a strong medicine for her illness, but the old woman did not have the

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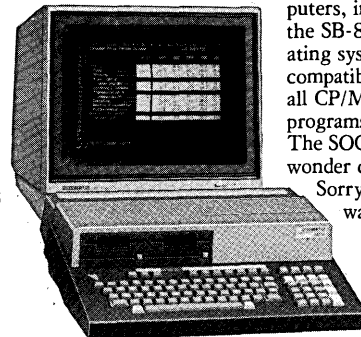
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money for the medicine, so she went home to her village with her prescription unfilled. Because the great doctor had treated her, the villagers knew she was well and healthy. She delighted in showing them the prescription with its fine Latin hand. Once the great doctor even visited her village on his way across country by rail. The great doctor was quite happy to see that the old woman had improved so much.

Our trick is to do on purpose what the old woman did without guile. Get a prescription or report and enshrine it. But never act upon it. If questioned by fellows in the company, simply produce the report to show that the problem has been treated.

In other situations the office manager sees a problem and wishes to force his solution. The office manager can impose his solution by force if he wields enough power. But this is not desirable even in cases where it is possible. After all, it is easy to make enemies and hard to dispose of them. The consultant can be blamed for any unpopular action that the office manager would have imposed himself. One method is obvious: simply shop for a consultant who agrees with your solution. The consultant will quickly discover it, and the office manager can praise his insight to assure loyalty. The second method for forcing a solution is to give only the data that lead to the desired conclusion. This is risky, because many times the same data can lead to different solutions. This method is best used when the consultant is given to the office manager from sources high in the company.

In a situation where the office manager does not see a solution but is forced to provide one anyway, he must surround himself with a group of consultants. This group might come up with a correct solution, which the office manager must grab and take credit for at once.

This group might find no solution or discover some proof of impossibility which the office manager must blame on the consultants. They are now the forces of evil, and the people in the company can be made to forget that no one in the company could find a solution either. It is to their advantage to see the consultants as weak and to decide the problem is not worth the effort.

In some situations the office manager wants his own department but the company is not willing to provide it. Here again, use of a group of consultants can be beneficial for the office manager. Go to the upper management that has denied the request for a department. Offer instead to hire an outside group to provide the software development people. Since the outsiders will leave after the project is finished, management will generally agree to this compromise. But at the same time they fear that the loss of the outsiders will cripple the ability of the company to use the new system.

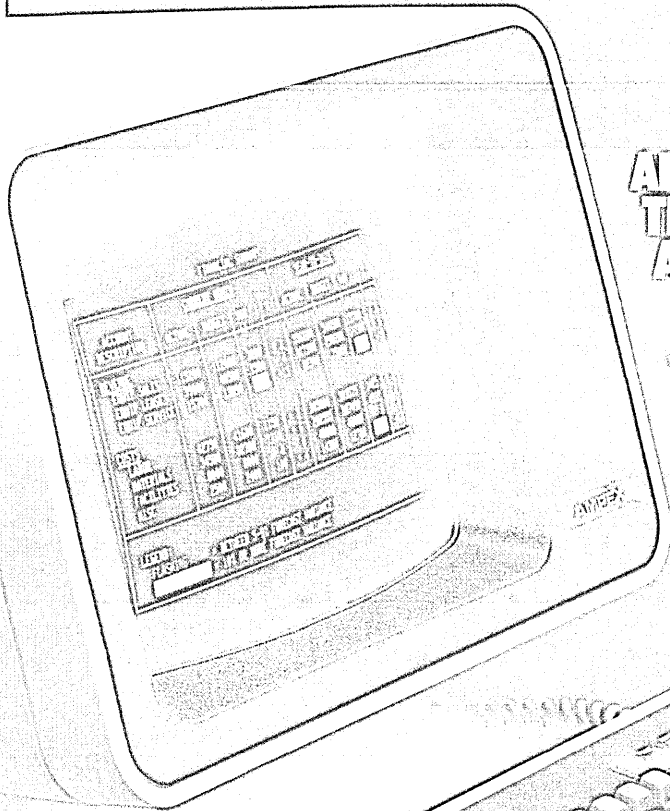
Here is the key: the office manager must borrow some company people for the project team to be trained by the outsiders. Once the outsiders leave the project, the office manager can hold on to the borrowed company people. Behold, before he had no department staff, but now he has those employees he hijacked from other parts of the company. Furthermore, his actions appear to be noble, because he is now attempting to operate the system on a fraction of the staff that the project had before.

When the office manager desires to block an opponent but cannot do so directly, a simple solution is to do research in trade and professional magazines. Look for articles written by people whose opinions differ from the opponent's. First, this provides written material to show upper management as an initial assault. Secondly, it provides the names of people who can be hired to destroy the opponent. This way the office manager's hands will remain clean.

—Joe Celko
Atlanta, Georgia

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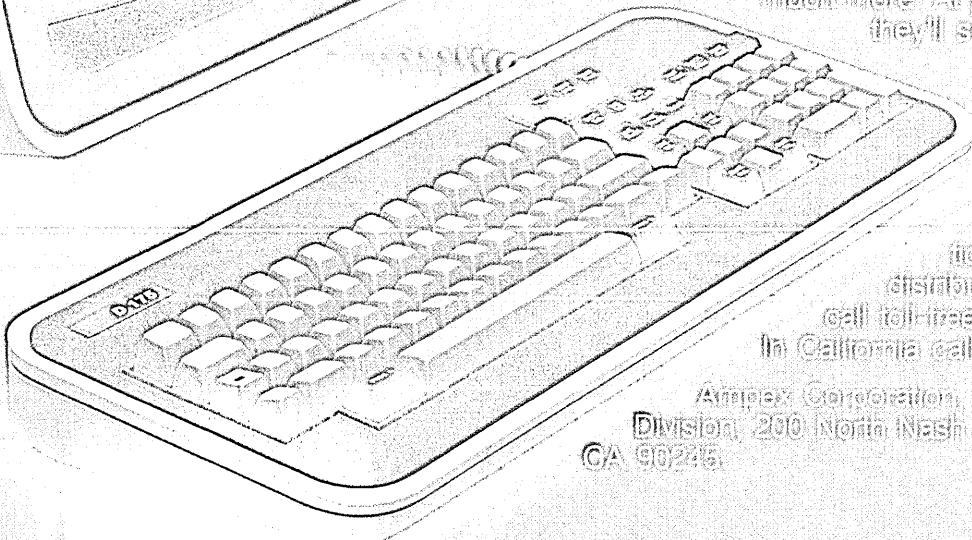
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