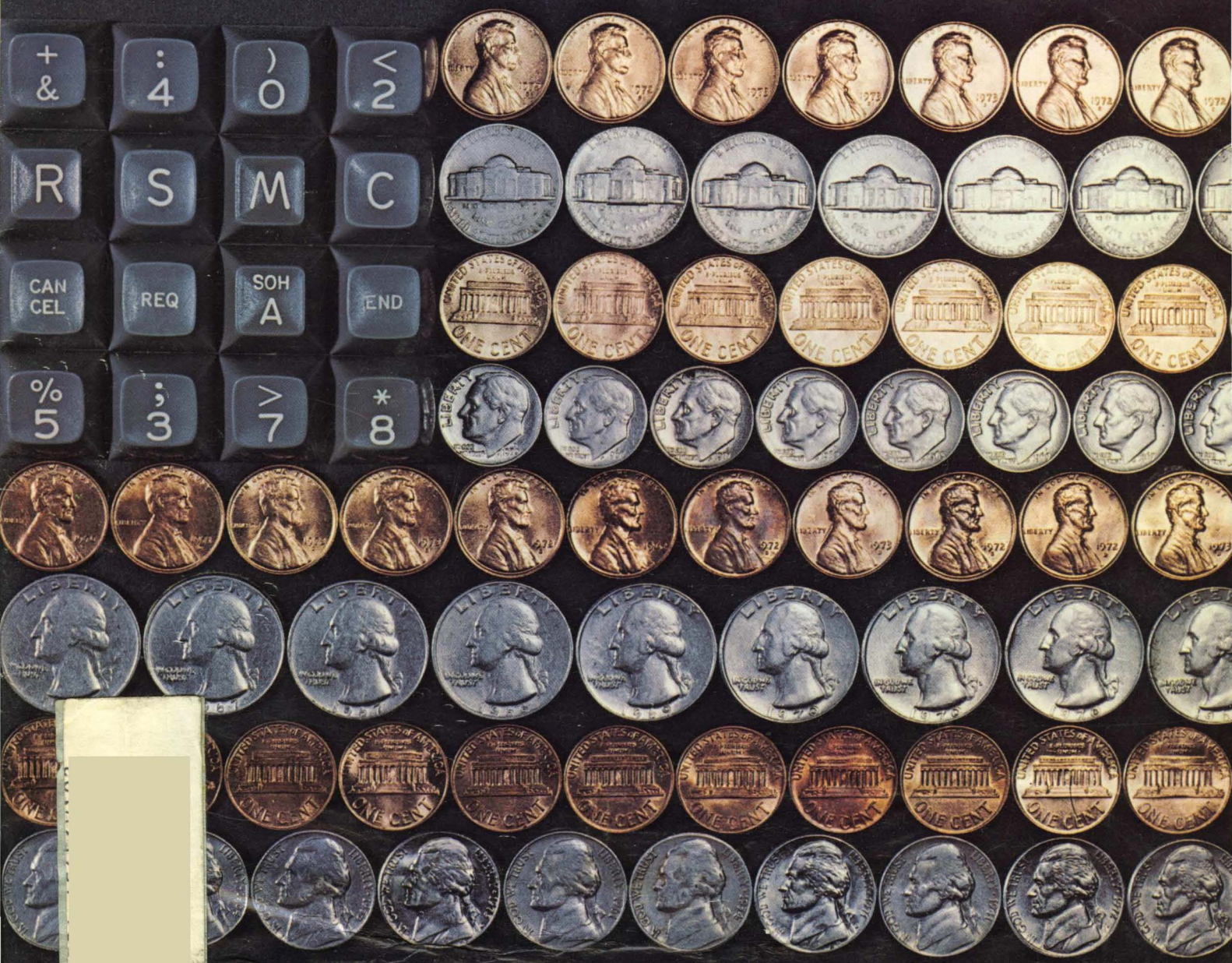
DATAMATION '73®

June



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It's something you sense in a product.
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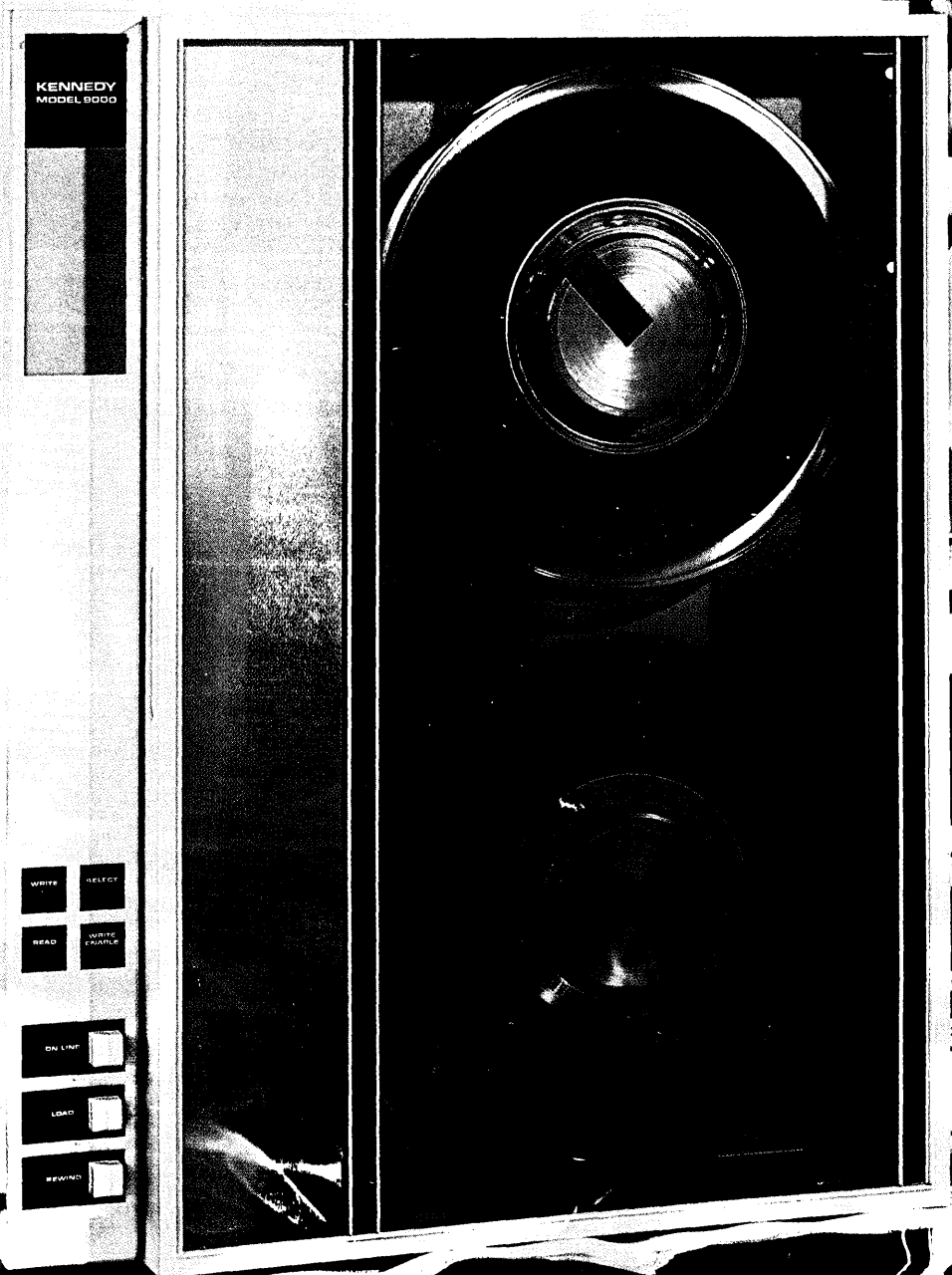
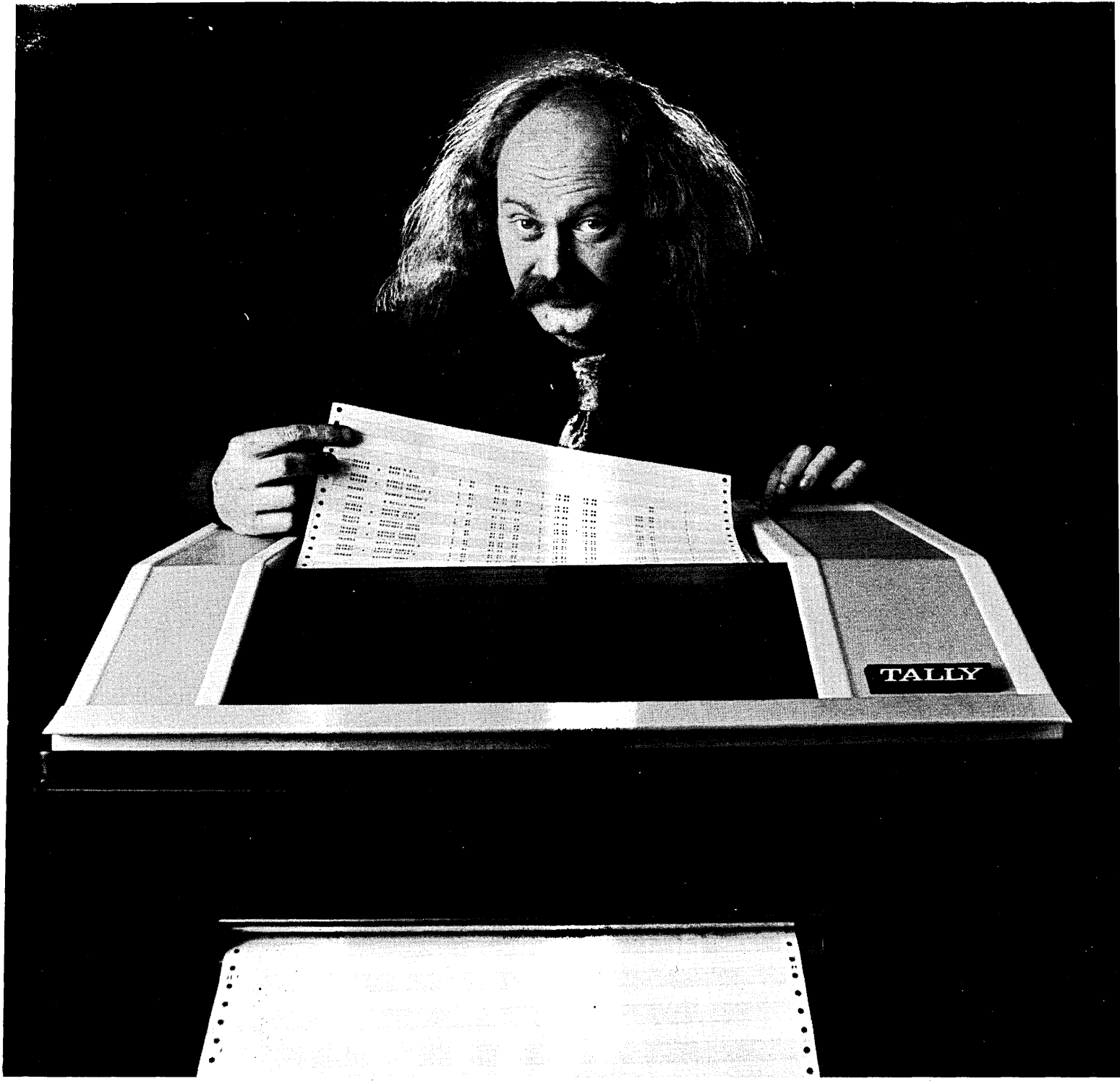


KENNEDY • QUALITY • COUNT ON IT

CIRCLE 1 ON READER CARD



Watch this!

Watch the Tally Series 2000 line printer churn out your job at 200 lines per minute without fuss, without failure, without need for maintenance adjustments. That's because of its beautifully simple print mechanism that we cheerfully guarantee for one whole year or 1,000 hours of printing with no duty-cycle limitations.

No wonder its the ultimate choice of computer system manufacturers and users who need unqualified dependability.

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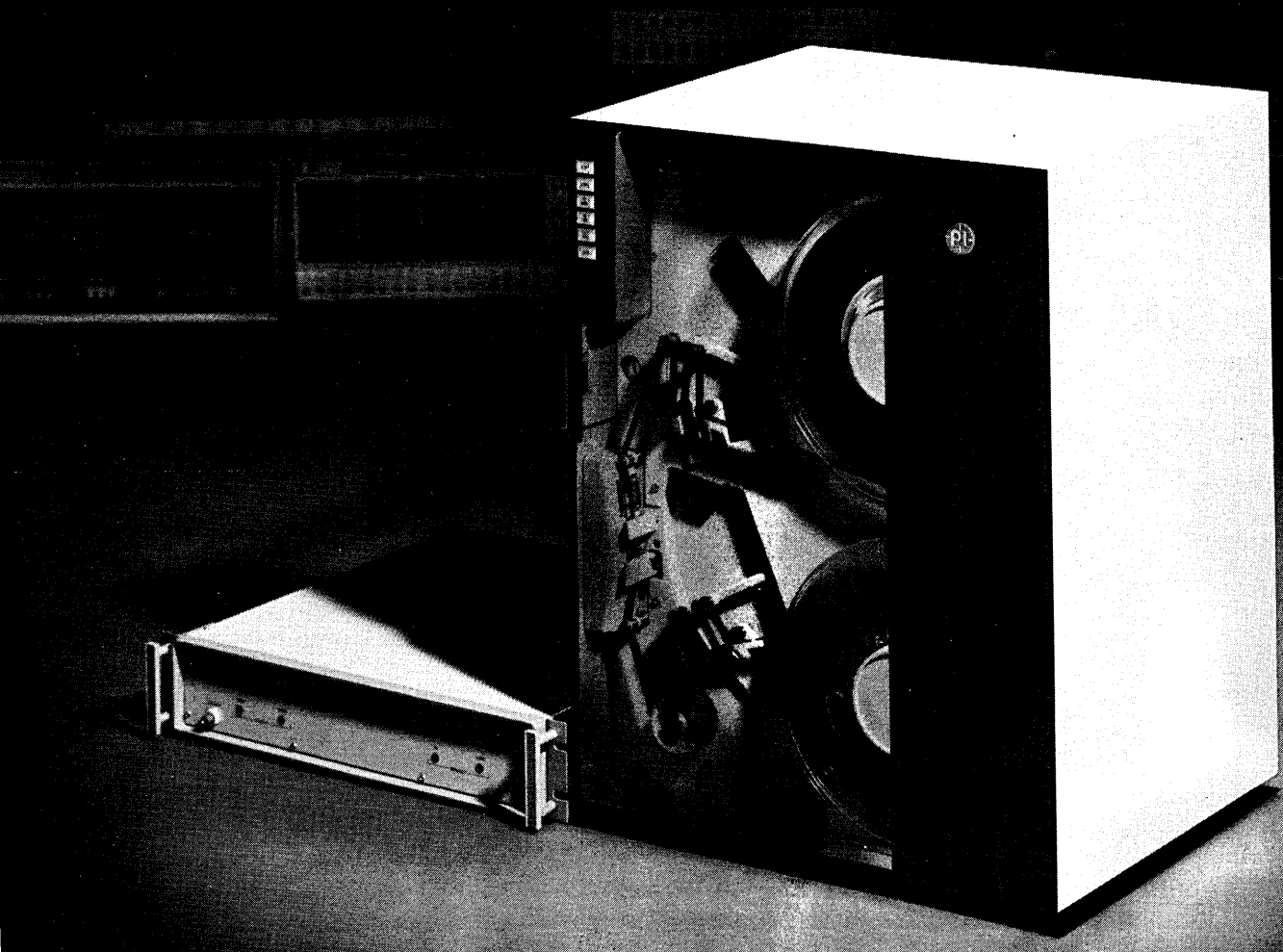
Data Terminals • Printers • Card Reader Terminals • Paper Tape Peripherals

CIRCLE 4 ON READER CARD

MINIMAX

maximize your minicomputer value with a total data system for $8k



MINIMAX is our PI-1400, IBM compatible, digital recorder and hardware/software controller, matched to your minicomputer.

Just plug it in. Use existing software, or we'll supply a utility package. It works. We've been delivering systems like this for over two years.

Standard dual density, program-switchable . . . select 800/1600 nine-channel, or, 800/556/200 (any two) seven-channel formats. Three tape speeds. Rugged double castings that isolate the transport from the main frame. Jam-proof controls.

Options include data buffer memory with 0–500k char./sec. transfer rates, single board formatters to permit NRZI and phase-encode tape transports.

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PRECISION INSTRUMENT

CIRCLE 43 ON READER CARD

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DATAMATION®

JUNE, 1973
volume 19 number 6
This issue 143,161 copies

departments

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Circulation audited by Business Publications Audit BPA

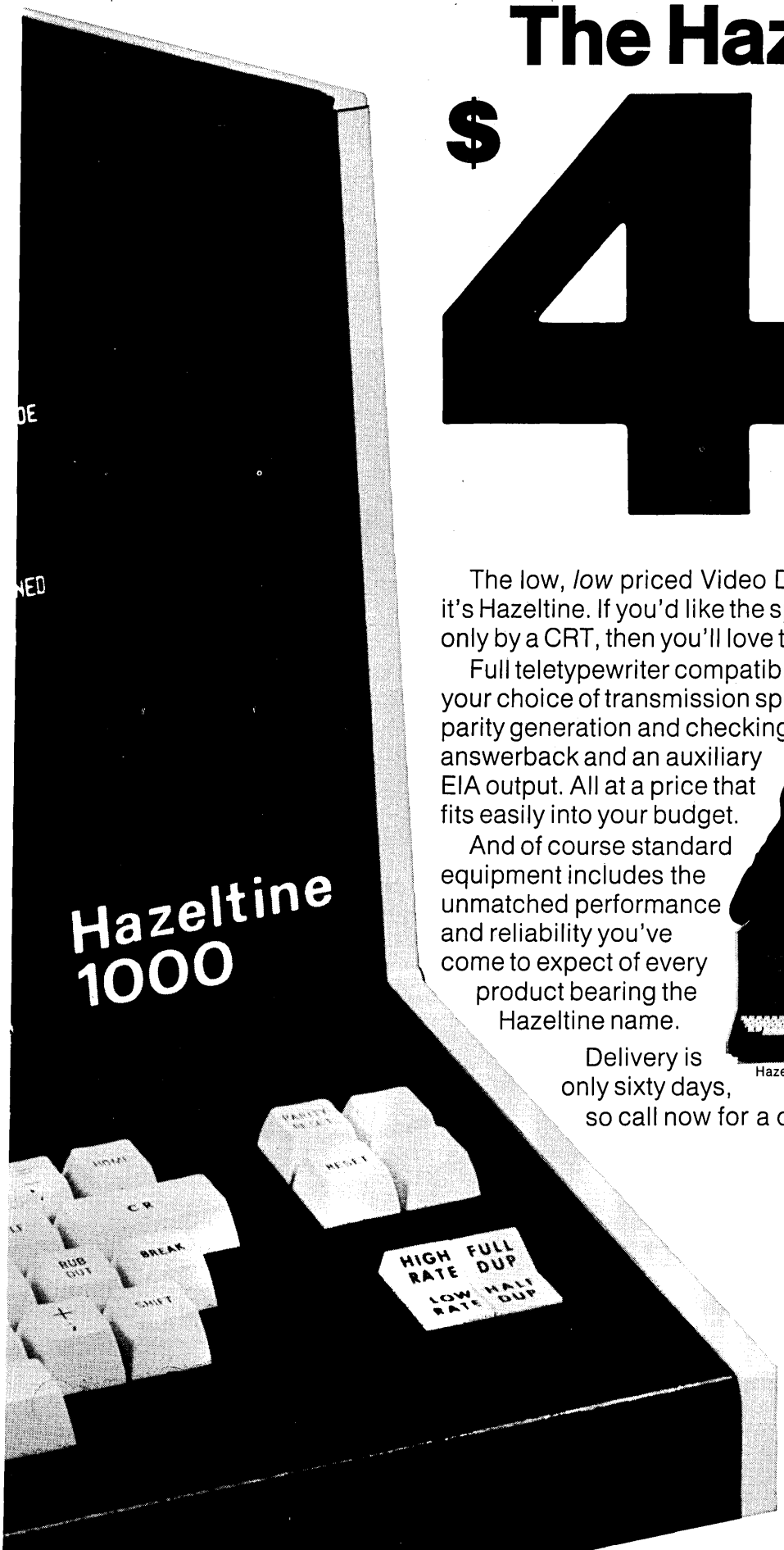
Member ☆ABP American Business Press, Inc.

DATAMATION is published monthly on or about the first day of every month by Technical Publishing Company, 1301 South Grove Ave., Barrington, Illinois 60010; Arthur L. Rice, Jr., Chairman of the Board; James B. Tafel, President; Gardner F. Landon, Executive Vice President. Executive, Circulation and Advertising offices, 35 Mason Street, Greenwich, CT 06830, (203) 661-5400. Editorial offices, 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Published at Chicago, Ill.

DATAMATION is circulated without charge by name and title to certain qualified individuals who are employed by companies involved with automatic information handling equipment. Available to others by subscription at the rate of $18 annually in the U.S. and Canada. Reduced rate for qualified students. Foreign subscriptions are available for £12.50 or for the equivalent of $30 U.S. in most West European currencies. 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. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulation paid at Columbus, OH and Form 3579 to be sent to Technical Publishing Company, P.O. Box 2000, Greenwich, CT 06830.

Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Beslow Associates, Inc.

Hazeltine Introduces a New Era in Terminal Economy: Announcing The Hazeltine 1000.



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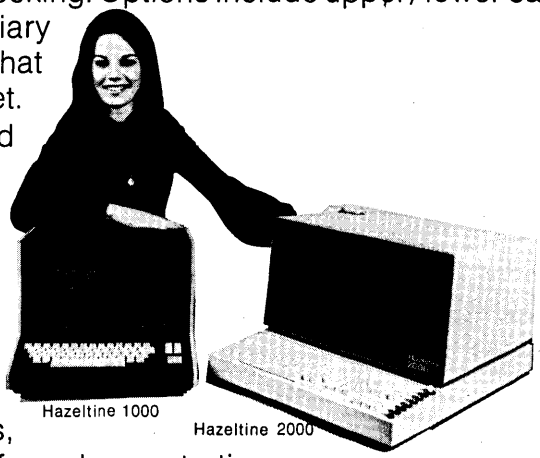
The low, *low* priced Video Display Terminal is here—and naturally it's Hazeltine. If you'd like the speed, flexibility and silence provided only by a CRT, then you'll love the Hazeltine 1000.

Full teletypewriter compatibility, 960-character display (80 x 12), your choice of transmission speeds up to 9600 bps as well as parity generation and checking. Options include upper/lower case, answerback and an auxiliary EIA output. All at a price that fits easily into your budget.

And of course standard equipment includes the unmatched performance and reliability you've come to expect of every product bearing the Hazeltine name.

Delivery is only sixty days, so call now for a demonstration.



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CIRCLE 26 ON READER CARD

The toughest thing about building a network is finding a place to start.

When you get into something as complicated as networks, it's easy to get in trouble.

What's difficult is knowing where to begin.

Start with us.

After all, you'll be using a lot of minis. And they'll probably be our PDP-8's and 11's. Simply because they're the minis almost everybody buys.

You'll be needing all the interfaces for those minis. For synchronous lines. Asynchronous lines. Memory to memory. We already have them all. All off the shelf. Ready to go. So you can hook up your network the way you want it, when you want it.

You'll want a host computer, a big timesharing computer, that fits right in with all our minis and works the way you do.

We make that, too. It's our DECsystem-10.

In fact, almost 30% of the computers used by independent timesharing services are DECsystem-10's. Networks are their business, so they have to go with the best computer available.

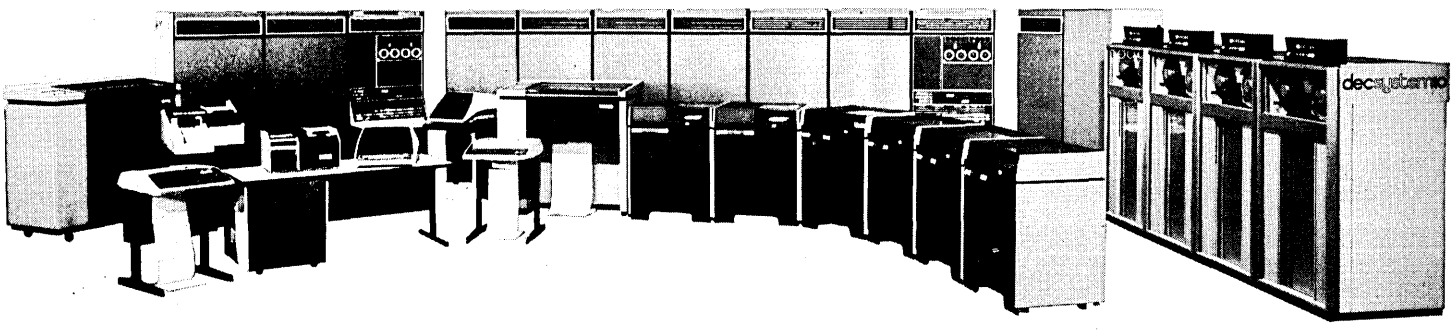
If you're interested in networks, we're the people to talk to. We have more timesharing installations than anyone else in the world.

You can come to us because of all our minis, or all our interfaces, or our DECsystem-10 host computer, or our timesharing experience.

But we expect you'll come to us because we're the only company that gives you all of them.

DECsystem-10 Group, Digital Equipment Corporation, 146 Main Street, Maynard, Mass. 01754. (617) 897-5111. European headquarters: 81, route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada Ltd., P.O. Box 11500, Ottawa, Ontario. K2H 8K8. (613) 592-5111.

digital

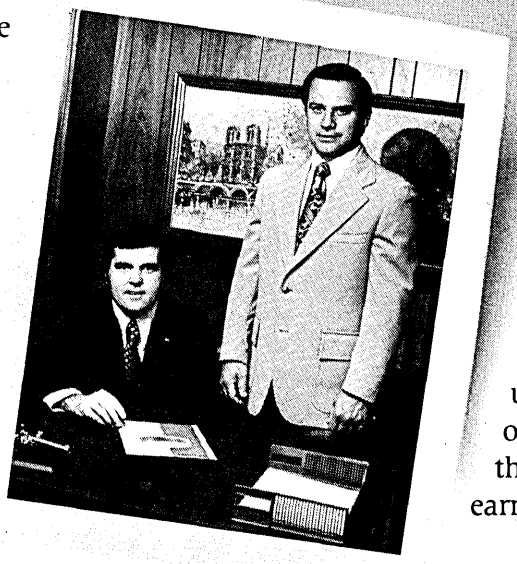


DECsystem-10: It'll make your network work.

"Three hundred men in the Carolinas are selling CFI disk packs for us. They're our customers."

"Actually, our customers sell more for us than we do," says Carlton Chandler of Carlton Chandler & Associates. "The high degree of service and personal concern we show are the reasons they get the word out for us."

"We carry a complete selection of data processing supplies, and John Efird and myself personally help each customer select the best product for him. In disk packs and cartridges, that's CFI Memories. They cover both IBM-compatibles and nonstandards for new and old systems alike. And they're as interested in personal attention as we are. In fact, CFI is the only firm we deal with that has a direct, open line we can use around the clock to get answers for our customers."



Personal profiles
Carlton Chandler (left) and John Efird, partners in Carlton Chandler & Associates, Greenville, S.C. Active members of DPMA. Fifteen years experience. Family men who are active in their community

Carlton Chandler and John Efird, professionals who have devoted their entire careers to data processing, are typical of the 186 representatives serving CFI customers here and overseas. Together, they've supplied users and OEMs with thousands of disk packs and cartridges. And they're all men who work hard to earn your business by providing the kind of personal attention you require.

A nearby CFI representative is waiting to serve you now. For his name, call us toll-free at 800-854-3290. Or write: CFI Memories, Inc., 305 Crescent Way, Anaheim, CA 92801.

We take your business personally.

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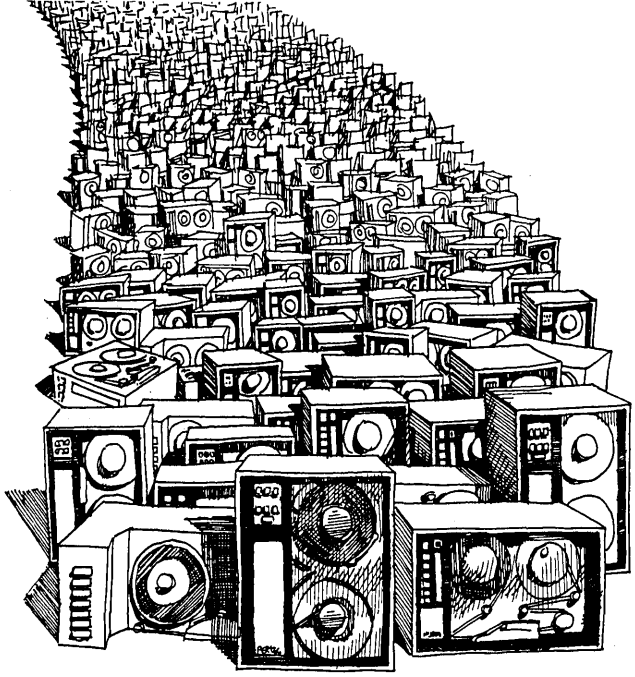
EUROPE: CFI Memories, Inc., Carolyn House, Sixth Floor, Dingwall Road, Croydon CR9 INT, England. Tel. 01-681-3811 **CANADA:** Barshaw Office Systems Corporation, 9559 Cote de Liesse Road, Dorval (Montreal), Quebec, Canada. Tel. 541-631-8591



Will a Pertec tape transport fit your application?

400 times yes!

In fact, you're likely to find a Pertec transport that will work as if it were expressly designed for your system.

You can choose from more than 400 model variations, with speeds ranging from 6¼ to 75 ips, four densities, three reel sizes and buffer and formatter options.

You get interfaces which have become the standard of the industry. (Even our competitors describe their components as "Pertec-compatible".)

You enjoy personal and professional assistance in the design, development and maintenance of your system. Factory training for your sales people. Back-up by a service and support network in 30 U.S. cities and 20 foreign countries.

And all at surprisingly low prices.

Whatever you need in a tape drive, look into Pertec. We pioneered low-cost transports, we developed the first cost-effective phase encoding capability, and we continue to keep and often set the pace in industry advancement.

Today Pertec transports are in more than 20,000 systems around the world. They should be in yours.

Find out more. Call us collect in the area nearest you: Boston (617) 890-6230; Chicago (312) 696-2460; Los Angeles (213) 996-1333; London (Reading) 582-115. Or write us at 9600 Irondale Avenue, Chatsworth, California 91311.

The best values in computer peripherals come from

PERTEC

Already the world's largest independent manufacturer of tape transports.

CIRCLE 83 ON READER CARD

THE REASONS TO KEEP YOUR IBM 1130:

THE REASONS NOT TO:

Throughput. You already know there's a limit to the throughput your 1130 can handle. If you haven't reached that limit yet, you probably will. Then come the problems. You don't want to move up to a more expensive system. You don't want to rewrite your software. You don't want a lot of grief. We think you should check into our "Super" 18/30 DMS. It's a direct 1130 replacement that gives you three to ten times the throughput at about the same cost. And it still uses all your existing programs.

Real Time. Your 1130 doesn't have real time capability. Our 18/30 does. It's a fourth generation computer with real time, multi-programming (on-line CRT, etc.) capability. And we're prepared to help you make the conversion to real time, now or any time you are ready.

Money. The 18/30 does much more work for almost exactly the same number of dollars. And lets you avoid having to move up to a bigger, more expensive computer with all new software to write. The result: enormous savings in dollars, downtime and anguish.

None of the above. Even if you aren't throughput-bound and couldn't care less about real time at the moment, we can still help you cut costs. Our "Mini" DMS also works with your 1130 software and gives you at least the same throughput (much more in disk work). All for as much as 40% less per month than you're paying now.

Us. Anybody who says they can do all this is worth talking to. Call Ron Doiron at (714) 778-4800. Or write him in care of General Automation, Inc., 1055 S. East St., Anaheim, Calif. 92805.

GENERAL AUTOMATION 18/30 DMS

See DMS in Booth 2201 at the National Computer Conference.

If you're looking for a low cost, powerful front-end processor...

one that can support any combination of terminals...

stop looking.

T-COMM 7, the low cost, communications processor designed by Periphonics, is ideal for teleprocessing applications. This powerful, versatile front end eliminates the need for communications programming yet supports any combination of different vendors terminals. It is currently interfaced to the entire IBM 360/370 line, to Burroughs, Univac, and others.

Along with T-COMM, Periphonics can supply the most dramatic innovation ever developed in audio response – VOICEPAC 2000. This amazing unit brings you conversational audio with a vocabulary capacity of up to 1500 words.

Full support of existing and future terminal requirements, elimination of costly TP Programming, more efficient use of the mainframe, and conversational audio are just a few of the benefits being enjoyed by T-COMM 7 users across the nation. Add to this a system up-time record of better than 99.5% and system backup from 100 Service Centers nationwide. So stop looking. Join the more than twenty major corporations that have ordered T-COMM 7 in the past few months alone. Write, or better yet, call for the full T-COMM 7 story. Periphonics Corporation, Airport International Plaza, Bohemia, N.Y. 11716. Phone (516) 567-1000.

T-COMM 7
is here...now.

Periphonics Corporation

"your computer's interface to people"

CIRCLE 81 ON READER CARD

Calendar

JUNE

Word Processing Syntopican, June 28-29, Boston. This presentation of the International Word Processing Assn. is designed to give both beginners and experts practical knowledge of the word processing concept through plenary and concurrent sessions, informal discussions, equipment exhibits, and workshops. Fee: $100, IWP and AMS members; $125, others. Contact: Linda Zangrilli, IWP, Maryland Rd., AMS Bldg., Willow Grove, PA 19090.

JULY

Summer Computer Simulation Conference, July 17-19, Montreal. Theme: "Simulation: Increasing Its Credibility." The technical program consists principally of papers dealing with the application of simulation in ecological, social, engineering, and chemical analysis systems. Sponsors: AICHE, AMS, ISA SCI, SHARE. Advance registration: $50, members; $60, others; at conference, add $10. Contact: Lawrence Sashkin, c/o The Aerospace Corp., P.O. Box 92957, Los Angeles, CA 90009.

International Conference on Computers in the Humanities, July 20-22, Minneapolis. The Univ. of Minnesota Depts. of English, German, and Computer Science are providing this forum for people of diverse interests in the humanities but with a common interest in the use of the computer in their own fields. Fee: $25; students, $5. Contact: Prof. Jay Leavitt, 114 Main Engineering Bldg., Univ. of Minnesota, Minneapolis, MN 55455.

Third Annual International Computer Exposition for Latin America, July 23-27, Mexico City. Sponsored by the Computer Society of Mexico, the exposition will have approximately 140 booths of manufacturers, distributors, and suppliers of computers, peripherals, software, and supplies from Mexico, U.S.A., Europe, and Japan. A program on "Computer Communications" will be held in conjunction with the exposition. Fee: exhibits free; about $25 for seminars. Contact: Emilio Ferstl, Sociedad Mexicana de Computacion Electronica, Yacatas 435, Mexico 12, D.F.

AUGUST

Conference on Making Service Industries More Productive through Computers and Automation, Aug. 12-17, Henniker, N.H. For individuals and organization representatives actively concerned with the technology, economics, or institutional arrangements necessary to apply computers to increase productivity and improve quality in the provision of services. Sponsored by the Engineering Foundation and the Institute for Computer Science and Technology, National Bureau of Standards. Registration limited; application deadline 30 days before conference. Fee: $160, including double room and meals. Contact: Engineering Foundation, 345 E. 47 St., New York, NY 10017.

APL Congress 73, Aug. 22-24, Copenhagen. This first major international APL conference will focus on the application of APL to a wide variety of disciplines including engineering, business, science, and education. The program will include over 60 papers as well as discussions and demonstrations. Fee: Dkr. 600. Contact: Philip Abrams. c/o Scientific Time Sharing Corp., 7316 Wisconsin Ave., Bethesda, MD 20014; or APL Congress 73, Secretariat, Brøndbyøster Boulevard 22, 2650 Hvidovre, Denmark.

International Conference/Eventibition on Computers and the Arts, Aug. 27-31, Edinburgh. On the theme "Interact: Man-Machine-Society," this event is cosponsored by the Computer Arts Society, the Scottish Arts Council, and the Dept. of Educational Studies of Edinburgh Univ. Each daily session of the conference will focus on a particular approach to computer art. The emphasis of the eventibition will be on live events in music, dance, theater, poetry, film, and robotics; there will also be an exhibit of static graphic works. Eventibition free. Conference fee: £16.50, CAS members; £19.80, others. Contact: R. John Lansdown, Computer Arts Society, 50/51 Russell Sq., London WC1B 4JX, England.

SEPTEMBER

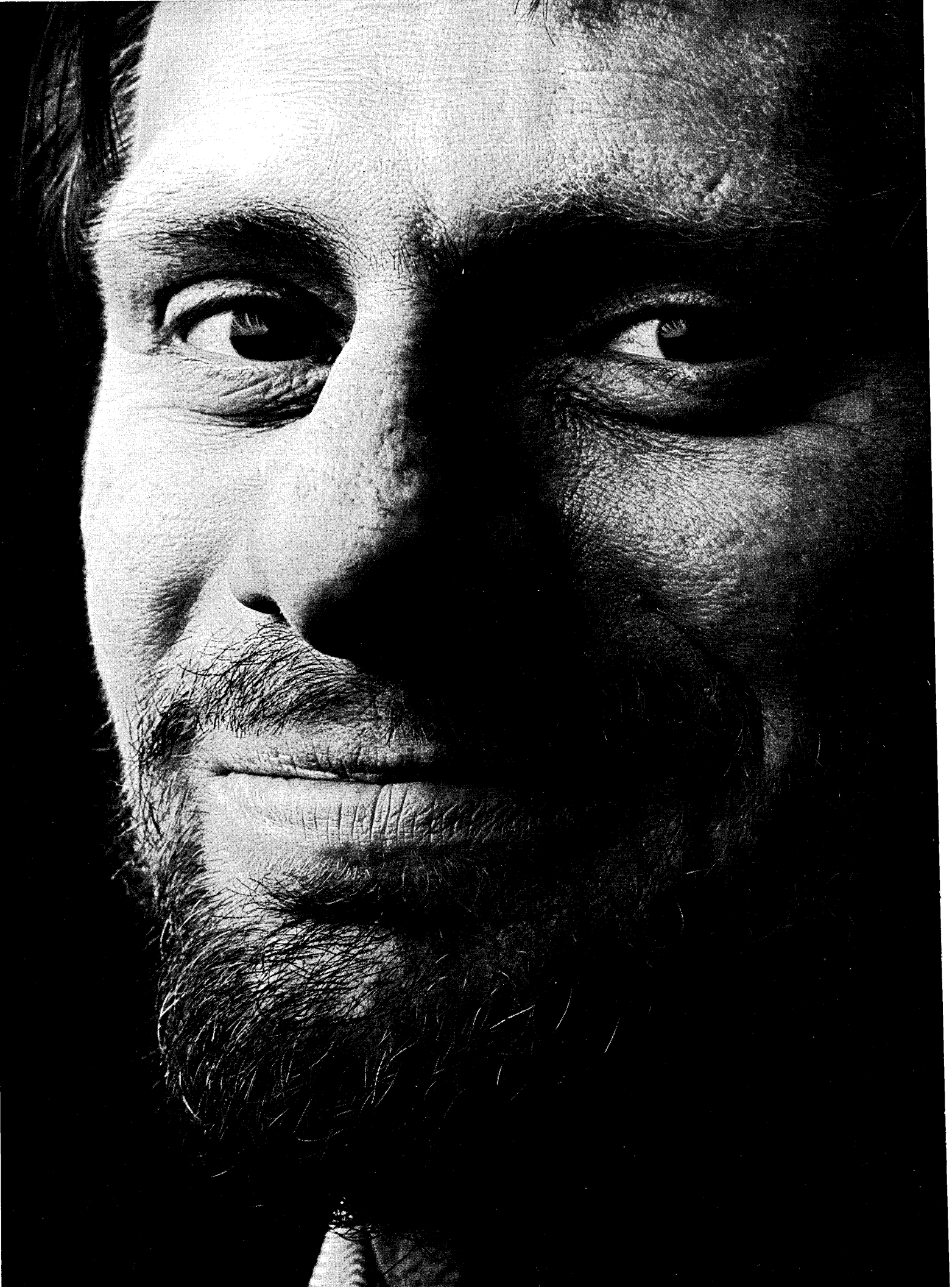
International Computing Symposium 1973, Sept. 4-7, Davos, Switzerland. Held by the European chapters of the Assn. for Computing Machinery, this symposium will consist of papers in the major fields of computer science. Nonstudent participants receive a copy of the Proceedings. Fee: Swiss Francs 270, members of ACM, AFCET, AICA, BCS, and GI; Swiss Francs 320, others. Contact: Dr. H. Lipps, International Computing Symposium 1973, c/o CERN, CH-1211, Geneva, Switzerland.

International Health Evaluation Assn. Conference, Sept. 11-14, London. The third annual general conference of this professional organization devoted to the use of computer techniques for the improvement of health care will include discussions, demonstrations, presentations, and visits to British hospitals and clinics. Fee: $125 (£50), members; $150 (£60), others. Contact: Norma M. Oldfield, IHEA, 354 Tappan St., Brookline, MA 02146.

International Conference on Information Centers in Governmental and Industrial Administration and Management, Sept. 17-18, Cologne. Organized by the special interest group on methods of computer science for special applications of the Gasellschaft fur Informatik and the BIFOA, this conference will discuss problems which arise in the development and utilization of information centers, created so that edp could be used more efficiently and economically. Fee: $16 (DM 50), members; $23 (DM 70), others. Contact: Prof. P. Schmitz, Lehrstuhl fur Informatik der Universitaet zu Koeln, 5 Koeln 41, Berrenrather Str. 136, Germany.

CALL FOR PAPERS

IFIP Congress 74, Aug. 5-10, 1974, Stockholm. Submitted papers will make up the major part of the program of the sixth triennial meeting of the International Federation for Information Processing. Papers dealing with new techniques or new theoretical advances are particularly looked for, but papers describing practical experiences with information processing systems are also invited. Deadline: Nov. 15, 1973. For information, write, giving category of paper and tentative title, to: Dr. Herbert Freeman, c/o AFIPS, 210 Summit Ave., Montvale, NJ 07645.



This man singlehandedly maintains over 1000 ADDS terminals.

Why is he smiling?

Ordinarily, you can spot a Service Manager a mile away. Bleary eyes, furrowed brow, and that nervous little Service Manager Twitch.

Introducing Mort Norman, smiling Service Manager for Applied Digital Data Systems. Why the smile instead of a twitch? Because, frankly, ADDS' TTY compatible terminals are so dependable, Mort's job has become—well—cushy.

For Mort, the picture wasn't always so rosy.

From the outset, ADDS was committed to innovation; witness our features and patented options. Unfortunately, innovation breeds bugs, and we had our share. But we were also committed to quality. So our engineers designed, redesigned, fussed and fidgeted for almost three years. The result?

This. ADDS Consul series of desktop CRT terminals had a calculated MTBF of 3,000 hours. The rack-mountable MRD series rated out at 5,400 hours.

We found ourselves with a broad line that was not only remarkably innovative; it was exceedingly reliable.

Mort was ecstatic.

Mort's wife started seeing more of him.

And we started smiling. Because that kind of dependability is building us a reputation. And a list of the bluest blue chip clients around.

When you're considering terminals, remember Mort and what's behind his smile. ADDS.

What's behind our smile. **ADDS**
Applied Digital Data Systems Inc.


Consul 880

Applied Digital Data Systems, Inc. 100 Marcus Boulevard, Hauppauge, New York 11787 (516) 231-5400

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Up to 40 times faster processing... 15 times more memory... 20 times faster printing.

Burroughs new, more powerful TC 3500 series

Burroughs new TC 3500 intelligent terminal computers offer:

- Up to 40 times the processing speed, plus 15 times the user program and data storage capacity of Burroughs TC 500, the first intelligent terminal computer.
- Broad peripheral power with line printers providing up to 20 times faster system output, computer-compatible magnetic tape, 96-column card reading, punching and sorting equipment, paper tape units, SELF-SCAN® panel display, and a new magnetic tape cassette subsystem that allows Dynamic Memory Overlay.
- Versatility in batch-oriented applications, on-line operations, or mini-network control; communication with many kinds of terminals and almost any computer mainframe, using different transmission modes simultaneously.
- The economy of shared lines, COBOL programming, and compatibility with existing TC networks.
- 15 models to fit your company's needs for productive power, versatility and economy in data communications.

Burroughs

CIRCLE 9 ON READER CARD

Look Ahead

TELEX VS. IBM: THE JUDGE DID HIS HOMEWORK

One of the surprises of the IBM-Telex cases in Tulsa has been the knowledge of the computer industry displayed by Judge A. Sherman Christensen, who constantly demonstrates that he has read the voluminous files of exhibits and depositions. Witnesses often receive their most incisive questioning from the judge. There is even some speculation that he could set major antitrust precedents in his ruling.

Virtually no one, however, was predicting the outcome of Telex's antitrust case against IBM. One thing appeared certain though: both IBM and Telex are dug in so deeply against each other that a settlement a la IBM-CDC is not expected. A decision in the case may not come for a few months.

WHO'S REALLY ON TRIAL IN TULSA?

The Telex antitrust trial against IBM, with disclosures of IBM's efforts to unplug the compatibles, may be doing more harm than good to the case for independents. Some users say their managements have long doubted the viability of independents in an IBM-dominated environment and so have remained IBM-pure. Now they have court-produced documentation to support these fears.

MORE THAN DOUBLE DENSITY?

A "multiple-density" 3330 disc file from IBM appeared imminent as this column was being prepared. A user with a 370/168 on order has been promised a "very significant" announcement soon by his IBM salesman, who left the impression that it will be more than a double-density model. This user must soon decide on a supplier for his 3330s and, barring something fantastic from IBM, is currently leaning toward an independent vendor. Thus the teaser.

NOT SUCH A BARGAIN AFTER ALL

When Ampex offered the feds 80% discount on Univac 1100 series core memory extensions last January, it looked like a real buy. But the first core boxes delivered to the Census Bureau and NBS didn't work. Ampex, now redesigning the interface, is losing approximately $2500 per month on each of 13 core boxes. Also, deliveries to other agencies have been postponed. The redesigned interface is supposed to be tested this month, but a knowledgeable outside source believes it will take four or five months to solve the problem. Until then, Census and NBS will have to rent core extensions from Univac and pay roughly four and one-half times more than the Ampex bid. Our source contends that GSA, which negotiated the contract, is "technically incompetent." If they had required benchmarks and used NBS as a technical advisor, the trouble could have been prevented.

UNIVAC: THREATENING TO KEEP THAT 90%

Univac aggressively defends the 90% of RCA's computer base it acquired 18 months ago. Its methods: delay, bargain, threaten. In California, its threat last month to file a protest against an Invitation for Bid (IFB) on equipment for a huge consolidated computer center was seen as a delay tactic to keep its Series 70 computers in the Dept. of Motor Vehicles ($200,000 a month in revenue). The DMV is to be consolidated within the new center next June.

Look Ahead

Univac and IBM were the only companies to bid on the $40-million center buy earlier this year, and both were disqualified (April, p. 121). On this second round, Univac won't bid, just protest.

Nor did it bid in Utah on a Spectra upgrade where IBM beat out Digital Equipment Corp. But it's filed a protest questioning IBM's ability to live up to the terms of the RFP, and a Univac salesman -- no longer with the company -- is said by state officials to have hinted Univac might junk its plans to expand a manufacturing plant in Utah if it didn't get the state's business.

And in Butte county in Northern California -- where Univac bid a 9400 system to replace a Spectra 70/35 for a data center serving seven other counties and lost out to a CDC 3170 -- we're told strange things happened before a contract could be signed. Univac came in with a new proposal: It offered a 70/45, an additional 162K of core, an increase in disc storage from 81 million characters to 240 million, the addition of a communications multiplexor and a printer -- all for the same price as the original configuration being upgraded. At writing, the situation was unresolved.

GREGARIOUS RECTOR REPLACES ALOOF GILCHRIST AT AFIPS

Not everybody was sorry to see Bruce Gilchrist step down as executive director of the prestigious American Federation of Information Processing Societies. Although bright, energetic, and dedicated, Gilchrist was socially aloof and, say some, didn't show the greatest sensitivity to the financial and ego needs of the member society presidents who helped to hasten his departure.

Things should be different with his successor. Bob Rector, says one of his ex-colleagues, "knows a heck of a lot of people, and he doesn't have very many enemies." Says another: "He's very extroverted, likes people, likes to mingle, chat with them." He also is described as a diplomat who can "bend with the wind," unlike Gilchrist, who stood his ground.

Rector, an officer in the Naval Reserve, is dignified, as befits the post he'll fill. But he's not above having some fun: he appeared at the recent dinner meeting of the Digital Computer Association wearing a bunny suit.

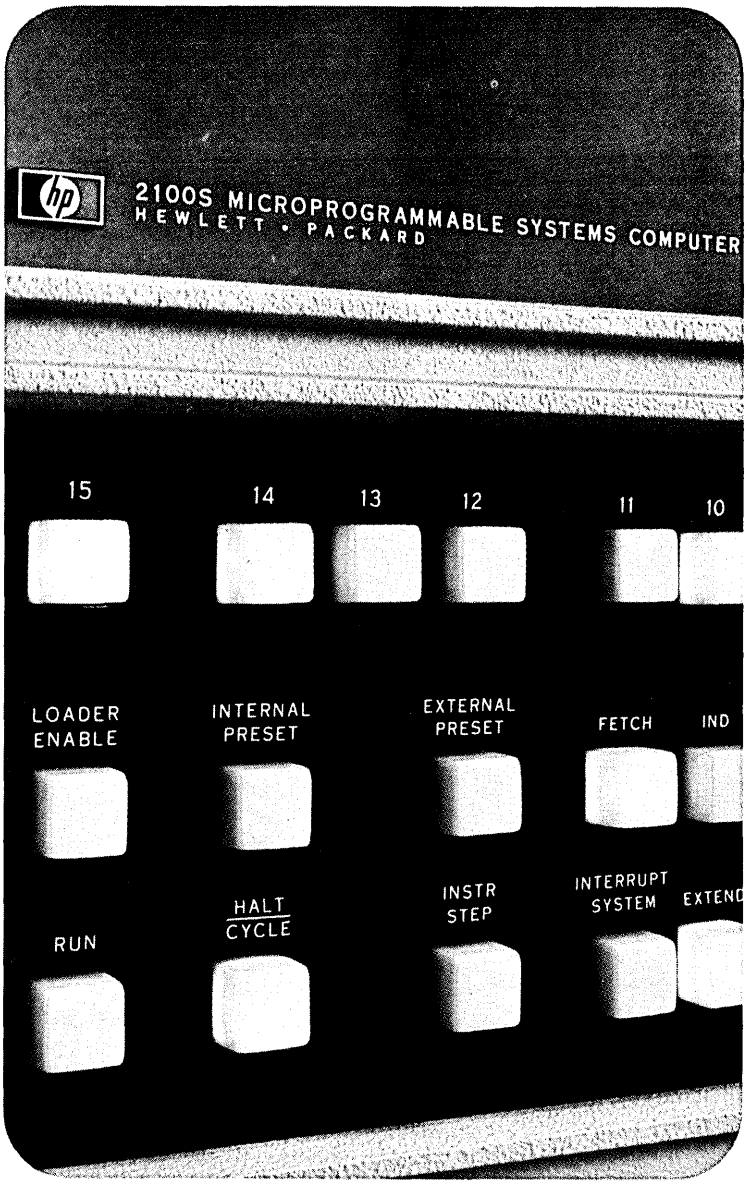
THE XEROX PRINTER: A THREAT TO COM?

There are differing opinions on the impact that Xerox's new computer printing system will have on computer output on microfilm (COM). Both are line printer replacements, targeted at the same type of customer: one producing multiple copies of 300,000 to 500,000 pages a month. And both leave the door open to customers with smaller quantities. (Xerox offers a minimum monthly rental of $2,600 for those with as low as 100,000 pages, and COM marketeers have similar metered plans.)

Some COM installations already use a xerographic process to produce hard copies from microfilm, and many thought the next step would be a highly desired software system to control the number of copies per page (i.e., computer-generated invoices would be coded during the microfilming process to vary the number of copies made of each invoice). Although the new Xerox model 1200 doesn't have this quantity-control feature, it nevertheless bypasses COM by copying directly from magnetic tape at a rate of 3,600 copies an hour. This could hurt the growth of COM.

COM marketeers say an advanced xerographic system that used microfilm would have helped the growth of COM, but they don't think

(Continued on page 199)



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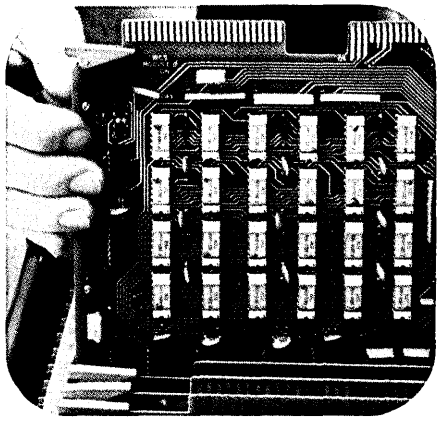

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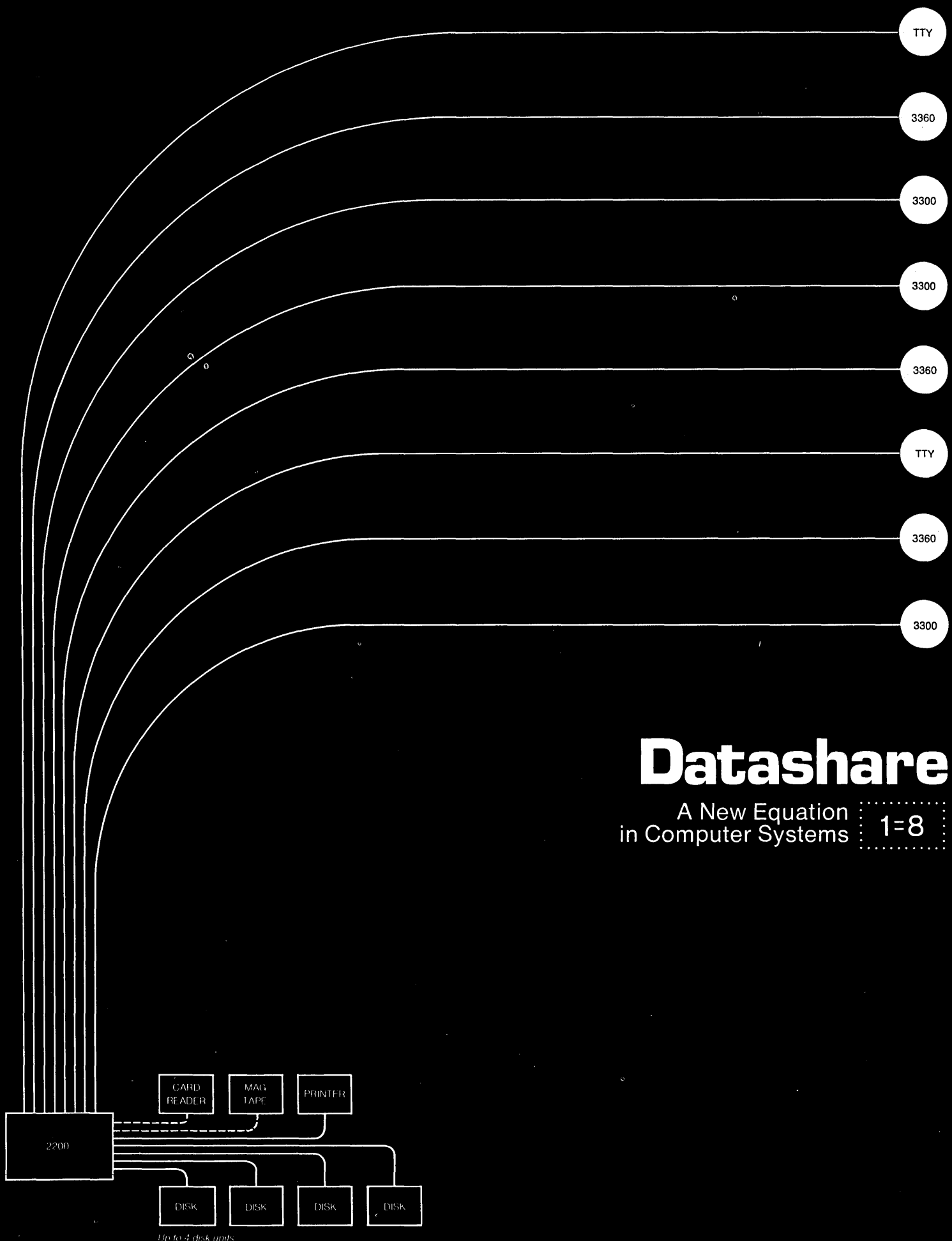

Datashare

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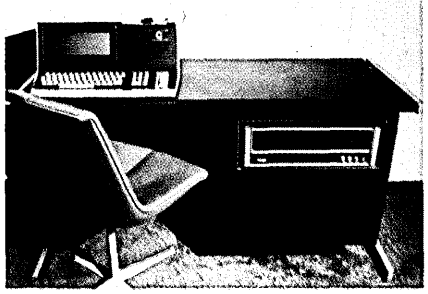

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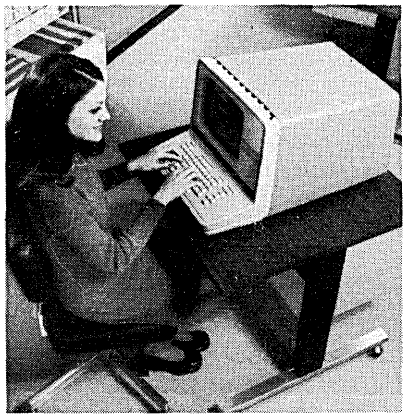

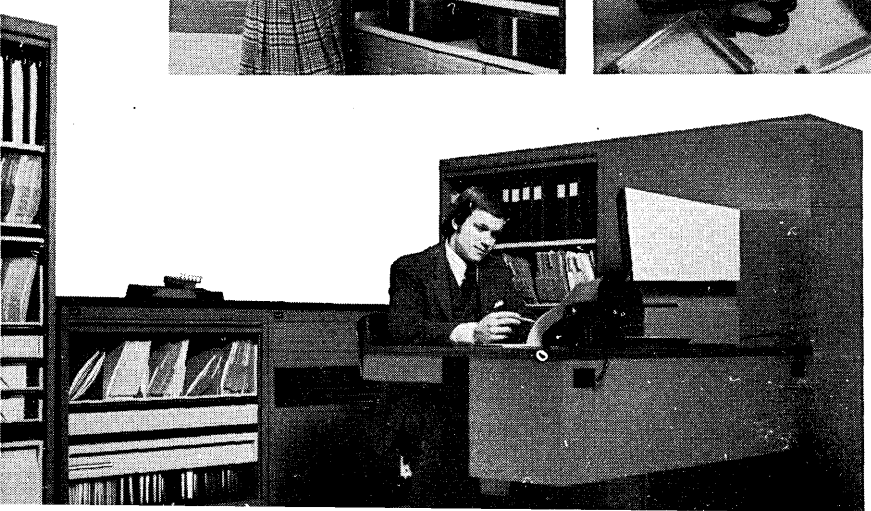

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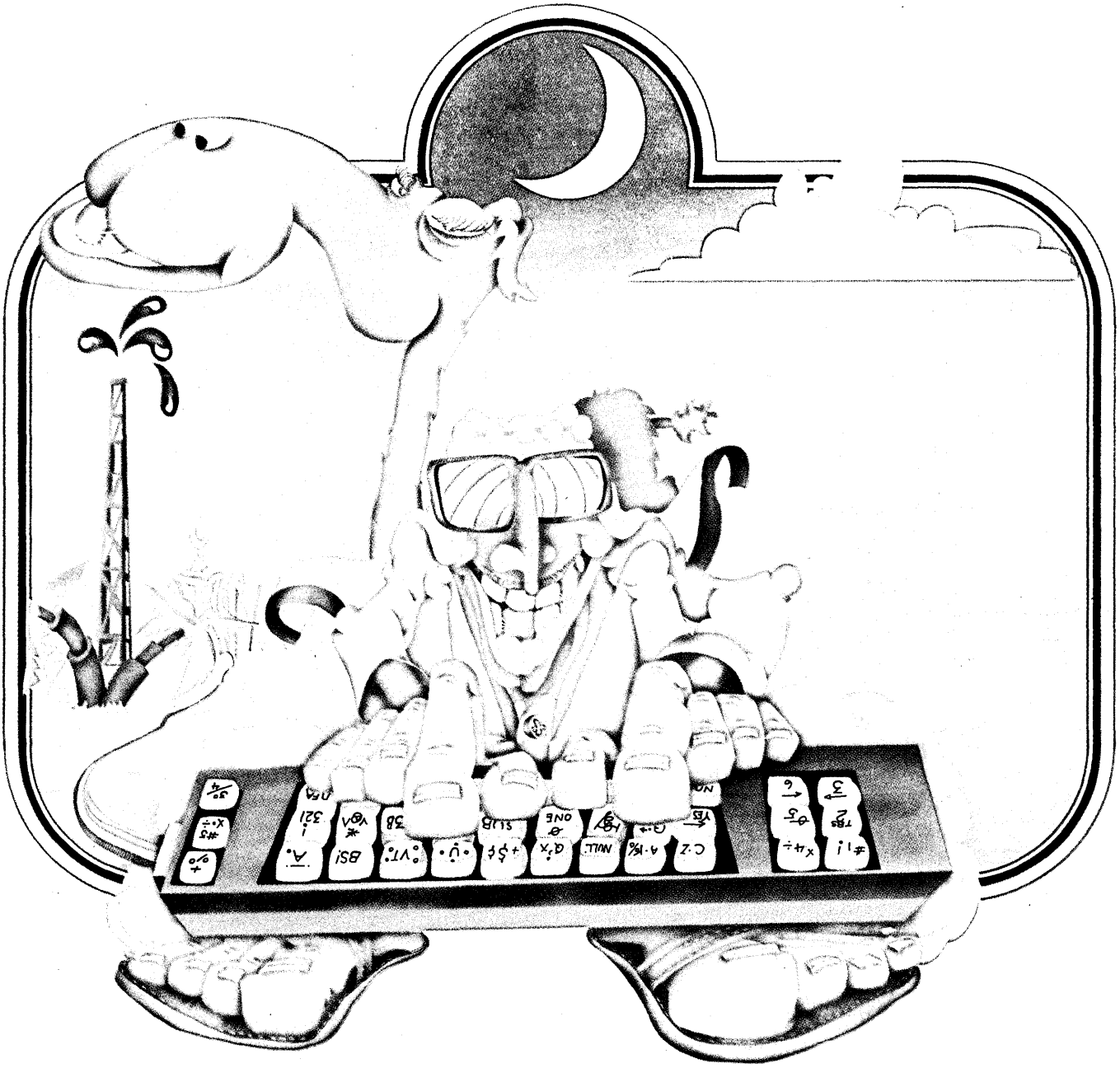

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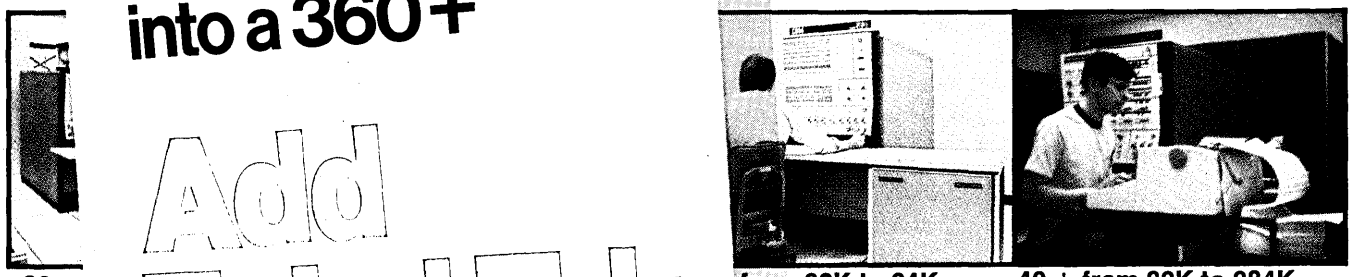
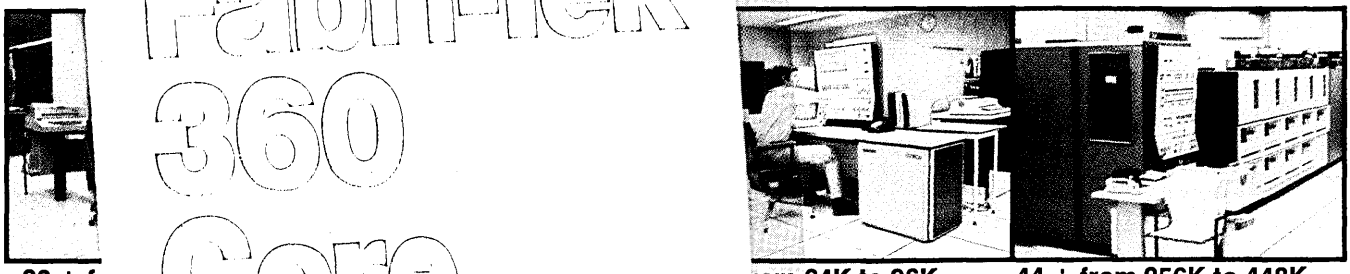


30 +

from 32K to 64K

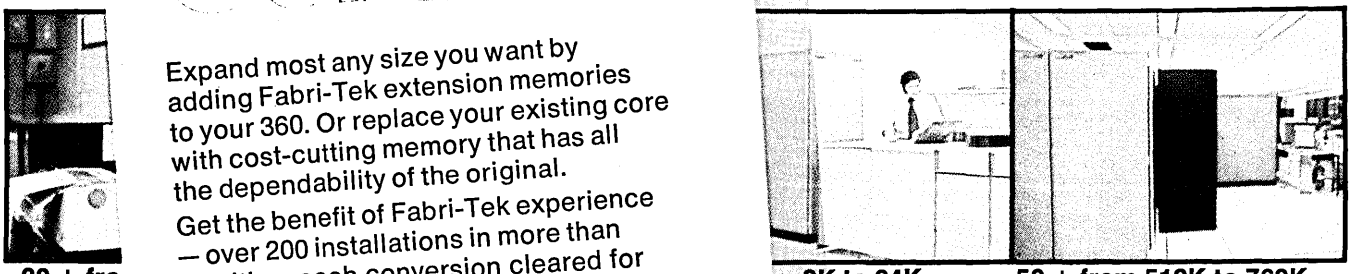
40 + from 32K to 384K



30 + fi

om 64K to 96K

44 + from 256K to 448K



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Letters

Frask and fantasy

In reference to Mr. Granholm's article on Complex-Time Computing (Feb., p. 71), you may be interested in knowing that Fuling and Funning have done fascinating work on number systems with a variable rather than constant Radix or Base.

In fact, a FRASK compiler has been developed using a number system with $\int e^x$ as a Base where $\int e^x = F(U^n)$, which lends itself quite well to simulation applications.

Inquiries on the FRASK compiler, which has been said to really pack a wallop, may be addressed to its creator, FRASK INBACKEN.

KARL RACKARUNGA
Brooklyn, New York

The giant of jargon

In the March Forum (p. 166), Ms. Donovan, either as a fallen away English major or a defrocked technician, does all but directly answer the question of who invents our industry's language. Bluntly, who but her employer has the power and authority to which she so coyly alludes?

Who else could force a nation to accept "unbundling," the converse of which was splendid Americana, and the actual of which is mostly confusion?

Who else can coin "deconceive"? Certainly no mere member of the American College of Gynecology.

Who else can reduce their work force by laying off thousands and then explain it as "attritional disengagement"?

As for the spelling of the job title that has kept nearly 300,000 near unemployables off the welfare rolls, I look upon the absent "m" as David's stone. Unfortunately it won't kill Goliath. For my part, I'm spending my spare time looking for a gravel pit.

L. A. WELKE
Indianapolis, Indiana

Think the IBM term is "decommit"; "deconceive" is "inoperative."

Much ado

More ado about the DO.

I noted, with surprise, the letter by Collins and Redelmeir (March, p. 21). They seem to be laboring under several misconceptions that ought to be cleared up.

Since only American Standard FORTRAN is subject to the ANSI standard, there is no real question as to FORTRAN IV vs. FORTRAN V. (Maybe the new standard could be called FORTRAN II?)

The standards set by ANSI are required to be subject to periodic review and revision. The default case is that the subject is no longer of sufficient interest to justify continuance of the standard.

Regardless of one's opinion of FORTRAN as a programming language, it is continuing to evolve. If in doubt on this point, consult current manuals from several vendors. The mandate of the X3 committee is to set standards so as to prevent chaos in the information processing *industry*.

It is a disservice to structured programming to equate the block structure of ALGOL 60 (which has been around for 12 years) with the concepts of hierarchical structure advocated by Djkstra and others.

Lastly, having asserted that an attempt to extend FORTRAN IV would jeopardize its stability, the writers neglected to document the assertion. If one has a current program with a statement, say

DO 20 I = 1, N (1)

is there any hint that a new compiler which would also compile

DO 20 I = N, 1, −1

would fail to compile (1) correctly?

In point of fact, there is a potential incompatibility. In current compilers, if N=O, then (1) would execute its range once, whereas in the proposed standard the range would not be executed. This resulted in extended discussion in X3J3. To help resolve this point, an extensive audit of actual code was undertaken. As a result of the audit, six latent bugs were discovered in production code, and no examples were found in which the code should execute its range once given that the loop condition was satisfied prior to entry.

Academic computer scientists still have not learned the take-home lesson from the old FORTRAN-ALGOL conflicts. It is not sufficient to invent a better language. What is required is that one invent a language that people will want to use and then to work on a continuing basis with the industry to assure its acceptance and its correct specification (standardization). One retires into the Ivory Tower at the risk of being ignored.

PETER M. NEELY
The University of Kansas
Lawrence, Kansas

Time and charges

Referring to your News in Perspective (March, p. 122) review of the Packet Communications Inc. (PCI) application to the FCC, we would like to take exception to the arithmetic used to demonstrate the attractiveness of this proposed offering. While we believe the PCI service as presently proposed could be attractive to many users, particularly those with high peak to average traffic ratios, we found the example cited to be somewhat misleading.

The comparison with switched telephone network usage assumes 2000-bps transmission, 15% line usage efficiency, and daytime direct distance dialing rates with an airline distance of 1,000 miles. Under these assumptions for a 10-million-bit message, the cited transmission time is 9 hours and the cost $195. It has been our experience that 3600- and 4800-baud transmission on the switched network is entirely practical.

Furthermore, an efficiency of 15% is exceptionally low; efficiencies of 75-80% seem much more realistic for typical error rates, block lengths, propagation delays, etc. Assuming 3600-baud transmission and 75% line utilization efficiency, the total time for this transmission would be 1 hour rather than 9 hours, and the cost would be $22 as compared with the $20-40 charge cited by PCI for their service. Furthermore, the cost of the switched telephone network usage might be reduced still further by making use of WATS tariffs, assuming that other demands (both voice and data) could justify the use of this service.

An evaluation of the leased line costs is somewhat more difficult since one doesn't know what usage applies in prorating costs of this particular transmission. However, it can be pointed out that, as with the switched telephone network example, both the data rate and the line usage figures are much lower than practice would indicate.

In general, it is our belief that the PCI offering should be attractive and will have a legitimate role to play in data communications systems. However, any comparison between the PCI offering and existing or other proposed services should be based on realistic estimates of equipment, performance, and costs. In particular, costs of termination and software modifications must be included in the analysis.

MELVIN H. BLITZ
Corporate-Tech Planning Inc.
Waltham, Massachusetts

Tape transport technology

In January of this year, when I initially took over as president of Bright Industries, Inc., I was interviewed by one of your reporters: The data I transmitted was misunderstood by your reporter and recorded in DATAMATION for all to see. IBM's recent announcement of a 6,250 character per inch magnetic tape recording density has borne out most of the ideas I was trying to communicate. However, the article in your March issue (p. 153) makes it appear that I was wrong about higher density recording, and much worse, that I am not even aware

letters

that the new IBM format exists.

The points I was trying to make are:

1. The ability to record information on magnetic tape at densities in excess of 6,000 bpi has been known for some time.

Tape is the data processing interchange media. IBM, however, has established tape format standards for the past decade by virtue of their huge installed systems base.

Conclusion: It makes no sense to bring out a high-density tape transport unless the format for data interchange has been agreed upon by the industry, and to a great extent, this depends on the actions of IBM.

2. A 0.5-inch interrecord gap is required to start and stop today's tape transports.

If 6,000-bpi recording were to be introduced for use on today's tape transports, a 1,000-byte record would occupy 0.166 inches, but the 0.5-inch interrecord gap would yield a tape utilization factor of only 33%, less when preambles, check characters, etc., were added.

Conclusion: If higher density recording is to be practical, means of reducing the interrecord gap must be found.

3. One way to shorten the interrecord gap is to accelerate and decelerate the tape using a shorter distance. This would mean, assuming a constant acceleration, that the acceleration would increase linearly with the decrease in distance.

Today's 200-ips transports are pushing the limits of acceleration achievable with today's motors, and 3420-like tape paths given substantially higher accelerations would yield significant tape perturbations when starting and stopping.

Conclusion: It would be difficult to achieve shorter interrecord gaps by increasing acceleration and maintaining tape speeds in the neighborhood of 200 ips. If this approach is chosen, tape speeds would probably be reduced.

4. Another way of shortening the interrecord gap would be to write and read while accelerating.

If this approach is taken, a means must be had to accurately determine the velocity of the tape during the acceleration modes. This is necessary to control character spacing while writing and to control signal amplitude while reading.

Bright Industries tape transports utilize a capstan photo-optical disc which is used to strobe the data onto the tape in the write mode. The use of this technique is confined at present to eliminating the effects of speed variation once the tape deck is up to speed on packing density. Bright is the only manufacturer of low-speed tension-arm tape transports which uses this technique, to my knowledge.

IBM's 3420 tape transports contain such a capstan optical means.

Conclusion: If higher tape speeds are to continue in use, a means will probably be found whereby data is strobed onto the tape during acceleration; and if further reduction in interrecord gap warrants the expense, the same transducer built into the transport could be used to vary the read amplifier gain, so that reading of data could begin also while accelerating.

While it is not clear by IBM's announcements to date just what technique is being used to shorten the interrecord gap, I believe that the same set of facts remain pertinent to the problem.

NORMAN GRUCZELAK
President
Bright Industries, Inc.
Sunnyvale, California

Field service

I am trying to find out if there is any organization or professional society which concerns itself solely with field service of computers, digital systems, etc. I would appreciate any information you could furnish.

THOMAS F. BRADLEY
Singer-Simulation Products Div.
Manager, Field Engineering
11800 Tech Road
Silver Spring, Maryland 20904

Last battle in the war

I enjoyed reading Roger Milgrim's article on trade secret protection of software ("Software, Carfare and *Benson,*" April, p. 75). I concur in his conclusion that on the basis of current law, trade secrets is the best method of software protection, and I believe two additional points bear mention.

The first goes to an additional advantage which trade secrets have over patents—the significant possibility of obtaining timely (a few weeks, if not days) relief. Although it is almost impossible to obtain a preliminary injunction in patent infringement actions, courts are not nearly as reluctant to grant them in trade secret suits. A preliminary injunction would keep the defendant from using or marketing the software during the pendency of the action. This is of particular importance in the software industry where the litigants typically are small companies (or even individuals) unable to finance several years of litigation. In such circumstances, the battle for preliminary relief is the last battle in the war; if the

(Continued on page 196)

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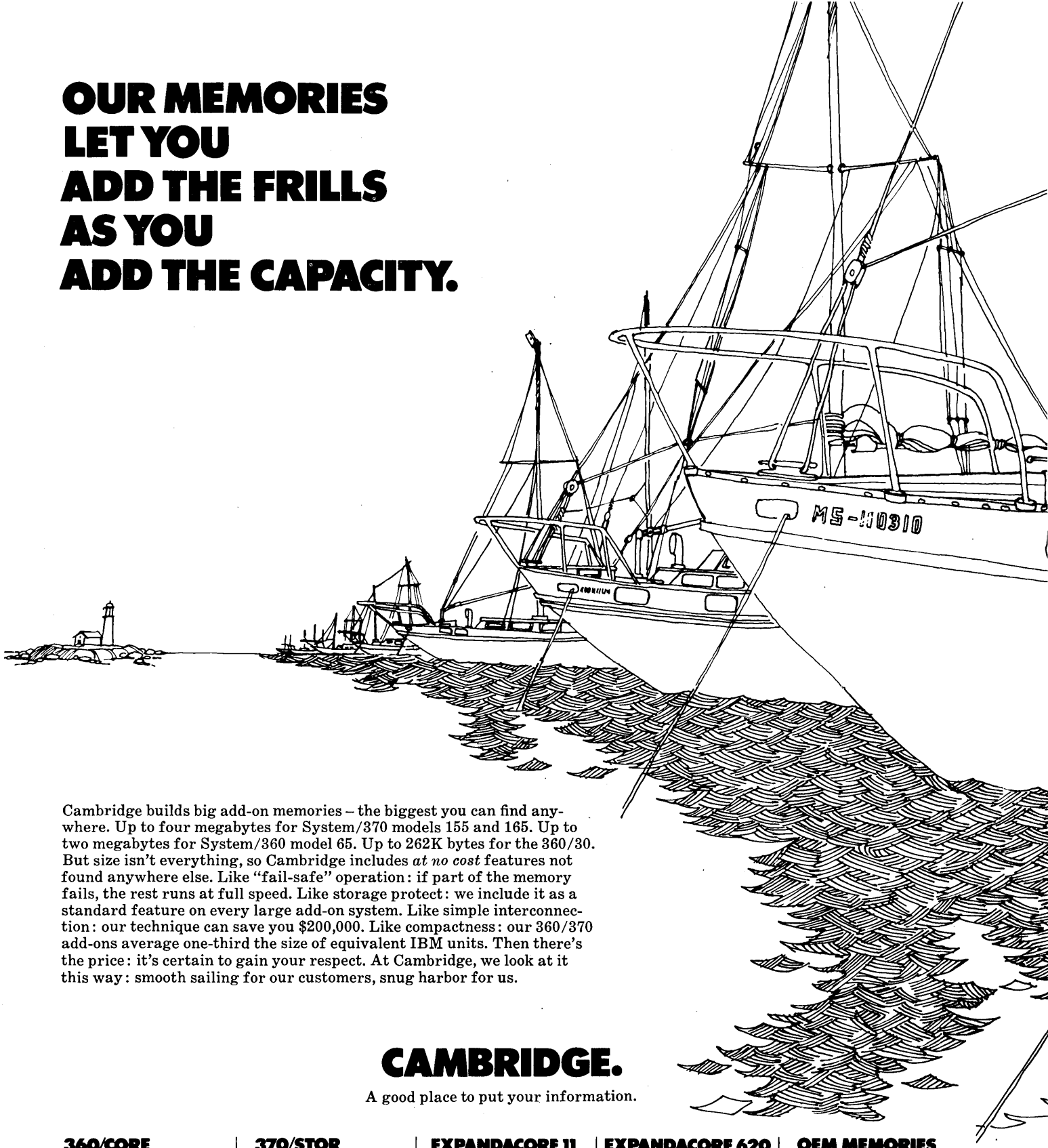

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Core and semiconductor memories for mainframes, controllers, peripherals and terminal products.

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cmi CAMBRIDGE MEMORIES, INC., 696 Virginia Road, Concord, Mass. 01742 (617) 369-8850

A money-saving idea that IBM doesn't like to talk about.

It was probably someone at IBM who invented the term "mass memory" a decade or so ago to describe their tape drives, disc drives and drums. Maybe they were "mass" storage back then. But in light of today's data storage requirements, they really have to be considered "mini memories."

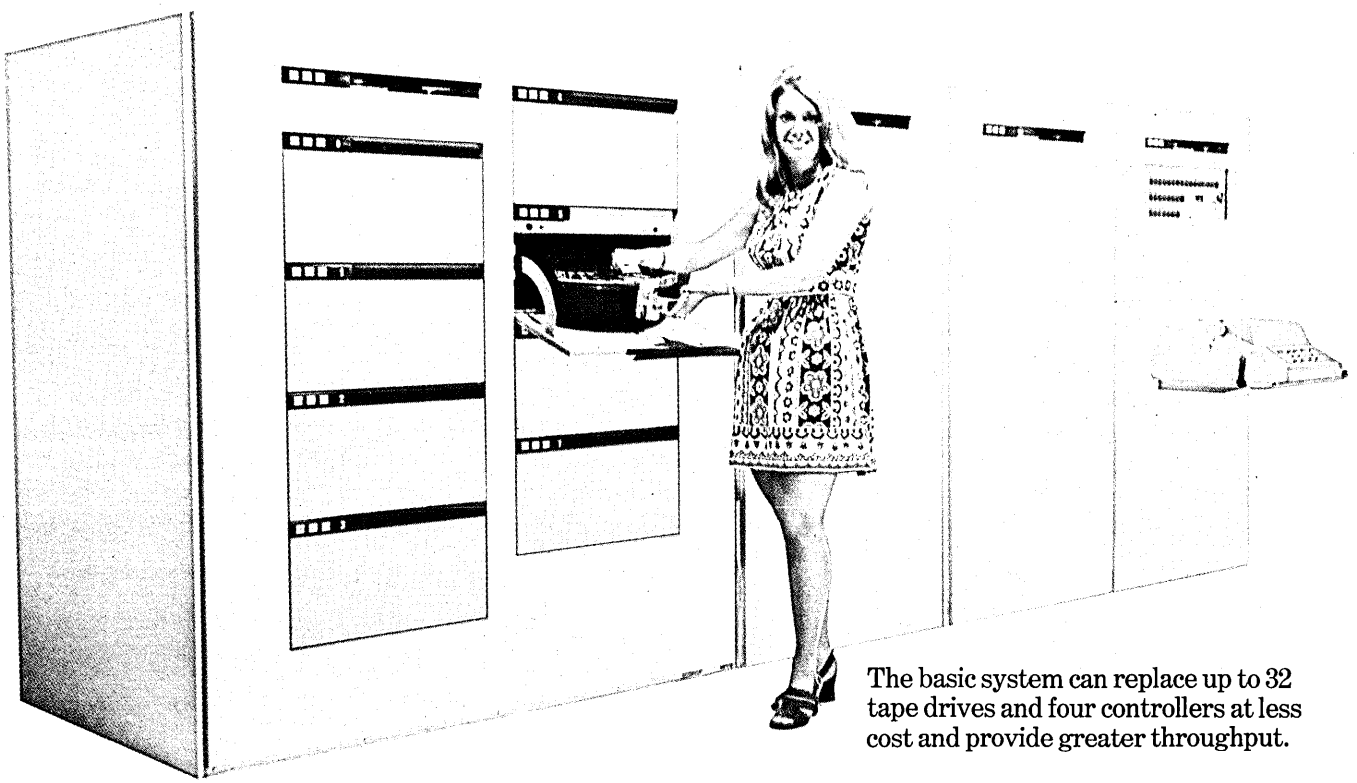
And as you've probably noticed as your storage requirement has grown, so have the costs of your growing stable of discs and tapes.

While IBM keeps on grinding out the tapes and discs, we started thinking of ways to cut costs, cut down handling and put more data on-line in a real mass memory system.

Enter MASSTAPE.™

We introduced the result of this thinking. We called it MASSTAPE, the first commercial on-line mass memory system.

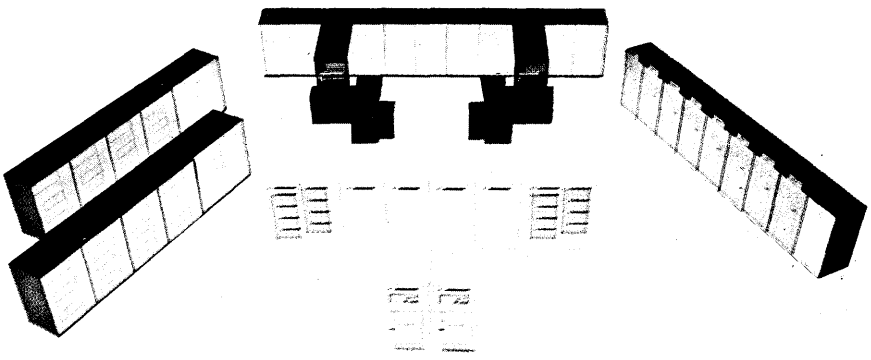
By using a high density data storage system we developed during the Apollo program, we were able to find a way to put your active tape library on-line.



The basic system can replace up to 32 tape drives and four controllers at less cost and provide greater throughput.

The smallest MASSTAPE storage system puts the equivalent of 5,000 tape files on line... 14 billion bytes.

The system's data staging provides 32 device addresses. It bursts data to and from your computer at over a million bytes per second, saving hours of costly computer time each day.



This twin-computer center with a 28-billion-byte MASSTAPE system can result in a saving of over $400,000 per year over current methods.

The basic MASSTAPE system rents for less than the tape and disc drives it replaces.

Save up to $1 million a year.

What's more, with any MASSTAPE system, your cost of on-line data storage drops from $7-15 per million bytes per month to less than $1.00.

In a large multi-computer center MASSTAPE can save up to a million dollars a year. And that's including all costs of MASSTAPE.

In a typical twin 360 or 370 installation, you can save over $400,000 a year in hardware and labor savings.

(We will be glad to document this in your own computer center.)

The system is compatible with 360/370 systems under OS without costly reprogramming. And we'll be glad to discuss adapting it for users of other large systems.

MASSTAPE is installed at Grumman Data Systems' own computer center. And it's in production for several top Fortune 500 companies.

If you're interested in saving money, please contact our sales office nearest you or Grumman Data Systems Corporation, 711 Stewart Avenue, Garden City, L.I., N.Y. 11530. (516) 575-3034.

MASSTAPE by Grumman Data Systems

Eastern Region	Washington, D.C. Region	Central Region	Western Region
(212) 532-1122	(202) 872-1800	(312) 654-2755	(213) 322-6990

Introducing QUADRONIX I

We've taken the edge off computer tape

The hand holding the scalpel is that of Mrs. Samuel Johnson, who used to work at one of our certifiers. Her function was to repair tape errors that our certifier detected by scraping the tape, using this instrument. Mrs. Johnson has just been promoted.

Until now, tape manufacturers like Wabash have used similar methods in repairing their tape to pass the rigid certification test to achieve, "error free tape at the time of certification".

With the introduction of Quadronix I, repairing tape has been eliminated, like Mrs. Johnson's job. You see, we've known for some time that repaired tape, like a repaired road, could lead you into trouble, so we've been working on the problem. We've solved it and would like to tell you all about it. So fill out the coupon and we'll send you our new 12 page brochure on Quadronix I, the industry's first certified computer tape unscarred by traditional manufacturing techniques.

We'd like to hear from you, even if it's only to congratulate Mrs. Johnson.

Wabash Tape Corporation
Huntley, Illinois 60142

☐ Please send me your new 12 page brochure on Quadronix I, guaranteed write-skip free computer tape.

☐ Have your sales representative contact me.

Name

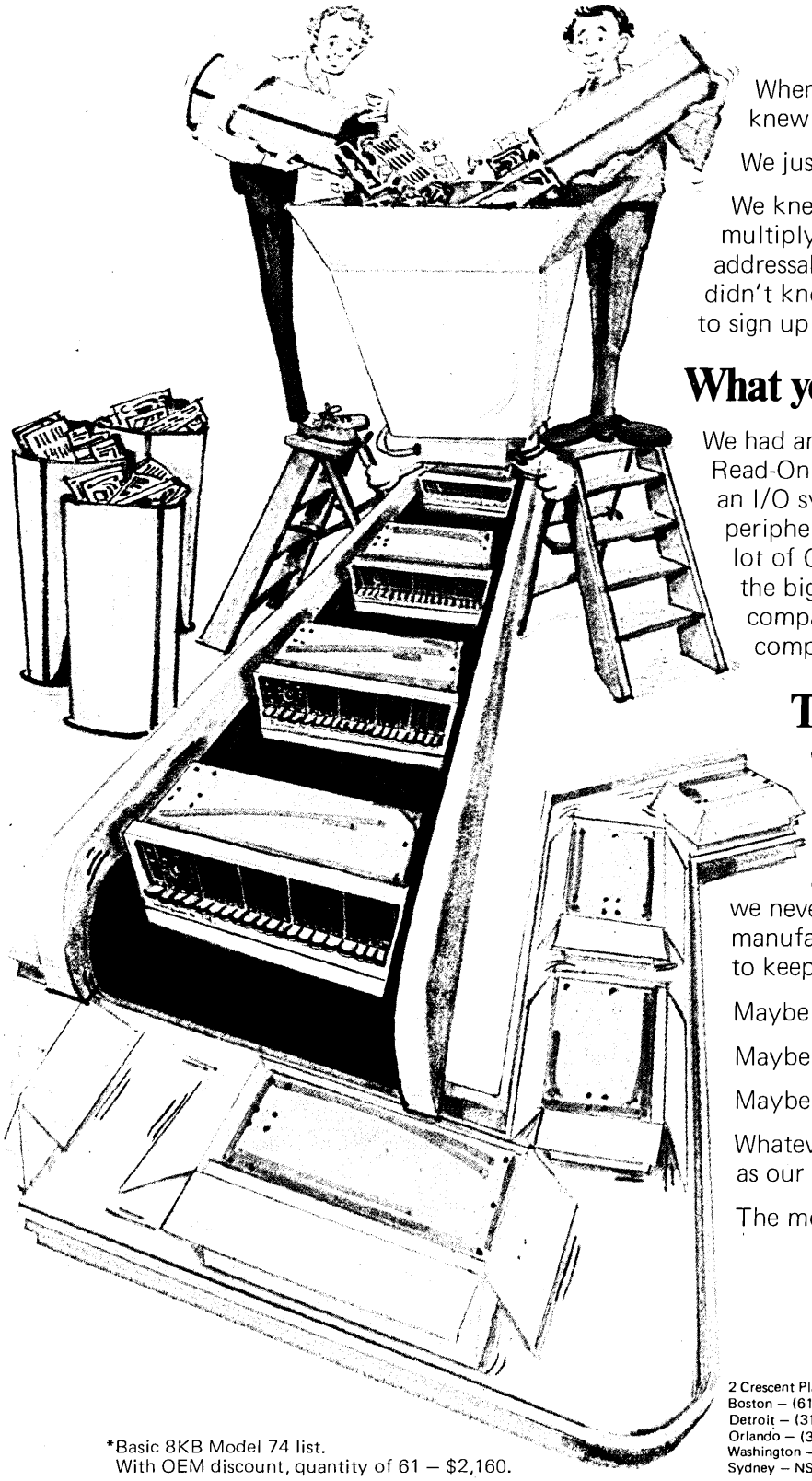
Title Phone Number

Address

City State Zip Code

wabash

Now that the world has flipped over our OEM Model 74, can we make them fast enough?



When we introduced our Model 74 in 1972, we knew we had a great little OEM minicomputer.

We just didn't know how great.

We knew a lot of OEMs would like the hardware multiply/divide, 16 general registers and directly addressable 8KB core — expandable to 64KB. But we didn't know so many OEMs would beat down our door to sign up for it within the first 6 months.

What you need is what you get.

We had an idea that the 80-nanosecond solid-state Read-Only-Memory and the multiplexor providing an I/O system for communicating with up to 255 peripheral-oriented device controllers would turn on a lot of OEMs. But who would've guessed we'd have the big machine tool manufacturers, electronics companies, peripherals houses and controls companies standing in line for it?

The $3600* OEM Model 74.

We were pretty sure a lot of OEMs would appreciate the upward compatibility of the Model 74 and our Mix and Match discount schedule, which gives cumulative credit for all machines bought, regardless of model. But we never even dreamed we'd have to tell our manufacturing people to make them by the bushel to keep our 30-day delivery schedule.

Maybe it's the $3600 price.

Maybe it's the no-frills design.

Maybe it's just the way it does so many jobs so well.

Whatever it is, we'll keep making them just as fast as our OEM customers want them.

The more the merrier.

INTERDATA®

2 Crescent Place, Oceanport, New Jersey 07757 (201) 229-4040. Denver – (303) 758-0474. Boston – (617) 890-0557. Chicago – (312) 437-5120. Dallas – (214) 238-9565. Detroit – (313) 356-5515. Houston – (713) 783-1830. Los Angeles – (213) 640-0451. Orlando – (305) 851-6962. Palo Alto – (415) 969-1180. Philadelphia – (215) 436-5579. Washington – (703) 525-4806. Toronto – (416) 678-1500. United Kingdom – Uxbridge 52441. Sydney – NSW 439-4155. West Germany – 0811/8543887. Tokyo – 270-7711.

*Basic 8KB Model 74 list.
With OEM discount, quantity of 61 – $2,160.

now... Total Data Entry

A single system that handles all input requirements!

Recognition Equipment is in: Austria, Belgium, Canada, Denmark, Finland, France, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and West Germany

You can now handle *all* data entry requirements with Total Data Entry. Some of your input may be adaptable to OCR processing, some to key entry, some may be handprinted, and some prepared on many different typewriters with dissimilar type styles and pitches. No matter what form it takes, it can now be handled on a single system provided and supported by a single supplier. Recognition Equipment.

Total Data Entry combines the best features of two technologies: optical character recognition and key-to-disk.

The OCR capability is Input 80. Input 80's recognition capability permits reading documents in a variety of sizes containing degraded characters, tears, and skewed lines. Virtually any type font is fair game for Input 80, and the fonts can be intermixed on the same line. Handprint, mark sense, page numbering, and line marking are all available options.

And Input 80 is modular. As your needs grow, so can Input 80, from the new, low-cost Model C to the ultimate high-speed OCR system, Input 80 Model A.

Add the in-line capabilities of key-to-disk for non-OCR applications and character reentry. This feature provides from one to 22 key stations, each equipped with a CRT screen and keypunch or typewriter keyboard. It's supported by a sophisticated software system with those important format, edit, arithmetic, and reentry features needed to handle today's data preparation needs.

Single Keystroke Reentry of unrecognized characters optimizes operator productivity and accuracy. Contextual display allows complete documents or lines to be viewed, and the position containing the unrecognized character is highlighted. Video image display permits inserting of unrecognized characters without referring to the source document. Both reentry methods may be used without slowing reading or other keying functions.

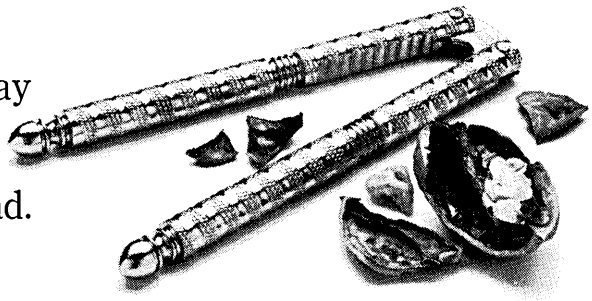
We'd like to tell you more about how Total Data Entry can handle all your input requirements. Write or call Recognition Equipment today.

Recognition Equipment

Designing Systems with Vision

Recognition Equipment Incorporated
Box 22037, Dept. T, Dallas, Texas
75222/Phone: 214/259-5777

Caught in the old cassette vs. ½"-drive, price vs. performance crunch?



With a choice like that you pay the price no matter what you do.

So we've come up with the first real alternative you've ever had.

The "Scotch" Brand Data Cartridge.

It's a unique approach to digital tape storage that's priced like a cassette but performs like a ½"-compatible drive.

It operates at speeds up to 90 ips, starts/stops with accelerations up to 2000 in/sec² and offers transfer rates up to 48,000 bps.

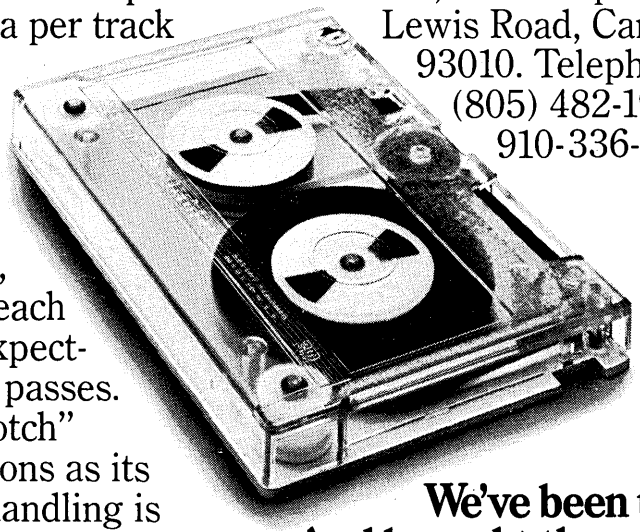
It uses ¼" tape and records at up to 3200 frpi, so it stores up to 5.5 million bits of data per track on 1 to 4 tracks.

It needs only a single point drive and no external tape guidance, so tape can never cinch, spill, stretch or break and each cartridge has a life expectancy in excess of 5000 passes.

Because the "Scotch" Data Cartridge functions as its own transport, tape handling is fast, accurate and precise at all times. It's ideal for: Word processors and terminals. Point-of-sale data capture and computer data entry. Minicomputer I/O and paper tape replacement.

And if you need more information, you've got a choice there, too.

Just contact any of the major peripheral manufacturers or Data Products, 3M Company, 300 South Lewis Road, Camarillo, Calif. 93010. Telephone: (805) 482-1911. TWX: 910-336-1676.



We've been there.
And brought the answers back.

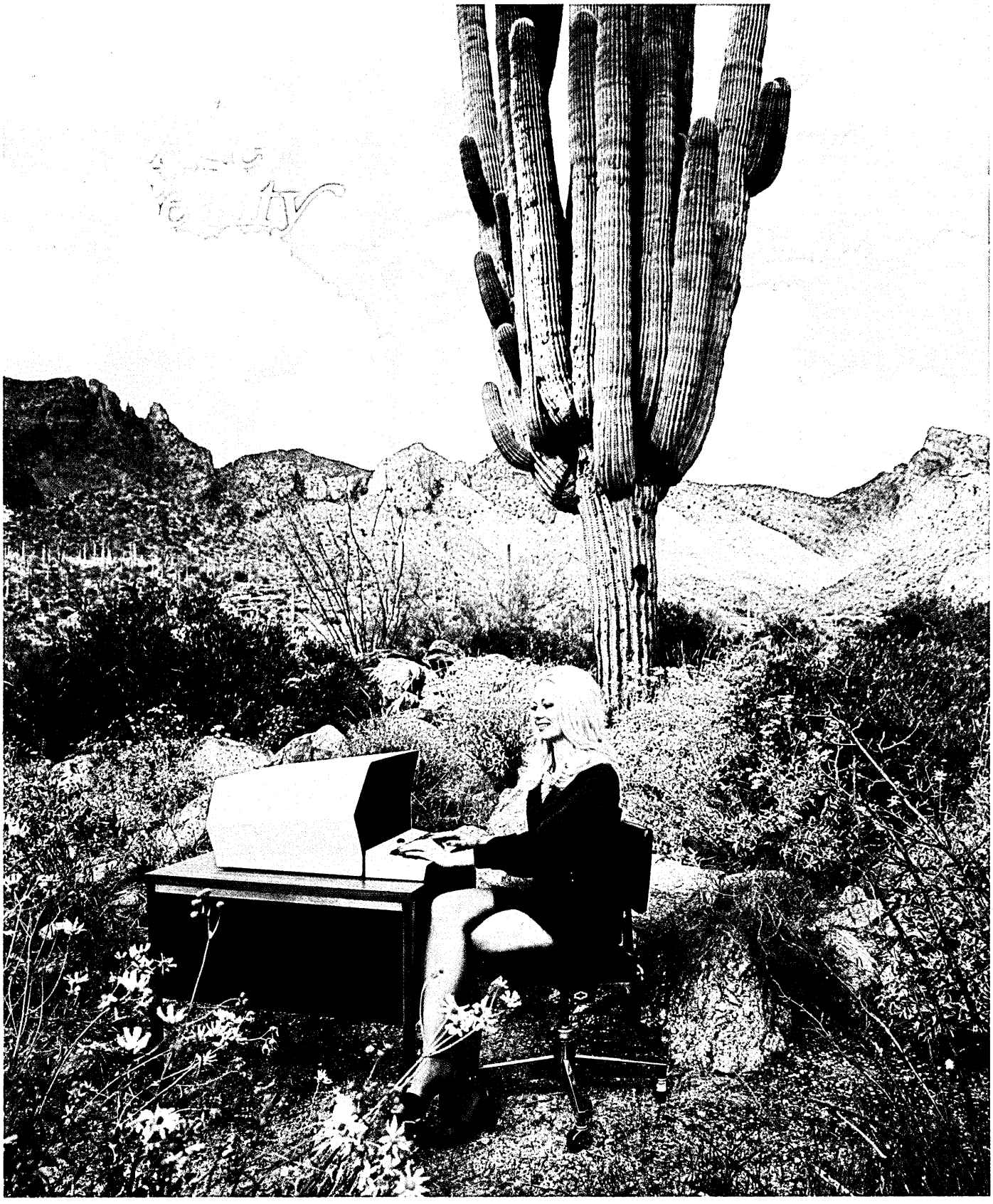
3M COMPANY

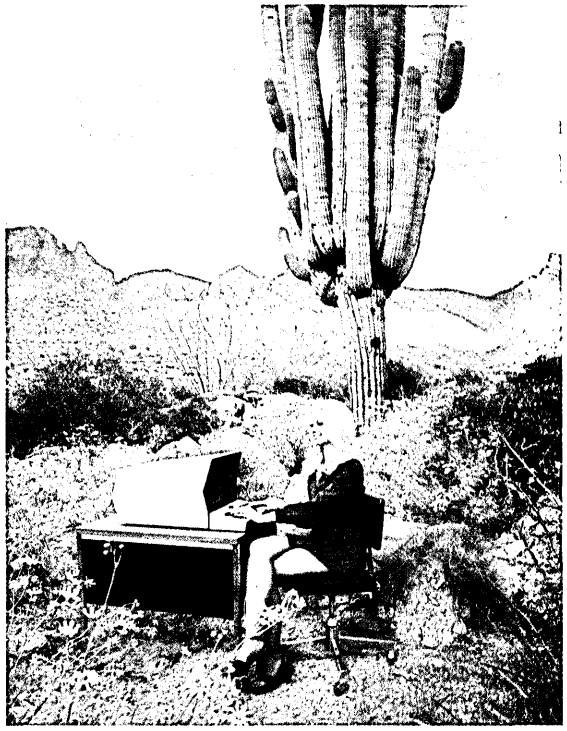
SERIES 400

DATA-SCREEN™

TERMINALS

TEC® INCORPORATED





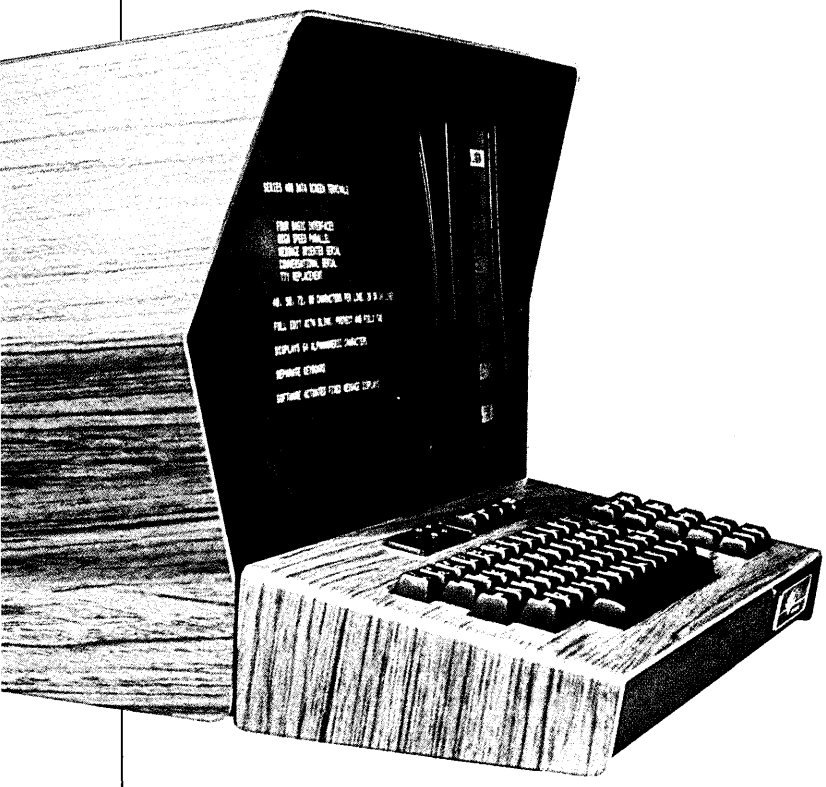
Stability Age Beauty

The stability of Arizona's Catalina Mountains, the age of a giant saguaro cactus, the beauty of nature are captured in this photograph by Ray Manley.

Stability, age and beauty are important, too, in the design and production of display terminals. At TEC, we've been designing and building highly reliable crt terminals called DATA-SCREEN Terminals for more than 10 years (other visual display products for more than 15 years). That's *age* in the computer peripheral equipment industry.

For all these 15 years we've been manufacturing high quality information display and control devices — providing the vital link between man and machine in this computer-oriented world. That's *stability,* especially when it has been done profitably.

We offer our carefully styled terminals in esthetically compatible colors and finishes to match any decor, any application. That's *beauty.*



SERIES 400

DATA-SCREEN™

TERMINALS

Four basic interfaces

- *High Speed Parallel*
- *Message Oriented Serial*
- *Conversational Serial*
- *TTY Replacement*

Non-glare CRT screen
40, 50, 72, 80 characters per line; 20, 24 lines
Full edit with blink, protect and field tab
Displays 64 alphanumeric characters
Sharp 5 x 7 dot matrix characters
Separate keyboard
Software actuated fixed message displays
Hard copy connector

TEC® INCORPORATED

FEATURES

Communications between man and the fabulous computers that serve him must take place with maximum speed, accuracy and reliability . . . and at sensible costs. Versatile DATA-SCREEN Terminals, with a decade of proved performance, provide that efficient, low cost link.

Thirteen models meet varied system interface requirements and provide a variety of display formats for the many applications encountered in data communications and information systems. DATA-SCREEN Terminals operate locally — at the computer at computer speeds — or remotely, via telephone lines across city or continent.

Operators using keyboard and crt screen compose and edit data before sending it to the computer in block form, reducing expensive on-line time with the computer. Similarly, data stored in the computer's memory is displayed on the crt screen for review and, if required, is updated or corrected by the operator. During text review period the computer can be engaged in other functions.

Composing and editing data before it is transmitted to the computer or modifying data brought out from the computer's memory requires an easy to understand, easy to use editing capability. DATA-SCREEN Terminals provide keyboard editing controls that give the operator unique composition freedom to insert and delete lines and characters.

Logically arranged keyboard controls for the "cursor" (flashing symbol indicating where character will be entered on screen) allow its rapid movement to any point on the screen. "Fixed" formats may be entered on the screen and protected — by the computer — from operator alteration or accidental erasure. Similarly, selected text displays read from computer memory can be protected by programming. A "Tab" function permits cursor movement directly to predetermined points on the screen and saves operator time in composing tabular material and in filling in "blanks" in preformatted material.

On command of the computer, important data can be blinked to call the operator's attention to its presence on the screen.

Optional DATA•PANEL® Display is a fixed message display panel located to the right of the crt screen. Software actuated, it provides additional display capability with up to 16 custom messages backlighted in a variety of brilliant colors. It can be used to give the operator his or her next data entry instruction, indicate computer processing modes and system alarms.

STYLING

Compatibility is a primary consideration in the design of DATA-SCREEN Terminals. And it extends beyond interfaces, languages and logic. TEC's terminals are visually compatible with their surroundings — front office or factory floor. See back cover for colors and finishes offered.

INTERFACE FLEXIBILITY

DATA-SCREEN Terminals are compatible with most computers — mini, midi or maxi. They work equally well with specialized industrial and process control systems. Interface flexibility is achieved in direct, computer linked (parallel I/O) terminals by providing controlled data rates within the terminal. As a result, the terminal operates in block mode at speeds dictated by the computer to best utilize the computer's time. Simplified software requirements for these models are the result of the terminal's "ready-resume" interface control that signals when terminal or computer is ready to receive data and then acknowledges receipt of data sent. Conventional signal levels and low impedance, long line signal drivers match requirements of most information systems.

In remotely located (serial I/O) applications, DATA-SCREEN Terminals operate at standard, industry established RS-232, TTL or current loop interface levels in character or block mode. These models offer data transmission rates from 110 to 9600 baud. Teletypewriter replacement models can be connected directly to the computer without modems or remotely via communications lines and modems.

Printed circuit boards of DATA-SCREEN Terminals are equipped with switch selectable options that permit easy, on-the-spot customization.

APPLICATION

TEC designed and built its first crt terminals in 1963. Now, with more than a decade of experience — serving a variety of OEM and end user applications — a full range of data entry/retrieval capabilities are offered:

Off-line data entry — allows the operator to compose a message on the crt screen, verify accuracy — correct or rearrange text if necessary and then go on-line to transmit the information in block mode into the computer's memory at speeds beyond human capability.

Data retrieval — allows the operator to request (via coded address) that a specific block of information held in the computer's memory be displayed on the terminal's screen. This block of data can be reviewed, updated if necessary — then returned to the computer's memory instantly.

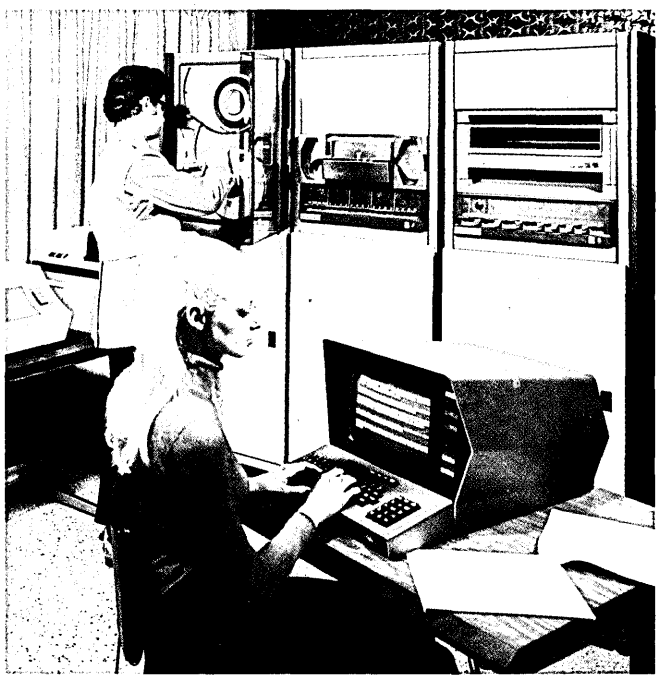
On-line conversational operation — used for time sharing, scientific, computer aided education and other applications where operator and computer communicate directly with the terminal forming the connecting link.

RELIABILITY

Every major component, subassembly and every completed DATA-SCREEN Terminal is computer tested. Completed terminals are "burned-in" for no less than 72 hours in a high temperature environment as a final test of performance. TEC has designed its terminals with unique modularity and accessability for ease of maintenance. Printed circuit boards, for example, can be replaced in less than a minute — an important consideration in keeping downtime to a minimum. Power supply, TV monitor and printed circuit card cage make up the major assemblies and are readily accessable and easily maintained.

The solid state printed circuit board logic of DATA-SCREEN Terminals is highly reliable, but should a component fail, TEC offers a printed circuit board exchange plan that puts a replacement board in the mail within 24 hours. By keeping a spare set of printed circuit boards on hand, terminal downtime can be reduced to less than one minute.

INCORPORATED



SERIES 400

DATA-SCREEN™

TERMINALS

HIGH SPEED, PARALLEL I/O BUFFERED, DATA-SCREEN TERMINALS

Full Message Editing Capability
Data Transfer Rates to 800,000 Characters Per Second
TTL Compatible Interface with Optional Line Drivers

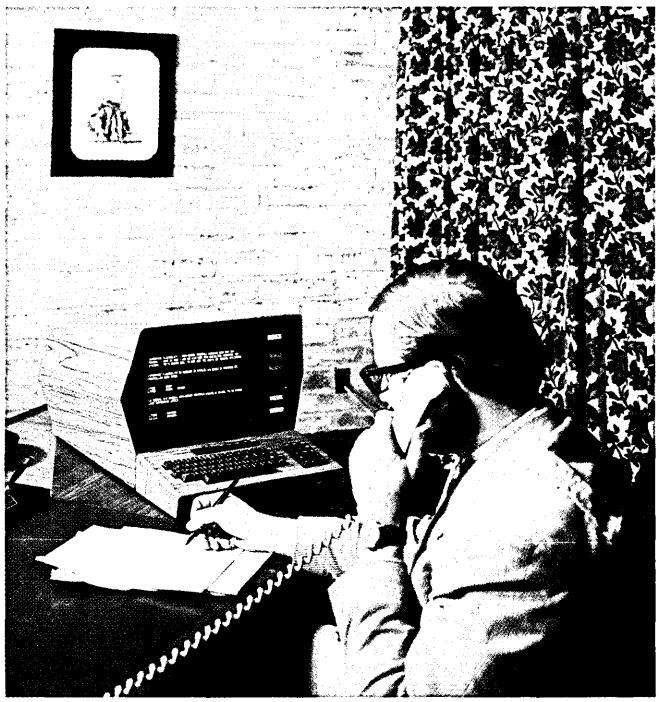
Model 410 — 1000 character display, 50 characters/line, 20 lines
Model 415 — 1920 character display, 80 characters/line, 24 lines
Model 416 — 960 character display, 40 characters/line, 24 lines

These DATA-SCREEN Terminals operate locally with computer, multiplexor or batch terminal and their high speed allows block transmission or reception of data at the maximum speed of many computers. In block mode, the message sent or received can begin or end anywhere on the screen.

Efficient use of computer time results because these models have a reply-acknowledge feature that allows the computer to control the rate of data transfer between terminal and computer. As a result, the DATA-SCREEN Terminal will operate as fast as the computer can transmit or receive data — or, if the computer is simultaneously involved with other peripherals, at slower speeds.

Terminal/computer communications is made more efficient because of the DATA-SCREEN Terminal's cursor address readout to the computer and the ability of the computer to position the terminal's cursor anywhere on the screen as it communicates with the operator.

The operator, using the terminal's full edit features, can quickly compose and correct messages prior to transmission to the computer — can easily update computer-stored data displayed on the screen.



SERIAL, POLLING, BUFFERED DATA-SCREEN TERMINALS

Address Capability — Up to 63 Terminals
Transfer Rates to 9600 Baud
RS-232 or TTL Interface

Model 420 — 1000 character display, 50 characters/line, 20 lines
Model 425 — 1920 character display, 80 characters/line, 24 lines
Model 426 — 960 character display, 40 characters/line, 24 lines

As many as 63 terminals, operating from one serial I/O channel, can send data to a computer — and the computer can address one or more of these terminals at random. In addition, the computer can poll each terminal individually to determine if the terminal has a message ready for transmission.

In single terminal, non-addressable applications, pressing the "transmit" key sends an entire pre-composed and edited message in block mode, or sends a single "message ready" code to the computer indicating that the terminal has a block of data ready for transmission whenever the computer can accept it. In block mode, messages to be transmitted or received can begin or end anywhere on the screen. Buffered operation allows the operator to edit and correct displayed messages (either operator or computer originated) off-line, then enter the data in the computer memory at maximum serial speeds from remotely located terminals. On-line time is further reduced by the terminal's cursor address readout to the computer and the computer's ability to move the terminal's cursor to any location on the screen.

see inside back cover for complete specifications.

TELETYPEWRITER COMPATIBLE, CONVERSATIONAL MODE DATA-SCREEN TERMINALS

RS-232, TTL, Current Loop Interface
Transfer Rates to 2400 Baud
Cursor Positioning by Computer

Model 430 — 1000 character display, 50 characters/line, 20 lines
Model 435 — 1920 character display, 80 characters/line, 24 lines
Model 436 — 960 character display, 40 characters/line, 24 lines

These models connect directly to the teletypewriter interface ports provided on most computers and communicate on-line in character mode. The terminal provides computer controlled cursor positioning directly to any point on the screen. For on-line editing, function command codes are transmitted from the terminal's keyboard to the computer. The terminal performs the required function when the command code is received and the computer may perform the same function in its memory.

Selectable options include automatic line feed and automatic roll-up (scroll). When the roll-up feature is used, data entered on a full screen will continue to appear on the bottom line and all copy above will move up and the top line is lost. Full (echoplex) or half duplex operation is switch selectable.

TELETYPEWRITER REPLACEMENT, CONVERSATIONAL MODE DATA-SCREEN TERMINALS

Transmits and Receives Data at Speeds to 9600 Baud
Can Transmit Data at One Speed — Receive at Another
RS-232, 20 or 60mA Current Loop or TTL Interface

Model 440 — 72 or 80 character line, 24 lines, offers 1728 or 1920 character display

Direct teletypewriter replacement is silent — up to 100 times faster than TTY's. Designed specifically for time sharing and other on-line data communications, Model 440 can transmit data at one speed and receive at another speed. As a result, the terminal can send and receive data at far higher speeds than the normal 110 to 300 baud rates of teletypewriters.

In addition to conventional bottom line data entry and line feed from the bottom, Model 440 DATA-SCREEN Terminals offer optional automatic carriage return and line feed. Automatic line feed is also provided in the local mode.

Rates of 110 to 9600 baud are switch selectable. Display of 72 or 80 character line is also switch selectable. A 9-pin connector permits use of a read-only teletypewriter or other on-line printer if/when hard copy is required.

Model 440 keyboard duplicates teletypewriter keyboard format to minimize operator training.

SERIAL, BUFFERED AND CONVERSATIONAL MODE DATA-SCREEN TERMINALS

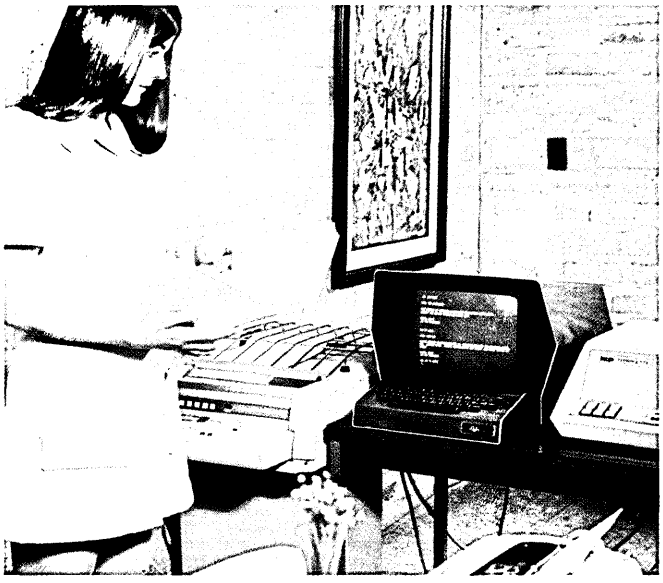
NEW

Automatic Interface Selection
RS-232, TTL, 20-60mA Current Loop Interfaces
Operator Controlled: Conversational or Buffered Mode

Model 450 — 1000 character display, 50 characters/line, 20 lines
Model 455 — 1920 character display, 80 characters/line, 24 lines
Model 456 — 960 character display, 40 characters/line, 24 lines

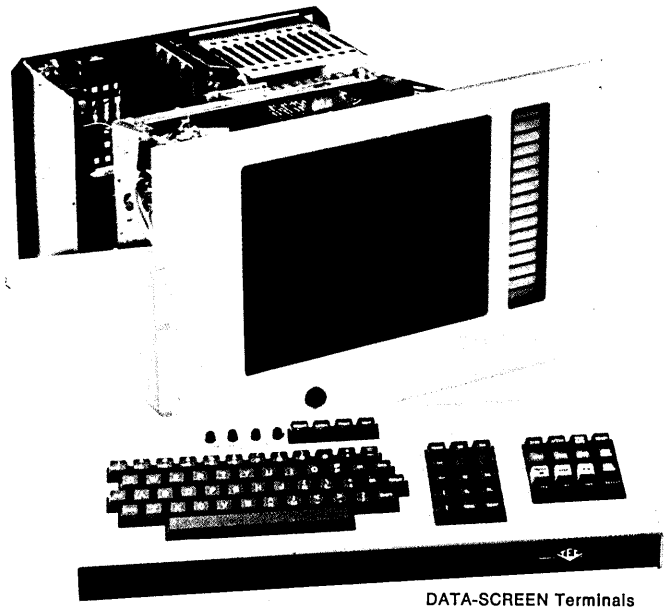
New in the DATA-SCREEN Terminal line, these versatile models give the operator the choice of communicating on-line directly with the computer, or composing and verifying data off-line, then transmitting the data to the computer in block mode at rates to 9600 baud. Keyboard switches make this selection simple. Data transmitted or received in block mode can begin or end anywhere on the screen.

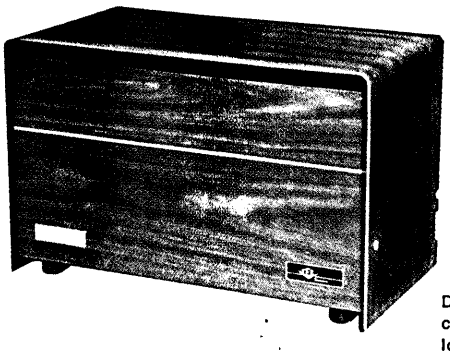
Terminal/computer compatibility is improved by cursor address readout to the computer and the ability of the computer to position the terminal's cursor anywhere on the screen. Automatic line feed and automatic roll up (scroll) are selectable. Full (echoplex) or half duplex operation is controlled by a back panel switch. A single printed circuit board, which may be added at any time, provides compatible outputs for buffered printing at speeds to 120 characters (1200 baud) per second. An optional read-only memory answer-back up to 64 characters long (simulating teletypewriter feature) is available and may be added at any time.



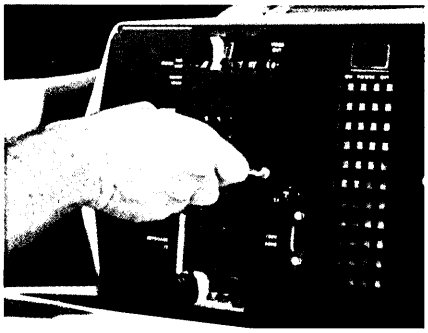
see inside back cover for complete specifications.

SERIES 400
DATA-SCREEN™
TERMINALS

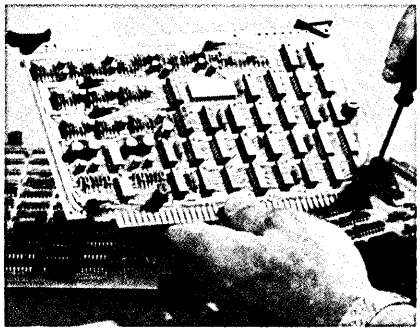


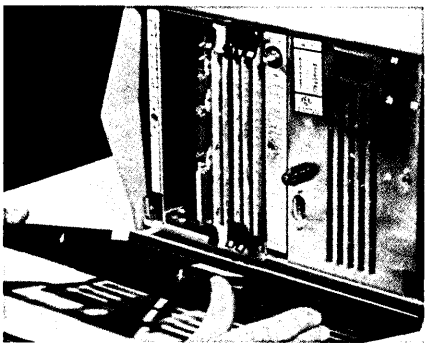


DATA-SCREEN Terminal controller for remotely located crt monitors can be placed on desk top, shelf or wall mounted. All finishes are available.

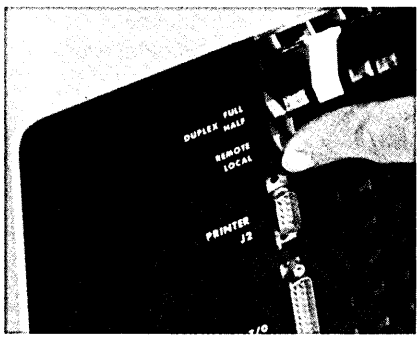


DATA-SCREEN Terminals in rack mount chassis are available with (above) and without integral crt monitor. Separate keyboards in all models can be located up to ten feet from the terminal. Keyboard above includes extra 16-key data entry matrix.

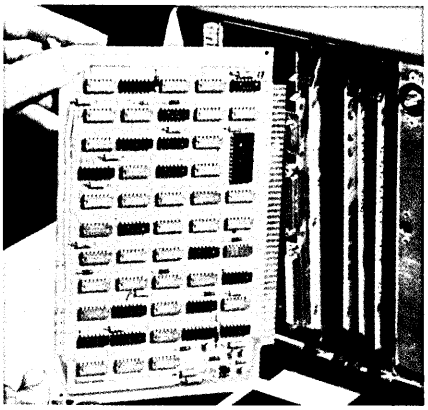


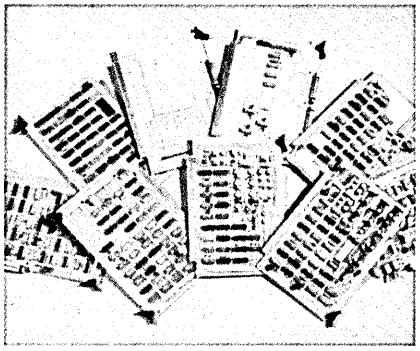


Printed circuit boards can be changed in 60 seconds or less. Three ¼-turn fasteners release rear panel. With replacement PCB's on hand, DATA-SCREEN Terminal downtime is cut to minutes.

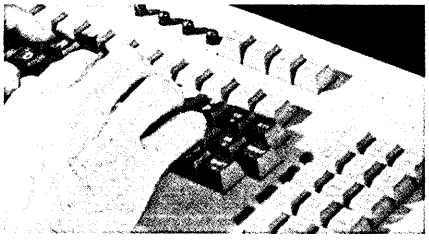


Field selection of modes, data rates, stop bits, parity, auto roll-up and line feed, display or non-display of cursor and carriage return symbol are easily made with back panel switches and switches or jumper wires located on printed circuit boards.

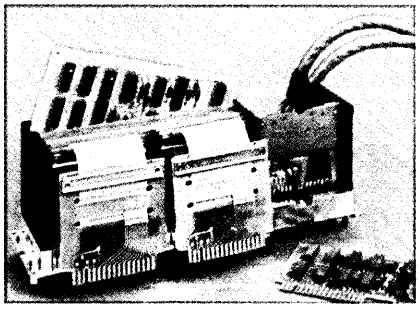




Data rates, screen capacities and other options can be field changed by simply exchanging printed circuit logic boards. Avoids DATA-SCREEN Terminal obsolescence when systems are updated. Special TEC designed interfaces, for major computers, such as Burroughs' computers with NDL line adaptor among others, are also provided by printed circuit boards located in the terminal, or as in the case of the Honeywell H316/516 Computers, interface modules located in the computer itself (lower photo).



A full complement of editing and cursor controls, plus "blink" and "protect" formatting features are standard in all except Model 440 DATA-SCREEN Terminal.



INCORPORATED

MODEL SELECTION CHART

MODELS	INTERFACE: PARALLEL	INTERFACE: SERIAL (ASYNCHRONOUS)	INTERFACE: BUFFERED (BLOCK MODE)	INTERFACE: CONVERSATIONAL (CHARACTER MODE)	ADDRESSABLE	CURSOR POSITIONING BY CPU	CURSOR READOUT FOR CPU	FULL EDITING CAPABILITY	OPTIONS: KEYBOARD	OPTIONS: FIXED MESSAGE INDICATORS	OPTIONS: HARD COPY OUTPUT
410, 415, 416	•		•			•	•	•	•	•	•
420, 425, 426		•	•		•	•	•	•	•	•	•
430, 435, 436		•		•		•		•	•	•	•
440		•		•					•		•
450, 455, 456		•	•	•		•	•	•	•	•	•

SPECIFICATIONS: *DATA-SCREEN TERMINALS BY MODEL*

	410	415	416	420	425	426	430	435	436	440	450	455	456
DISPLAY													
SCREEN CAPACITY, NUMBER OF CHARACTERS	1000	1920	960	1000	1920	960	1000	1920	960	1728/1920	1000	1920	960
CHARACTERS PER LINE, NO. LINES PER SCREEN	50/20	80/24	40/24	50/20	80/24	40/24	50/20	80/24	40/24	72 or 80/24	50/20	80/24	40/24
CHARACTER SIZE (Height x Width — inches)	.21 x .15	.20 x .08	.21 x .15	.21 x .15	.20 x .08	.21 x .15	.21 x .15	.20 x .08	.21 x .15	.14 x .08	.21 x .15	.20 x .08	.21 x .15
NUMBER OF DISPLAYABLE CHARACTERS	67	67	67	67	67	67	67	67	67	64	67	67	67
CURSOR CONTROLS AND CURSOR POSITIONING BY COMPUTER	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
CURSOR ADDRESS READABLE BY COMPUTER	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
BOTTOM LINE ENTRY (No Cost Option)	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Standard	Optional	Optional	Optional
AUTOMATIC LINE FEED (No Cost Option)	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Standard	Optional	Optional	Optional
MESSAGE EDITING CAPABILITY	Yes	Yes	Yes	Yes	Yes	Yes	Limited	Limited	Limited	No	Yes	Yes	Yes
FIELD TAB FEATURE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
"BLINK" AND "PROTECT" FEATURE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
BLACK ON WHITE DISPLAY FEATURE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
INTERFACE													
I/O ASYNCHRONOUS	—	—	—	TTL RS-232	TTL RS-232	TTL RS-232	TTL RS-232 20 ma	TTL RS-232 20 ma	TTL RS-232 20 ma	TTL RS-232 20/60 ma	TTL RS-232 20/60 ma	TTL RS-232 20/60 ma	TTL RS-232 20/60 ma
SERIAL (Baud Rates — Switch Selectable)	—	—	—	110-9600	110-9600	110-9600	110-2400	110-2400	110-2400	110-9600	110-9600	110-9600	110-9600
PARALLEL RATE (Char. per second)	0-1000, 10,000-400,000	0-1000, 10,000-800,000	0-1000, 10,000-400,000	—	—	—	—	—	—	—	—	—	—
TRANSMIT MODE (Switch Selectable)	—	—	—	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex	Half/Full Duplex
PARTY LINE (Multi Station)	—	—	—	Yes	Yes	Yes	No	No	No	No	No	No	No
TRANSMISSION FORMAT	7-Bit Parallel	7-Bit Parallel	7-Bit Parallel	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop	10/11 Bit Start-Stop
HARD COPY OUTPUT	Optional	Optional	Optional	Optional	Optional	Optional	Standard	Standard	Standard	Standard	Optional	Optional	Optional
MEMORY													
TYPE, CHARACTER CAPACITY	MOS, 1024	MOS, 2048	MOS, 1024	MOS, 1024	MOS, 2048	MOS, 1024	MOS, 1024	MOS, 2048	MOS, 1024	MOS, 2048	MOS, 1024	MOS, 2048	MOS, 1024
OPTIONS													
DATA•PANEL® DISPLAY (with monitor)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
LONG LINE DRIVERS	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
PRINTER INTERFACE	Yes	Yes	Yes	Yes	Yes	Yes	Standard	Standard	Standard	Standard	Yes	Yes	Yes
KEYBOARD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
"HERE IS" ANSWER BACK	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes

SPECIFICATIONS COMMON TO ALL DATA-SCREEN TERMINAL MODELS

DISPLAY: 12" Direct view non-glare CRT, 74 sq. in. viewing area.
TV type horizontal raster scan.
P4 (white) phosphor standard. P31 (green) optional.

REFRESH RATE: 50 or 60 Hz, Crystal Controlled.

CHARACTER GENERATION: 5x7 Dot Matrix.

CURSOR: Blinking underline, alternates with displayed character at 4 Hz.

INTERFACE CODE: USASCII 7-bit.

HARD COPY OUTPUT CONNECTOR: Located on rear panel.

REMOTE MONITOR OUTPUT SOCKET (BNC): Located on rear panel.

POWER REQUIREMENTS: 115 or 230 VAC; 50 or 60 Hz, 150 watts maximum.

TEMPERATURE RANGE: Operating, + 10°C to + 40°C; storage, — 40°C to + 65°C; both at 80% relative humidity (non-condensing).

STANDARD FINISH: Vinyl clad or blue Armorhide paint.

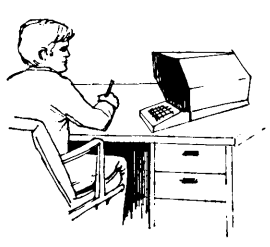
DIMENSIONS AND SHIPPING WEIGHT*

Desk top with monitor: 17⅛" W x 19¾" D x 13" H; 68 pounds
Desk top without monitor: 18" W x 10" D x 11¾" H; 48 pounds
Rack mount with monitor: 19" W x 17¼" D x 12¼" H; 65 pounds
Rack mount without monitor: 19" W x 8⅜" D x 10" H; 39 pounds

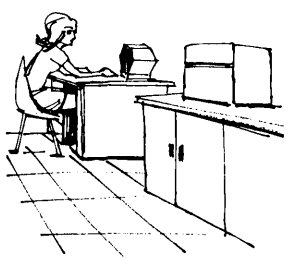
*Includes keyboard

All specifications subject to change without notice.

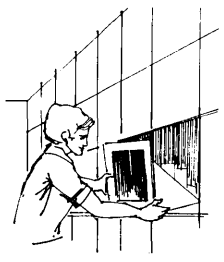
MOUNTING OPTIONS



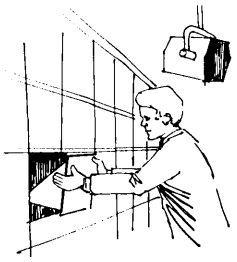
DESK TOP WITH MONITOR



DESK TOP, REMOTE MONITOR



RACK MOUNT WITH MONITOR

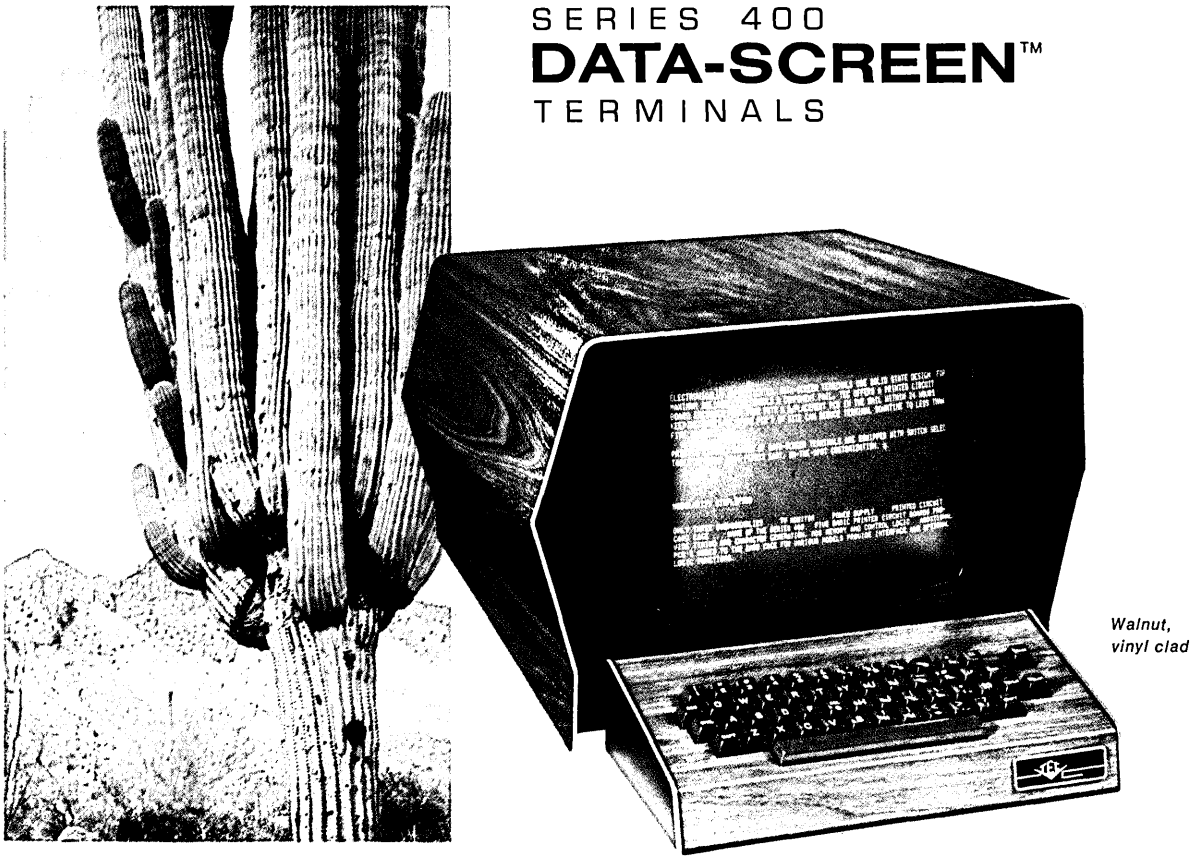


RACK MOUNT, REMOTE MONITOR

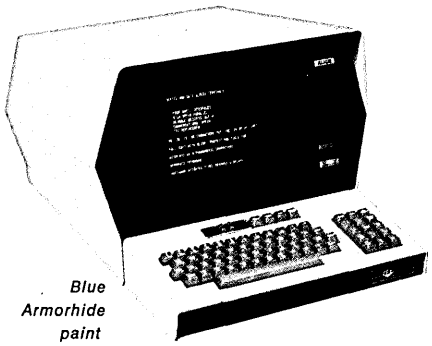
SERIES 400

DATA-SCREEN™

TERMINALS



Walnut, vinyl clad



Blue Armorhide paint

A variety of durable, easy to clean, wood grain and textured vinyl clad finishes are offered for terminal and keyboard covers. Walnut and teak wood grain finishes suit mahogany row — others complement modern office and factory decor.

Front panel choices are non-glare crt surrounded by bezel, above, or crt screen and fixed message display area mounted behind black Plexiglas filter, left.

Brown Matador vinyl clad *White Matador vinyl clad* *Blue Matador vinyl clad* *Teak vinyl clad* *Blue Marlin vinyl clad*

Use post cards enclosed to request contact by a TEC Systems Division Sales Engineer — or call the TEC DATA-SCREEN Terminal Sales Representative in your area. He's listed in the the post card insert

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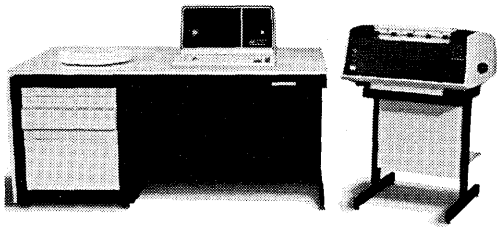

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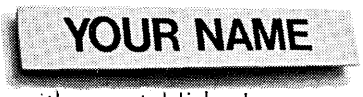

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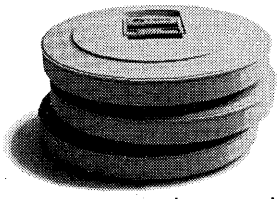
Let's talk. Call the number below, collect, or write us at 6201 E. Randolph Street, Los Angeles, California 90040.



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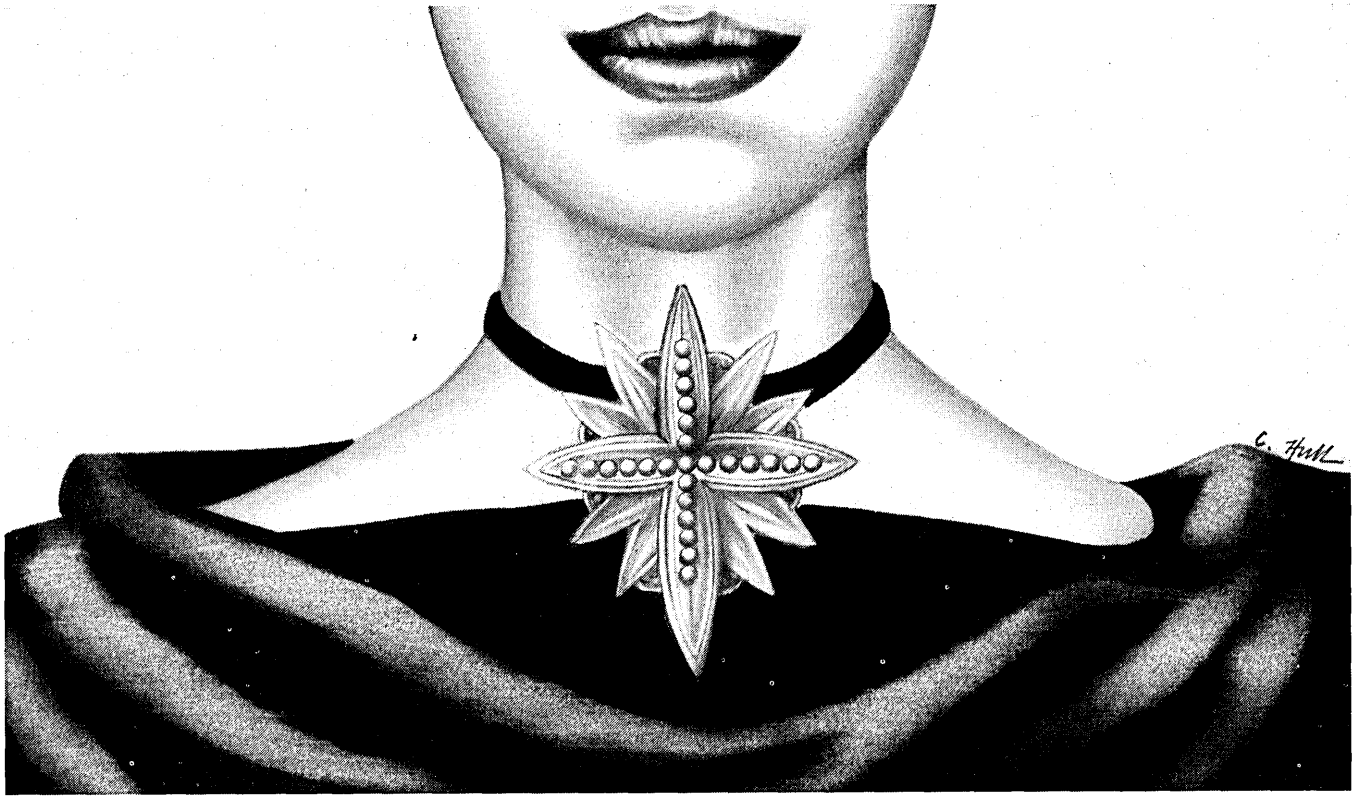
CIRCLE 64 ON READER CARD

Another problem to ponder...



The Problem of the Purloined Pearls.

An unscrupulous jeweler robbed many of his customers of their fine gems by changing the positions of the stones in their setting so that a few missing stones would go undetected.

An examination of the picture above, a representation of a noted movie star's pendant, will illustrate how the villainous jeweler accomplished his thievery.

The pin contains 25 matched pearls. The lady always made sure of the number by counting down from the top to the center, then by continuing the count either to the left, to the right, or on down to the bottom. In all three cases, the count was exactly thirteen. The pin's symmetry assured the lady of the final total without further count.

After several months of wearing the stickpin, the movie star decided that the pearls needed cleaning to restore them to their original lustre. Alas, the unsuspecting lady, in entrusting her valuable necklace for cleaning to the notorious thief, showed the jeweler her method of counting the gems.

When the cleaned pin was returned to the lady, the jeweler politely counted the pearls again for her. And for years she continued to count them the same way, never realizing that *two of the pearls had been stolen!*

The mystery: how did the thief rearrange the pearls to conceal his crime?

The Sales Pitch.

The Purloined Pearls problem has been brought to you by Capitol/Audev 6400, the computer tape that brings you no taping problems.

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And Capitol/Audev 6400 is reliable. Every reel is 100% certified, with the guarantee of no first pass permanent errors at the specified system density.

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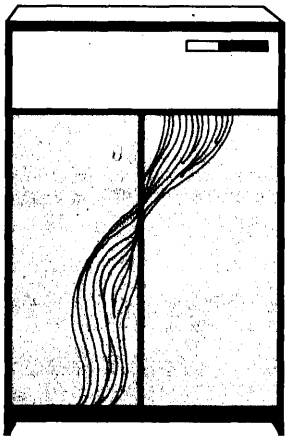
presented by the computer tape that presents no problems at all.

Capitol/Audev

SAVE on IBM Control Units, Disc and Tape Drives

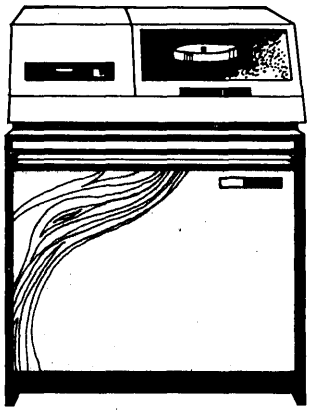
IBM Disc Control



36 month lease	$70	includes freight and installation
36 month lease	$60	FOB our warehouse
Ownership?	Yes.	No additional charges after 36 months.

Guaranteed acceptable for manufacturer's maintenance.

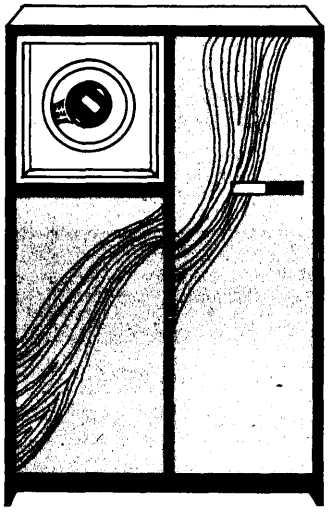
IBM Disc Drive



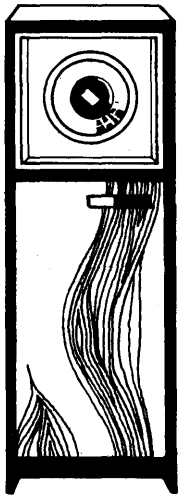
36 month lease	$145	includes freight and installation
36 month lease	$135	FOB our warehouse
Ownership?	Yes.	No additional charges after 36 months.

Guaranteed acceptable for manufacturer's maintenance.

IBM 60K Tape Control Unit



IBM 60KB Magnetic Tape Transport



One Control, two tapes, 9 track, 800 BPI

36 month lease	$643	includes freight and installation
36 month lease	$633	FOB our warehouse
Ownership?	Yes.	No additional charges after 36 months.

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Name _____ *Title* _____

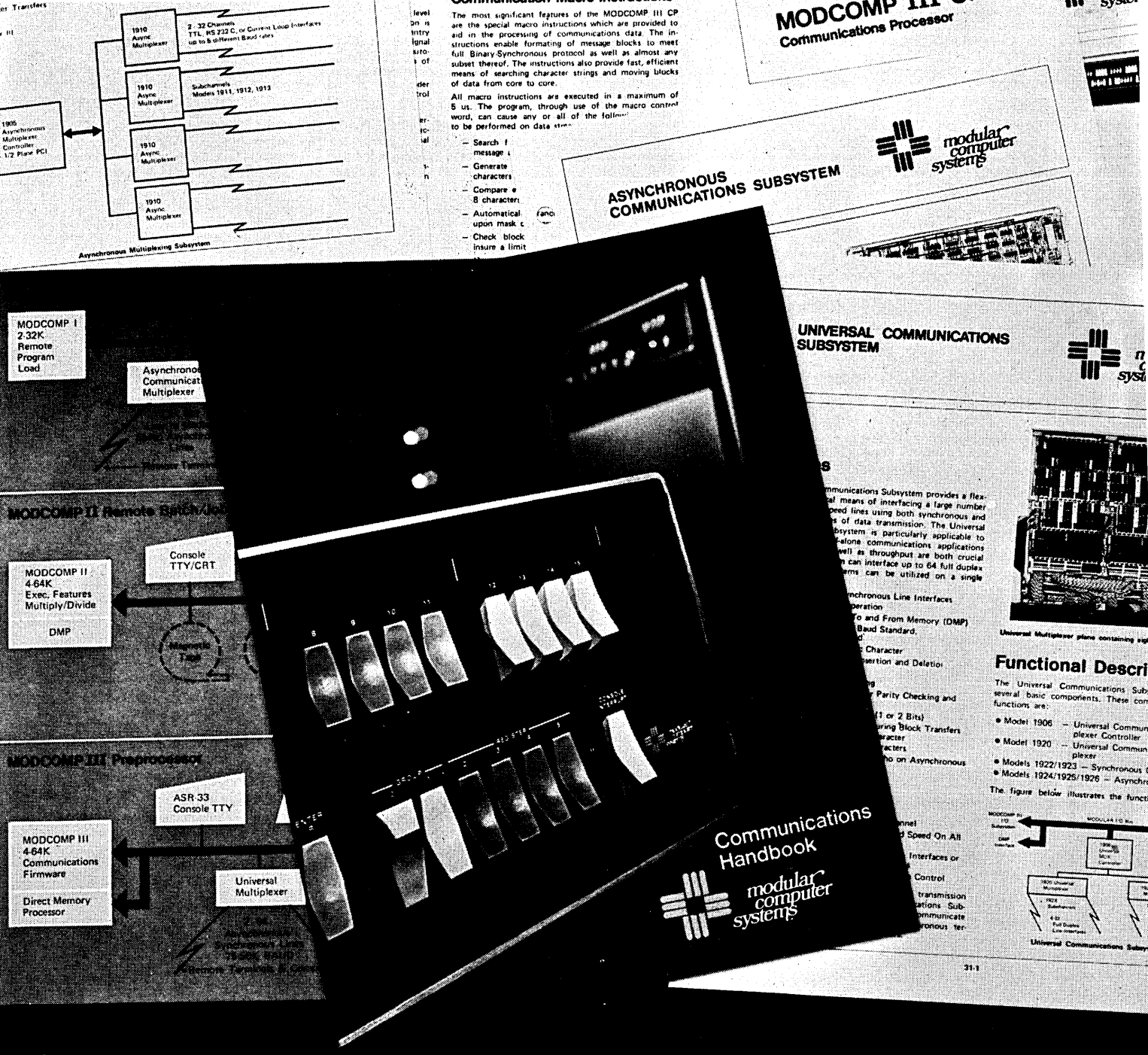
Company _____ *Address* _____

_____ *Telephone* _____

City _____ *State* _____ *Zip* _____

Other equipment needs _____

_____



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CIRCLE 31 ON READER CARD

Editor's Readout

Suspense Won't Kill Us

Last month's Editor's Readout explored some facets of the proposed Computer Foundation, its mission and its relationship to AFIPS. *Convinced that the issues involving the Computer Foundation are both broad and vital, we've asked Paul Armer to discuss them in further detail. A member of the* DATAMATION *editorial advisory board, Paul is a past president of* AFIPS *and presently a Fellow at the Center for Advanced Study in the Behavioral Sciences.*

—RBF

I am in complete sympathy with the stated goals of the Computer Foundation. But I have misgivings about the approach they have taken to achieve these goals and their implied assertion that the existing test leading to the Certificate in Data Processing is a meaningful one.

First of all, the formation of the Computer Foundation means we will have one more organization in the field when we should be consolidating, not proliferating. We need to focus our meagre resources, not spread them over an ever-larger number of organizations. It's clear to me that rationalization of the structure of information processing societies should be one of the highest goals of our profession. If we are going to have any hope of solving the problems facing us, we've *got* to improve our problem-solving mechanisms. What we really need is one large society of individual members that includes the membership of ACM, the IEEE Computer Society, DPMA, and many small societies with a primary interest in information processing.

But it appears that I don't have much company in my concern over this structuring problem. My contact with individual ACM members recently convinces me that they simply aren't very worried about the proliferation of organizations. They are as cynical about professional societies as is the U.S. electorate about the honesty of our politicians. They feel that none of our existing societies is very effective. They approve of the goals of the Computer Foundation, and while they're dubious of its chances of success, their attitude is "Let 'em try . . . What have we got to lose?"

This attitude alone suggests the desperate need for rationalization of our professional society structure.

My second concern is about the existing plans for the Computer Foundation. Whenever the Foundation gives a certification test and confers "certification" on the basis of the test results, it will be certifying to the world that the test used is meaningful. Yet the plan is to use the existing test until new ones can be developed and validated—a long and expensive process.

The alternative I support is to suspend testing until suitable tests are available. (Such a proposal was made at a meeting of the Foundation's organizing committee by L. Dale Holmberg of the Society of Professional Data Processors. Holmberg is himself a CDP.) Unfortunately, the costs are financial as well as psychic. The proposed budget for fiscal 1974 includes $140,000 from "operations." Without testing next year to provide such income, other sources of support will have to be found.

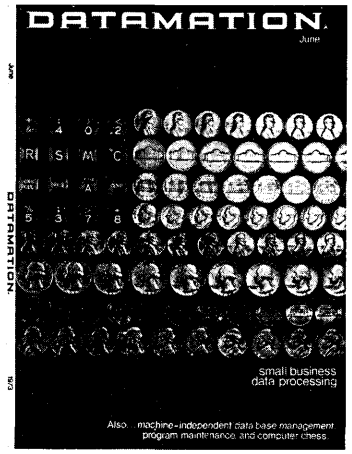
Is the present test meaningful? Robert N. Reinstedt, a psychologist in Rand's Computer Sciences Department and founder of ACM's Special Interest Group on Computer Personnel Research, will argue in a forthcoming issue of DATAMATION that there is virtually no evidence to indicate that we are ready, without research, to produce a valid instrument worthy of the title of certification test. I obviously agree, as do many others, if one can take the Letters to the Editor in the trade press as an indication. J. Frank Ellmer put it rather well when he said: "I question the validity of any project or endeavor that prevails untested and unproven . . . are we to violate the analytic technique we supposedly practice, by recommending or installing a system and performing the initial system study afterwords?"*

Some CDP advocates argue that it is untrue that the test is unproven and untested, since DPMA has labored over it from its inception, making it more difficult and weeding out questions which fail to discriminate between high scorers and low scorers. But that doesn't prove that the test measures what it purports to measure, since one of the major shortcomings of the existing test is that there is no definition of just what holders of a CDP are qualified to do.

To continue with certification testing using today's test because of the high cost of suspending testing is to accept the philosophy that "The end justifies the means." We are presently painfully aware of where that leads.

—Paul Armer

**Computerworld*, March 28, 1973.



This month's cover design, suggesting the influence of automation on American small businesses, is by our art director—with photography by Fine Arts Software, Santa Monica, Calif.

Well-established with eight years of experience, Keydata now sees eventual expansion to over 10,000 terminals

The Keydata Service

That every business could benefit by the use of a computer is generally accepted by the business community; that to be truly effective, management requires the rapid, accurate and timely information that a well-equipped, well-programmed, well-staffed edp department can deliver is also indisputable. Yet the question remains whether it is advisable or even necessary for every business to spend the time, money and effort to develop its own computer system.

Our feeling at Keydata has always been that "a computer for every business" is not the solution for most of the business community seeking "computer power." Consequently, we have developed an alternative service to the in-house computer system and the local service bureau. We entered the data processing marketplace some eight years ago, having made the decision to develop a service to fill the void for that segment of the business community that did not want to pioneer their own data processing systems. Applying the experience gathered during our software consulting days, we developed an on-line, real-time system to provide the business community with timely information on their inventory levels, sales volumes, receivables, payables, etc.

Originally we thought the service we offered would be most attractive to wholesalers and manufacturers in the one to ten million annual sales category. However, we quickly discovered that our service was equally attractive to the wholesaler/manufacturer grossing 10 to 50 million dollars in annual sales, with multiple warehouses or branches. After successfully implementing several of these accounts, large national corporations with many subsidiaries or divisions also found us attractive, either as a complete service or used in conjunction with their own edp departments, due to the on-line capability of our service and our national communications network to tie multiple locations together.

By offering a service to our customers rather than equipment, the onus of the technical expertise and the capital investment required to keep a system up and running rests with us, allowing our customers to manage their respective businesses rather than an edp department. We have found that what the business community truly seeks are the *answers* to business questions rather than the mechanics for providing the answers.

To provide the business community with its timely answers, Keydata's system operates on-line with a two-second response time from the computer center. Initially, after a design survey, customer records are loaded at the computer center. Then, all subsequent activities are initiated by the customer's operator through the Keydata terminal. The terminal is located in the customer's office and is connected to the Keydata computer center by a private duplex telephone line. Customers may send and receive information simultaneously. Operating in a real-time mode, as each transaction is received records are automatically updated. Thus, records reflect the current status of customer accounts and inventory position. An auxiliary printer keeps customers abreast of exceptional conditions, out-of-stock notices, re-order points, customer credit rating and the like. With the on-line service, any information about a customer's business is available upon demand due to the instant inquiry capability. Details of on-line transactions are captured at the Keydata computer facility for entry into an off-line system for the generation of periodic accounting and analytical reports which are delivered to the customer at prescribed intervals.

Keydata services

The distribution accounting system. This service performs all functions related to the distribution of goods: order processing, inventory control, receivables, and sales analysis. This is an integrated service which begins with a customer's order, ends with goods having been shipped or services rendered, and results in automatic updating of all pertinent inventory, customer and sales analysis records. Operating as an integrated part of the distribution accounting system, the open order service serves customers that receive or-

by Randolph S. Naylor

ders for future delivery, manufacture to order or have a high percentage of back orders. Invoices and shipping documents are automatically produced at the terminal when orders are released or inventories are replenished. Information is available on the status of open orders, current and future demands on inventory, and requirements for similar demands on purchasing, production and shipping.

Accounts payable/general ledger system. This system enables customers to distribute expenses, control accounts payable liability, produce checks and record journal entries. Taken with the distribution accounting system, it provides a complete package of management information and the ability to produce financial reports, including expense and budget analysis, profit and loss statements, and balance sheets.

Labor distribution/job cost accounting system. This service is designed for improved cost analysis and control. It enables a customer to post costs to specific jobs, inquire through the terminal into the current status of any job order—to compare actual with budgeted costs or with percentage of completion—and generate gross earnings of employees.

Communication network. In an effort to minimize communications costs, Keydata developed a nationwide communications network. Our customers pay communications charges between their office and the nearest of the 42 Keydata communication centers. The network has strong appeal, especially to multi-location companies, by making it economically feasible for them to link headquarters with outlying offices, warehouses or other organizational units and by using the same data base to interact with and monitor the operations of all their locations. Centralized control is thus achieved at reasonable cost.

Costing the service. In pricing our service, Keydata uses two types of monthly charges: fixed and variable costs.

There are two categories of fixed-cost charges, communication costs and record file storage costs. Although communication costs do not normally increase on a month-to-month basis, increases by the telephone company in local rates could affect the communications costs.

Because each customer's usage and application of the services varies, variable costs are based on transactions and applications used. The rates charged for these are set for the term of the contract, usually three years. As a customer grows and his need for computer power is greater, additional terminals may be added at minimal cost.

Having offered our service for the past eight years, we have noted some characteristics of the successful Keydata user:

1. In terms of volume of sales, we have found that a potential customer should do at least one million dollars in annual sales to justify the cost of the service. On the other end of the scale, we have never encountered a customer too large for us to handle. Even in the very large corporations with in-house edp departments, the Keydata on-line service has been used in conjunction with their own edp department to connect branches and warehouses for centralized control.

2. Our service is best suited to wholesalers and manufacturers. We presently provide service to 539 customer terminals in 25 states and 2 Canadian provinces in some 72 industries with the major area of concentration in: air-conditioning, heating and plumbing supplies; aluminum products; building materials and supplies; chemicals and dyes; cosmetics and perfumes; electrical and lighting supplies; furniture; games and toys; industrial equipment and tools; jewelry; liquor; office supplies; paper products; and watches. At the present time, we do not provide a service that advertising agencies, insurance agencies, stock brokers or real estate dealers would find useful.

Getting started

To insure the success of our service to potential customers and our existing customers, Keydata provides the following support functions as part of the original contract price.

The Keydata Service

After an in-depth survey and cost analysis by one of our sales people, and the acceptance of the proposal by a potential customer, the account is turned over to one of our system designers. He will work with your people to further detail the day-to-day operations to be performed, and to finalize the format of your invoice form and report design. After the systems survey has been completed and all details of the system defined, Keydata personnel will implement your specific applications on the computer. To insure trouble-free operation, prior to installation, Keydata pretests your programs with your live data. After testing, conver-

At Last—Rewards For a Pioneer

The moment of truth for Keydata was approaching in 1968. The firm was under severe financial pressure and the highly-touted Keydata time-sharing system just wasn't performing the way a highly-touted system should be performing. In a bit of classic understatement, Keydata president John T. Gilmore recalls:

"I guess you could say our system wasn't exactly perfect.

"We were planning for our first users' meeting and we were having our doubts. Some people thought we would be idiots to put all our customers together under one roof. We were afraid they would all get together and complain about how bad things were."

But Gilmore elected to gamble and go ahead with the users' meeting. About 100 persons representing 30 customers showed up at the meeting in Boston and it went very well, he remembers. Instead of burning the Keydata management in effigy, the users got together, talked about their common problems and goals, and they left the meeting generally happy and hopeful about Keydata's ability to continue to provide service in the future.

These days Gilmore approaches Keydata users' meetings without trepidation. Not only does his system work smoothly, but his now-profitable company has more than $1 million in the bank and there are more than 350 Keydata customers out there in 22 states and two Canadian provinces.

If the computer industry gave a prize for tenacity, Gilmore would be the logical winner. The first commercial time-sharing firm, Keydata was founded in 1965 and, furthermore, Gilmore was a founder of Keydata's forerunner, Charles Adams Associates, which started up in 1959. Gilmore and Allen Rousseau, Keydata's vice president of technical operations, have seen the enterprise through those 13 long and tough years.

Now Gilmore is confident that Keydata's profits are permanent, not ephemeral. He observes that the firm has moved gradually from a loss of $1.3 million in fiscal 1970 to a profit of more than $500,000 in the first six months of fiscal 1973. Furthermore, the company is targeting sales and profit growth at more than 30% a year over each of the next few years.

How did Keydata make it over the hump? Gilmore gives major credit to the company's employes ("the most important thing was their dedication") and to the firm's venture investors ("they hung in there").

But many people close to Keydata argue that Gilmore's ability to hang in with a seemingly doomed proposition was an important factor in the company's struggle for viability. Asked to elaborate, Gilmore remarks, "Well, I'm really a technical guy, but I had to do some selling, too. And I'm even told I'm not a bad salesman. I've just adjusted to whatever I've had to."

Gilmore had worked at MIT during the 1950s in the Air Force's SAGE air defense program and he and a friend, Charles W. Adams, left to form Charles Adams Associates. (Adams left the operation in 1966.) That operation stumbled along for a few years and in time a subsidiary, Keydata, got rolling in 1965 with 24 customers.

It soon became evident that Keydata had made a mistake: each customer had a custom package and custom packages were very expensive for Keydata. Gilmore quickly declared a moratorium on new customers and the firm concentrated on developing standard packages. When this was accomplished in late 1967, the company began adding customers at a steady rate. But all through the 1960s and into the early 1970s, Keydata was relentlessly stalked by an ugly financial bugaboo.

"Money was really a problem," says Gilmore. "There were several times when we had to do some fancy talking to our bank to meet our payroll. Turning the corner on profits was a big turning point for us. Now we have more than $1 million in the bank and that means a lot to the bigger companies looking at our services. We've reached the area of critical mass, I think. We don't need any more capital and it's easy to add new customers."

Another interesting aspect of the Keydata story is the efficient way it uses its hardware. That's not particularly surprising because Gilmore and technical operations expert Rousseau are strong programmers and systems men. Gilmore, of course, came from an academic atmosphere at MIT while Rousseau learned virtually everything about computer technology on the job.

For instance, Keydata currently operates some 725 terminals, many of them in-house. They are tied to a Univac 494—a machine one would hardly call state-of-the-art hardware —and 40% of the cpu time is idle. Rousseau says Keydata can hook 1,000 terminals to a 494. In addition, the terminal response time is two seconds.

What will the future bring? Gilmore says the current Keydata hardware will be efficient through the 1970s. The company continues to add new features to its packages with the idea that these will attract new customers (Gilmore, for example, has just developed a new management information system that will be unveiled soon.) The company has some 30 programmers working full time on enhancement of Keydata's service.

Europe, too, represents an area of future growth for Keydata. Rather than starting up an operation from scratch in Europe, Gilmore feels that Keydata will follow its U.S. domestic customers who want Keydata services in European locations.

Keydata has had a knack for turning disasters into pluses for the company. Take the recent recession, for instance. Keydata got hurt, of course, but Gilmore now thinks the recession was good for the company. "When our customers' business was off by, say, 6%, their Keydata bill was off by 6% too. If they had had their own computer installations they would have had to pay the same as before and they would have had wasted capacity."

—W. David Gardner

sion from your present system to the Keydata system will be coordinated by Keydata personnel. Once conversion and operation is effective, Keydata will assign a member of its customer service department to your account to handle requests and any problem areas. As the customer's needs change, programming changes are provided for by Keydata.

Keydata's training school will supervise your personnel in the operation of the terminal. Operating the Keydata terminal is simple and all personnel in your office can be easily trained to fill in on an emergency basis.

Company facilities

Our present computer configuration includes two Univac 494s for the on-line system and an IBM 360/50 for the off-line reporting system. Honeywell 316 and 516 concentrators are located in remote cities as part of the Keydata communications network. We have backup equipment for every component in our configuration; thus, we can provide our customers with a service that has a 97.8% reliability factor.

Corporate headquarters for Keydata Corp. are located in Watertown, Mass. Although corporate headquarters will remain in Watertown, we are moving our computer and communications operations to a new remote facility. The immediate reason for the move is that we require additional space for mass-storage equipment to support our expanding customer base. The new facility in Foxboro, Mass., offers many advantages: the availability of backup power from a second independent source, good security, and room for eventual expansion of computing equipment to handle well over 10,000 terminals.

In product development, Keydata's management planning and reporting system is now in pilot operation. This on-line service allows any manager to correlate and analyze operating and financial data, including budgets to measure performance, develop plans and make decisions.

Keydata as an alternative

From our experience with our own customers, Keydata offers advantages in five basic areas:

1. A system that requires no investment in data processing equipment.
2. An increase in personnel productivity and/or a reduction in personnel.
3. A reduction in the capital investment in inventory by using the Keydata inventory control system to reduce inventory levels while simultaneously improving customer service.
4. An improved cash flow position. The Keydata system expedites preparation of invoices and provides the necessary credit control and documents that facilitate the prompt collection of receivables.
5. A management reporting system that helps to highlight trends and provides timely information to better run your business by pointing out areas that require management attention.

As an alternative to an in-house edp department or service bureau, Keydata offers a proven, flexible service the cost of which can be readily identified and accurately forecast. We offer to the business community an installation that is easy to use, expandable, completely programmed and documented, and productive on a predetermined schedule. It's a service that requires no special staff or equipment, yet provides the business community with the instantaneous, timely information required to run a more profitable business. □

Mr. Naylor is vice president, marketing, for Keydata Corp. Until he joined Keydata at the end of last year, he had been with IBM since 1964 and was most recently eastern area manager for the Service Bureau Corp. He is a graduate of Princeton Univ. and attended graduate school at New York Univ.

Their Customers Say . . .

After soliciting this article from the vendor, the DATAMATION staff checked with some of Keydata's customers to get first-hand information on how they liked the service.

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Marine Colloids, Inc., of Rockland, Maine, likes it fine. The company processes seaweed to produce an extract used in food products. Annual sales are over $10 million and the firm employs about 200 people. In 1971, they unloaded an IBM installation that was costing about $100,000 a year and required six to eight people full time; they now pay about $25,000 a year and have two full-time people for the job. Office manager Edwin Tyler says: "We have less flexibility than before but we still are able to accomplish everything we need to."

"The first three months were very trying," Tyler recalls. "We were going from one system to another totally new system. So the problems were understandable, I think."

The Keydata system works well now, he said. It handles accounts payable, accounts receivable, general ledger, and some sales analysis. The company now does its inventory manually and more elaborate sales analysis through an independent supplier—two services that had been provided by the displaced computer system.

"It's a real practical way for a small company to go," Tyler says. "I'm afraid if we rented the big equipment again we'd go hog wild and have a monster on our hands."

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An organization that made the change directly from bookkeeping equipment is *The Harvard Business Review*. In 1967, facing growth problems, they looked into the possibilities of using a service bureau, getting an in-house computer, or using the computer facilities at Harvard Univ.

"Fortunately," general manager Ernest D. Frawley says, "Keydata was just about there when we had to change. The conversion was very easy too. We took our ledger cards and put them on punched cards for our data base. We did the whole conversion job over a weekend."

Charges to the HBR for the service are from $25,000 to $30,000 a year and Frawley thinks they will stay with Keydata. "We looked at the new minicomputer business systems . . . but there you usually have the problem of needing to add a programmer to your payroll."

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Although the Keydata service is usually thought of as one for smaller companies, we talked to a large chemical products manufacturer who has one department tied to the service—replacing an in-house computer. This is the first time they have ever used an outside service for data processing and Keydata handles their customer orders, invoices, bills of lading, and related paperwork. It also provides input to their production control, accounts receivable, and sales analysis systems.

The company notes that the service is easy to use if you take the standard package but, if you want modifications, it's more difficult.

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The Psychological Corp., New York City publisher of psychological tests and consultants on industrial psychology, are enthusiastic users of the Keydata service. The firm does $6 million a

year in sales and has about 165 people. They made the big switch directly from a manual system, except for an outside sales analysis program.

One of their applications may be unique. Buyers of their tests must have certain qualifications, such as the proper academic degrees, to be permitted to administer the tests. All customer names are coded to reflect these qualifications and the system won't prepare an invoice unless there is a match between customer qualifications and the nature of the test ordered.

According to Paul Rosenzweig, the system is little short of phenomenal. "It's almost limitless and their additional programming charges are ludicrous. I don't know how they can do it." Their monthly bill is $5,000 and they cut 15 positions from the payroll for an estimated savings of $195,000 a year "and we're able to do a lot of things we never did before."

Any problems? The Keydata service is growing so fast that "there's sometimes a bit of difficulty in keeping up in terms of customer service. But they don't try to con us. The off-line reports come down by courier . . . if the couriers get fouled up somehow they usually call and tell us."

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G. L. Johnston Co., Detroit, has used the Keydata service for five years to do billing, receivables, payables, general ledger, and inventory control. The company is a wholesaler of air conditioning, heating, and refrigeration equipment and parts, with a sales volume of $6-$7 million, five locations in Michigan and Ohio, and a staff of 55.

They changed from unit record equipment, rather than upgrade to a 360/20. "Programmers are like butterflies," president Lee Johnston says. "They get excited with a new system for a year and then want to light elsewhere."

The company reports no problems in converting to the service. They also say that gross profits increased 2.9% the first year and that virtually all the improvement was the result of more accurate invoice processing. And in the past five years, volume has tripled while the accounting staff stayed the same. As for cost, the company has recently negotiated a new contract and will be paying $4,300 a month for the service, to handle 60-70,000 invoices a year.

Training? "You could take a little boy or girl off the street and teach them to operate the system in 20 minutes. After a week they're experts." □

XCS expands eastward, bringing its accounting and other systems to businesses that want the benefits but not the presence of computers

Xerox Computer Services:

Electronic data processing, which matured in the environment of the large scientific and industrial complexes, has stretched out in recent years until it has reached, inevitably, the small businessman.

Today the computer can help a business enterprise as small as, say, a two-man professional partnership. It does this not only by bringing speed, efficiency and economy to regular operations, but also—and perhaps most importantly—by ordering and distilling information in a manner necessary for intelligent business planning.

Whether or not the manager of a small or medium-sized business should use edp has become an academic question; the computer has long since passed this kind of examination. The question has become how the businessman can most efficiently and profitably employ computer technology.

There are several alternatives open to him. Usually the first option to be considered is the obvious one: buying or leasing a computing system. It's an enticing thought—having one's own computer—and certainly there are numerous small machines available.

Before embarking on this course, however, there are a number of basic problems that should be faced. There are the matters of capital investment required for the system; office space that must be dedicated for its installation and operation; time and attention that must go into the period of design and development of the programs necessary to the particular business; and, most critically, employment of trained personnel to implement and operate the system.

I categorize the problem of trained personnel as critical simply because it is just that. Assuming the businessman is willing to devote the funds, time and space necessary for launching his system, he still faces the biggest hurdle: recruiting and holding onto analysts with the ability to design and develop a system not only geared to the needs of his particular business, but also one which will fully utilize the computer's capacity. Hiring and keeping such personnel puts the small businessman in competition with the larger computer users—organizations that can afford to pay premium salaries and offer career paths to the data processing professional.

The second alternative open to the businessman is the batch-processing service bureau. Service bureaus typically receive source documents from their customers, process them sequentially at a computer center, then return reports to the customers at a later time—sometimes days later.

Although the service bureau industry has stabilized from the volatile days of the late sixties and early seventies, when bureaus proliferated like buds in spring only to fall like leaves in October, there are still a number of factors the small businessman must consider. Time lags remain a chronic problem; information entry is prone to error and difficult to correct; and the customer tends to feel he is out of touch with the processing of his information—which, to some extent, he is.

Another option, shared interactive computer services, sprang from the massive military command and control systems, such as SAGE, of the 1950s and 1960s. These systems pioneered the development of remote data entry, real-time data processing and multiple-user time-shared access. The interactive ac-

Interactive Accounting

by J. C. Lewis

counting system (IAS), developed by Xerox Computer Services over the last three years, makes heavy use of the technology produced by such efforts.

This system permits users, with terminals on their premises, to draw as required upon the data processing resources of a large central computer to carry out computing functions. Sophisticated operating systems allow these users to do their processing concurrently, each functioning as though he were the only one using the system, and each bearing only a small fraction of the cost of the system he is using.

Invisible to the user, but critical to his success, are the shared, prior development costs—literally millions of dollars—required to develop the hundreds of interactive computer programs which create a multipurpose business information system.

At Xerox Computer Services, we consider our primary function to be providing operating information to management, rather than a simple data processing service. Although the use of computers clearly is integral to the concept, it is important to keep this basic attitude in mind because it permeates everything we say about applications.

The Xerox IAS addresses all the basic accounting, financial and operational management needs of a small or medium-sized business. Standard application packages typically installed include order entry, invoicing, accounts receivable, accounts payable, payroll, labor distribution, inventory control, sales analysis and general ledger with comparative reporting capabilities.

In addition to these basic applications, Xerox has special services aimed at specific industries or market segments. For example, for local government, additional applications are utility billing, fund accounting and police systems. The utility billing service provides significantly reduced billing-cycle time and streamlines the recording of cash receipts and meter readings. Fund accounting gives an on-line check of expenditures and encumbrances against appropriation balances, providing positive control over current expenditures. The real-time police system allows police departments to anticipate situations, rather than reacting to incidents after the fact, and deploy their officers appropriately.

In the manufacturing industry, Xerox capabilities include job costing, bill of materials processing, material requirements planning, and production control. Perhaps the most encompassing of these systems is material requirements planning (MRP). This system relates forecasted product demand and firm customer orders to all levels of available stock, determining material needs over future time periods. This system assists material control personnel to maintain minimum inventory levels consistent with chosen customer service levels.

Inventory control features

In the distribution industry, Xerox clients now use IAS to control inventories as small as 300 items, and as large as 50,000. IAS offers highly sophisticated inventory control techniques, including flexible replenishment rules which can create purchase orders automatically. Backordered items can be highlighted immediately, customer service made more responsive and lost sales minimized. The generation of master pick lists on the client's terminal can lend efficiency to the operation and management of his warehouse.

The capabilities for improved profits through IAS inventory management are clearly present—but, as with any system, it takes dedication and leadership from client management to realize these benefits.

From the user's standpoint, each of these applications operates in a similar fashion. Using "order entry" as an example, the customer terminal operator wishing to enter a sales order need only key into the system the purchase order number, order date, customer number and the part numbers and quantities ordered for each of the desired items. The system automatically checks on-hand inventory, customer credit limits, confirms prices, verifies part numbers and acknowledges that the sales order has been accepted and entered. A simple one-line instruction will then cause either a pick list or a fully extended invoice to be printed, including taxes, shipping instructions and other indicative data.

While this process is taking place, all affected customer files on the system are immediately updated. These include customer receivables, sales analysis, inventory balances, backorders, suggested purchase orders, sales, cost of sales, etc. This concurrent posting, made possible because the system is fully integrated, is a highly important aspect of interactive accounting. The net result is to provide the customer with a complete picture of his business, always as current as the last transaction entered.

Determination of the sequence of applications to be installed is made by

the client, based on his own priorities and critical needs. A skeleton general ledger file is installed first to provide the proper interface and control with all other applications which integrate through it. Beyond that, there are no priority constraints on installation.

Directly responsible for the success of each account is a Xerox installation consultant, who, working with the client, sets objectives and monitors the conversion at the management level, making sure that planned schedules are met. He is a senior systems analyst with a strong accounting background, often with a CPA certificate.

Working for the consultant is an installation specialist, who is engaged in the more detailed tasks of file building, parallel runs, customer training and data entry. The consultant may handle from three or five accounts simultaneously, while the installation specialist typically spends nearly full time at one account until it is operational.

What sort of business utilizes the Xerox IAS? Obviously, a General Motors Corp. doesn't need anyone else's computers. Just as obviously, a mom-and-pop store doesn't need a computer at all. Generally speaking, IAS best applies to a company wishing to retain positive management control and discipline over operations, while continuing to grow and expand at the same time.

In our experience, most organizations that fall into this category do an annual business in the range of 2 to 40 million dollars. We also find that manufacturing firms with between 50 and 1,000 employees represent potential IAS users. As we expand to new geographic areas, multilocation businesses also become prospects. Technologically, there are no constraints on serving a nationwide organization with branches in many different cities. A number of our current users have this structure and are using our communications network to process the work of their geographically dispersed branches.

No matter what the size of the company, the Interactive Accounting System looks the same from the businessman's end: the only visual evidence of the system is one or more typewriter terminals. His office clerical staff can be easily trained to operate these terminals. Operator training consists of one day of overall system familiarization and one-half day formal education for each application the client will use. This is provided at no charge by Xerox. In addition, one-day management seminars are conducted for customer executives.

Costs are computed on the basis of volume of activity, including number of transactions, number of lines printed and volume of data stored on the system. Connect time is not a factor. The minimum monthly charge is $1,000.

As volume increases, customers typically add additional terminals. Our largest customers at present have 10 to 12 terminals installed. Incremental costs include the cost of the terminal and the expense of the additional phone line.

Direct cost comparisons of manual accounting methods against IAS costs are always difficult to make, because IAS produces much more timely and significant information than any manual system can generate. Cost tradeoffs typically turn on two elements—first, the size and effectiveness of the current accounting staff and, second, the need for and value of rapid access to a broad spectrum of management information.

Specific benefits that the typical client should receive through effective use of IAS include positive control of cash and accounts receivable, and streamlined inventory investment through tightened inventory management. Customer service should be improved because of minimization of out-of-stock conditions and more rapid order completion. From a marketing standpoint, he should be able to tighten his control through prompt identification of the most productive and profitable marketing representatives. Information on actual labor, material and work-in-process costs is immediately available to him. Accounting input errors are identified by the system at the moment they are made, enhancing the accuracy of the data base. And finally, the material requirements planning system will optimize utilization of production resources, with significant impact on profit.

These benefits give the businessman the ability to react immediately to both opportunities and problem areas; he should be able to influence events as they are happening, rather than spend a large portion of his business life attempting to recover from events that reached his attention long after the fact. As one businessman lamented when asked what was going to happen to his business in the next year: "I'd settle for knowing what's going on right now!" This knowledge is what we feel the Interactive Accounting System gives him.

At present, all our data processing is done at the Los Angeles computer center on multiple, large-scale Xerox Sigma 7 and Sigma 9 computers. This computer family was specifically designed for efficiency in the time-sharing environment.

Recovery procedures

Recognizing the problems of downtime in an on-line system, we have invested considerable effort in developing tools to allow our clients rapid recovery with a minimum of inconvenience. IAS has an automatic "reconstruct" capability which matches yesterday's data base for any client against

"If you want corporate growth, take the acquisition route."

a file of today's transactions, thus updating his files and restoring him to current status, without any need for his re-entering his transactions. At the end of each working day all customer files are offloaded and saved, so that each client always has machine-readable files as current as the previous day's activity. Data is saved in this manner for a period of nine historical weeks, covering two previous accounting periods.

Current customers are in a wide variety of businesses, with greatest frequency in the distribution and manufacturing industries. Construction, business and financial service, municipalities and utility districts are also well represented.

At the moment, 90% of our client base, about 200, is in California. These businesses are served by branch offices in Los Angeles, San Diego, and San Francisco. Xerox opened its fourth office in Chicago in March of this year and now has a number of clients there. A few weeks ago we opened our Manhattan office. It is our intention to establish branches in most principal cities throughout the continental United States. Satellite Xerox Sigma 3 computers, such as those now located in San Francisco and Chicago, will do report printing and act as communications concentrators/multiplexors for input/output of data to the Los Angeles computer center.

In looking at the future, we're finding fewer limits to the system than we had imagined. At one time, we thought that the service was suitable only for relatively small- to medium-sized businesses. This market remains, and will continue to remain, of primary importance to us. But small businesses, if they're successful, have the propensity for becoming large businesses. And this is where we feel that the Interactive Accounting System offers a real bonus to the small businessman—no matter how vaulting his ambition. We are already handling organizations whose gross annual sales are in the neighborhood of $60 million. We see no reason why we could not continue to provide complete information processing services to these clients even if they should double or treble in size. □

Mr. Lewis is vice president, marketing, for Xerox Computer Services. With Xerox since 1970, he was previously director, commercial systems, in the Xerox Information Systems Group. Before joining Xerox, he had various sales management jobs with IBM, including that of manager of market planning for the Service Bureau Corp. He has a BS in accounting from Fresno State College.

XCS Customers Say . . .

After soliciting this article from the vendor, the DATAMATION staff checked with some of Xerox Computer Services' customers to see what they thought of the system.

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Scripps Clinic and Research Foundation in La Jolla, Calif., is converting to use of the service from a Univac 9300. They began conversion in January and hope to be in full operation by December.

Their applications are substantial—generated by a 69-bed hospital and an affiliated research foundation—a total staff of 800. They include grant reporting, with monthly reports for 17 agencies; a complex payroll that involves charging to 70 different operating departments and from 250 to 300 grants; patient accounting, with up to 35,000 transactions per month; and billing for 40 physicians. Grant and patient accounting are not yet on the XCS system. They note that the service requires experienced accountants to understand how an entry affects various files.

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Almaden Vineyards doesn't have much to say at this stage; they're in the second month of a five-month conversion from a service bureau to the Xerox system. They think the main advantage will be getting more information with fewer people and David Barasch, the controller, says: "We didn't want to have anything to do with computers if we could get out of it." They got their wish, since Xerox beat out IBM, proposing a System/3.

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Smith Tool Co., Compton, Calif., is particularly pleased with the XCS inventory control system. The company, with $35 million annual sales and 1,200 employees, makes drilling bits for oil, mining, and industrial markets.

Scott Mulholland, controller, says they "can spot every single drilling bit by serial number and location anywhere in the world with the XCS system." Their transition is novel. They had a 360/30 they were miserable with, blaming an IBM payroll package in particular. Xerox moved the machine out of the plant and is running it at their headquarters for Smith during the conversion phase. So right now some of their applications are on the 360 and some are done by the XCS service. Some advantages cited for the new service: you get a day-to-day handle on all your operations; it seems like an in-house system; space problems are over; and reports can be created easily. Mulholland, whose experience includes a stretch with IBM analyzing customer systems, has some advice for prospects: don't be in a hurry; be sure they understand your problems and you understand their limitations; remember that it's going to be different than what you've done before. And he warns that, with an integrated system such as XCS offers, a single entry could affect 15 different areas of your operation—so one error could give you a lot of false information.

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Boysen Paint Co., Oakland, Calif., a subsidiary of Grow Chemical Co., made the jump to XCS from a Burroughs L 3000 accounting machine. They reduced the number of operators needed, although not enough to offset the cost of the service. They're very pleased with the way inventory is handled and report a big decrease in invoicing errors.

David Helman, treasurer, says: "We've learned a lot about our product line, those that are doing well and those that aren't, as well as getting profit data on our dealers, those working for us and those who aren't."

The company had considered renting a computer from Honeywell, IBM or Singer Friden but went with XCS after finding out about the system from another Grow subsidiary. They're also pleased that Xerox cost estimates were accurate, within 10% of actual costs.

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One customer who has had the Xerox service for two years and is still happy with it is Ameritone Paints Corp. This is a $7.5 million business, with 110 people, and XCS takes care of all their accounting; new applications for control of manufacturing are being developed. They went directly to the service from a manual system using accounting machines. XCS supplied the training for their operators at first but now the company says that the employees are able to train each other.

In general, complaints about the system cover problems in data transmission, downtime, and response time while the features getting most praise were inventory control, prompt and flexible reporting, and the sales analysis programs. □

For the first time,
a very large group of IBM users
is showing clear signs of independence

System/3 Doesn't Belong to IBM

by David Ferguson

You think Xerox and Frigidaire and Coke and Kleenex have problems about their names falling into general usage? Xerox a couple of copies, but the machine is an IBM. Put it in the Frig, but the machine is a Westinghouse. What did you use the last time you blew your nose?

Five years from now, there will be a ton of System/3 installations out there, 50,000, maybe even 60,000, and they'll bear about as much resemblance to today's IBM System/3 as a typical '73 Chevy does to a '73 Chevy stock car.

Why? For two distinct reasons, one of which is really unique in the history of the computer industry.

First of all, the market entry of the independent peripheral manufacturers for the System/3 started with a tentative, cautious murmur about a year ago, grew into a roar about six months ago and finally real products are beginning to appear.

Of course, this has happened with other computer systems, notably the 360/370. Therefore, it is the second reason which is the telling one.

The System/3 user is not cast in the mold of the old, hardbitten systems man who has been brought up on IBM security, cost justification and return on investment all neatly clad in dark blue serge. To the typical System/3 user, IBM is a company that sold him something, and that's the end of it.

As a matter of fact, a System/3 user said to us the other day, "IBM? They think they sold me something. Hell, I can cancel the thing in 30 days. They must be nuts."

In other words, the S/3 user is a businessman, unaffected by the IBM charisma. If he is offered core at a savings, he'll snap it up. If he can get a better data entry system for less, he'll snap it up. And he already has.

A large number of manufacturers have already begun to recognize two things about the System/3 marketplace: its enormous size and the willingness of users to talk economic sense with no adherence to IBM dogma. These two things are important in considering the future not only of the System/3, but all other small business computing systems as well. These two factors have never existed to the extent they do in this particular marketplace. And I would say that the latter, the ability to talk economic sense to an IBM-built and IBM-controlled market, has never happened in the history of the industry.

> Here was a man in the heart of an IBM market looking for, and finding, viable alternatives.

This is not to say that the "IBM-regardless" faction is not out there. They certainly are, but to a far lesser degree than any other IBM model installation base.

Three examples may help to substantiate this. Of course, three cases in point rarely can be used for scientific proof, but let's not allow statistics to ruin the point. At the least, the cases are rather novel and point out the fact that the System/3 user has hair on his chest.

No more than an hour before writing this particular paragraph we were talking on the telephone to a gentleman in Topeka, Kansas, who opened up with the rather startling line, "I've got $1300 a month to spend; what kind of small computer should I get?"

Now the important thing is the fact that Mr. Tipeka had spent a great deal of time with IBM, who had suggested a bare-minimum Model 6 and a field-developed program patterned specifically for his business. The only problem was the fact that there wasn't any money left over for things like general ledger, accounts receivable, accounts payable and payroll. And we also informed him that the System/3's yawning maw was going to eat up a lot of discs, cards, forms and ribbons that had to come out of his monthly budget.

We suggested that he investigate other sources for his software and encountered not a moment of hesitancy. "Where do I get it?" We also suggested other sources for core and peripherals and the same thing happened.

In a way, it was history. Here was a man in the heart of an IBM market looking for, and finding, viable alternatives.

About a month ago, another System/3 user recounted to us that he

had, in just eight months, grown out of his Mod 10. He'd tacked everything on it but a wet bar . . . two 11-highs, two tape drives, high-speed printer . . . but he was still running 420 meter hours a month and hurting. And, of course, IBM was selling him up to a new 370/125.

The System/3 user's answer was rather unusual. After he took a good look at what IBM said the conversion costs would be to go to the 125—and then figured out what those costs would really be—he rented a *second* System/3 instead. Two systems, with almost the exact same configurations, running discrete programs.

Then there was that paragon of the crusty American businessman who got his dander up when he found out he was paying IBM for 24-hour, seven-day-a-week service and had to pay for that service because he was renting the computer.

IBM explained it to him at length, but it made no sense. They did explain, after a while, that if he bought the computer he could then buy any of 16 variations of service to meet his needs.

So he bought it.

It's another kind of marketplace.

This is what convinces me that the next five years is going to see a phenomenon in the computer industry. It's going to be called the System/3, all right, but you're going to have a little difficulty trying to find any IBM components on it.

And that might even hold true for the cpu.

To date, the independent manufacturers have been somewhat slow recognizing the depth and strength of the market. And they really can't be blamed too much for that, having gotten their fingers burned on all those lovely 360 chestnuts. Even IBM was somewhat surprised at the reaction to the S/3. In the early days of its development, the Big System (or BS) people called the System/3 "Super-TOKE." This had reference to the old IBM Tape Oriented Key Entry system, which was a grand and glorious flop. And they were predicting the same el foldo for the System/3.

. . . but it won't be long before the independents come up with faster memories . . .

But soon what IBM and the independents were hearing and actually finding out sounded too good to be true.

There was a marketplace that had started slowly, like the Mississippi river, had begun to gather strength in 1971 and by 1972 had reached torrential proportions with no signs of stopping. IBM was, and is, *delivering* systems at the rate of 35 a day!

The supplies people were, naturally, the first ones to get into the free lunch line. Everybody started making the new 96-column cards. New labels were cast and stuck on old cabinets. But some furniture people got smart and started making cabinetry that fit the physical configuration of the system. All of the disc manufacturers got into the act early, led by Nashua, in producing the disc cartridge unique to the System/3. Nashua was quickly followed by 3M, Caelus, BASF, CFI and Athena. The ribbon people started ribboning and the forms people forming and, when IBM introduced tape drives for the system, the tape people jumped on board.

The first peripheral manufacturer to develop a piece of on-line equipment for the System/3 was Bridge Data Products, which saw that the introduction of the 96-column card was going to pose some serious conversion problems for the old 80-column card people.

Bridge introduced an 80-column card reader for the System/3 as early as 1971. It has been well-accepted in the field, especially by installations which had converted from the IBM 360/20.

The first piece of off-line equipment was Decision Data's 96-column data recorder. The company initially designed the data entry unit for Burroughs' new 1700 series, which also employs 96-column cards. The acceptance of the new data recorder by System/3 users has been nothing short of phenomenal. As one S/3 user said: "The thing's got two hoppers instead of one, it's faster and it's cheaper. What possible choice did I have?"

As soon as these peripherals begin to proliferate, third-party leasing will get rolling as well. IBM's price structure on the System/3, even on a straight rental arrangement, does not make the advantages of third-party leasing as large as they are for the 360/370. However, by "tailor-making" a System/3 the savings to the System/3 user will be enormous.

Long-range planning in the computer industry can be another way of chewing on razor blades. Data centers, up to this point, have changed computer models the way they change underwear. They'd outgrow one model of a computer series and immediately upgrade. All of which left the independent peripheral manufacturers chasing their tails in absolute frustration. As a matter of fact, this kind of quick upgrading and early obsolescence is a rather obvious part of IBM's game plan.

But Big Daddy made a mistake with the System/3. It was introduced initially with an upward memory limit of 32K bytes and a possible nine million disc bytes. Even this was too much for most of the initial System/3 users.

Today, you wouldn't even recognize the machine. Memory limits are now up to 64K and you can have 50 million bytes in disc storage if you need it. Line printer speeds are now up to 1100 lines a minute. Tape drives have been introduced. And peripherals from independent manufacturers are going to improve the system even more.

At the present time, the System/3 is memory bound but it won't be long before the independents come up with faster memories and will be able to extend the S/3 beyond the current 64K limit.

But the hardware on the System/3 is not the only area of improvement which is going to keep the system around for a long time. The users themselves are one of the major keys to the longevity of the machine. They started out with little if any knowledge of basic programming. IBM had sold them, not a computer, but "another kind of electronic accounting machine."

IBM said, "Here's a deck of cards we call a program or here's an initialized disc. Now all you have to do is press these buttons and, wham!, you've got an instant general ledger."

This might be exaggerated but with a couple thousand dollars invested in consulting, it would work. However, it didn't take long for the neophyte user to realize that what he actually had was a computer. A real computer, for God's sake! So either he hired himself a programmer or he learned some RPG II and started to make some real use of his machine. Now, there's COBOL for the S/3 and FORTRAN for the S/3 and it won't be too long before our manager of data processing, or some bright guy in his shop, says, "Hey, there's a thing called assembly language that I can learn."

However, it didn't take long for the neophyte user to realize that what he actually had was a computer.

With the new peripherals and the increased sophistication of the user, the System/3 will have increased in power and performance by a factor of 10 over the little machine that was first introduced two-and-a-half years ago.

But if you think the giant is not going to smell the blood of an Englishman, you're mistaken. IBM is obviously not going to hold still while all the independents seriously erode its marketplace. However, whether IBM is going to be able to protect its position with the same strong arm tactics it has employed in the past is questionable.

In the first place, the litigation now

System/3

in effect against IBM will make it difficult for it to take any kind of action which might be criticized in any way. And in the second place, IBM rarely takes action until the independents land about 10% of the market. Now, 10% of this market is going to mean about 4,000 or more installations, which is a big enough market in and of itself.

But it is the third place that is the really important answer. The System/3 market is a user market, a user who will buy what he wants to buy from whomever he wants to buy it. That is, however, not going to keep IBM from trying.

IBM is touting the 370/115 as the replacement for the System/3 as well as the 360/20. And they're as wrong as rain. True, the 115 can use either 80- or 96-column cards and the conversion, although expensive, is fairly simple. But the whole thing stops right there.

The best thing to do is look behind all the flowing, glowing words of the IBM press releases and get at some of the facts. The figures for the most commonly used instructions we are about to set out for the 115 are derived from IBM's only public statement to date regarding 115 instruction execution speed, namely "(it is) more than seven times faster than the . . . System/360 model 20 submodel 4." The figures in Table 1 for the 360/20 submodel 4 and System/3 (with the exception of average monthly costs, of course) are derived from the IBM manuals for those machines.

Any System/3 users for the 115? As far as the bang for the buck is concerned, it's obvious where the biggest price/performance advantage resides.

In addition, there's the disc problem. The System/3 user is, in the main, disc-oriented. He buys cartridges like there was no tomorrow. He even uses disc cartridges for backup. However, the new "Winchester" disc cartridge unique to the 115 sells for $1600, in the smaller of two versions, as opposed to the System/3 disc cartridge which the user can buy for as little as $105.

At the present time, the average System/3 user has between 16K and 24K in core memory and he's getting along just fine with that. However, the 115 user has two choices of memory size . . . 64K and 96K! That would be pretty heady for the System/3 user, at least for the present.

So the System/3 user will stay right where he is, which means that IBM is going to have to move aggressively to get back into the marketplace it created. Faster peripherals. Virtual memory. Cheaper tape drives. In other words, IBM is going to have to start really competing with the independents.

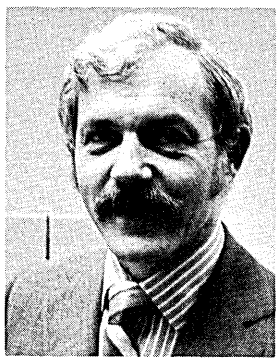
In the System/3 marketplace, for the first time in the history of the computer industry the user is calling the shots. Since he wasn't raised with the IBM security blanket tucked firmly under his chin and since he generally represents a small, extremely dollar-conscious company, he will buy what best suits his needs. Also, he has his own organizations speaking for him. Group/3, a national subscription service for System/3 users, and NASU, the National Association of System/3 Users, are both organizations serving that marketplace. And the important thing is that, although they are totally different in the services they offer, they are completely independent of IBM control.

	Typical Monthly Rental	Typical Instructions MVC 4 bytes	BC	AP/AZ 10 digits
Mod 20/4	$3000	338 μs	110 μs	920 μs
370/115	$7500	48 μs	15 μs	120 μs
System/3	$2500	18 μs	6 μs	36 μs

Table 1

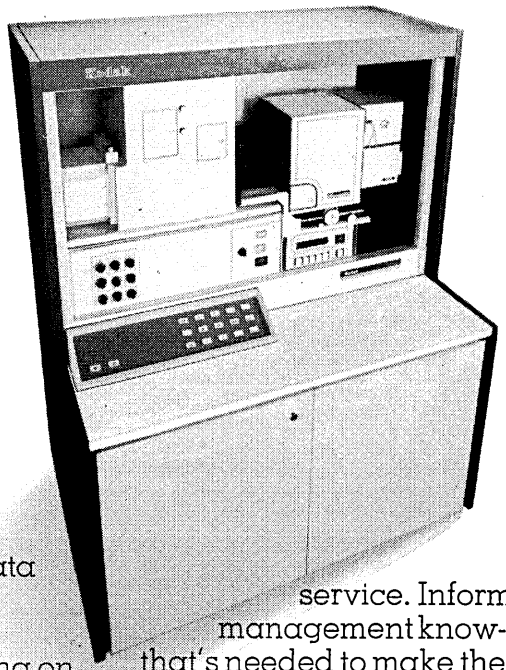
The day an independent comes up with a compatible System/3 cpu is going to herald a new era. And the day will come. Five years from now one may be able to walk into a computer room and be faced with a System/3 installation where the only IBM label is on the Selectric typewriter.

And maybe not even there. ☐



Mr. Ferguson is the president of Group/3, a national subscription service for System/3 users. He was formerly president of Programmatics, Inc., and was one of the original employees of Computer Sciences Corp., leaving there to found Programmatics. He has a BA in mathematics from UCLA.

Can't afford computer output microfilm? Sure you can.



You don't have to buy a computer output microfilmer or even rent one. Just call on a service bureau equipped with a Kodak Kom microfilmer.

Using a service bureau is similar to time-sharing. You get all the savings of computer output microfilming. Without a big investment.

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Take your pick of microforms. Depending on your application requirements, you can instruct the service bureau to microfilm in roll or fiche formats. You can even have your business forms superimposed on the microfilm images.

When you select a service bureau equipped with a Kodak Kom microfilmer, you can do so with confidence. Kodak backup makes the difference. Full software support. Kodak service. Information management know-how. Everything that's needed to make the most of COM.

Get all the facts.

For more information on computer output microfilming, please write us. Eastman Kodak Company, Business Systems Markets Division, Dept. DP580, Rochester, N.Y. 14650.

For better information management. Kodak

A variety of software from independent vendors, plus an explanation of IBM's offerings

Software Packages for the System/3

by Richard A. McLaughlin, Technology Editor

The IBM System/3 has introduced to the computer fold not only a vast new audience of computer users, but also an expanding group of vendors that hope to serve this big, attractive marketplace.

Estimates of how many System/3s have been installed in the U.S. range as high as 13,000 to date, and as many as 35 per day are said to be coming out of the molds. Of course, IBM will neither verify nor disprove these figures, but if the estimates are accurate, there may be as many System/3s installed by the end of this year as there are general purpose computers from Burroughs, CDC, Honeywell, NCR, Univac, and Xerox all put together.

Although the number of System/3s is very large by any estimates, the revenues they account for are not as impressive. It takes about 25 System/3s, for instance, to bring IBM the same rental revenue they would realize from a single 370/158. This means that IBM has to treat that customer base a little differently; the company simply cannot afford each user the same attention he would receive if he had a larger machine. And this makes some unique opportunities for small independent companies.

The packaged software products included in this survey are from such a set of vendors. Most have less than a dozen employees, and several are one-man firms. Although we have attempted to include everyone actively participating in the business, the survey should be considered representative and not definitive. Certainly by the time this magazine is a month old, new companies will have joined the club.

Two of the vendors, Group/3 and NASU, are actually a subscription service and a users group, respectively. They too represent new phenomena in the computer business in that they are not the old kind of users group, supported by (and therefore subject to some pressures from) the computer manufacturer, and in that they exist in a kind of quasi-competitive state in relation to each other.

The survey is being published as a means to let those in the S/3 audience know what is available to them and from whom. However, the information included—about the products and about the vendors—has been taken from data supplied by the vendors, and should be read accordingly.

The product descriptions purposely provide only skeletal information, including the minimum machine configuration required (note that MFCU refers to the multi-function card unit, where that abbreviation appears), and documentation provided (operator's manuals and programmer's manuals, among others).

For more information on any of the products, please contact the vendors directly, or circle the appropriate numbers on the readership service card bound into the back of this issue.

Systems Software

APODICTICS, INC.
Assembler.
Runs on 12K Model 6 or 10.
Object deck, program manual, and user manual provided; updates offered at $25 each.
4 installed since 6/72; $250.
FOR DATA CIRCLE 151 ON READER CARD

APODICTICS, INC.
SPLIS Source Procedure Listing
Explodes procedures from disc, showing detail of included calls and source library entries.
Lists source entries; punches named, numbered and dated RPG programs.
Runs on 12K Model 6 or 10 disc system.
Object deck provided; mailed updates offered at $15.
6 installed since 9/72; $50.
FOR DATA CIRCLE 152 ON READER CARD

DATA USAGE CORP.
Documatic
Documents RPG II programs; outputs include I/O record layouts, text description, and system pictorial.
Runs on a 16K card or disc system.
Object deck, oper. manual, and mailed updates provided.
210 installed since 8/68; $1,800 to $2,300.
FOR DATA CIRCLE 153 ON READER CARD

GROUP/3
CSORT/3 Card Sort Program
Performs card sort on MFCU, reducing deck size from 300+ cards to 20 cards; also eliminates printer messages and halts.
Runs on an 8K card system with MFCU.
Object deck, oper. manual, user manual, and mailed updates provided.
50 installed since 1/73; $50 (50% discount to subscribers).
FOR DATA CIRCLE 154 ON READER CARD

GROUP/3
STAP Assembly Program
Assembler for disc or card-only machines, includes linking loader and trace; replaces S/3 Basic Assembly Program.
Runs on an 8K system.
Object deck, oper. manual, user manual, and mailed updates provided.
5 installed since 3/72; $45/month for disc, $35 for card (20% discount to subscribers).
FOR DATA CIRCLE 155 ON READER CARD

GROUP/3
STEP IBM 360/20 Simulator
Simulates a card model 20 at the machine level; includes a translator for 80/96 col. cards.
Runs on a 12K system with MFCU and printer (1442 card reader desirable).
Object deck, oper. manual, user manual, and mailed updates provided.
20 installed since 6/72; free to subscribers.
FOR DATA CIRCLE 156 ON READER CARD

GROUP/3
STIR Information Retrieval
Selectively retrieves information from card file and formats it for printing using user-defined report formats. Especially useful for mailing labels.
Runs on an 8K card system.
Object deck, oper. manual, user manual, and mailed updates provided.
150 installed since 7/72; free to subscribers.
FOR DATA CIRCLE 157 ON READER CARD

INFORAMA
DATRO Data Input System
Replaces IBM's KDE.
Runs on an 8K Model 6.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
8 installed since 3/72; $700 ($65/month).
FOR DATA CIRCLE 158 ON READER CARD

INFORAMA
INTER/3 Information Retrieval Program
Permits conversational information retrieval from disc files.
Runs on a Model 10 disc system.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
3 installed since 1/72; $600.
FOR DATA CIRCLE 159 ON READER CARD

INFORAMA
MERO Source Statement Renumbering
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
1 installed 12/72; $600.
FOR DATA CIRCLE 160 ON READER CARD

INFORAMA
PROGED Spooling Utility
Runs on a two-partition Model 10.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
4 installed since 10/72.
FOR DATA CIRCLE 161 ON READER CARD

INFORAMA
REFORM File Utility
Reformats card and disc files.
Runs on a Model 10.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
3 installed since 9/72; $600.
FOR DATA CIRCLE 162 ON READER CARD

INFORMATION PROCESSING & CONSULTING
LSC List-Source Compiler
Similar to the IBM List/Summary Punch utility for the 360/20, it generates a card-to-print RPG II source program handling addition, subtraction, editing, three subtotal levels plus final totals, headings, print formatting, etc.
Uses a small set of parameter cards.
Runs on an 8K Model 10 card or disc system.
Object deck, user manual, coding sheets provided.
24 installed since 1/71; $200.
FOR DATA CIRCLE 163 ON READER CARD

PROGRAM GENERATION CORP.
Index File Management
Four pograms to create, list, inquire of, and maintain disc index file with field testing. Fields may be changed or blanked; records may be added, deleted, reinstated, or suspended.
Runs on a Model 10 disc system.
Object deck, object listing, oper. manual, program manual, user manual, source deck, source listing, input card design and input card form provided.
10 installed since 1/73; $300 plus $5 per field in disc file.
FOR DATA CIRCLE 164 ON READER CARD

WALRUS CORP.
SANOSN Numbering of Alpha Names
Assigns numbers to proper names of any kind to eliminate the need for an alpha cross reference file. Automatically inserts and lists additions to the file.
Source deck with user logic statements and mailed updates provided.
3 installed since 8/71; $250.
FOR DATA CIRCLE 165 ON READER CARD

Accounts Payable and Receivable

CERTIFIED SOFTWARE PRODUCTS
Accounts Payable
Standard package produces journal, cash requirements forecast, vendor analysis, check and remittance information, check register, and check reconciliation. Optional float report and vendor purchase analysis reports available at extra cost.
Runs on a Model 6, 8K Model 10 card system, or 12K Model 10 disc system.
Object deck, user manual, oper. manual, test data, sample output, and mailed updates for one year provided; mag tape copy ($25), plus installation and training ($25/hour) offered.
$1,200 for card system, $1,600 for disc (extra reports from $150 to $270).
FOR DATA CIRCLE 166 ON READER CARD

CERTIFIED SOFTWARE PRODUCTS
Accounts Receivable
Standard package produces accounts receivable edit, aged analysis, and statements. Balance Forward and Open Invoice versions are offered.
Runs on Model 6, 8K Model 10 card system, or 12K Model 10 disc system.
Object deck, user manual, oper. manual, test data, sample output, and mailed updates for one year provided; mag tape copy ($25), plus installation and training ($25/hour) offered.
$1,500 to $2,500.
FOR DATA CIRCLE 167 ON READER CARD

ENGINEERING COMPUTER SYSTEMS, INC.
Accounts Payable
Includes 16 programs, excluding sorts, and outputs 11 weekly reports, four monthly reports, and three reports on request.
Runs on a 12K Model 10 card or disc system.
Oper. manual, program manual, user manual, and source deck provided.
65 installed since 5/72; $295.
FOR DATA CIRCLE 168 ON READER CARD

INFONATIONAL
A/P Accounts Payable
An automated vouchering system providing control over cash disbursements and related accounting distribution.
Runs on a 32K Model 10 with one 5444 disc, one 5445 disc, and two 3400 mag tapes.
Object deck, object listing, mag tape copy, oper. manual, program manual, user manual, and mailed updates provided; installation and training ($500 to $1,000) offered.
47 installed since 1969; $280/month.
FOR DATA CIRCLE 169 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AP01 Accounts Payable
Includes 9 programs.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 8/72; $25 to members.
FOR DATA CIRCLE 170 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AP07 Accounts Payable
Includes 8 programs.
Runs on a 16K Model 10 disc system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 171 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AP18 Accounts Payable
Includes 30 programs.
Runs on a 12K Model 6 disc system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 172 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AR02 Accounts Receivable
Includes 5 programs.
Runs on a 16K Model 10 disc system.
Oper. manual, user manual, and source listing provided.
First installed 8/72; $25 to members.
FOR DATA CIRCLE 173 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AR05 Accounts Receivable
Includes 6 programs.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 251 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AR12 Accounts Receivable
Five programs designed for retail stores.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 252 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
AR20 Accounts Receivable
Open item accounts receivable system includes 9 programs.
Runs on a 12K Model 10 disc system.
Oper. manual, user manual, and source listing provided.
First installed 1973; $25 to members.
FOR DATA CIRCLE 253 ON READER CARD

Financial and Banking

BANKPUTER, INC.
Installment Loan Accounting
Performs installment loan accounting for banks; outputs dealer and management reports including new business and delinquency reports by branch, officer, dealer, loan type, etc.
Runs on a 16K Model 10 with two discs, card reader, printer, and MICR reader/sorter.
Oper. manual, program manual, user manual, source programs on disc cartridge, source deck, source listing, and one year's updates provided; installation and training offered ($150/day).
11 installed since 4/72; $4,000 to $5,000.
FOR DATA CIRCLE 254 ON READER CARD

BANKPUTER, INC.
Club Accounting
Performs Christmas Club and other club accounting for banks and savings & loans.
Runs on a 16K Model 10 with one disc, card reader, printer, and MICR reader/sorter.
Object listing, oper. manual, program manual, user manual, source programs on disc cartridge, source deck, source listing, and one year's updates provided; object deck ($300), plus installation and training ($150/day) offered.
2 installed since 10/72; $1,500 to $2,500.
FOR DATA CIRCLE 255 ON READER CARD

BANKPUTER, INC.
Savings Accounting
Performs savings accounting for banks, including handling statement savings, passbook, and notice accounts, and all interest types; provides branch reporting.
Runs on a 24K Model 10 with three discs, card reader, printer, and MICR reader/sorter.
Oper. manual, program manual, user manual, source programs on disc cartridge, source deck, source listing, and one year's updates provided; object deck ($300), plus installation and training ($150/day) offered.
2 installed since 10/72; $4,000 to $5,000.
FOR DATA CIRCLE 256 ON READER CARD

DATA USAGE CORP.
Check Protection
Converts dollar amounts to words.
Runs on any S/3.
Program manual and source listing provided.
17 installed since 7/72; $10.
FOR DATA CIRCLE 257 ON READER CARD

K&H COMPUTER SERVICES, INC.
Loan Amortization
One to three card input produces amortization schedule showing payment number, payment amount, interest, principal, and balance after payment. Used for monthly, quarterly, or annual payments.
Runs on any S/3.
User manual and source deck provided.
First installed 4/70; $100.
FOR DATA CIRCLE 258 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
DS15 Depreciation System
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 259 ON READER CARD

Packages for System/3

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
DS21 Depreciation System
Runs on a 12K Model 10 disc system.
Oper. manual, user manual, and source listing provided.
First installation 1973; $25 to members.
FOR DATA CIRCLE 260 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
FS09 Financial System
Includes 10 programs.
Runs on an 8K Model 6 disc system.
Oper. manual, user manual, and source listing provided.
First installation 1972; $25 to members.
FOR DATA CIRCLE 261 ON READER CARD

General Ledger and Accounting

APODICTICS, INC.
Financial Reporting
General ledger with user-defined report formats; independent of structure of chart of accounts.
Runs on a 12K Model 6 or 10 disc system.
Oper. manual, program manual, user manual, source deck, source listing, installation, testing, and one day of training provided (expenses extra).
5 installed since 3/72; $950 ($95/month for 12 months).
FOR DATA CIRCLE 262 ON READER CARD

CERTIFIED SOFTWARE PRODUCTS
General Ledger/Financial Reporting
Standard package produces journals, four-column general ledger, balance sheet, and income statement. Thirteen optional reports are available at extra cost.
Runs on a Model 6, 8K Model 10 card system, or 12K Model 10 disc system.
Object deck, user manual, oper. manual, test data, sample output, and mailed updates for one year provided; mag tape copy ($25), plus installation and training ($25/hour) offered.
$1,100 for card system; $1,500 for disc (extra reports from $50 to $470).
FOR DATA CIRCLE 263 ON READER CARD

ENGINEERING COMPUTER SYSTEMS, INC.
General Ledger
System includes 17 programs, excluding sorts, and generates 10 reports from trial balance to P&L statements and consolidated balance sheets (by location if desired).
Runs on a 12K Model 10 disc system.
Oper. manual, program manual, user manual, and source deck provided.
43 installed since 5/72; $295.
FOR DATA CIRCLE 264 ON READER CARD

INFONATIONAL
F/A Fixed Assets Accounting
Performs accounting and inventorying using latest tax legislation (including the Revenue Act of 1971), Asset Depreciation Range System (ADR), and Class Life system.
Runs on a 32K Model 10 with one 5444 disc, one 5445 disc, and two 3400 mag tapes.
Object deck, object listing, mag tape copy, oper. manual, program manual, user manual, and mailed updates provided; installation and training ($500 to $1,000) offered.
10 installed since 4/72; $280/month.
FOR DATA CIRCLE 265 ON READER CARD

INFONATIONAL
G/L General Ledger
Provides multiple-level financial reports, consolidated over multiple companies for higher levels; integrates budgets, forecasts and actual performance.
Runs on a 32K Model 10 with one 5444 disc, one 5445 disc, and two 3400 mag tapes.
Object deck, object listing, mag tape copy, oper. manual, program manual, user manual, and mailed updates provided; installation and training ($500 to $1,000) offered.
85 installed since 1969 (first installed on System/3 4/73); $420/month.
FOR DATA CIRCLE 266 ON READER CARD

INFORAMA
COMPTA PACK 2
General and analytical accounting.
Runs on a 24K Model 6 or 10 with two discs.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
4 installed since 9/72; $8,000 to $11,000 ($750 to $1,000/month).
FOR DATA CIRCLE 267 ON READER CARD

K&H COMPUTER SERVICES, INC.
GAP General Accounting Package
Edits and posts bookkeeping entries, checks for zero balance and valid account numbers; produces general ledger, journal list, balance sheet, and P&L statement.
Runs on a Model 10.
Oper. manual, program manual, user manual, source deck, and mailed updates provided.
20 installed since 6/70; $1,000 ($100/month).
FOR DATA CIRCLE 268 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
GL06 General Ledger/Financial Statements
Includes 6 programs.
Runs on a 16K Model 10 disc system.
Oper. manual, user manual, and source listing provided.

What IBM Offers in System/3 Software

The software packages presented in this survey are those offered by independent vendors. It is assumed that anyone who has a System/3 has also received descriptions of the software packages and software services available from IBM. For those who are only contemplating the acquisition of a System/3, the following may be helpful.

Program products

IBM offers three kinds of software for the System/3: program products, field-developed programs, and IBM-installed user programs. Program products include both systems software and applications software, but both kinds are characterized by being plug-ins which were developed by IBM, are supported by IBM, and are sold on a monthly license basis.

The systems software included in program products now totals 17 programs and some optional features. RPG II, COBOL, FORTRAN, and BASIC compilers fall into this category, as do sorts, the assembler, and miscellaneous utilities. There are presently also about two dozen applications programs sold as program products. These range from a bill of materials processor, to a citation processing system, to a utility billing system, plus some auxiliary routines for doing math and statistics calculations in BASIC. Like the systems software, they are sold on a monthly license basis.

Field-developed programs

The second major kind of package is the field-developed program. There are about 120 of these now, ranging from mortgage loan accounting, to broadcast scheduling, to 1130 FORTRAN conversion. Developed by IBM systems engineers working with specific customers, they are offered on a monthly rental plan but charges are waived after either 12 or 24 payments, depending on the package.

IBM-installed user programs

The third kind of program is the IBM-installed user program, which is pretty much what it sounds like. When a customer creates a marketable program, IBM licenses it and rents to it other customers. Again the charges are waived after one or two years. There are about 33 programs in this category, including one for cable tv accounting another for a commuter airline.

Because they come from different sources, programs in one category may be alternatives to programs in other categories, and very similar programs may exist in the same category.

Application customizer service

In addition to the program products, IBM offers two kinds of programming service for System/3s. Although the program package categories are roughly equivalent to the company's offerings for its bigger machines, there is no direct counterpart for the Application Customizer Service or for the Application Programming/Application Development Service.

The two services are alike in that they address themselves to a strictly limited set of applications: order writing and invoicing, inventory accounting, accounts receivable, sales analysis, payroll, general ledger, accounts payable, and labor distribution. (Further, the last four of these are restricted to the Model 10 card system.)

The services differ in how much the user has to do for himself. The

First installed 1972; $25 to members.
FOR DATA CIRCLE 269 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
GL11 General Ledger/Financial Statements
Four programs designed for CPAs and service bureaus.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 270 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
GL14 General Ledger/Financial Statements
Includes 7 programs.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 271 ON READER CARD

QUAZELL TECHNICAL
PM/I Property Management System
Produces reports on the management of residential income properties, including monthly owner's statement, management fee report, and detailed property ledger.
Runs on a Model 10 disc system.
Object deck, oper. manual, program manual, user manual, source deck, source listing, and mailed updates provided.
1 installed since 2/73; $500 to $750 ($50 to $75/month).
FOR DATA CIRCLE 272 ON READER CARD

RPG DATA SYSTEMS, INC.
Real Estate Management
A system for property management firms, comprised of accounts payable, income, and budgeted/varianced general ledger. Accounts for expenses by building and by account, writes checks, computes delinquency, and generates operating statement by netting cash and expenses while computing commissions and owner payout for automatic check generation.
Runs on a 16K Model 10 with three discs and 100 lpm printer.
Object deck, oper. manual, user manual, source deck, plus three days of training and installation provided (expenses extra). Object listing ($250), mag tape copy ($100), program manual ($300), source listing ($200), and updating ($300/year) offered.
3 installed since 6/72; $2,000 to $7,600 ($85 to $295/month).
FOR DATA CIRCLE 273 ON READER CARD

Inventory and Merchandising

APODICTICS, INC.
Big Ticket Retail
System of over 75 programs performs inventory control, accounts payable, accounts receivable, and general ledger accounting for furniture, appliance, and carpet retailers.
Runs on a 12K Model 6 or 10 disc system.
Oper. manual, program manual, user manual, source deck, source listing, mailed updates for one year, plus two weeks of installation and training provided (expenses extra).
2 installed since 7/72; $7,500.
FOR DATA CIRCLE 274 ON READER CARD

APODICTICS, INC.
Book Warehousing
System of over 60 programs provides financial and inventory control for a book warehouse, plus inventory for retail stores buying from a warehouse.
Runs on a 12K Model 10 with three discs.
Oper. manual, program manual, user manual, source deck, source listing, updates for one year, plus two weeks of installation and training provided (expenses extra).
First installed 5/73; $7,500.
FOR DATA CIRCLE 275 ON READER CARD

CERTIFIED SOFTWARE PRODUCTS
Inventory
Standard package produces a transaction proof register, plus stock status and action report. Optional reports for management, purchase orders, and price tickets are available at extra cost.
Runs on a Model 6, 8K Model 10 card system, or 12K Model 10 disc system.
Object deck, user manual, oper. manual, test data, sample output, and mailed updates for one year provided; mag tape copy ($25), plus installation and training ($25/hour) offered.
$800 for card system, $2,000 for disc (extra reports from $250 to $1,000).
FOR DATA CIRCLE 276 ON READER CARD

COMPUTER TECHNICAL SERVICE, INC.
BASIC Automotive Wholesale Parts
Performs billing, accounts receivables, sales analysis, inventory control, and purchasing; outputs invoices, statements, aging reports, buying reports, and 21 others.
Runs on a 12K system with 5203/3 printer, MFCU, and 5444/2 disc.
Object deck, object listing, oper. manual, program manual, user manual, source deck, source listing, installation and training, and mailed updates provided.
3 installed since 1/71; $7,000 to $12,000.
FOR DATA CIRCLE 277 ON READER CARD

DATA USAGE CORP.
Retail Dollar Management
Provides management reports for retail chains, integrating sales, last-year sales, markdowns, payroll, inventory, open to buy, sales forecasts, etc.
Runs on an 8K card system, but 12K disc system suggested.
Oper. manual, program manual, user manual, source deck, source listing, and updates provided.
$4,500 ($410/month for 12 months).
FOR DATA CIRCLE 278 ON READER CARD

INFORAMA
BASE/3 Bill of Material Processor
Replaces IBM's BOMP.
Runs on a 12K system.
Source deck, source listing, and updates provided.
2 installed since 6/72; $3,600 to $5,200 ($350 to $500/month).
FOR DATA CIRCLE 279 ON READER CARD

INFORAMA
MODULES 3/6
Three packages, for invoicing, inventorying, and accounting; to replace IBM's SAM 6.
Runs on an 8K Model 6.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
6 installed since 6/72; $3,000 to $10,000 ($300 to $950/month).
FOR DATA CIRCLE 280 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
Backlog/Inventory
Runs on a 12K Model 10 disc system.
Oper. manual, user manual, and source listing provided; $25 to members.
FOR DATA CIRCLE 281 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
Forecasting System
Forecasts sales, business trends, etc.
Runs on a Model 6 disc system.
Oper. manual, user manual, and source listing provided; $25 to members.
FOR DATA CIRCLE 282 ON READER CARD

Application Customizer Service is a program design service. The System /3 user, with the help of his systems engineer, fills in a set of questionnaire forms describing how he wants his applications program to operate, including what kinds of reports he wants and what kinds of taxes he has to consider, etc. He sends off the deck of cards he punches from the questionnaire to his local IBM software design factory. IBM returns a set of programming aids including documentation and flowcharts and the user is left on his own to venture into the RPG II programming end. For an extra $100, he can have "customized" source decks to start with, but he still must modify them for his own applications.

Application programming service

The other kind of service, Application Programming Service for the Model 6 and Application Development Service for the Model 10 card system, can be thought of as forms of contract programming done with existing modules of code. For the same four applications—order writing and invoicing, inventory accounting, accounts receivable, and sales analysis—these cost about four times as much as the basic customizing service does. (For example, an order writing and invoicing program for the Model 6 costs $665 on a one-time charge basis if done under the customizing plan without any hand tailoring; if done under the programming service, it runs $1,350.) For the extra money, the user gets it all done for him. Although he still must be involved, he does not have to code the job.

In general, the program products are aimed at installations that are up and running or that know how to get up and running. The customizing and programming services are aimed at the bread-and-butter end of the small business market. Their purpose is simply to get a machine on the air doing productive work as rapidly as possible. They represent another way IBM's service for small customers differs from what it does for the more sophisticated, higher-revenue customers of the bigger machines. □

Packages for System/3

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
IW17 Invoice Writing
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 283 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
SA16 Sales Analysis
Includes 6 programs.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided; $25 to members.
FOR DATA CIRCLE 284 ON READER CARD

Payroll

CERTIFIED SOFTWARE PRODUCTS
Payroll
Standard package produces deduction register, payroll register, paychecks and stubs, and employee master register. Seven optional reports are available at extra cost.
Runs on a Model 6, 8K Model 10 card system, or 12K Model 10 disc system.
Object deck, user manual, oper. manual, test data, sample output, and mailed updates for one year provided; mag tape copy ($25), plus installation and training ($25/hour) offered.
$1,800 for card system, $2,400 for disc (extra reports from $100 to $470).
FOR DATA CIRCLE 285 ON READER CARD

ENGINEERING COMPUTER SYSTEMS, INC.
Payroll
Includes 28 programs, exclusive of sorts, and outputs 22 weekly reports, one monthly report, three quarterly reports, plus several yearly and "as requested" reports.
Runs on a 16K Model 10 disc system.
Oper. manual, program manual, user manual, and source deck provided.
24 installed since 5/72; $435.
FOR DATA CIRCLE 286 ON READER CARD

GRANAT DATA CORP.
Payroll
Computes payroll for salaried and hourly employees.
Runs on an 8K Model 6 or 10 disc system.
Oper. manual, source deck, and mailed updates provided.
6 installed since 7/72; $1,000.
FOR DATA CIRCLE 287 ON READER CARD

INFORAMA
GAIN Personnel File Control System
Calculates salaries, reports on salaries, statistics, and accounting data.
Runs on a 16K Model 6 or 10 system with two discs.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
20 installed since 3/72; $8,000 ($750/month).
FOR DATA CIRCLE 288 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
PR03 Payroll
Includes 22 programs.
Runs on a 12K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 8/72; $25 to members.
FOR DATA CIRCLE 289 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
PR08 Payroll
Includes 13 programs.
Runs on an 8K Model 6 disc system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 290 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
PR10 Payroll
Includes 10 programs.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 291 ON READER CARD

Others

INFORAMA
PROMEDIT Letter Writer
Prints business letters in upper and lower case characters.
Runs on an 8K Model 10 with ERMF cartridge.
Object deck, oper. manual, user manual, source deck, source listing, updates, plus installation and training provided.
3 installed since 1/72; $1,600 ($150/month).
FOR DATA CIRCLE 292 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
Hospital Census System
Performs daily hospital census.
Runs on a 16K Model 10 disc system.
Oper. manual, user manual, and source listing provided; $25 to members.
FOR DATA CIRCLE 293 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
SF19 Subscription System
Performs subscription fulfillment and label printing.
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1973; $25 to members.
FOR DATA CIRCLE 294 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
SL04 Subscription System
Subscription and label listing system includes 7 programs.
Runs on a 12K Model 10 disc system.
Oper. manual, user manual, and source listing provided.
First installed 1972; $25 to members.
FOR DATA CIRCLE 295 ON READER CARD

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
TL Time Logging
Runs on an 8K Model 10 card system.
Oper. manual, user manual, and source listing provided.
First installed 1973; $25 to members.
FOR DATA CIRCLE 296 ON READER CARD

UNITED COMPUTING CORP.
UNIAPT
A version of the APT Numerical Control Tape Generation Language, for producing punched tapes for NC tools.
Runs on a 32K Model 10 with 5444 or 5445 disc, 1403 or 5203 printer, 2501 or 1442 or 5424 card reader, and 1018 paper tape punch.
Object deck, oper. manual, and user manual provided; program manual ($12.95), installation and training ($750), mailed updates ($600/year), and postprocessors ($1,000 to $4,000) offered.
52 installed since 1/70; $16,000 ($368 to $700/month).
FOR DATA CIRCLE 297 ON READER CARD

Vendor Listing

APODICTICS, INC.
Box 2109, Ann Arbor, Mich. 48106
Established 1970; 6 employees.
Edward Strait, vp (313) 769-4458

BANKPUTER, INC.
420 Campbell Ave., West Haven, Conn. 06516
Established 1971; 12 employees.
Ernest R. DelMonico, pres. (203) 933-5491

CERTIFIED SOFTWARE PRODUCTS
3050 Metro Drive, Minneapolis, Minn. 55420
Established 1970; 9 employees.
Norton S. Gray, pres. (612) 854-3976

COMPUTER TECHNICAL SERVICE, INC.
1140 Campbell Ave., West Haven, Conn. 06516
Established 1968; 12 employees.
Wm. Martin, mktg. dir. (203) 933-0700

DATA USAGE CORP.
2460 Lemoine Ave., Fort Lee, N.J. 07024
Established 1968; 20 employees.
Gary Mokotoff (201) 461-6242

ENGINEERING COMPUTER SYSTEMS, INC.
21 Worthen Road, Lexington, Mass. 02173
Established 1969; 40 employees.
Offices: Lexington and Beverly, Mass., & Washington, D.C.
Curtis G. Emmons, mktg. mgr. (617) 862-6550

GRANAT DATA CORP.
2061 Broadway, New York, N.Y. 10023
Established 1972; independent contractor.
Lawrence B. Granat (516) 666-0321

GROUP/3
6399 Wilshire Blvd., Los Angeles, Calif. 90048
Established 1972; 7 employees.
Eugene H. Jacobs, exec. dir. (800) 421-0702.
A subscription service offering discounts on software and other products to its subscribers; yearly membership $240.

INFONATIONAL
1119 6th Ave., San Diego, Calif. 92101
Established 1969; 125 employees.
Offices in San Diego, Los Angeles, Chicago, New York, Dallas, New Zealand, and England.
Manny Funtall, dir. mktg. (714) 238-6344

INFORAMA
7 Rue Pasquier, 75008 Paris
Established 1968; 300 employees.
Offices in Paris, Lille, Lyon, Toulouse, Marseilles, Rouen, Brussels, Geneva, Zurich, Milan, and Munich.
Patrick R. Knight 265-48-65

INFORMATION PROCESSING & CONSULTING
Box 56, Hazel Crest, Ill. 60429
Established 1971; independent contractor.
James L. Waranius (312) 335-1810

K&H COMPUTER SERVICES, INC.
Box 1951, Titusville, Fla. 32780
Established 1969; 3 employees.
Tom Galloway, sales mgr. (305) 267-0476

NATIONAL ASSOCIATION OF IBM SYSTEM/3 USERS
1209 Valley Drive, Las Vegas, Nev. 89108
Established 1971
Chapters in U.S.A., Canada, Mexico, So. America
Irwin Cohan, pres. (702) 870-8114
A worldwide users' group of over 2,600 members. Software available only to members. Yearly membership $40.

PROGRAM GENERATION CORP.
15 Maple Place, Nutley, N.J. 07110
Established 1973, 6 employees
Robt. L. Rossi, pres. (201) 661-2777

QUAZELL TECHNICAL
4646 Cobb Drive, San Diego, Calif. 92117
Established 1968; 2 employees.
Ronald Webb, mgr. (714) 270-1653

RPG DATA SYSTEMS, INC.
1317 W. Olympic, Los Angeles, Calif. 90015
Established 1972; 6 employees.
Offices: Los Angeles and San Diego
Jim Mc Innis, vp sales (213) 381-3716

UNITED COMPUTING CORP.
22500 S. Avalon Blvd., Carson, Calif. 90745
Established 1963; 35 employees.
Offices: Carson, Cleveland, Boston, Edinburg, Paris, & Geneva
M. Leonard Simon, dir. mktg. (213) 830-7720

WALRUS CORP.
1935 West 38th Ave., Denver, Colo. 80211
Established 1970; independent contractor.
W. D. Walters (303) 433-2730 □

They're quiet about it,
but banks offering dp services have
the bulk of the business in some areas

Banks as Service Bureaus

by Edith D. Myers,
Los Angeles Bureau Manager

Although some bankers are reluctant to talk about it, it is a fact that data processing services offered by banks are widely used by and widely available to the small businessman and both the use and availability are growing.

The price is right because, in most cases, the banks' computers are already in place and "paid for" by the banks' own processing requirements. The sharing of something the bank has to have for its own operations also makes use of its data processing services convenient for the small businessman where the bank has far-flung branches.

The world's biggest bank, Bank of America with 1,029 branches, notes in all its literature on its data processing services that "there's always a Bank of America branch near your business." This is a big plus for a small businessman in an outlying area. He can drop off his data at night in a branch around the corner and pick up reports there the next day. The bank has to pick up branch data anyway. B of A even makes pickups by airplane from some of its more remote branches.

Another factor making use of bank dp services increasingly attractive to the small businessman is the changing payments mechanism and the move to direct deposit of payroll. Many local banking laws forbid payment of payroll by any method other than check or cash. These laws are a stumbling block to the spread of direct deposit on a nationwide basis, but most bankers see this coming within three years. And a side effect will be an inevitable growth of bank payroll services in spite of efforts of independent service bureaus to introduce legislation to prevent banks from offering them.

The changing payments mechanism will affect a lot more than payroll. For the retailers there's the prospect of tying point-of-sale terminals right into a bank dp system for instantaneous, automatic transfer of funds from a customer account to theirs. This is pretty futuristic right now and mainly in use only in experimental projects, but one bank, Valley National Bank of Phoenix, offers a version of this to small retailers as a practical matter.

Valley National has 1,800 customers for its dp services and 1,200 fall in the small to medium business class. For its heavy customer concentration in the retail field it takes entry nightly from punched paper tape from customers with NCR registers, and its system polls Singer terminals for other customers. These entries lead, in some cases, to automatic funds transfer. Ray Valour, sales manager for the bank's Business Services Div., said they can handle any kind of terminal and definitely are thinking now that direct on-line payments transfer is "coming soon."

Joe McGrath, assistant vice president and Southern California sales manager for Bank of America's Business Services Div., said his group is "taking a long hard look" at all point-of-sale terminals now available to be ready to provide on-line funds transfer "without being locked into any one type."

Being in California automatically puts B of A out in front in being able to offer automatic transfer services. The state's Special Committee on Paperless Entries (SCOPE) last October put a system on the air for exchanging paperless credits and debits among banks (see Nov. 1972, p. 155). When this happened B of A began offering its "Electronic Money Transfers" service. This provides automatic deposit of payroll and preauthorized debits and credits through B of A or other California banks via an automated clearing house.

Admittedly the bank has few customers for this service so far, and it offers as part of the service to assist the customer in developing a campaign to obtain authorizations for automatic transfer from employees, customers, and vendors, "for that's the hardest part."

Bank of America's major services, and those of most other banks, are payroll, accounts payable, and accounts receivable. It will add a general ledger service in the third quarter of this year. It also offers a Management Information Service which, utilizing data from one or more of the other services, will produce a variety of management reports for $15 apiece. B of A also offers a special billing service just for doctors and a freight payment service.

Biggest vendor

McGrath estimates that Bank of America currently is doing 69% of all the computer service business being done in Southern California. He names Security-Pacific National Bank and United California Bank as the closest runners-up. He said his bank's business services business "has doubled since 1966."

Bank of America processes about 1,000 payrolls in Southern California. Of these 19.9% are 1-15 man payrolls; 18.9%, 16-25; 30.2%, 26-50; and 11.1%, 51-75, for a grand total of 80.1% being payrolls with 75 or fewer employees. Banks generally charge from 30¢ to 35¢ per check for a payroll, and this includes figuring and filing

all taxes. McGrath said Bank of America had a big increase in business for payroll services when California started withholding state income taxes. "There's always a point at which it becomes too difficult for small businesses to do payroll themselves, and for many this was it."

Phoenix's Valley National has something it thinks is unique in an audio response billing service. It performs this service for retail stores of many types, but the big concentration is with doctors and dentists. The client uses a touch-tone telephone to key in a billing and gets an audio response verifying that billing and providing a total to date for that customer.

Valley National is a bank with $2¼ to $2½ billion in deposits. It is mainly the big banks that are strong in offering data processing services. A recent report by the technological market research firm, Frost & Sullivan, included a survey on dp expenditures and stated: "Almost all of the big spenders (more than $50,000/month) were in the $60 million to $200 million (deposits) bracket, and their large expenditures may be attributable to the fact that all offered outside edp services in addition to their in-house processing activities."

The same report noted that the percentage of banks offering outside edp services, 58%, "is most interesting in that it is significantly higher than most previous estimates concerning banks' offerings of edp services." It went on to note that there was a deliberate weighting in its sampling towards the large and medium sized institutions.

The soft sell

On the surface, most banks offering dp services do their marketing low key. You don't find them listed in the yellow pages under data processing services, and their listings under "banks" don't make mention of these services. Few do much advertising of the dp services. But they generally have aggressive marketing staffs which get the message across without advertising. Valour in his Business Services Div., of Valley National, has 30 sales people among a staff of 160.

B of A's McGrath has 16 salesmen covering Southern California. They are supported by some direct mail advertising, but McGrath said their best leads come from branch managers, who are encouraged to become active in local civic affairs and consequently make some good contacts. And the competition helps too, says McGrath. "Customers are getting more sophisticated. They want to compare. So the more people they talk to out there the more often I get called in, and there's plenty there for everybody." He said 38.1% of the business his office did last year was with customers who were brand new to the bank.

One of the newest bank-provided, dp-based services made available for small businessmen is Mark V, offered by Cleveland, Ohio, Union Commerce Bank since the first week in February. Mark V is a kind of money management system which provides financial planning tools, budget controls, a bill paying service, record keeping, and a reserve credit line.

Robert Girvin, the bank's marketing vice president, wouldn't say how many customers they have so far for Mark V, but he did say "we're pleased with the type of responses." He mentioned small chemical companies, "operations with branch type operations, two or three stores, for instance," and executives with a couple of businesses. He said he believes Union Commerce is the first to offer Mark V as they have packaged it, "although other banks offer various aspects."

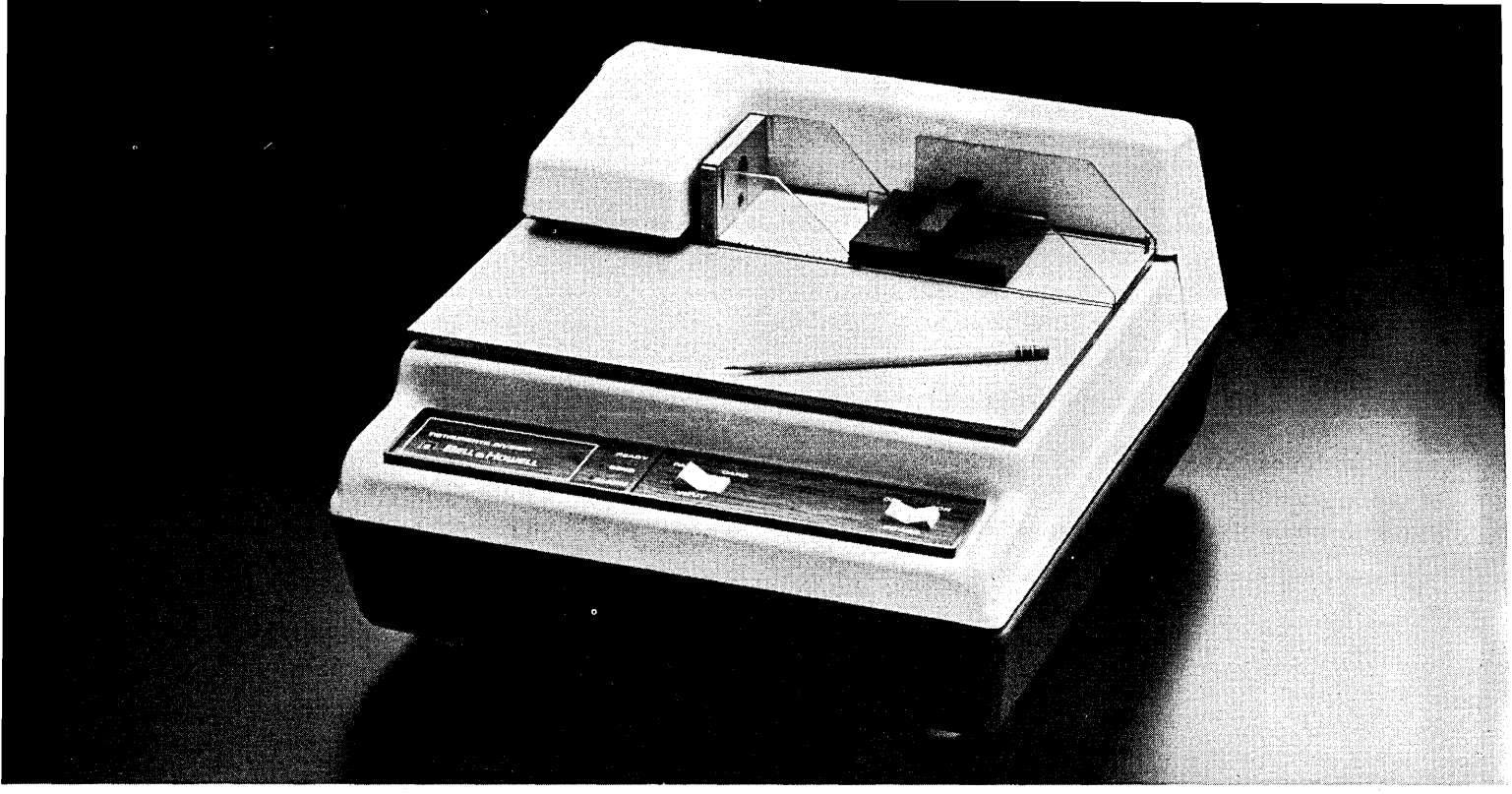
Mark V isn't exactly cheap. There's a $50 setup charge and a $15-a-month fee for 15 transactions, plus 38¢ for each additional item.

Bank dp services appear to be here to stay and grow. Some banks even market the services of service bureaus and turnkey type service organizations, and they have a value-added function in that the client has a one-source supply for banking and dp. Their low rates make them logical suppliers for some services, even for those small firms who have their own small computer systems. This is particularly true of payroll.

And the people providing and selling banks' dp services are beginning to change. Where once there were just bankers selling something they had to spare, now there are people hired because they have some knowledge of the problems of the people they are serving. At Valley National, the woman in charge of the billing service for doctors and dentists is a former office manager of a large clinic. McGrath said when he took over his present B of A job "they had mostly bankers selling the service." He's changed that. He likes to hire ex-Burroughs and ex-NCR salesmen because "they know systems *and* applications."

Ron Oakes of Pittsburgh National Bank, Pittsburgh, Pa., was one of those who was somewhat reluctant to talk about his bank's outside services, but he did say he thinks direct deposit of payroll "will be the thing." Oaks believes "it's up to the ultimate consumer . . . when he begins to feel his time has become so valuable that he doesn't want to make that trip to the bank . . . "

And this is what many banks are banking on. □



This little machine can help you "talk" to a computer without keyboard.

The Bell & Howell MDR Optical Mark Document Reader eliminates keypunch. Totally. Because it reads pencil-marked source documents and immediately converts this data to computer-compatible language. It works on-line or off. And, it can interface with any system you're designing.

Who's buying our MDR reader?

Who isn't buying would be an easier question. Texas Power & Light is using 51. And the American Stock Exchange bought 36. And Fisher Foods has 86. And, many of our customers are coming back with double quantity orders.

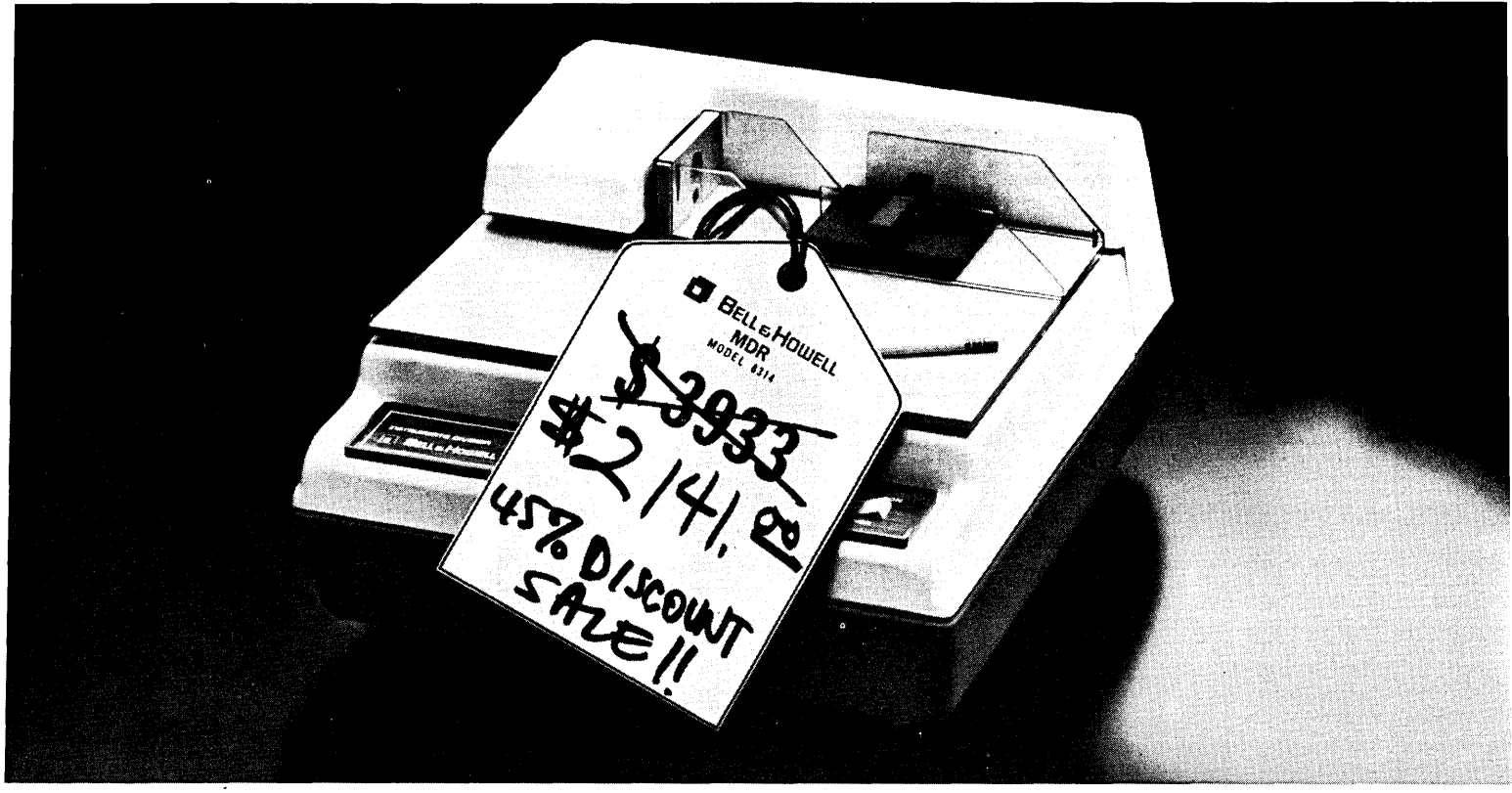
Why the interest in quantity orders?

The Bell & Howell MDR unit is the most successful reader in the business. Thousands are in operation today! And in almost every industry you can think of. Because its range and variety of application serve so many systems.

For instance: Our medical customers are using them for control system reporting; Our manufacturing customers are using them for inventory control; Our utilities customers are using them for meter reading; Our educational customers are using the MDR reader for attendance and grade reporting.

The damn thing works.

Our little machine doesn't care what business it's in. It will work for anyone. If your customer is marking cards the Bell & Howell MDR reader will help him get his information into any computer system without keyboard. Without error. And, without any nonsense.



Yesterday this machine cost $3933.

Today, if an OEM buys 31 or more, (model 8314) these incredible little machines will cost only $2141 each. A saving of $1792 per machine!

Has someone gone crazy?

Maybe, but that's for the courts to decide. What *is* important is our decision to accelerate the popularity of our readers by selling them to OEMs. Now *you* can convert existing systems to MDR readers or sell new systems with our MDR units. The demand is excellent. What we're doing is improving on the supply. Does *that* sound crazy?

Do we have a discount if you don't buy 31 units?

Absolutely! We'll give you a discount if you buy just two units, (not 45% but enough to make it worthwhile.) As a matter of fact, we've got a sliding scale discount up to 45% that covers purchases in lots between 2 and 30. On unit purchases of 100 or more we'll even negotiate discounts greater than 45%!

First come first served.

When you're hot you're hot. And our MDR reader is hot. So, maybe you should play it cool and be the first to call us collect (213-796-9381). Kind of makes you warm thinking about it, doesn't it?

BELL & HOWELL
WE'RE REWRITING THE BOOK.

Bell & Howell MDR. 360 Sierra Madre Villa, Pasadena, California 91109

With ten more companies in the market, the small business user has a wider choice of performance and price

Small Business System Suppliers

by Michael William Cashman, Products Editor

Since our survey of small business computers last year (see June, '72, p. 51), ten new sources for these systems have been found. We are happy to report that every firm in last year's survey is still in business, so there are now 27 companies that satisfy our criteria for being listed as a small buisness system vendor. Briefly, these criteria included the following points:

1. The hardware should be a general-purpose, user-programmable system capable of accessing at least 1 megabyte of information from a disc or drum. Also, the system must have a high-speed printer.

2. The software must include at least skeletal programs for doing payroll and typical accounting functions such as accounts payable, accounts receivable, inventory, and billing. Additionally, the system must be capable of sorting files stored on the disc or drum.

3. The vendor must be willing to provide the system on a turnkey basis, including installation and training. Finally, a system capable of running payroll must lease for less than $2K/month on a "best terms" type of contract.

These specifications are a general description of the IBM System/3 computer system, which is the most common small business system. In an untypical IBM announcement more than a year ago, T. Vincent Learson, then IBM chairman of the board, underscored the dramatic growth of the small business market by stating that more than 10,000 System/3s had been installed, little more than two years after its introduction. In addition to IBM, the 26 companies listed below offer products that perform approximately the same functions as the System/3. Between them, these vendors have several thousand systems installed.

One new system was introduced since last year's survey that may well be the class of the field. Any firm contemplating the acquisition of a small-scale computer would be doing itself a disservice were it not to at least evaluate the Burroughs B 1700. The computer is an engineering masterpiece—but that isn't the principal reason we're so high on it. We like it because so much technology and design theory have been blended into a product that promises users so much performance and convenience for the price. (For a description of this system, see August, '72, p. 98.)

Every vendor has something worth considering, however, be it price, technological innovation, proximity to prospective clients, or familiarity with specific types of applications. The home offices for all vendors are listed below. For more information on specific products, please circle the reader response number that appears at the end of each entry.

BASIC/FOUR CORP.
18552 MacArthur Blvd.
Santa Ana, Calif. 92707
FOR DATA CIRCLE 174 ON READER CARD

BEEHIVE MEDICAL ELECTRONICS INC.
1473 S. 6th West
Salt Lake City, Utah 84104
FOR DATA CIRCLE 175 ON READER CARD

BERG-HAUS CORP.
770 Washington St.
Holliston, Mass. 01746
FOR DATA CIRCLE 176 ON READER CARD

BURROUGHS CORP.
Burroughs Place
Detroit, Mich. 48232
FOR DATA CIRCLE 177 ON READER CARD

CASCADE DATA, INC.
3000 Kraft Avenue S. E.
Grand Rapids, Mich. 49508
FOR DATA CIRCLE 178 ON READER CARD

CLARY DATACOMP SYSTEMS, INC.
2021 Business Center Dr.
Irvine, Calif. 92664
FOR DATA CIRCLE 179 ON READER CARD

COMPURAND
130 E. 17th St.
Costa Mesa, Calif. 92627
FOR DATA CIRCLE 180 ON READER CARD

COMPUTER INTERACTIONS INC.
425 Northern Blvd.
Great Neck, N.Y. 11021
FOR DATA CIRCLE 181 ON READER CARD

CUSTOM COMPUTER SYSTEMS INC.
40 South Mall
Plainview, N.Y. 11803
FOR DATA CIRCLE 182 ON READER CARD

ELDORADO ELECTRODATA CORP.
935 Detroit Ave.
Concord, Calif. 94518
FOR DATA CIRCLE 183 ON READER CARD

FOCUS SYSTEMS, INC.
2103 Mannix St.
San Antonio, Texas 78217
FOR DATA CIRCLE 184 ON READER CARD

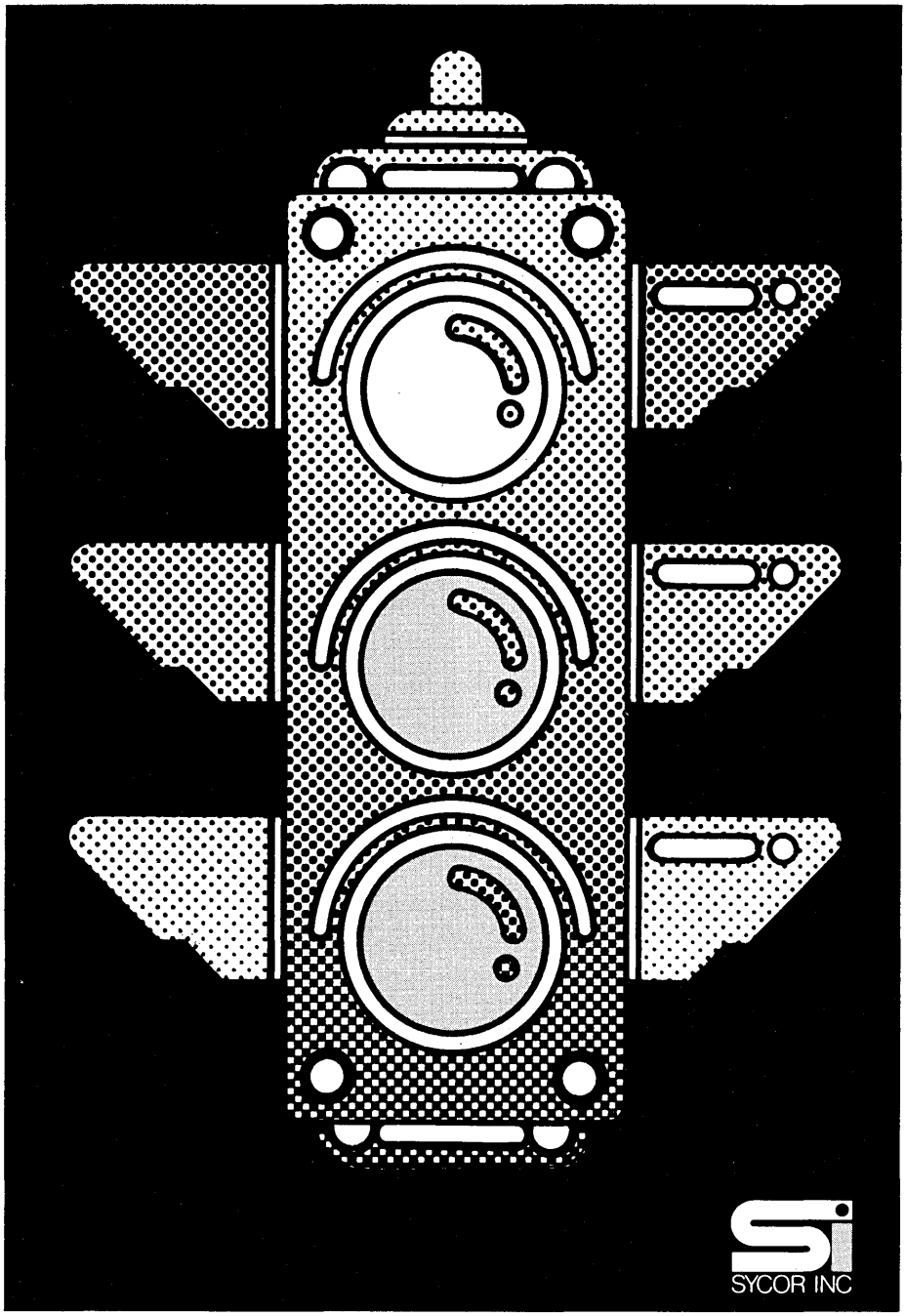
HONEYWELL INFORMATION SYSTEMS INC.
200 Smith St.
Waltham, Mass. 02154
FOR DATA CIRCLE 185 ON READER CARD

INTERNATIONAL BUSINESS MACHINES CORP.
Data Processing Div.
1133 Westchester Ave.
White Plains, N.Y. 10604
FOR DATA CIRCLE 186 ON READER CARD

LINOLEX SYSTEMS, INC.
5 Esquire Road
North Billerica, Mass. 01862
FOR DATA CIRCLE 187 ON READER CARD

MARTIN, WOLFE INC.
8369 Vickers St.

OUR INTELLIGENT TERMINAL DOESN'T ALWAYS DO WHAT IT'S TOLD.



Our intelligent communications terminal, the Sycor 340, can be very obstinate.

Like the times an operator inadvertently enters the wrong data.

Perhaps she omits an entry. Or tries to enter a number that doesn't pass the range check.

An alarm buzzes, the keyboard goes dead, and the entry that's incorrect blinks on and off.

Your operator corrects it on the spot. And you save time and money.

And when she's got the clean data ready, the 340 can transmit it unattended at 1200 to 4800 baud speeds.

But clean source data entry isn't the only advantage of an intelligent communications terminal.

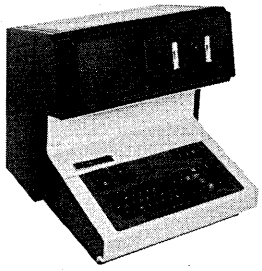
The 340's 8K bytes of programmable memory, and our special terminal application language (T.A.L.), make our terminal putty in your hands when it comes to tailoring it for specific applications.

And with capabilities like customized field validation, conditional data entry and arithmetic operations, you've got the tools you need to tackle applications you may not have had in mind when you first leased it.

Our intelligent terminal has some pretty smart peripheral equipment, too. Like remote printing capability from 30 cps to 300 lpm.

Before you lease, check into our intelligent terminal that doesn't always do what it's told. More than 6,000 Sycor terminals are now being obstinate in 33 countries around the globe.

And you'll find a world of uses for them right at home.



SYCOR

Corporate Offices: Ann Arbor, Michigan 48104 (313) 971-0900. **District Sales Offices:** Atlanta (404) 262-2162 • Boston (617) 890-7290 • Chicago (312) 986-1833 • Cleveland (216) 831-8625 • Dallas (214) 521-6710 • Detroit (313) 522-0080 • Houston (713) 688-5224 • Los Angeles (213) 640-0120 • New York (212) 371-9050 • Philadelphia (609) 665-1170 • Pittsburgh (412) 922-3350 • San Francisco (415) 349-6626 • Washington (703) 525-7300. **In Canada:** Sycor International Ltd., Toronto (416) 429-0883. **Service Centers in 76 cities.**

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MOBYDATA, INC.
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New Hartford, N.Y. 13413
FOR DATA CIRCLE 190 ON READER CARD

THE NATIONAL CASH REGISTER CO.
Main & K Streets
Dayton, Ohio 45408
FOR DATA CIRCLE 191 ON READER CARD

NATIONAL INFORMATION SERVICES, INC.
675 Massachusetts Ave.
Cambridge, Mass. 02139
FOR DATA CIRCLE 192 ON READER CARD

QANTEL CORP.
3474 Investment Blvd.
Hayward, Calif. 94545
FOR DATA CIRCLE 193 ON READER CARD

RCS DATA SYSTEMS
Post Office Box 94
Lathrop Village, Mich. 48076
FOR DATA CIRCLE 194 ON READER CARD

RPG DATA SYSTEMS
1317 W. Olympic Blvd.
Los Angeles, Calif. 90015
FOR DATA CIRCLE 195 ON READER CARD

SEARCH COMPUTER SYSTEMS
111 Ash St.
East Hartford, Conn. 06108
FOR DATA CIRCLE 196 ON READER CARD

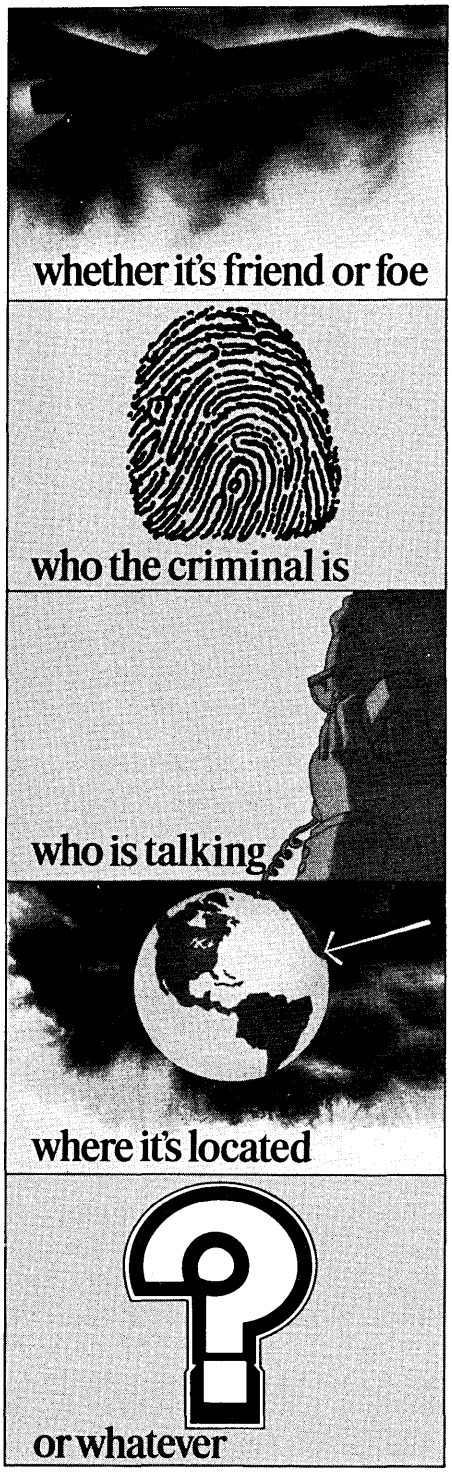
THE SINGER CO.
Business Machines Div.
2350 Washington Ave.
San Leandro, Calif. 94577
FOR DATA CIRCLE 197 ON READER CARD

THE SYSTEMS CORP.
1441 Kapiolani Blvd.
Honolulu, Hawaii 96814
FOR DATA CIRCLE 198 ON READER CARD

ULTIMACC SYSTEMS, INC.
9 Brook Avenue
Maywood, N.J. 07607
FOR DATA CIRCLE 199 ON READER CARD

UNIVAC DIV.,
SPERRY RAND CORP.
Post Office Box 500
Blue Bell, Pa. 19422
FOR DATA CIRCLE 200 ON READER CARD □

Nothing matches Staran for matching. It can tell you in micro-seconds:



Goodyear's STARAN™ associative array processor has no match for correlation capability. Its true-content addressibility (matching data in memory) allows STARAN to search its entire memory in micro-seconds to match given data. Correlation of radar or infrared signatures, map areas, fingerprint files, waveforms from voiceprints, EKG's, etc., are all possibilities. There are more.

STARAN is not everyman's computer. But for those who have problems that require high speed searching of a dynamic data base—or those whose problems require high speed operations on similar data streams—the STARAN associative array processor may very well be the most cost-effective solution.

STARAN is a combination system that does both associative array and sequential processing. It can be added to your system or used in new system developments.

A minimum basic STARAN system sells for as little as $250,000 and software costs can be reduced to one-third of amount required for a conventional system.

Goodyear invites you to try your system problems on the STARAN Evaluation and Training Facility at our plant in Akron, Ohio. See for yourself how STARAN can handle your specific data processing problem.

For more information, or to plan a demonstration, write: STARAN Marketing, Department 920, Goodyear Aerospace Corporation, Akron, Ohio 44315. Or call (216) 794-3631.

GOODYEAR
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Introducing Bruning. The bold new force

The Foundation

For years, Bruning has been coming up with better ideas and products for engineering graphics. That's the Bruning tradition. Now, this pattern of leadership has put us in a front-running position to supply micrographics systems for the general business market.

The evolution was natural enough: our big specialty for many years has been the diazo coating process for efficient, high-quality document reproduction. This led us to significant achievements in dry diazo microfilm for image duplication. Today's Bruning diazo film is easier to use than silver halide film, images have better resolution, costs are lower, and through-put time is sharply reduced.

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Bruning several years ago began development of a series of advanced machines for producing hard copy from microfilm. To accelerate our expansion into micrographics, we have recently acquired the Microfilm Division of Kleer-Vu Industries, an acknowledged leader in the field.

Our Bruning machines now being released, combined with Kleer-Vu's complementary machines and broad line of software, give Bruning a major capability in microfilm systems for information distribution.

Ingredients of Our Systems Capability

First, of course, there's the great Bruning dry diazo microfilm. Next, a remarkable range of enlargers, duplicators, printers, readers, and collators —for use with roll film, fiche, or aperture-card formats. Many of these machines perform several functions in space-saving, time-saving, cost-cutting combination.

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But hardware and software don't develop efficient micrographics systems. People do. And, traditionally, that's where Bruning excels. Bruning Micrographics System Specialists are in place now across the country to serve you —along with the broadest network of sales and service people in the business.

So if you are already in micrographics, or feel you are ready to take advantage of this advanced method of information distribution, call your local Bruning Sales Office today. We have lots to show you. Bruning, 1834 Walden Office Square, Schaumburg, Ill. 60172.

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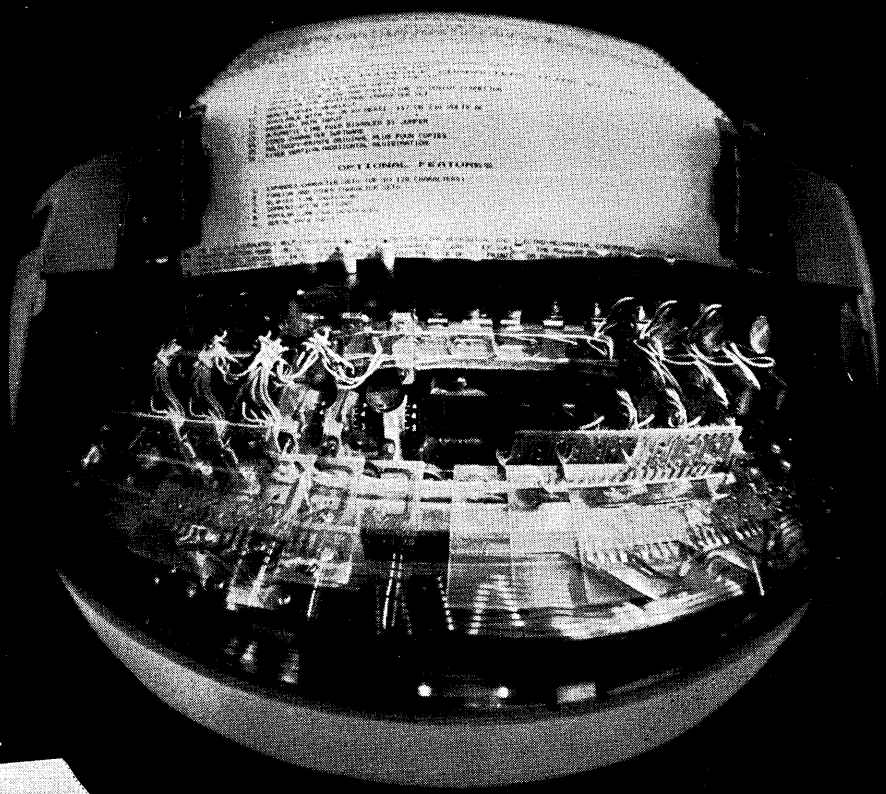
Our first printers, at 165 char/sec, are the best selling medium-speed printers. Anywhere.

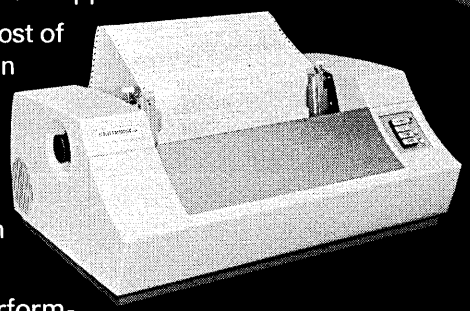
Now, Model 102A, at 330 char/sec, doubles the speed. Priced at $4,635, it costs 12% more than our 101A. Or 18% more than our 101.

This 132 column printer achieves 125 lines/min with bi-directional printing. Two print heads operate in unison, each traveling half the width of the paper, then printing in reverse on the next line. Thus, there's no carriage return.

A 9 x 7 dot matrix serial impact printer, you get an original and four clear carbons—and most of the line being printed is visible at all times. You can add lines of boldface on command. And interfaces are available for a wide variety of systems and data communications applications.



About reliability. Most of the same field - proven modules from our other printers are used in the 102A. And thousands of them are in operation around the world.



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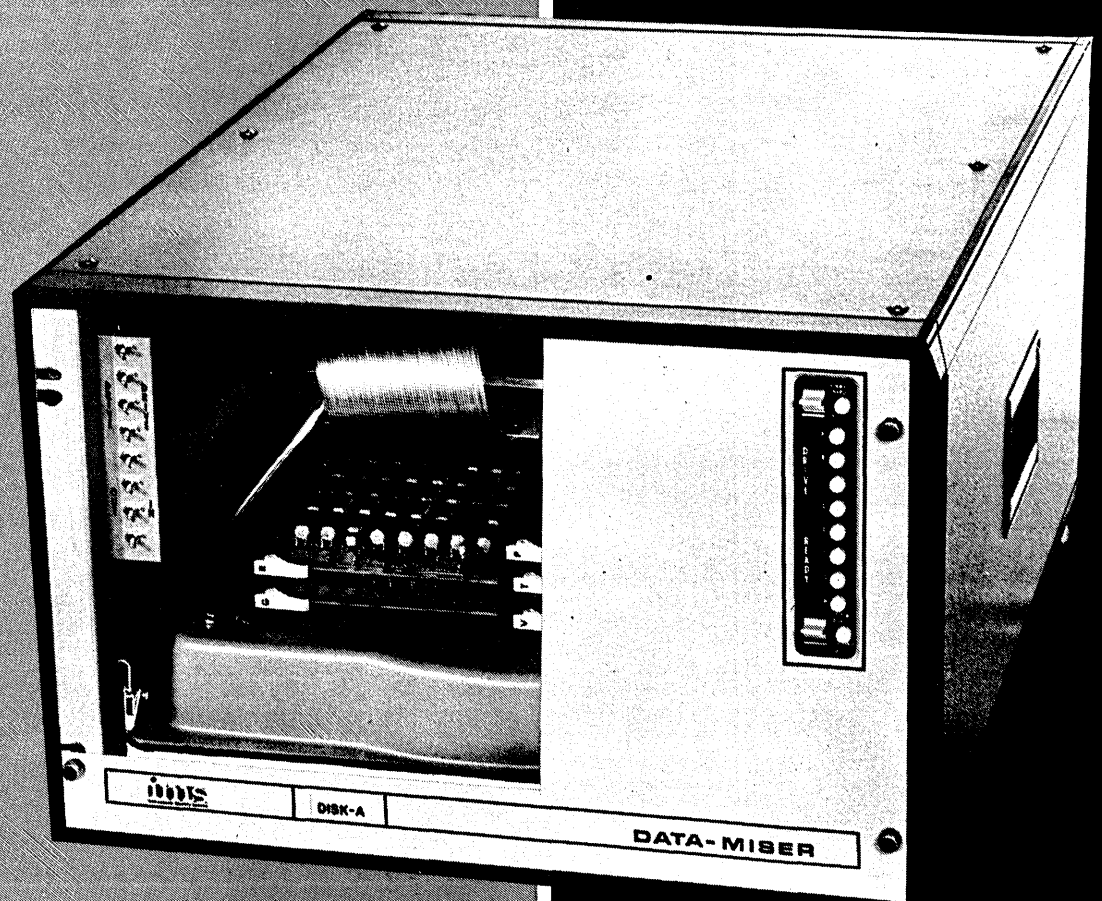

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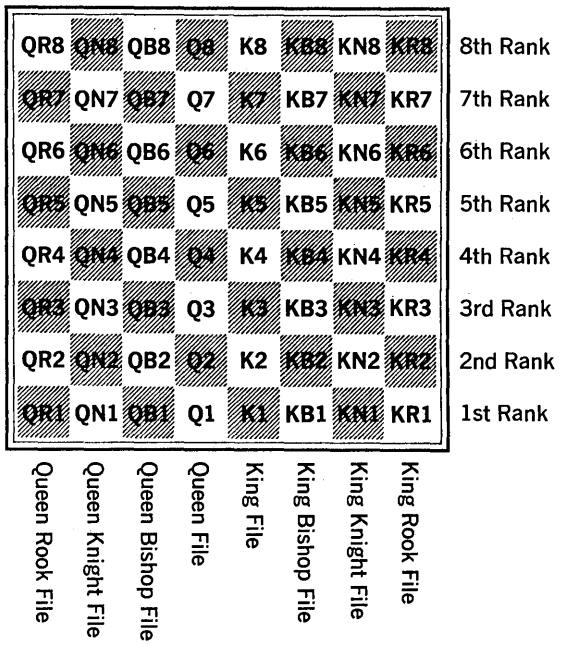


At left, a basic chess notation for White's moves only. Black's moves are the reverse making the eighth rank for White the first for Black.

Some chess programs have earned a rating of Class C but they lack the human ability to screen out uninteresting lines of action without careful analysis

Key to other abreviations used in this article:

X = capture
– = moves to
ch = check
e.p. = capture in passing
o-o = castling; with King's Rook in the game.

Can a Computer Beat

"In Computer Chess, Blunders Help, Too," "Analysis Puts Fischer Ahead of IBM," "CDC 6400, R-B4ch," "The Computer was a Fish," "Printout for a Pawn." These are some of the titles of articles which appeared in the *New York Times, Newsweek, Analog* science fiction magazine, *Midwest Magazine* of the *Chicago Sun-Times,* and newspapers across the country. From Chicago's public broadcasting tv station, a terminal communicated moves from the 19th game of the Fischer-Spassky match to Northwestern University's CDC 6400 for analysis by CHESS 3.6, the computer program that had just won the ACM Computer Chess Championship for the third consecutive year. Computer chess was national news. The question at the top of every reporter's note pad was: "Can a Computer Beat Bobby Fischer?"

This same question dominated a panel discussion which I chaired at ACM '72, the annual conference of the Association for Computing Machinery in Boston. This panel brought together some of the programmers who had entered the ACM '72 computer chess championship.[1] The panel discussed those capabilities which a program would have to exhibit before it had any chance of playing master-level chess. The topics discussed included strategy vs. tactics, learning and advice taking, and creativity. Before reviewing the panel's discussions, it is of interest to report on what the press has been saying about computer chess and to summarize the current state of the art in chess playing programs.

Press comments

In the August, 1972, issue of *Analog,* Mr. George Martin, a former Northwestern Univ. student and member of its chess club, delightfully recounts the history of the development of the reigning computer chess champion, CHESS 3.6 of Northwestern Univ. He begins:

"Once upon a time there was a fish. A most unusual fish, worth several million dollars. It lived in a one-story building with a grass-covered roof on the campus of Northwestern University . . .

"Most people would have called the fish a computer. To be precise, they would have called it a Control Data Corporation (CDC) 6400.

"It was a CDC 6400, of course. But it was also a fish.

"A fish, you see, is a chess player. A bad chess player. The title is awarded by other players when one of their peers exhibits a singular skill in losing chess games. Popular synonyms are "patzer" and "meatcake."

"And Northwestern's CDC 6400 was a chess player. A bad one. A fish. During years of tournament play, the machine earned the title not once, but several times. A whole legion of human opponents regularly blasted the machine off the board.

"Then, one day during the summer of 1970, the fish became a champion.

"It happened in New York City, during the twenty-fifth annual convention of the Association for Computing Machinery (ACM). Meeting at the New York Hilton Hotel, the ACM decided to enliven its proceedings with the world's first all-computer chess tournament . . . "[2]

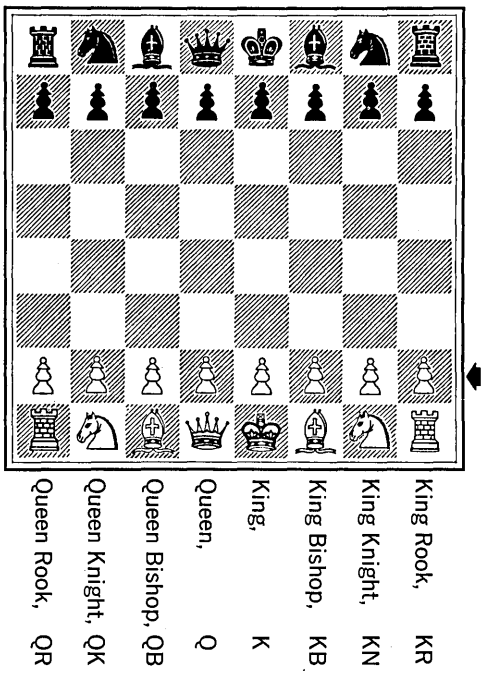
Northwestern's program won again at ACM '71 in Chicago and at ACM '72 in Boston. Computer chess had come of age (due, no doubt, to the "other" chess championship taking place in Iceland). In the *New York Times* the famous chess player, Sammy Reshevsky, published an analysis of the final tournament game between CHESS 3.6 of Northwestern and one of the runners-up, TECH of Carnegie-Mellon. Part of Mr. Reshevsky's analysis is reprinted below (with the game score), since it gives the flavor of computer chess as viewed from the vantage point of an international grandmaster and a former U.S. Chess Champion:

"The computer chess match in Bos-

[1] Members of the panel were David Levy, an international chess master who ACM had invited to be the tournament director, and program authors: Monroe Newborn and George Arnold of Columbia Univ., Edward Kozdrowicki of the Univ. of California at Davis, David Slate of Northwestern Univ., Franklin Ceruti of the U.S. Air Force, Albert Zobrist of the Univ. of Southern California, James Gillogly of Carnegie-Mellon Univ., and Bruce Leverett of Harvard University.

[2] Martin, George R. R., "The Computer was a Fish," *Analog,* August 1972, pp. 61-74.

At right, the opening position in all games of chess. White always moves first.



Reading from left to right:

Queen Rook Pawn,	QRP
Queen Knight Pawn,	QNP
Queen Bishop Pawn,	QBP
Queen Pawn,	QP
King Pawn,	KP
King Bishop Pawn,	KBP
King Knight Pawn,	KNP
King Rook Pawn,	KRP

Bobby Fischer?

by Benjamin Mittman

ton proved one thing: computers have a long way to go before they become international grandmasters. But their game was an interesting experiment nonetheless.

"At the opening, TECH's reply to CHESS 3.6's first move of P-K4 was P-K4. An irregular variation of the Ruy Lopez then developed . . .

"TECH was saddled with two doubled pawns in the end game. CHESS 3.6 pressed its advantage reasonably well.

"CHESS 3.6 displayed good judgment on its 18th turn when it recaptured the rook with its knight instead of its own rook, realizing that the knight could be better utilized at K3 than at QB3.

"White's 20 P-KB4 was a mechanical but useful stroke. It threatened to win the bishop with P-B5ch, and TECH, seeing it, moved its king away.

"White's 25th move, R-B2, protected his queen rook pawn. How did CHESS 3.6 ever see that it was attacked by black's rook? TECH slipped on its 27th move when it advanced its queen bishop pawn. Correct was 27 . . . P-R3 with an even position.

"White's 28th move, N-Q5, was a star move for a computer. Black's position was untenable from here on. TECH's 30 . . . P-KR4 was a good try but insufficient.

"White's 33 P-KR6ch, on the other hand, was a computer stroke of genius! Of course, 33 . . . KxP; 34 RxPch would have finished it off right there. White was really concentrating when it played 34 P-R5ch.

"After 35 RxP, TECH could have resigned, but being a good computer it fought until the bitter end."[3]

The game in Boston

	CHESS 3.6 White	TECH Black
1	P-K4	P-K4
2	N-KB3	N-QB3
3	B-N5	N-B3
4	O-O	B-B4
5	N-B3	P-Q3
6	BxNch	PxB
7	P-Q4	PxP
8	NxP	O-O
9	B-N5	B-KN5
10	Q-Q3	BxN
11	QxB	R-N1
12	BxN	QxB
13	QxQ	PxQ
14	P-QN3	R-N5
15	P-KR3	B-K3
16	P-N4	R-Q5
17	QR-Q1	RxR
18	NxR	K-N2
19	N-K3	K-N3
20	P-KB4	K-N2
21	K-N2	R-QN1
22	K-KB3	R-QN4
23	P-QB4	R-QR4
24	P-KB5	B-Q2
25	R-B2	R-K4
26	R-Q2	P-QR3
27	P-KR4	P-QB4
28	N-Q5	B-QB3
29	NxQBP	BxPch
30	K-B4	P-KR4
31	PxP	P-QR4
32	RxP	BxP
33	P-R6ch	K-KN3
34	P-R5ch	KxP/4
35	RxP	R-K7
36	KxB	R-KB7ch
37	K-K5	R-R7
38	N-Q5	K-N4
39	N-B3	R-R5
40	RxP	KxP
41	N-K4	R-R4ch
42	K-Q6	K-N3
43	R-QR7	P-R5
44	RxP	K-B2
45	R-R7ch	K-N3
46	P-R4	R-B4
47	P-R5	R-B6
48	R-QN7	K-B4
49	NxP	R-B6
50	P-R6	R-R6
51	P-R7	Time forfeit

(See diagram page 86)

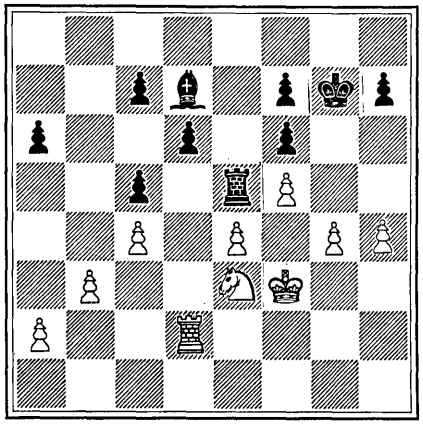
[3] Reshevsky, Samuel, "Analysis Puts Fischer Ahead of IBM," *New York Times*, Aug. 18, 1972.

Review of the programs

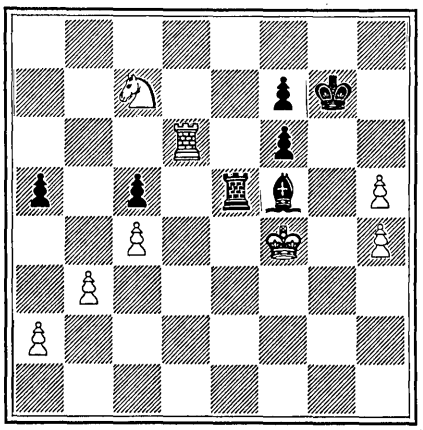
What is the strength of today's chess programs? The chess programs entered in the ACM '72 tournament ranged in playing strength from Class C (approximately 1,550 U.S. Chess Federation points) to Class E (below 1,000 USCF points). Thus they are obviously not a threat to a player like Bobby Fischer, whose USCF rating is over 2,800. Detailed descriptions of some of the programs entered in the 1971 and 1972

tournaments can be found in the *Proceedings of ACM '71*[4] and in a brochure which was distributed at ACM '72.[5]

The programs generally utilize the logic which was first proposed by Claude Shannon in 1950.[6] Shannon introduced the use of the minimax algorithm to search a tree of legal moves at any position in a game. The programs utilize alpha-beta pruning and various forward pruning techniques to reduce the time required for tree searching. The net effect of pruning methods is to cut down the large number of inferior lines which one would have to examine if no special steps were taken in the minimax tree search procedure. These techniques allow larger trees of moves to be examined than were possible with the earlier chess-playing programs.



Position after move 27; P to KR4, P to QB4.



Position after move 32; RxP, BxP.

Different evaluation functions are used to order legal moves into a sequence of ranked moves for candidates to be analyzed in the minimax procedure. The evaluation functions consider such factors as material on the board, enprise pieces, pinned pieces, control of the center squares, pawn structure, castling status, king safety, etc. The programs carry on analysis to tree depths of from three to eight or more half moves. The variations in tree search logic and in the complexity of the evaluation functions used by the programs result in vastly different numbers of end positions in the trees being analyzed. For example, CHESS 3.6 normally considers about 10,000 end positions per move, due to its fairly sophisticated evaluator, while TECH's search strategy can result in as many as 500,000 end positions in the move analysis tree, due to its simple terminal evaluation function and efficient move generation.

The Univ. of Southern California (USC) program, which entered the computer chess championships for the first time in Boston, utilizes a different logic in performing positional evaluations. A so-called "pattern recognition" approach is used. The authors of the USC program developed a set of 45 patterns; for example, a pattern to detect all instances of white pieces which attack black pieces or which can move to attack black pieces. These patterns are then used to analyze a position and to provide relatively simple criteria for move selection and evaluation during the tree search process. The authors of the USC program feel that their pattern recognition approach is a major step forward in facilitating "advice taking" by a chess program, i.e., the ability of a program to assimilate chess playing heuristics. Chess playing has evolved over centuries. New ideas are constantly being introduced and analyzed. The USC approach is to use a pattern recognition technique to permit a chess master to "teach" a program basic tactical or strategic ideas in chess. More will be said about this later in the discussion of the panel.

The logical structure of the current collection of chess programs has been an important limiting factor in their development into effective chess playing automata. The structure of an evaluation function driving a tree search, minimax process for move selection has produced programs which play tactically sound chess. The better programs do not blunder in the obvious ways that average human players do. The programs do not fall victim to: "Oh, I didn't see the bishop on that diagonal" or "I didn't see that the pawn was able to fork my knight and rook." Since the better programs evaluate every possible move, at least at the first level of tree search, most tactical blunders are avoided.

Many of the programs utilize stored libraries of "book openings," so that opening play is also reasonable. They are generally limited to a relatively small set of the most studied and published opening variations. As soon as a move is made which switches out of "book," the programs are on their own, being supported only by the collection of chess heuristics which have been built into their evaluation procedures. Beyond the rote "learning" of openings, some of the programs have utilized other primitive types of "learning" algorithms. These permit certain exceptionally good or poor moves to be stored and, hopefully, retrieved when the proper situation arises in future games.

Most of the programs which competed in Boston are inept in playing end games, even though their middle game play is reasonable. This is because, in the end game, the chess heuristics needed for successful completion of a game are very dependent upon the remaining pieces on the board. In effect, the program would have to invoke one of a series of possible evaluation functions, for say a rook-king end game, two bishops end game, etc. To improve end play, some of the programs have been designed to modify evaluation parameters dynamically when it is determined that an end game has been reached. But most of these attempts at effective end game play have been very primitive. The COKO III program of Bell Labs utilizes a sophisticated MATER routine which can recognize a fairly large class of mating threats and press forward through the correct set of moves to achieve checkmate.

All of these features are, of course, necessary components for playing master-level chess. However, they are not *sufficient*. The panel discussion at ACM '72 was organized to examine both the necessary and sufficient conditions for developing a master-level chess program.

The panel discussion

In addition to the panel members mentioned above, we were fortunate to have an audience which contained people who were interested in the subject and who had worked on these and related topics. Among them was Dr. Arthur Samuel of Stanford and formerly of IBM who is the developer of the world famous, master-level checker playing program.[7] The issues discussed in the panel included strategy vs. tac-

[4] "Computer Chess Programs (Panel)," *Proceedings of the 1971 Annual Conference, Association for Computing Machinery*, Aug. 3-5, 1971, pp. 97-102.

[5] "Computer Chess Programs," Printed brochure distributed at ACM '72, Boston, Aug. 15, 1972.

[6] Shannon, Claude, "Programming a Digital Computer for Playing Chess," *Philosophical Magazine*, 41, 1950, pp. 256-275.

[7] Samuel, A. L., "Some Studies in Machine Learning Using the Game of Checkers. II—Recent Progress," *IBM Journal of Research and Development*, Vol. 11, No. 6, November, 1967, pp. 601-617.

tics, learning and advice taking, creativity, and the value of game playing research.

As indicated earlier, the better programs are usually tactically sound. They do not blunder in obvious ways; they do not fall prey to simple "cheap shots"; they can even produce an occasional "brilliant" move (see move 33 P-R6ch in CHESS 3.6 vs. TECH above). They accomplish this by applying effective chess knowledge while evaluating a position and following the consequences of these evaluations to five, six, seven or eight ply in their tree search. But what about chess strategy?

Can the program "decide" on mounting a queen-side attack with a pawn storm after having first prepared the ground with knight migration to the queen side and by opening an appropriate file for the eventual doubling of rooks? Can the program divert attention from a strong point which it eventually "plans" to occupy by creating pressure first on some other portion of the board? The current crop of programs cannot do these things.

When the program moves a knight to B3, it does so because the book opening dictated that move or because the evaluator highly valued a move that attacks the central squares. To retreat this knight for strategic reasons requires a level of analysis that transcends pure tactics. It would require that a strategic analyzer be invoked when the tactical analyzer finds no sufficiently strong moves to "suggest." This should be done. But, to date, it hasn't been done.

The panel members agreed that strategic play is an absolute necessity for master-level chess. Little progress has been made yet since all of the programmers have been busy producing programs that play reasonably effective tactical chess. But strategy is not all that is required to beat Bobby Fischer, or any other master or grandmaster, for that matter.

Learning and advice taking

To play master-level chess, a program must be "taught" or must "learn" tactics and strategy, openings, end game play, fundamental positional ideas, king safety, pawn structure, zugzwang, etc. During the panel Dr. Samuel stated that he would have liked to have had a checkers master *teach* his program if he had an adequate means of allowing the master to *communicate* with the program. Unfortunately, his program and most of today's chess programs must be communicated with through some programming language.

Dr. Zobrist and others on the panel felt that the pattern recognition approach being taken at USC offers such a possibility. Charles Kalme of the USC team is a master-level chess player, but not a programmer. He was able to utilize the pattern language available in the USC program to input the 45 patterns which were used at ACM '72. Unfortunately, USC only won one game in Boston. However, the consensus of the panel was that the play of the USC program would improve considerably with a larger repertoire of patterns. Rather than "learning," Dr. Zobrist referred to this mode of pattern processing as "advice taking." David Slate of Northwestern (with an "expert" USCF rating) felt, also, that substantial improvements to Northwestern's program must await a more effective procedure for inputting chess heuristics—for advice taking.

Creativity

David Levy was skeptical of the claims that a chess playing program could beat him in a match by 1978 (he has put £1000 behind this skepticism in bets with four computer scientists). He conceded that strategic play could be implemented. He agreed that improved advice-taking procedures and pattern processing could improve play beyond the current Class C level. However, Mr. Levy doubted that master-level chess could be achieved. The issue of creativity was brought up—a topic of current interest, since Bobby Fischer and Boris Spassky were demonstrating creativity across the chess board in Reykjavik.

One might define creativity at the chess board as a process in which surprising, unorthodox, unexpected, and new moves are made which prove to be strong after further play and/or further analysis. The problem with today's computers and computer programs is that they are unable to "see" the potentially interesting patterns without deep analysis. The capacity of the human chess master to screen out uninteresting lines without careful analysis, i.e., the ability for *gestalt* pattern recognition, is a difficult barrier for computers to overcome.

David Levy contended that no program could display creativity, when looked at in this way. However, David Slate said that he believed that computer algorithms will be developed to detect the kinds of features and combinations of features of board positions, whose recognition will enable the computer to select creative, deep and ingenious moves with an efficiency approaching that of a chess master. The question of creativity in chess playing is thus one large unknown in discussing the question of whether a computer can beat Bobby Fischer.

Value of research

One final subject which interested the panel, but which has little to do with the subject of this paper, concerned the value of game playing computer research. This was not a question that really concerned the authors of the programs, since all of them would tell you that they have put all those man-years into writing chess programs because it is fun. Dr. Samuel urged them to continue their efforts because he feels that solving chess playing or checker playing problems is one step toward solving even more difficult problems. He personally has moved on to research in speech recognition. Speech recognition must deal with far more complex patterns, far more complicated decision trees, and far more varied cognitive environments than any game. But progress in the development of tree searching algorithms, pattern recognition, decision making, and other techniques in artificial intelligence research is sure to further progress in speech recognition.

Conclusions

The annual ACM chess tournament has generated enormous interest in the public press—helped, of course, by the Fischer-Spassky world championship. The authors of the programs are intent on improving the level of play of their programs; however, some of them feel that the end of the road has been reached using the Shannon structure. Thus future efforts will be directed toward the areas discussed in the panel. As a result, it appears that a new era in computer chess playing research has begun. David Levy will probably win his bets, but there are many computer scientists who would answer the question "Can a Computer Beat Bobby Fischer?" with "Maybe." However, not many of them are willing to answer the next logical question: "When?" □

Prof. Mittman is an associate professor of computer sciences and director of the Vogelback Computing Center at Northwestern Univ. He and Prof. Monty Newborn of Columbia Univ. have organized the annual ACM computer chess championships for the past three years. Prof. Mittman will chair another panel of chess programmers at ACM '73, to be held in Atlanta in August.

The lack of dp controls and auditing procedures must be taken seriously

Equity Funding: Everyone Is Pointing at the Computer

by R. A. McLaughlin,
Associate Editor

The words "computer fraud" lept into print on newspaper front pages early in April in the wake of the celebrated Equity Funding Life Insurance scandal. The company is said to have been keeping two sets of books for several years and selling bogus life insurance policies to firms in the "reinsurance" business. Of the 97,000 policies that made up the $3 billion worth of business EFLIC claimed to have in force in March, something less than 34,000 of them were real. The other 63,000 or so were falsified records, some of which were supported by fake policy applications and some of which existed only on tape files in the computer room of the parent company, Equity Funding Corp. of America.

Data processing professionals were quick to scoff at the idea of a "criminal computer," but some others took the headlines literally, as illustrated by a class action suit filed in Los Angeles against Equity Funding, IBM, and several thousand unknown defendants. The suit contends:

> "That defendants, and each of them, so carelessly, negligently and wantonly designed, constructed and manufactured said data processing equipment that said equipment could be used for any business for the purpose of defrauding the public, of which plaintiffs are members; that there is no method available to prevent the insertion of false and fraudulent material in the computer print outs and no method to discover the insertion of false and fraudulent materials in a program otherwise legitimate."

In that it extends the definition of "general-purpose computer" to include fraud, the complaint is humorous. On the other hand, that "legalese" that implies a lack of dp controls and dp auditing procedures is an indictment of the whole dp industry and must be taken seriously if we are to prevent a recurrence of the scandal.

It will take several months to unravel what happened at Equity, even though two large accounting firms (Touche Ross & Co. and Ernst & Ernst), the FBI, and both California's and Illinois' Departments of Insurance are working on it. (Both California and Illinois are involved because the life insurance subsidiary was chartered in Illinois, while corporate offices and the computer facility are located in Los Angeles' plush Century City.)

"The computer was an integral part of the whole scheme," said Tom Conneely, assistant chief deputy director of the Illinois department. "Without it they probably could not have carried it off because it enabled them to bury the phony business." To illustrate, he said: "We know there was a special code (for the bogus business); when it was shown to the people in accounting, it was unfamiliar to them." He also implied a special handling of the business once it was on a file. "At billing time, the machine skipped phony policies. It had to. The people (who were supposedly the insured) didn't exist."

What happened to the files?

What most likely happened at Equity was that an actuary or other dp user was allowed access to the live master file of insurance policies to use as test data with a "Model Office" program to simulate the operation of the Equity Funding Life Insurance Co. in coming years. He used existing records to generate volumes of "test" data that somehow became "real" input to later master file updates.

The major difference between the old legitimate records and the newly manufactured records was that a special department number was assigned (in this case department "99") that caused the records to be skipped over when it came to the billing cycle.

In most cases the fake records did not have to be supported by real paperwork. If an auditor ever asked to see the policy application, medical history, or other papers, he was put off long enough for someone within the company to generate some for him. Ronald Secrist, an ex-assistant vp for the firm, told about "fraud parties" for the production of such physical records when he broke the story. The atmosphere of the party he attended was "real happy," he was quoted as saying. "People would joke around, and we'd make up funny

names for doctors. . ."

There was even an office in another building where a staff of people were supposed to be involved in the production of new policy applications.

Also, should an auditor have requested a written confirmation from a policy holder, the Equity staff "helped" him by providing names and addresses "at random" from the files. The "random" names turned out to be other loyal employees, the story goes, who dutifully filled out the forms and returned them to the auditor.

How did they get away with it?

To appreciate how this might have all gone undetected requires some understanding of Equity's data processing operation. First, the dp department was a young one, established in 1969. As the company grew in "sales" and "revenue," the dp group was hard-pressed to keep up. Bill Gootnick, Equity Funding Corp. vp for management information systems, told us: "You cannot compare it to old, established insurance company dp departments that have evolved over the years. The oldest system we have may be three years old."

Gootnick bristles over statements that the dp operation lacked controls. "The Equity data processing division had the same controls that most installations our size would have had, including programmer project control, file retention, and report balancing. We're no different than 90% of the shops around." His claim suggests the biggest reason why the dp industry must study the Equity story.

The department is actually a division of the parent company rather than part of the life insurance subsidiary. It had a staff of about 75 and a 370/145 which it ran in an open-shop service-bureau environment serving about 100 Equity organizations, including several in the life insurance subsidiaries. The actuarial department of EFLIC, responsible for such things as annual reports, was just another open-shop user. The dp staff screened run requests for legitimate account numbers to charge for the processing, then simply performed the services requested. (The life insurance subsidiary also had a System/3, which was not under the control of the dp department.)

As soon as the state insurance regulators stepped into the operation, on March 30, both the 145 and the S/3 were shut down for a time. Data processing people began to feel the heat, and two of them, Frank Hyman (manager of systems and programming) and Bob McGindley (a manager of financial systems), took it on themselves to issue a press release on behalf of the dp employees claiming the whole fiasco was a "people fraud" and not a "computer fraud." Both men claimed that dp's only role was to lend "an air of authenticity to otherwise bogus data."

According to Hyman, the dp department was not in a position to see what was going on. There would have been no opportunity, for instance, to see that two year-end reports were in conflict. For one thing, he says, the reports were fractionalized, with one piece of the business appearing on one report (which to the department was just another tape print) and another piece of the business appearing another day.

Bob McGindley had charge of the systems that produce the general ledger, a seemingly likely place for fraud to be visible. "There are 10,000 to 20,000 entries in the GL," he told us. "My only responsibility is that it balances." On top of that, many of the entries that appear on the general ledger get there automatically from other sources like the Commissions System, Hyman informed us. "The general ledger system looks to see that entries have a legitimate account number. Is the department right? Does it balance? . . . Now personally looking at some of the entries though, they look funny."

Further, it isn't clear that the reports that have been shown to the auditors for the past couple of years were even generated through the regular dp department cycle. Hyman told us about an incident that occurred in late March, apparently just before word of the scandal spread. "An auditor asked us to produce a report like one he carried in. It didn't have any of the report numbers we use to control our jobs—no titles, no headers. I had never seen it before." When asked to produce another listing that would conform to the same business represented in the auditor's report, the totals were—not surprisingly—different.

Is it likely that the dp employees are all that clean? Two things suggest they may be. First, although Equity's chairman of the board and EFLIC's president and five other vp's have been asked to step down, no dp staffer has yet been deposed. The same dp staff still runs the shop.

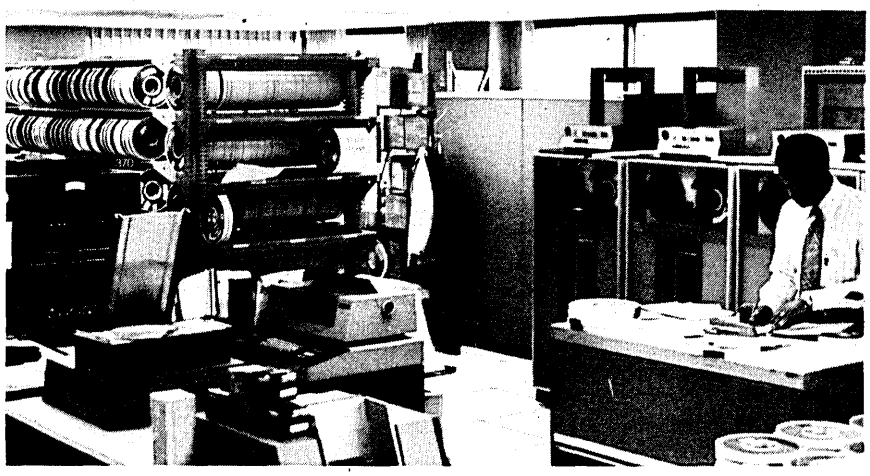
Second, the argument that people in the department would not have been in a position to see what was going on has been partially verified. John Montgomery, the man the California insurance Commission has charged with figuring out what happened in data processing, related: "To my knowledge, no one has ever seen a flowchart of the entire operation. It seems apparent from the people I talked to that the work was broken down into a great many steps and processed by separate people." To this extent, Montgomery backs up Hyman and McGindley. Also, Montgomery is asking the dp employees to do the rough layout of the file histories, although he has taken care to see that nothing could be destroyed in this operation.

What controls were missing?

Because of the sensitivity of the issue and the number of lawsuits expected to stem from it, the parties presently involved are reluctant to talk about specifics. However, we can infer from the new controls clamped onto the operation just what controls were probably missing in the past. The following steps have thus far been taken:

First, all tapes of any value have been taken to a confidential off-site storage place where they are being kept under armed guard. Previously, they were in a tape library where access was, in effect, uncontrolled.

Secondly, access to the remaining on-site tapes has been tightened. What is left of the library has been moved into the computer room, and access to that room is under control of another armed guard. Specifically, no programmers are given access to the tapes.



Equity's dp shop looks like any other small business installation. Authorities are trying to discover what portion of its "normal" job stream maintained the fraudulent business.

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Third, programmers are being signed in and out of their own area.

Fourth, tapes are not being scratched after use. Write-protect rings are locked up, and the installation goes through about 100 new tapes a day. (2,300 new reels have been acquired thus far.)

It now appears that some controls, especially internal ones, were *purposely* avoided by upper management, especially by some of the managers of user departments. For instance, Brian Tickler, an ex-consultant for Equity, has been quoted as saying he designed a reinsurance system for the company "four or five times, and it was rejected that many times." He claimed that "my design would have enabled you to find out how much went where. We would have coordinated the policies, really made everything in the records available at your fingertips. Ultimately, we were told that the reinsurance department was not on our contract any more."

Hyman and McGindley are in an especially ironic position. Hyman is a past director of the EDP Auditors Assn., and McGindley was formerly an auditor in a commercial banking institution. Part of their current frustration is that they and Gootnick were also unable to sell their ideas on internal controls to management, they have said. They cite a software system called Consolidated Insurance Management Information System, which they took over in mid-'72 from Datair, the Chicago software firm that employed Tickler. CIMIS records policy status from proposals to going into force to billing status. Several months ago, they claim, they began proposing interfaces to link CIMIS with other application systems, yielding an audit trail, which, according to Hyman, would have made the whole fraud impossible.

Were improper dp audits a factor?

Another major factor, in addition to the lack of controls over data processing, had to be present for the scheme to have worked. Somehow the auditors had to be duped. They were, and regularly. And the firms that were duped were not little ones. Seidman & Seidman, for instance, had the responsibility for the last couple of years' audits, and that firm is considered to be one of the "big eight" of the auditing business. Prior to that firm's involvement, Haskins & Sells ran audits on Equity, and that company is in the same size class.

Due to some peculiarities of the auditing laws which are imposed by the states on firms chartered within their boundaries, insurance companies are extensively audited only every three years. In the intervening years annual reports are accepted primarily on the sworn statements of the insurance companies' officers. Although the larger auditing firms do have some software to interrogate files, they may not have the right tools to investigate dp systems. It now appears that Equity's auditors treated the computer system like a huge black box. "In the three years I was there, no one came into the dp department to audit," Hyman says. "Where the auditors got their information is beyond me. No one ever asked us to dump the master files."

If the tools were adequate, at least the procedures for using them were not. Even in Illinois, a state that considers itself something of a pioneer in auditing, the available software tools are used on the "sworn" annual statement figures. Obviously that is not the place to start.

The place to start is with the organization of the dp department, according to Warren White, a respected dp consultant brought aboard to assist the trustee. He suggests that plans must be developed to establish an internal but independent auditing staff with responsible dp members as key elements. That staff would be responsible for final testing any software system before it could go into production status. Further, the auditing staff should get a copy of the program in its final form and should make surprise audits to compare their copy with the operating copy. They should have the right to take over the machine before anyone can hit a single key, he thinks, and should start out by loading their own copy of the operating system. In addition, that staff must authorize any program changes before they are implemented.

Among the controls newly imposed on Equity's date processing operation are armed guards that check admittance to the machine room and programming sections.

"No one can protect against truly massive collusion," he says, "but you can design a system to make it necessary to involve large numbers of people.

"There are two key elements to guarantee," he continued. "The first is *separation of duties.* There should be no programmer in the computer room with access to live data. You don't let the programmer operate the machine any more than you let the purchasing agent be in charge of accounts payable. The second element is *regular independent reviews,* both by the internal staff and by external organizations."

Gootnick, after noting how unlikely it was that a small shop could really afford to keep programmers away from the machines, added further thoughts in the form of questions: "How do you control an open shop? What authority does the data processing professional have to question run requests? What should be his involvement in audits? What controls can you have over what the user is doing?"

Hyman argued that public accounting audit teams should include data processing professionals. Further, he maintained that certain audit files (such as for file usage statistics) should be generated automatically, stored on-line, and be accessible only by an audit team. He also suggested that state insurance commissions could greatly enhance their ability to audit by establishing standards for master files, making it easier to maintain programs to read them.

The ideas come a little late for Equity.

White sees some good coming to the industry from the affair, proving what an optimist he really must be. "What's happening here will generate new interest (in the subject of controls and audits). We will be able to implement some of the things we have wanted to for a long time but were told were too expensive."

He may be right, for even as he was saying it, the American Institute of Certified Public Accountants was forming a special committee to investigate, in the light of the Equity scandal, whether there is a need for change in the existing auditing methods.

It will be a long time before the end of this story is written. In the meantime, Bob Loeffler (the trustee appointed by the courts to run Equity), Warren White, and others will be trying to salvage a working insurance firm from Equity's still-smoldering ashes.

Simultaneously, you can bet, a good many companies will be looking carefully into their own data processing controls, and a good many CPA's will be signing up for computer science courses. □

Under development since 1968, the Defense Intelligence Agency's data management system is now operational on both IBM and HIS computers

A Machine-Independent Data Management System

by Eugene E. Meiners

In planning for the transfer of computer-based information systems, provisions must be made for lengthy, expensive reprogramming efforts, and long terms of parallel operations when new computers replace old.[1] Managers are becoming increasingly aware of these problems, not the least of which is insuring that the computer-based information system continues to function. Complicating these problems, the information system is often in a constant state of development, change and refinement because of frequent changes of input data files, reports, and the necessary supporting computer programs. When the information system is based upon a general-purpose data management system, many of the problems are eased; however, in most cases, change of computers is just as traumatic whether data management systems are or are not used. This article reports on a development which may help reduce the time, the expense, and the trauma and help maintain continuity of operations during changeover periods.

A definition

First, "machine" may be equated to a medium to large scale general-purpose computer. Second "machine independent" does not imply that the data management system (DMS) is independent of computers but rather, considering today's state of the art, the system is readily transferable from one computer to another. Third, a DMS provides a means for the nonprogrammer file handler or analyst to process his file(s) with the system and without a programmer.

Many data management systems afford these advantages to the user:

1. Replacement personnel can be quickly trained, helping to insure continuity of operations when personnel turnovers occur.

2. Recurring products can be prepared and put into operation readily. If the user's input or output requirements change, these also can be easily and quickly changed.

3. Ad hoc queries can be quickly prepared. Where terminal facilities exist, queries can be input from the terminals in a few short instructions.

But if the DMS is machine independent, additional benefits are achieved:

1. Replacement computers can be competitively procured; the DMS can be adapted as a benchmark.

2. Conversion problems are minimized: the DMS and its files can rapidly be introduced to the new computer; continuity of operations can be maintained because of rapid transfer and a minimum of change in the human interface to the file systems and products.

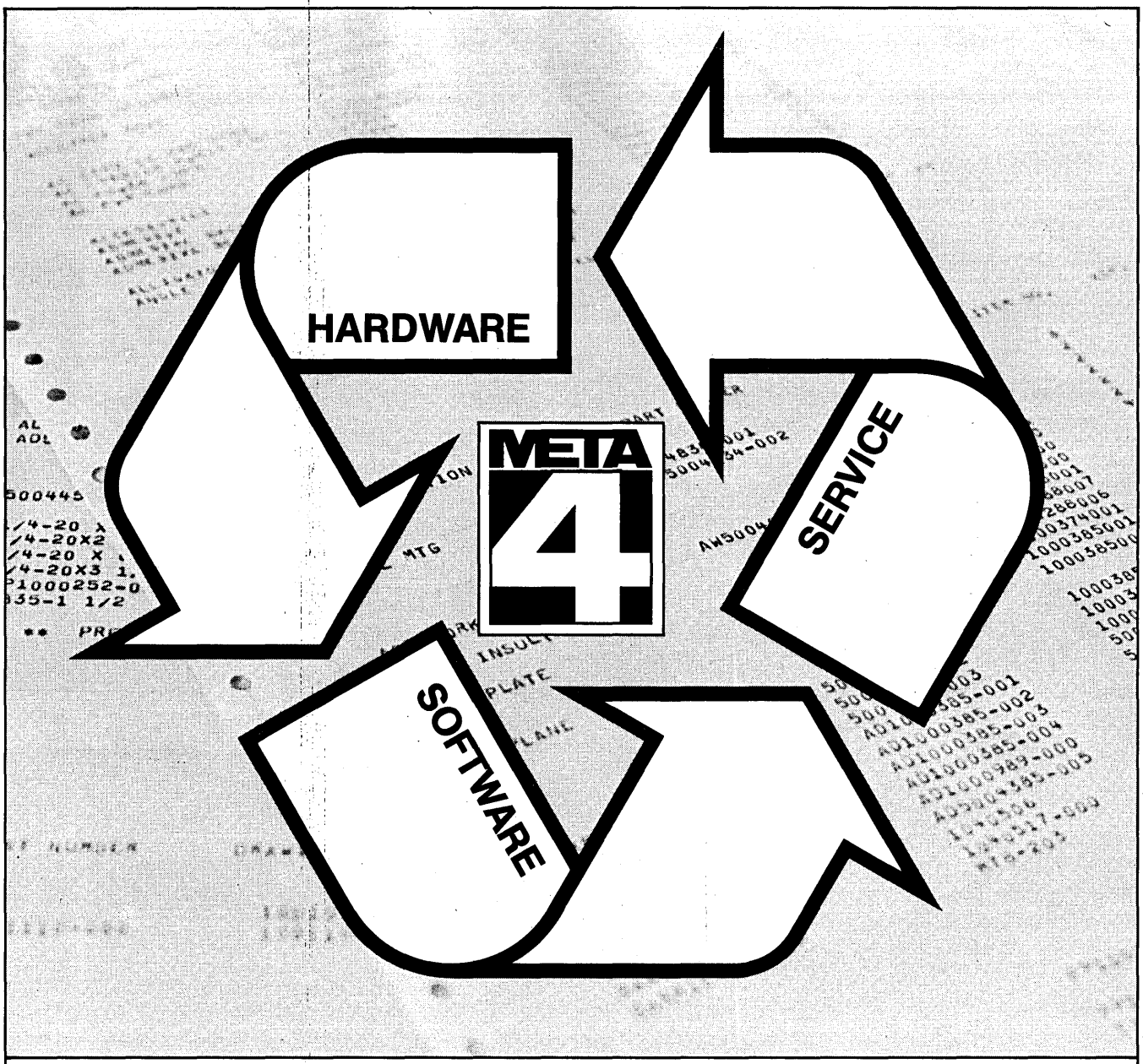
3. When several computers from different manufacturers are in an operational environment, the DMS can help reduce costs through centralized control of data, system maintenance and selected DMS improvements.

4. Data elements, files, documentation, procedures and training can be standardized with only minor variations to account for equipment variations.

While the original reasons for DMS's, i.e., file system operation by nonprogrammers and rapid system response to changing requirements, are still valid, these reasons also make these systems expensive to develop. In an examination based upon my experience, most DMS's with broad capabilities were found to cost 30 to 40 or more man-years of effort plus hundreds of computer hours for developmental testing. The current justification for this large expenditure is economy. In one analysis, it was demonstrated that when an organization has 30 or more relatively complicated files and their associated programs, the cost of development of the supporting programs would be equal to, or greater than, the development and installation of a DMS. Most DMS's can, of course, handle many more than 30 files.

Data management systems in the

[1] See McFarland, F. Warren, "Problems in Planning the Information System," *Harvard Business Review*, March-April 1971.



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past have been developed for a specific computer system. However, it is highly desirable that the DMS should be designed so that the DMS and its associated files can be easily moved or transferred from one manufacturer's computer to another. Further, a DMS written in an approved American National Standards Institute (ANSI) computer programming language and which is not dependent upon the peculiarities of a specific computer can be effectively utilized as a benchmark in the competitive selection of a computer system.

An important effect of a DMS is the reduced need for programming staff and the concurrent reduction of the efforts to train personnel. All DMS's require from a few hours to three weeks training before file handlers or analysts can begin to utilize the system. One factor, often overlooked in the procurement of a new computer, is the capability of the programming system to provide for continuity of operations during a changeover period. Continuity of operations can be maintained where the DMS and its files can readily be moved from one machine to another.

Certainly not the least important factor in the selection of a DMS is its efficiency in the operational environment. Traditionally, it has been assumed that DMS's were inefficient in operation on a computer. Proper design can and does reduce inefficiencies. In one instance, the user of a DMS reported that the DMS took from 25% to 40% more machine time than a tailored program written for the same application would in operation. However, he (and his company) felt that the DMS was efficient because, even though more machine time was used, the flexibility of file handling and reporting more than outweighed the inefficiencies on the computer. In my opinion, 25% to 40% is far too great a price to pay just for the flexibilities of the DMS.

An example

There is an operational data management system in being today which includes the desirable factors of machine independence and efficiency of operation. That system is the Machine Independent Data Management System (MIDMS) developed by the Defense Intelligence Agency (DIA) with contractual assistance from the General Electric Co.

As DIA moved from second to third generation equipment, severe reprogramming and associated operational problems developed. Also, the existing data management systems were completely tied to specific hardware and could not be used on new equipment.

Because of earlier experiences with data management systems, we at DIA were well aware of the effectiveness to be gained through a data management system and, therefore, determined that a data management system was necessary that would also be machine independent. In an investigation of existing and planned data management systems, conducted in 1968, nearly all were rejected because they were not machine independent. Only one was found which did have some measure of machine independence. However, in a demonstration, that system proved to be particularly inefficient in operation on a computer.

We also examined the programming languages available and even considered the possibility of an independently developed language to specifically support the data management system. After considerable study and analysis, the languages were reduced to two possibilities—COBOL and JOVIAL. JOVIAL had so many varieties of compilers that the standardization problem removed it from further consideration. COBOL was selected because at that time it appeared that it would soon be a USASI (now ANSI) standard.

When the decision was announced that COBOL would be used as the base language to develop a machine transferable DMS, it generated considerable skepticism. The arguments were much

SUMMARY OF MIDMS CHARACTERISTICS

GENERAL

Computers
IBM 360/40, 50, 65 (MIDMS uses 102K bytes core)
HIS G-635 (planned for July 1973)

Peripherals and Features
7 or 9 track tapes or discs for files
Disc (or drum) for system
Card reader/punch
Printer
Console typewriter
Decimal instruction set (floating point)

Programming Languages
97% COBOL
3% ALC
For HIS G-635 90+% COBOL, 10−% GMAP

Operating Systems
IBM 360 OS MVT, MFT, PCP
HIS GCOS III

Multiprogramming
Yes

System Control Language
360 proc. libraries used
HIS G-635 proc. libraries used

Tables and Subroutines
Standard tables and subroutines for maintenance, retrieval and output
Standard interface provided for user-written tables and subroutines
Store and execute from system library

Error Notation
Comprehensive error messages providing error locations and diagnostics

FILE CHARACTERISTICS

File Medium
Tape or disc

File Organization
Sequential
Direct access in late 1973

File Size
Unlimited

File Lookup
Through operating system control language

Maximum Record Size
10K characters

Field References
Maximum 5 character mnemonics

Field Length
999 characters alphabetic
18 characters numeric

Maximum Record ID
30 characters

Sets
1 fixed, max. of 49 periodic or variable

Control Fields
System generated

Subsets
599 max.

FILE MAINTENANCE

Transaction Sources
Card
Tape
Disc

Conditional Update
Yes, by logical maintenance

Batch Update
Bulk update via card, tape or disc

Confirmations
Optional (none, all or specific fields)

Table and Subroutine Conversion
Yes

Data Validation
Range
Specific values

RETRIEVAL AND OUTPUT

Boolean and Standard Logic

Standard Operators
Relational
"Between"

like those of 1961, when COBOL was a weak performer. What was overlooked was that compilers had greatly improved although generally programmers had not. Further, it was not generally known that DIA had selected a subset of COBOL to insure transferability. Following a design study which resulted in a unique program of great power and speed for retrieval and output, DIA began experimental programming in late 1968 and design studies in early 1969 on what was then known as the COBOL Data Management System. It was later renamed Machine Independent Data Management System.

MIDMS has been developed to aid information analysts in the manipulation of data files and the production of reports. It provides a means by which a nonprogrammer may structure a file, input data to the file, perform maintenance on the file, retrieve records in accordance with conditional statements, and output a formatted report, all of which may be done via an English-like users' language.

MIDMS is made up of modules, submodules, and subroutines, with a dynamic overlay structure permitting the system to be executed utilizing a minimum amount of main storage. The modular structure also gives the system a high degree of flexibility allowing for easy growth and change. Special features included with MIDMS are: the capability to process large variable-length records as well as the normal fixed-length record; the capability to call subroutines and to utilize tables in the maintenance, retrieval and output phases; special operators to perform geographic searches; and an extensive validation capability during the maintenace phase. In addition, the user may write programs in COBOL, FORTRAN, or assembler languages and, by utilizing the standard MIDMS interface, may call these programs during the maintenance, retrieval or output processes.

MIDMS is characterized by variable-length records containing fixed, periodic, and variable sets of data. The fixed information can have only one unique value for each record: for example, name and social security number for an employee's record in a personnel file. The system provides for a second level of data elements within a record by means of the periodic set structure. Each set represents a category of information which may either be empty or have one or more elements, each of which requires one subset. In a personnel file where a record would apply to one employee, there might be a periodic set for the dependents category, and a periodic set for the education category. The first set would contain a subset for each dependent, and the second a subset for each school the employee has attended. Finally, unstructured information of unknown length, such as remarks, can be placed in the variable sets. Thus the MIDMS concept permits a space saving by compacting the data. This also leads to a time saving for sequential files, since large empty areas need not be read (if the records were of a fixed length this would be required, since the record would have to be large enough to accommodate a maximum amount of data).

The same software on different vendors' computers

In the batch processing portion of MIDMS, 97% of all the programming language statements are COBOL. The system was programmed and is operational on the IBM 360 series. The batch system required 32 man-years of effort to bring to an operational status. In early 1969 it was estimated that to transfer the system when complete would require about 10% of the developmental effort. On this basis, then, we should expect about 3.2 man-years of effort to transfer to another computer. The efforts thus far in transferring to the Honeywell Information Systems (HIS) G-635 seem to indicate that the estimate may be fairly accurate. Some delay is being experienced because the programmers must learn the new operating system and its characteristics. The MIDMS retrieval and output capabilities are operational on the HIS G-635 and file maintenance will be available in June, 1973.

The operational version of MIDMS on two hardware/software systems which are quite different, we believe, proves the feasibility of the "machine independent" aspect of the design. Keeping MIDMS viable on both systems at once will give added proof of the practicability of such a system.

MIDMS is now in use in four locations in addition to DIA. At DIA one file previously required from 6 to 8 hours a day of processing on a dedicated computer. Under MIDMS, the processing has been reduced to 1½ hours per day in a multiprogramming environment. Not only has MIDMS proven effective on our files but in a comparative benchmark test in which DMS's were tested under controlled conditions, MIDMS ran 66% faster than the next fastest and 110% faster than a third system. MIDMS operated fastest of all systems tested in the controlled environment.

A number of improvements are planned for the next few months. MIDMS currently is a sequential processor. By the end of the year, nonsequential access methods will be added to the system. Current hardware limitations make this a desirable feature. However, the mass storage devices now in development open the way for MIDMS usage as a high speed sequential processor. MIDMS is already adapted to support these devices.

MIDMS was listed by Cdr. Grace Murray Hopper[2] as one of the outstanding software developments of the last 20 years and was the only one noted in 1970. □

"Satisfies"
Geographic

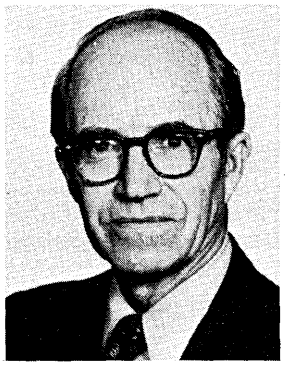
Options
Limit
Stop
Summary file
Keep

Flagging Option
First
Last
Low
High

Features
60 Batch queries 1 pass of file
Ascending or descending sort
Partial addressing
Table and subroutine conversion integral to system
Multifile retrieval, single report (60 files maximum)

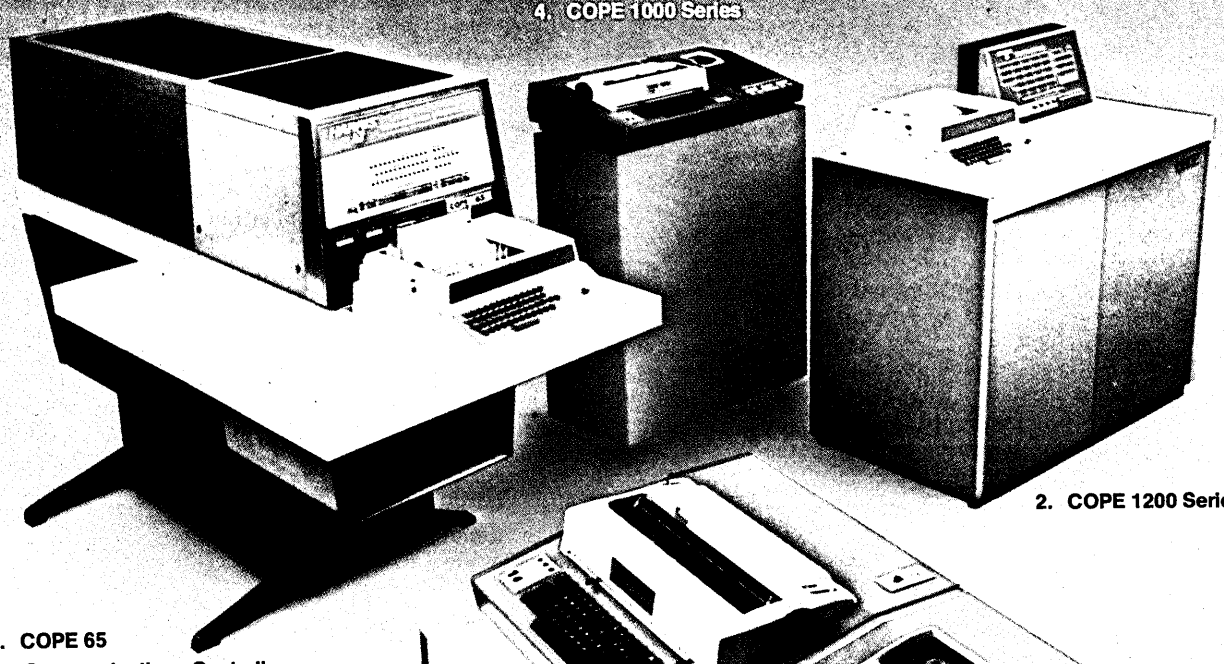
Variable or Text Set Can Be Searched and Retrieved by Textscan Operator

Output Format
System generated
Matrix form
User-generated through system
Shorthand language



Mr. Meiners is chief of the computer systems performance section of the Defense Intelligence Agency. Active in data processing since 1954, he has been involved in the development of three computer-based data management systems. Previously a lieutenant colonel in the Air Force, he has BA degrees from Washington State and Syracuse Universities and has done graduate work at USC, UCLA, and American University.

[2] See ACM 71 publication *"A Quarter-Century View,"* compiled by Commander Grace Murray Hopper.



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CIRCLE 10 ON READER CARD

Foundations for establishing
a maintenance-support facility

A Glimpse Into Program Maintenance

by Richard E. Gunderman

The observations, concepts, suggestions, and comments which follow are a glimpse of the important though somewhat neglected subject of program maintenance. Since I was first assigned the "onerous" task of determining maintenance support requirements in what I considered a dull, unrewarding, dead-end subject, I have been steadily and happily amazed to find that it is a vast, relatively untouched source for all kinds of interesting projects—at least for me. The intent of this article is not to present an exhaustive treatment (which all too often exhausts all but a special few), nor to dissect the subject into (meaningless) segments, nor to introduce myself as the Great Pontificator (although the title does have a certain ring to it); rather, it is as the title states—a glimpse.

Overview

Whether it be called a bug, error, enhancement, repair, or correction, and whether it be performed by a maintenance programmer, maintenance specialist, programmer, or even a program mechanic, it all pertains to a very important and essential activity within large, computer-based systems —program maintenance.

Estimates of its costs are frequently given in terms of initial development costs and range from approximately 50% to well over 100% (would you believe 200%?). Data on the "error-occurrence-to-repair" times range from minutes to days, with the emphasis on days. The nature of the errors and typical types varies with the particular program system and installations. (I/O problems might be considered a leading candidate for No. 1 offender.) It is, in effect, a large and continually growing area of activity, which is taking its toll in time, money, manpower, computer use, profits, etc., mainly because of its being ignored and considered an overhead operation and secondary service.

Traditionally, program maintenance has been viewed as a second-class activity, with an admixture of on-the-job training for beginners and of low-status assignments for the outcasts and the fallen. However, because of the increasing demands of time, cost, personnel, and machine power and the complexity inherent in large, modularly programmed information systems, it is essential that this wasteful and outmoded view be replaced by a more efficient and effective approach. Do I have the solution? No! But I do have some suggestions, techniques, and concepts which may aid in the necessarily customized implementations of maintenance philosophy.

Soft and hard facts

Hard facts and soft facts are terms I recently encountered in an article in *Newsweek* by Stewart Alsop, and they seem very appropriate for the following observations, experiences, and findings. A soft fact is something you "believe" to be true but can't prove, whereas a hard fact can be supported.

1. Considerable programmer time can be (and all too frequently often is) consumed in program maintenance.

2. Major or large programs are virtually never completely debugged; also, many programs acquire "maintenance-incurred" bugs.

3. The enormous number of system elements inherent to a large system introduces and promotes maintenance problems—that is, programs, records, files, load modules, libraries, program documents, design specs, etc.

4. Substantial skill and experience are required of a maintenance programmer, yet no prestige or recogni-

tion is associated with the task—even the salary level reflects this attitude.

5. The importance (or lack) of efficient maintenance techniques is brought to our attention during system downtime.

6. Program maintenance is generally practiced as a personal and individualized activity—often insuring job security but seldom furnishing usable documentation.

7. Quite often the urgencies accompanying maintenance and the putting out of one fire and then another leave maintenance personnel with little time (and inclination) to furnish meaningful documentation.

8. A "simple" bug does not necessarily imply a simple change, especially in an extensively interrelated and modularly programmed system.

9. Hardly anything of substance and utility is published or available concerning program debugging.

10. Minimum, effective documentation remains to be defined in terms of the maintenance programmer's requirements.

11. In practice, "informative and meaningful" comments within a program are often either skimpy or superfluous.

12. During a major downtime, the clock seems to run too fast and the maintenance programmer not fast enough.

Perspective

Consider a large application system that might consist of:

- 3 subsystems
- 40 runs
- 275 programs
- 80 record types
- 75 files
- 40 tables
- 345 test procedures
- 70 output reports
- 1,000 system documents
- extensive JCL
- 95 load modules (a module equals one or more linked programs), as well as other system elements.

Assume that an error has occurred during processing and is detected in an entry; within a column of figures; in a given output report; by a non-edp end user, who is knowledgeable in the subject area of the report's contents; and where the entry should have been no greater than 7.257 but was 7.657.

The trouble is reported on the standard Trouble Report form and sent to the maintenance control center, where the problem is assigned to a maintenance programmer, who then utilizes his own skills in combination with the resources at hand, namely: program description, listing, flowcharts, etc.; run books; load module folders; vendor documents; console log; vendor and in-house diagnostics; administrative procedures and controls; design specs; plus other, related documents and facilities.

The error source could be caused by a bug in a program or routine that handles formatting, calculations, editing, validating, file update, data entry, or other common function; or by one that accesses changed or updated files, tables, or programs; or could be caused by an out-of-date document.

At this point in time, the maintenance programmer is confronted with at least the following prime factors:

1. A general error description.
2. Extensive resources and documents.
3. Limited amount of time to effect repair.
4. Possibly, several versions of the application system.
5. Current system-maintenance status, especially of the programs.
6. Interrelationships and interactions of system elements.
7. Best approach for searching and localizing error sources.
8. Program test outlines and test data.
9. Documents that must be revised to reflect changes.

What the maintenance programmer could use at this state of the situation is a system or a capability that would provide him with: 1) a basic, problem-oriented input procedure that produces a solution-oriented output; 2) a rapid, thorough, and automatic search-and-locate function; 3) an organized, integrated arrangement of system elements and resources. For effective maintenance support, it is recommended that these three features be combined into a maintenance-support facility, wherein the special skills and the computer's capabilities can be fully utilized to locate the error sources and aid in their elimination. Also, such a facility must be able to indicate the ramifications resulting from any changes to the system elements that caused the error, as well as be able to furnish a list of documents that might require revisions because of these changes.

Maintenance-support facility

The following collection of concepts, techniques, and suggestions is offered as a basis upon which to establish an individual maintenance-support facility. Essentially, it reflects what appears as a natural outgrowth or development dictated by the common needs in maintenance programming.

Maintenance specialist. Within the current edp environment and its operational requirements, there is a growing need for a new type of computerman —a maintenance specialist. This need is suggested by the:

1. Extensive and intensive maintenance demands imposed by the large, modularly structured complex of program elements within a medium or large program system.
2. Increased cost, importance, and activities of system maintenance.
3. Critical impairments to company operations caused by system downtime and failure.
4. Need for more maintenance knowledge and better debugging methods.
5. Length of time required for a maintenance programmer to become effective.

As to just what a maintenance specialist would do and how such a specialty would be best used, consider the value of his participation in and contributions to:

1. Isolating, defining, and classifying system and general program-bug types.
2. Developing new and improving current debugging techniques and tools.
3. Providing error-diagnostic services for difficult error conditions or problems on a consultative and/or operational basis.
4. Furnishing program designers with valuable feedback in the form of maintenance-oriented design features for enhancing the maintainability of programs to be designed.
5. Participating in the development of maintenance-training curricula and in class lectures and workshop sessions.

Bug types. The classification of bug types and their correlation with program sequences, routines, and/or instructions affords a basis of relationship between error source and error diagnosis that can be applied to the solution of error conditions that arise.

Program definition. Programs can be succinctly and uniquely defined in terms of an abbreviated and established set of simple verbs. These definitions can serve both the programmer's needs for meaningful information and a computer-based error-search-and-locate scheme.

Maintenance history. Upon completion of a maintenance task, the maintenance programmer (or a software documentor) should prepare a "maintenance history" of the pertinent events and action taken, including any opinions and relevant suggestions. Its contents could be guided by means of a pre-established set of guidelines and fill-in directions. An organized collection of these histories would be very valuable during maintenance, especially since it could eliminate much duplication of effort.

Documentation. Program documentation has been propelled into im-

portance by sheer necessity. However, it still suffers from glowing tributes but inept implementations. One of the basic elements of good program documentation is an effective program listing.

Software documentor. A software documentor "should" possess that rare literary mystique, coupled with genius, intermixed with a deft dab of tact and diplomacy, permeated with saintly patience, and reinforced with an intensive and extensive knowledge of the entire field of edp and data communication. If he is also endowed with ESP and financially independent, it will serve him well. However, if reality must be considered, we could settle for much less; namely, a person with the ability to organize and to clearly and accurately write a given document about a subject in which he is experienced and for a specific type of reader.

Maintenance data and statistics. Closely related to the hunt for the bug and its ultimate classifications by type and occurrence is the accumulation of maintenance data and statistics from the maintenance activities themselves. Such data could be reviewed, analyzed, interpreted, and organized into a body of valuable debugging guidelines, as well as contribute considerably to basic program-system design techniques. One immediate application that suggests itself is the use of the data to design "scenarios" for on-the-job debugging examples for new maintenance programmers, thereby giving them valuable experience in a quasi-real trouble environment.

That is a glimpse of—or a quick entry into—the dense jungle of program-system maintenance. There, under the overlapping foliage of time, cost, manpower, paper, etc., is where there is need for planned, directed, meaningful action. □

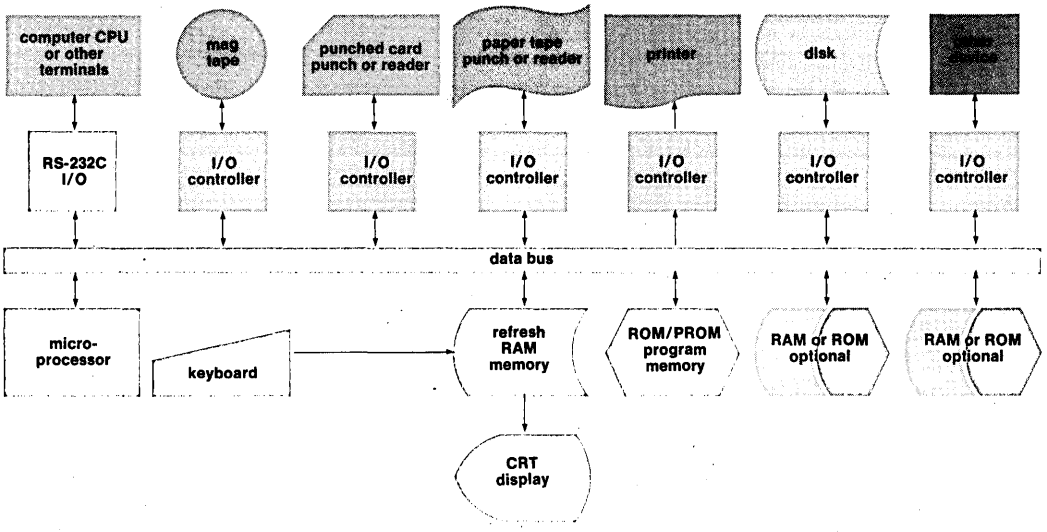
Mr. Gunderman, a member of the technical staff at Bell Telephone Labs, is currently engaged in developing and coordinating a maintenance-support facility as described in this article. He has a BS from Fordham and has done graduate work at Stevens Inst. of Technology.

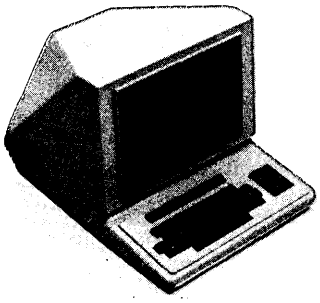
The OMRON 8025 programmable CRT is managed by an MOS micro-processor brain. You design the mix: RAM, PROM and/or ROM. All system activities are directed over an 8 bit data bus.

Totally solid state, the 8025 features: 80 characters per line, 24 lines on a 15″ diagonal display ☐ On line/off line operations ☐ Stand alone or cluster operation ☐ Systems Operations ☐ Programmed logic/editing/control ☐ Selective transmission rates ☐ Selective communications formats ☐ Terminal-buffered data storage ☐ and much, much more as shown in the tables at right.

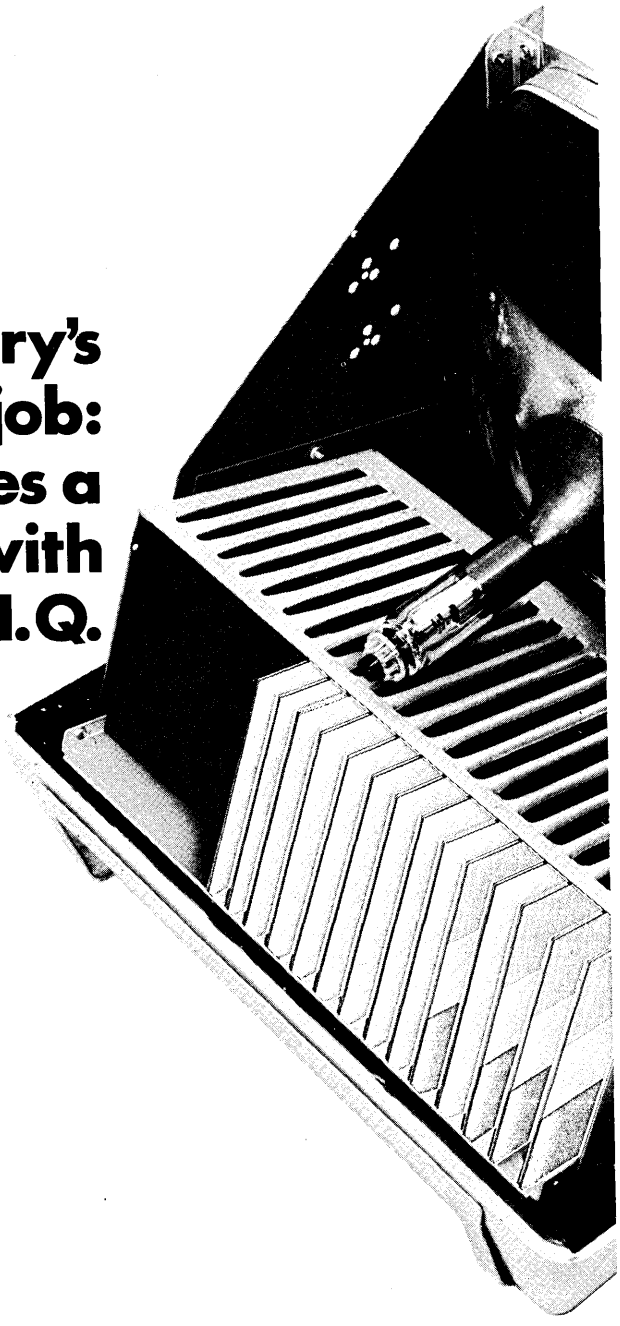
The basic 8025 system is shown in red. It costs $2350. The rest is up to you.

Model 8025 CRT terminal block diagram

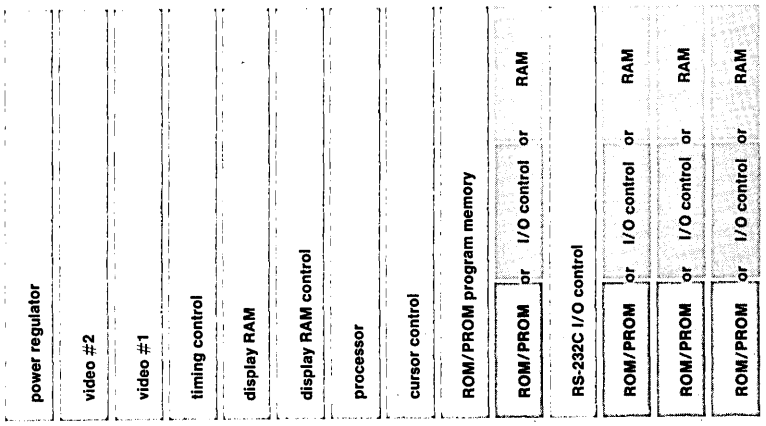




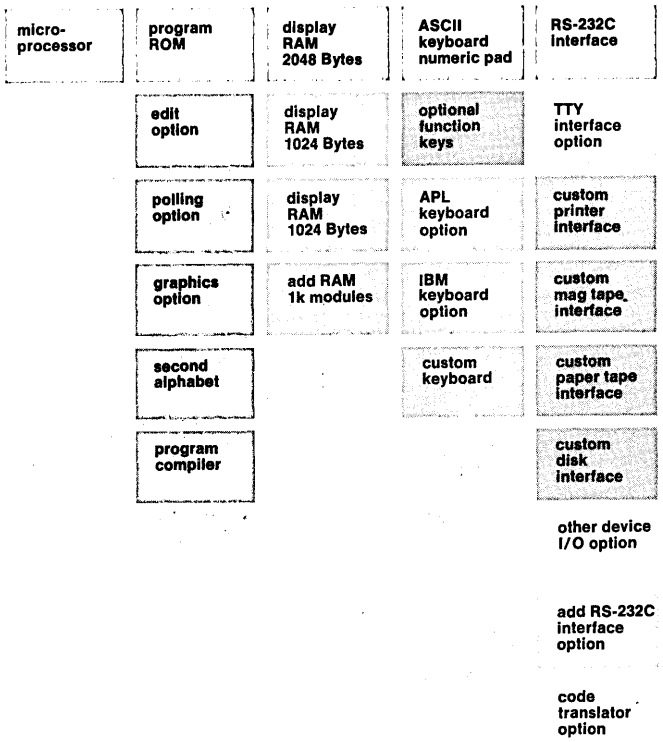
This just may be history's greatest inside job: OMRON SYSTEMS introduces a programmable CRT with variable I.Q.

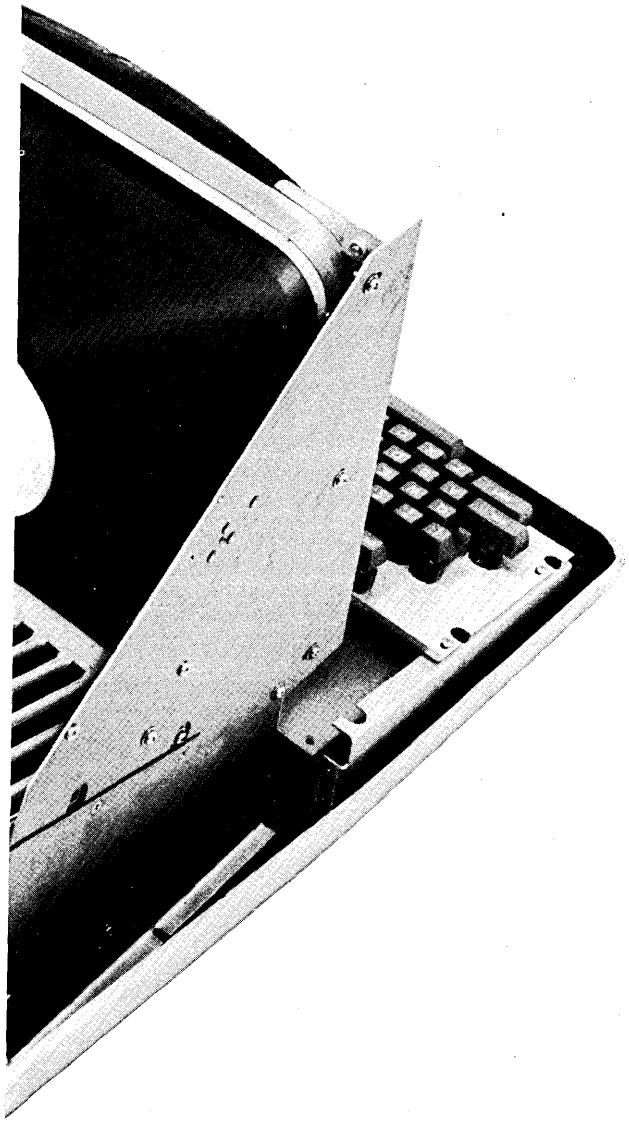


Model 8025 CRT terminal card cage



Model 8025 CRT terminal basic system





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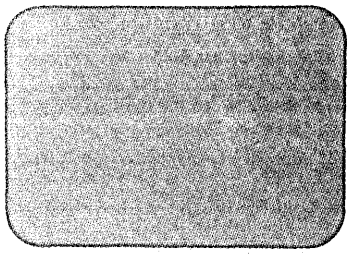

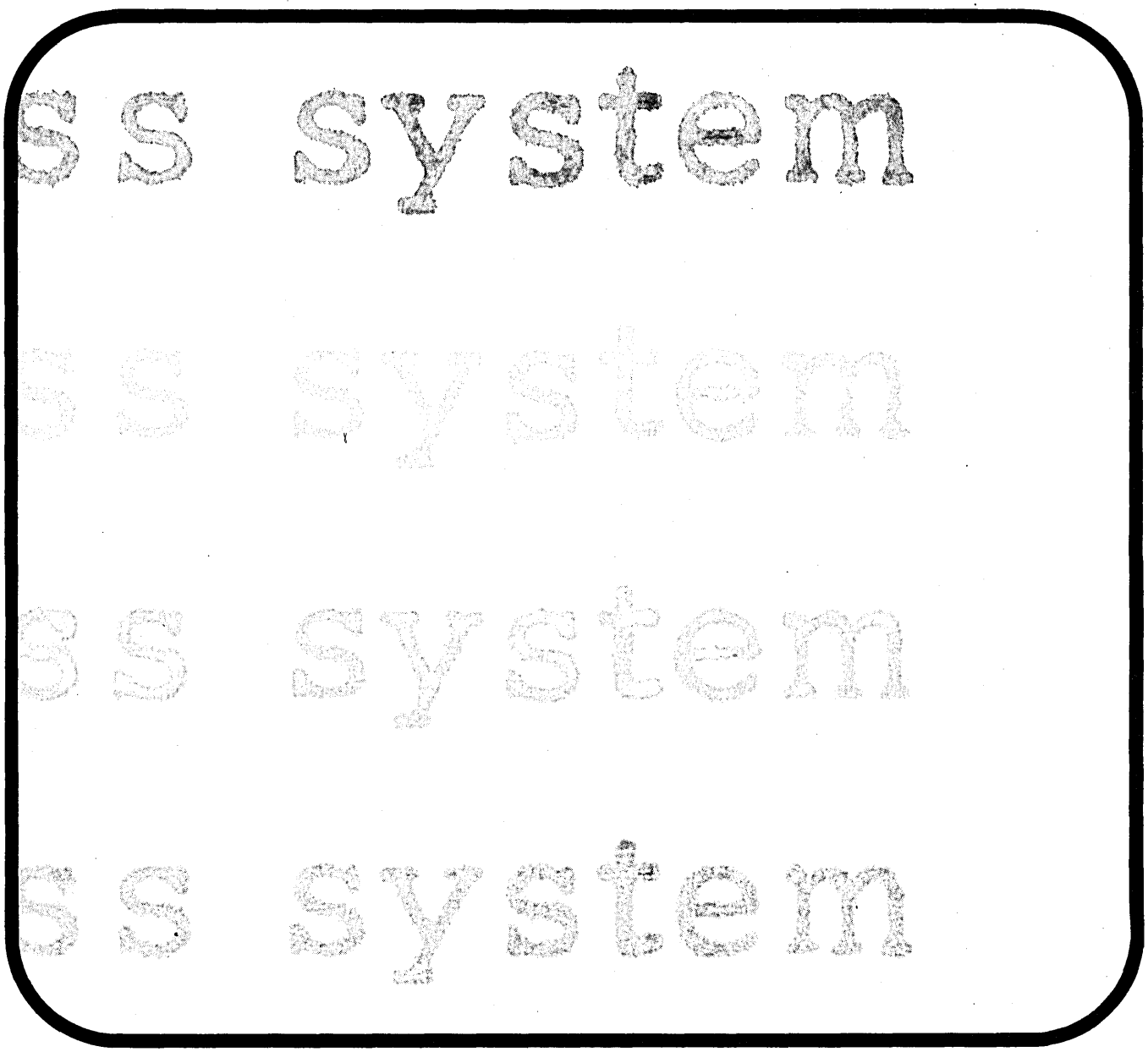

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IEEE's show in New York drew a big crowd, including lots of Japanese manufacturers

Intercon/73

by W. David Gardner, New England Bureau Manager

A tour of the exhibit area at the IEEE's Intercon/73 Show this year was a journey through deepest, darkest electronics. At every turn, it seemed, there was something new and unexpected—storage oscilloscopes with nonvolatile magnetic core memories, portable oscilloscopes, monolithic op amps, solid state relays, non-fixed pulse generators.

After hacking their way through the jungle of electronics exhibits, visitors stumbled upon a small open area with a mysterious altar bearing an IBM logo. Mysterious, at any rate, for an IEEE show. What, you might ask, is IBM doing exhibiting at an IEEE show and showing its 3740 data entry system, no less?

"Well," said one IBM man, who looked somewhat sheepish about it all, "it's a PR kind of thing. It's IBM's way of supporting the IEEE." Ever since IBM folded up its pricing umbrella some three years ago, and the edp countryside has been littered with the walking wounded and with corporate computer corpses wrapped in Chapter 10 proceedings, IBM has not been looked upon as a kindly benevolent personage. Industry support, if not necessarily in fact, then at least in image, is becoming more important to IBM (the computer colossus is also returning to the National Computer Conference show as an exhibitor this year after a long absence).

Besides eliciting puzzlement on the part of many showgoers, the IBM exhibit drew attention from many technical types who were interested in the new system, which features an eight-inch-diameter disc with a storage capacity of nearly 250,000 characters. IBM imported four engineers from its Rochester, Minn., facility—where the data entry system was developed and is being manufactured—to answer questions at the show.

Another computer exhibitor was Digital Equipment Corp., which displayed its oem minicomputers, some mini peripherals and portions of its module line. DEC was the lone mini company exhibiting minis at the show.

Several Japanese electronics manufacturers, including industrial giants like Hitachi, Matsushita, Sony, and Toshiba, were represented with large exhibits and native Japanese—rather than U.S. employees—manned the booths. The large number of Japanese firms displaying sophisticated electronics equipment prompted one wag to quip: "I think I see the same guys in those booths this year that I saw three years ago going up and down the aisles with cameras and tape recorders."

For computer people, the show exhibits were aimed at that part of the edp community concerned with the technical side of the business. In that regard, one show official observed that the type of clientele at this year's show in New York's Coliseum revealed a trend towards becoming more of a systems show.

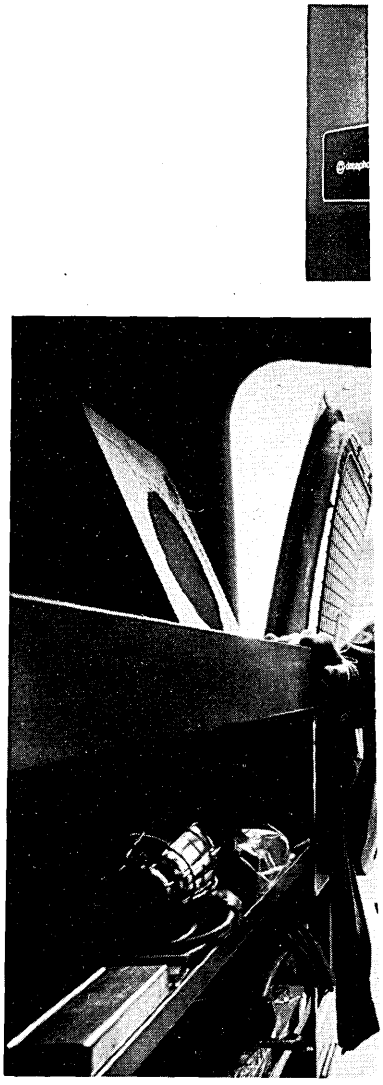
"These guys aren't the EEs with blinders that we used to see here," the official said. "For the most part, they're broader persons. Many more managers came this year, for example. All this is turning up in the show—it's fumbling its way towards becoming a systems show."

Others, however, thought that Intercon/73 was still a show in search of an identity. Many recalled the heydays of the mid-1960s when most of the edp manufacturers were represented. Later the semiconductor manufacturers and distributors dominated; then the testing and instrumentation companies. At this year's show in March there were enough of all elements to back up the feeling that the "systems show" label may turn out to be an accurate description of the IEEE show. The number of attendees and exhibits—about 25,000 and 225, respectively—was about the same as the previous year.

No show, of course, is complete without awards and the IEEE Intercon was no exception. Three co-inventors of the transistor — John Bardeen, Walter Brattain, and William Shockley —were honored at a luncheon and presented with gold medallions in honor of their work. The transistor was invented 25 years ago.

Efforts to group technical sessions together in areas of common interest and to boost exhibitor attendance were also regarded as successful by most observers.

There were several technical ses-



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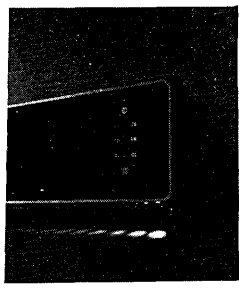

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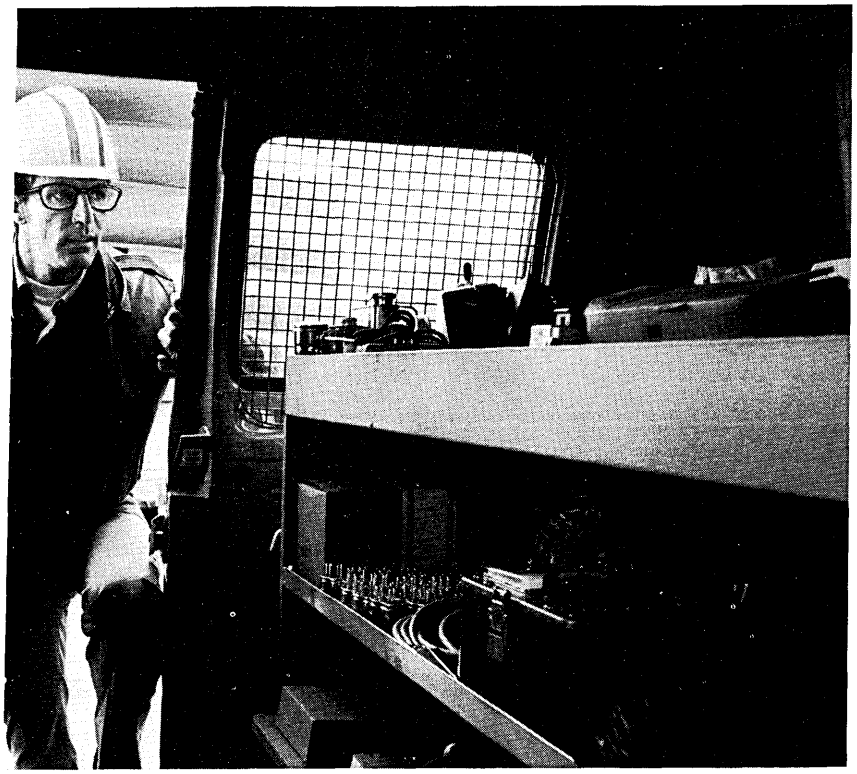

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sions, papers, and panels of interest to computer people. A team from Motorola's Semiconductor Product Division argued convincingly that N-channel MOS was the trend of the future in large-scale integration (LSI). But other speakers from Fairchild Semiconductor presented a paper with powerful arguments supporting P-channel MOS made in the Isoplanar processing technique.

H. E. Puckett and W. W. Lattin of Motorola cited several "fundamental advantages" of N-channel MOS over P-channel MOS. The authors stated:

"For logic systems requiring LSI the semiconductor industry has available many bipolar options. In addition, it seems that there are almost as many MOS options available as there are suppliers of MOS . . . With all of the available technologies why is N-channel MOS being pursued aggressively by most MOS suppliers?" They went on to say that N-channel MOS is two to three times faster than P-channel and both technologies will carry comparable prices in 1975. In addition, N-channel has easy compatability with TTL circuitry and extremely high density of chips is possible with N-channel.

On the other hand, Robert B. Seeds and Robert L. Luce of Fairchild noted that P-channel MOS manufactured in the Isoplanar process is far from dead. "Key to the development of . . . higher density MOS-LSI is an Isoplanar (ISO-P) isolation of the active components," the authors stated. "The increase in MOS circuit density brought about by the ISO-P structural changes is expected to increase by a factor of four the cost effectiveness of larger, more functionally complex P-channel MOS circuits. In addition, those factors leading to decreased defects, both electrical and mechanical, are expected to increase the predictability and reliability of cost effective, Isoplanar subsystems."

In the semiconductor memory area, David A. Hodges of the Univ. of California at Berkeley discussed future uses of semiconductor memories and semiconductor components. He predicted that programmable read-only memories "should be available at a moderate premium in price over ROMs (read-only memories) within a few years." He also stated that semiconductor memories could be used in computer file storage applications replacing drum and disc files, particularly in smaller storage capacity applications. He said: "It should be possible to manufacture large semiconductor memory systems for .02 cent to .05 cent per bit before 1980." □

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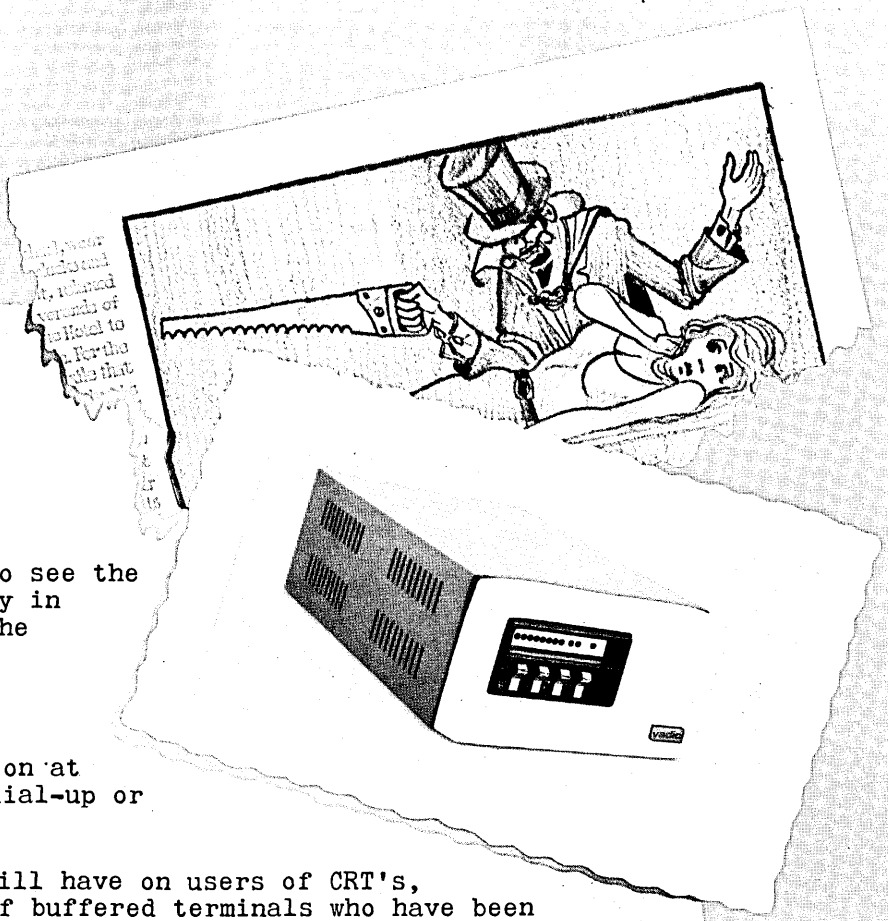

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CIRCLE 54 ON READER CARD

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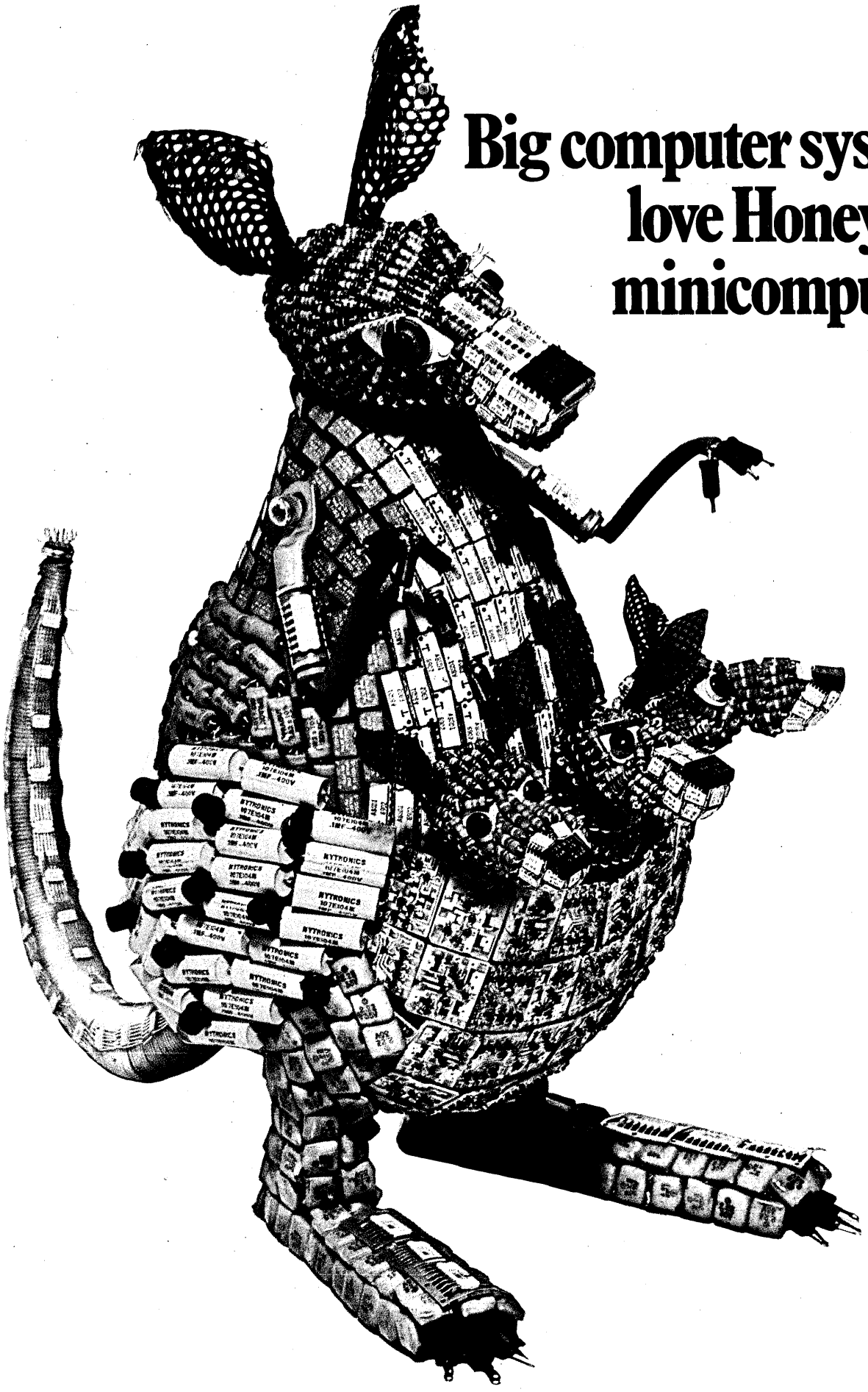

You have a big computer. We don't care who made it. When you bless that big computer with Honeywell's System 700 minicomputers, good things happen.

Use them as satellite systems. They can provide immediate on-site computer services to your company's remote locations, while at the same time tying local operations in to your headquarters system. And they can do this whether your applications call for batch or transaction processing.

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What your company's management gets from all this is more current information for decision-making, better control over operations, better service to your customers, and lower costs. What you get is a grateful management.

Now, not every minicomputer can do all this for you. It takes special hardware for the application interfaces, peripheral devices matched to the local operations, and operational software. In other words, it takes Honeywell's System 700 approach.

System 700 minicomputers are designed—from start to finish—to meet their basic reason for being: the business application. They're a modular family of products representing a broad range of capabilities. And they're strong in the capabilities that matter the most in a successful minicomputer installation. For example:

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The Other Computer Company:
Honeywell

News in Perspective

What went wrong with a system Los Angeles County was installing to retrieve criminal records from a television tape file supplied by Ampex? No one will explain the problem officially, page 116, but both parties are suing each other over its failure . . .

Twenty-seven years after it was invented, the first electronic digital computer—the ENIAC—was in the news this spring, page 119, following a court battle by Honeywell and Univac . . .

DPMA wonders if it should continue its annual national conference, despite an outstanding program it has lined up in Chicago this month. The reason: exhibitor apathy and a declining paid-up attendance, page 122 . . .

Control Data reorganizes, page 124, and proves it was right to stay with computer services . . .

What's the best electronic point-of-sale system for a fast-foods chain? Giant McDonald's still is looking, page 127 . . .

Europe is on the verge of a computer communications boom in which the number of installed terminals will increase fourfold by 1977, page 133 . . .

Japan will wait another year before allowing computer-related foreign investments, page 139 . . .

Common Market nations are thrashing out a unified computer policy, page 139. Most likely move: computer companies will give up national markets in favor of Europe-wide product markets.

Antitrust

The Government's Four Years and Four Months in Pursuit of IBM

"I quickly realized in my early days at the bar that I would take the simplest antitrust case . . . and protract it for the defense almost to infinity."

Bruce Bromley, who has represented IBM in its antitrust cases through the years, said that in a somewhat facetious manner in 1958. That was several months after the 1956 IBM-Justice Dept. consent decree was signed and several years before he and his law firm, Cravath, Swaine & Moore, would once again be called upon to defend IBM in major antitrust suits. Bromley did not mention any IBM litigation in his talk in 1958.

The current Justice Dept. antitrust case against IBM is unquestionably a protracted affair. The suit was filed in January of 1969 and it is now mired—hopelessly, it seems—in a complicated tangle of pretrial proceedings that have built up over a period of more than four years. No one, of course, has accused Bromley, his law firm, or IBM of deliberately protracting the case. For that matter, they have not been accused of speeding the case along either.

Why is it taking so long to get the Justice Dept.'s case against IBM moving? The importance of the question is underscored by the fact that two of the Seven Dwarfs—RCA and GE—have fled the computer industry since Justice filed its case in 1969.

To date, the government's pursuit of the case has not been marked by aggressiveness. Indeed, an attorney representing IBM said last year that IBM had considered making a move in 1971 to dismiss the case "for failure to prosecute."

The other two major antitrust cases filed along with the IBM case in the last days of the Johnson Administration in January of 1969 were settled long ago. A suit charging conspiracy among major auto makers to delay development of antipollution devices was settled by a consent judgment in October of 1969. The suit against the merger of Atlantic Richfield/Sinclair Oil was settled in a consent decree entered in August of 1970.

McAllester case

While many believe that the puny resources of the department's antitrust division play a big role in Justice's inability to mount an effective case against IBM, there are rumblings of discontent within the department itself. It has relieved one of its attorneys from duty on the IBM case. The attorney, Allen E. McAllester, was relieved last fall after several months on the case, and it is understood that the Justice Dept. has taken steps to have McAllester removed from all employment there.

Details of the McAllester case are confusing, primarily because of an unusual press gag order initiated by IBM that forbids both sides from commenting on the case to the press. However, there are two Justice Dept. communications on the court record that allude to McAllester.

According to one, McAllester wanted "to precipitate a trial of contempt charges against himself so that he could initiate a public discussion of the evils of the government's decision-making processes." McAllester was said to have torn up a document with the idea of informing the judge in the case, Federal Court Judge David N. Edelstein, that he was in contempt of court. Apparently McAllester believed these actions would initiate the "public discussion" that he is said to seek.

The Justice Dept. communication signed by his superior says further of McAllester: "Because I knew that this person was being treated by a psychiatrist and that a few years earlier he had suffered a nervous breakdown, and because of his appearance and manner, I concluded that his proposal was caused by an emotional disorder. I immediately brought this to the attention of the deputy assistant attorney general. Subsequently, it was learned from the attorney that the underlying reason for his attempt to induce a trial of contempt charges was his belief that for the past two years he has been the subject of a unique experiment involving his doctor, his wife, members of his church, and government officials."

Contacted by DATAMATION, McAllester says he believes he is involved in a conspiracy. It is not clear whether he believes the "conspiracy" is connected with the IBM case. McAllester declines to discuss the IBM case because of the press gag order.

But the primary problem that nags the Justice antitrust division is one of legal resources vis-à-vis those of IBM.

The division's budget amounts to some $13 million a year, and with that it must cover some 140 active antitrust cases, investigate another 450 or so cases, and generally enforce the antitrust laws of the land. On the other hand, Control Data set its pretrial legal expenses for its suit against IBM at $15 million. Further, in its April issue, *Fortune* magazine said that IBM's legal bill in the Control Data suit was believed to have totaled more than $60 million. *Fortune* had surveyed a cross-section of top corporations on the soaring increase of corporate legal expenses and presumably developed a good feel for what was happening.

On the other foot

The problem of resources has been noted by assistant attorney general Thomas E. Kauper, who heads the Justice antitrust division. While discussing the division's budget last fall, Kauper noted that in earlier days "the deck always seemed stacked on the government's side.

"Now, of course, the shoe is on the other foot," he added. "And from my perspective now I see hardworking, dedicated government lawyers, laboring under poor physical conditions and at salaries far below what they could command on the outside, badly outnumbered and beleaguered on all sides."

A glimpse into the gargantuan problems of document production presented by the massive number of documents produced in such cases was given by Judge Philip Neville of Minneapolis, who presided over the IBM-CDC case. At a recent U.S. Senate hearing (see following story), Judge Neville observed that during the pretrial discovery stages in 1969 and 1970, IBM microfilmed or copied about 80 million CDC documents, while Control Data copied some 40 million IBM documents.

As in the Justice Dept. case, the two sides became involved in elaborate and time-consuming legal moves and countermoves over document production and the status of privileged documents. Judge Neville, however, moved ahead and set a date for the trial. "I had set Nov. 5, 1973, as an inexorable trial date," he said. "Four years was long enough."

That case, though, was suddenly settled early this year, and in the settlement IBM got an important plum from CDC—CDC agreed to destroy an automated and computerized data base and information retrieval system upon which the Justice Dept. had been relying heavily. Judge Neville did his best to move the IBM-CDC case along. "I guess a judge has to take control of these things," he said. "Otherwise the one with the most resources outwears the other by attrition."

As for the Justice case, it remained more or less in limbo until Judge Edelstein took over in January of 1972. Then the tempo picked up sharply. Last fall, the judge indicated he would push the case forward at a more rapid pace and that he would announce a schedule. At this writing, however, the schedule had not been released, the case appeared to be bogged down, and a trial date appeared to be farther away than ever.

—W. David Gardner

Alternatives Pumped into Hart Hearings

Sen. Philip H. Hart's proposal for "deconcentrating" the computer industry, and some others, won't be effective even if it's enacted. This, in essence, is what a number of witnesses were saying at the latest round of hearings on S1167, officially known as "The Industrial Reorganization Act." Significantly, Sen. Hart, who presided at the hearings, agreed the bill probably can't be enacted in its present form.

Two witnesses—Dan McGurk, president of the Computer Industry Assn. (CIA), and Pierre Rinfret, formerly an economic adviser to President Nixon—suggested using a carrot to break up dominant companies instead of the stick contained in the Hart bill.

DAN L. McGURK
If IBM's field force went on strike.

S1167, basically, establishes an industrial reorganization commission to restructure seven industries, including computer systems manufacturing, where one or a few companies have a dominant share of the market. The bill also defines "monopoly power" in terms of certain statistical parameters and directs the commission to reorganize any industry that satisfies these criteria. An "industrial reorganization court" is established to determine whether each restructuring proposal is capable of restoring "effective competition."

McGurk said a better approach would be to impose a graduated corporate income tax, forcing dominant companies to pay extra for their dominance. Another idea, he said, would be to limit the size of undivided profits. These incentives would "make restructuring more palatable to the management of concentrated companies." A basic weakness of the Hart bill, McGurk indicated, is that it "proposes to restructure industries from the outside when a rebuttable presumption of monopoly has been proved in the courts. One of the problems with our current antitrust activities is that such a proof takes an inordinate amount of time . . . This is particularly true when one considers the enormous legal power available to, and used by, large corporations to delay, obfuscate, and resist the efforts of the Justice Dept. to win large antitrust cases."

What impact these comments will have on Sen. Hart and his conferees is an interesting question. The senator isn't particularly happy about using regulation to puncture bloated companies and is understood to have introduced the bill primarily in the hope of baiting others to come up with better alternatives.

Late last month, we asked a staff member of the Senate antitrust and monopoly subcommittee, the group considering the Hart bill, whether there was any interest in adding tax incentive language to the bill. The answer was "yes, it has appeal." But even if incentives were adopted, "government oversight" would still be necessary, said our source, to make sure that a dominant company which shucked off a subsidiary or a division cut all ties and set up the new venture so that its future growth wasn't limited.

Judge Neville's four years

Another participant in last month's hearing was U.S. District Court Judge Philip Neville, who presided throughout the CDC-IBM antitrust case and also adjudicated the early stages of eight related suits, including those involving Telex and Greyhound. During the four years he was involved with these cases, December '68 to January '73, they took nearly a fourth of his working time; this is the equivalent, he said, "of the time required to process more than 100 ordinary . . . civil or criminal cases."

Judge Neville also indicated that he disapproved of CDC's destruction of the computerized index it developed to access documents obtained from IBM. The judge answered "yes" when Sen. Hart asked whether rules should be adopted, or legislation enacted, to prevent a repetition of the CDC action.

Present antitrust trial procedures, the judge added, allow endless delays to

occur. For example, in mid-1972, IBM asked permission to update 2,700 "industry census" questionnaires it had sent out, several months earlier, to other hardware/software vendors. The company argued that the data generated by these questionnaires didn't reflect IBM's market share after 1970. Neville said he turned down IBM's request, "realizing that the (updating) process could go on and on."

The census, together with related materials, fills some 34 boxes, each the equivalent of a filing cabinet drawer, Judge Neville added. Almost 300 oral depositions were taken also. A total of 55 court orders had to be issued to resolve various arguments that came up as a result of these data-gathering activities. Each order required a one- or two-day hearing. There were so many contested claims alleging that certain documents were privileged, particularly in the IBM/CDC case, that Neville had to appoint a special master to consider them. "When I ordered the parties to pay the master's fees in proportion to the number of claims and challenges, the list shrunk greatly," he observed wryly.

One argument for enacting the Hart bill is that it would eliminate many of these stalling tactics. Judge Neville didn't think so, however. Federal courts might have a smaller workload because trial of federal antitrust cases would be shifted to the industrial reorganization court set up in the legislation, but he doubted whether the trial period would be shortened significantly. Meanwhile, civil antitrust suits, which aren't covered by the bill, would continue to be tried in federal courts.

Questions of competition

A major benefit of the Hart bill, said the judge, is that it puts much greater emphasis on remedying the effects of monopoly and restoring effective competition. This is a question that rarely gets addressed in court, he added. "The focus of the CDC case was whether there was antitrust activity. CDC wanted damages and so did Greyhound and Telex. The question of a remedy such as divestiture—things of that nature—I never heard any evidence on that, never got to that point at all in the four years I handled these joint cases."

The CIA's McGurk devoted much of his testimony to an explanation of how IBM's monopoly manifests itself. Until Armonk "legitimizes" new technology, developers have trouble finding backers and buyers, he contended. McGurk also said that IBM is responsible for "a. market environment that favors renting rather than purchasing of equipment. A major result is to slow down any increase in market share by smaller firms."

He admitted that IBM's dominance of the dp marketplace isn't all bad. Development and marketing costs per unit of production are less than with smaller firms, but he clearly feels that the disadvantages outweigh the advantages.

"The larger an industrial organization, the more expensive it is to administer. Parkinson's Law is a real law. The fact that these diseconomies are real appears to be indicated by the fact that the price differential between the dominant firm and the smaller competitors in this industry is approximately equal to the profit differential between them."

The "serious inefficiencies characteristic of large corporations in concentrated industries," he added, can be hidden for a long time because of their market position. But "eventually such concentrated industries tend to be hit by large-scale importation from other countries." The computer industry hasn't reached this critical point yet, but "some day, if structural changes are not made, imports will be significant. The less we have developed our (domestic) market, the more our rivals from abroad will develop it."

Another reason for deconcentrating the dp industry, he argued, is that computers are "going to be the nerve center of society in a few years." If IBM's field force were unionized and, at some point in the future, went out on strike, it would be a "catastrophe" far greater than the loss of power caused by the breakdown of a major electric utility.

—Phil Hirsch

Lawsuits

Oracle — Optimum or Ambiguous?

"An utterance, often ambiguous or obscure, given by a priest or a priestess at a shrine as the response of a god to an inquiry."

This is one dictionary definition of the word Oracle. It doesn't exactly define the Los Angeles County Sheriff's Dept.'s highly touted Oracle system, but neither, as it turned out, does "Optimum Record Automation for Court and Law Enforcement." Some parts of the dictionary definition do apply in Los Angeles, however.

With claims and counter claims by Los Angeles County and Ampex Corp. on who was wronged in a $7.4 million contract for the Videofile portion of the system, there have been some "utterances ambigious and obscure" as to what the system was supposed to do and what it could do.

The county has filed suit against Ampex for $4.5 million on grounds of nonperformance, and Ampex has countered with a $25.5 million claim for "unpaid past lease payments, substantial future lease payments, and other expenses incurred because of the county's prevention of delivery and acceptance of the equipment."

County Sheriff's department and data processing people aren't saying much

IN HAPPIER DAYS, a publicity photo (released March 8, 1971) described the Ampex Viedofile system as the "key element" in a system to make records available to sheriffs "almost immediately as television pictures." Two years later, the sheriffs were still waiting.

about exactly what the system wouldn't do that it was supposed to do. One source close to the implementation process cited some communications and retrieval-time problems (see April, p. 7) and summed up the problem by calling the system "the wrong truck for the right job."

He claims the county wanted and couldn't get on-line retrieval. Ampex says it never promised on-line retrieval capability. We're told there were no county-generated specifications for the system, that the system was purchased on the basis of an Ampex proposal. So what Ampex promised could be an important issue in any litigation. At writing Ampex had not heard from the county on its claim but was expecting it would be rejected. Then Ampex, too, would go to the courts.

Milan Telian, Ampex Videofile department manager, said the company has 10 Videofile installations around the country, the oldest at Southern Pacific, in since 1968. "And this is the first time we've had this kind of trouble."

In the meantime, the Los Angeles daily press is having fun, what with hints of scandal and cover-up and with newsman-turned-county supervisor Baxter Ward charging that Sheriffs'

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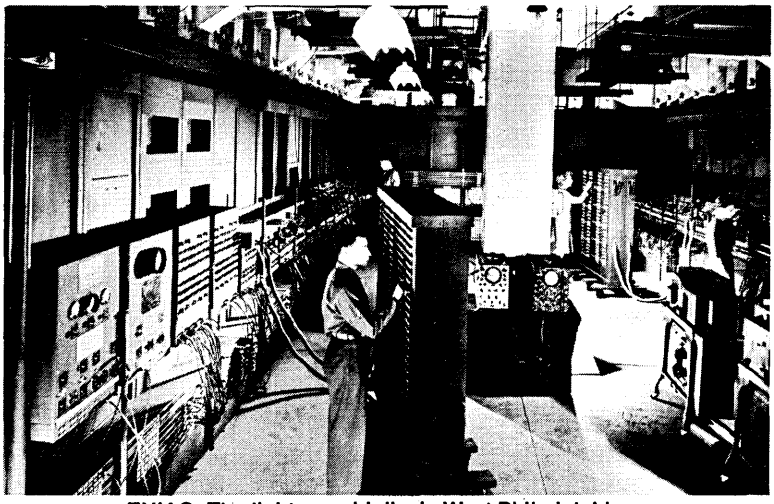
deputies took Ampex-financed "hospitality" trips to Las Vegas and Mexico and uncovering the fact that a relative of an elected official happened to buy some Ampex stock (on which he lost money) shortly after the signing of the Oracle contract.

Any answer at this point as to what's going to be done about Oracle could only be ambiguous and obscure.

ENIAC in Court: What Might Have Happened

When J. Presper Eckert and Dr. John W. Mauchly invented the first electronic digital computer—the ENIAC—in 1946, they knew they had made something marvelous, but they had no way of knowing that their invention would turn into something of a Frankenstein in 1973.

For the ENIAC patent has been ruled invalid, and the case presented to knock down the patent was prepared in large part by an electronic digital computer. Federal Judge Earl H. Larson of Minneapolis ruled in April that the patent —held by Sperry Rand Corp.—was invalid. Sperry had sued Honeywell for patent infringement and, in its defense, Honeywell is understood to have used a computer to help marshal evidence.



ENIAC: The lights would dim in West Philadelphia.

Details in the case are still sketchy and confusing, because Judge Larson has sequestered transcripts and other public filings in the case from the press. Reporters are referred to Sperry Rand and Honeywell, and both firms likewise decline to release transcripts and other public documents to the press. Honeywell and Sperry released brief and similar statements on the case. The Honeywell statement said:

"Judge Earl L. Larson of the Federal District Court in Minneapolis has made findings in the lawsuit of Honeywell Inc. against Sperry Rand Corp. and its subsidiary, Illinois Scientific Developments Inc. The parties have been informed that the court has decided the ENIAC computer patent of ISD is invalid, while also deciding that Sperry and ISD are not liable to Honeywell for antitrust damages."

Reply was antitrust

Honeywell had filed its antitrust suit against Sperry Rand in 1967, after Sperry had filed the patent infringement suit against Honeywell. The Honeywell suit has charged in essence that Sperry and IBM had engaged in antitrust activities since Sperry had licensed IBM to use the ENIAC patent.

If the judge's initial findings stand up—he is expected to release a full ruling on the case at some as yet unspecified later date—then the case is expected to have little real impact on the industry. However, if the findings had gone the other way, the ramifications would have been virtually earth shattering for the industry.

A decision that the ENIAC patent was valid, for instance, could have enabled Sperry Rand's Univac division to lay claim to patent infringements by scores —perhaps hundreds—of computer firms. Similarly, a decision that Sperry and IBM had engaged in antitrust or monopolistic activities would have opened up a Pandora's Box of issues and problems, particularly for IBM, which is currently the target of several antitrust actions. IBM had no comment on the Sperry-Honeywell case. The computer colossas was understood to have been an observer in the courtroom in Minneapolis during the proceedings.

Key testimony against the charges that Sperry and IBM engaged in anti-

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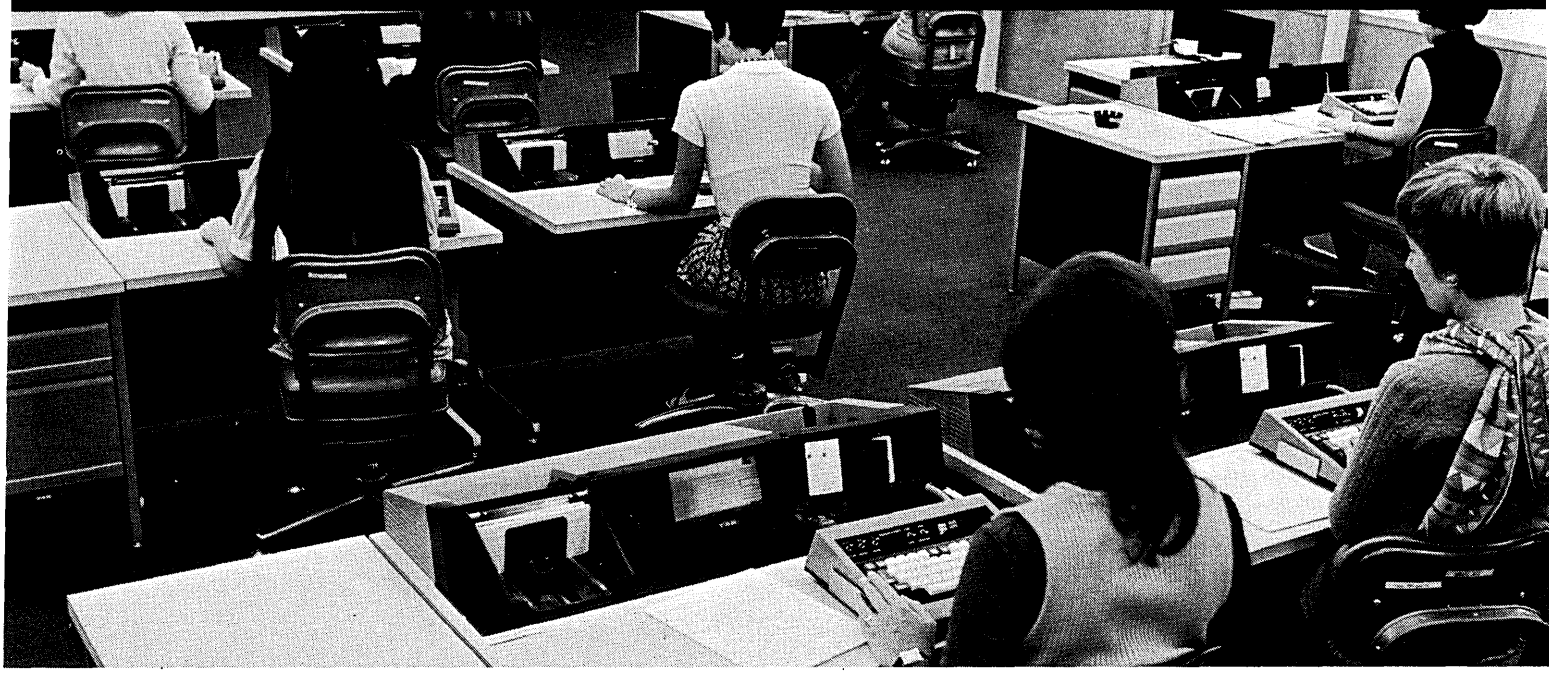

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trust activities came from F. G. Withington of the Arthur D. Little consulting firm. The computer industry expert argued that cross-licensing agreements between the two firms gave them no unfair advantages over competing computer firms. Withington noted that both IBM and Univac had had their fair share of computer product disasters. He mentioned several product failures by each firm, but Sperry's LARC computer and IBM's STRETCH are the best known to computer industry people.

As for the patent infringement case, Honeywell charged that Sperry's "fraudulently procured ENIAC patent" restrained and monopolized the edp industry. In addition, Honeywell maintained that the fact the patent was not granted until 1964 (almost 20 years after the ENIAC was developed) helped create a "willful and fraudulent delay which prevented the invention from promoting the progress of science and the useful arts." Honeywell had said that the computer design was in public use before the patent was granted. Honeywell also maintained that scientists and inventors other than Eckert and Mauchly should be regarded as the inventors of the electronic digital computer.

It is still not clear whether the trial transcripts and exhibits will ever be made public. The case was tried for several months and in addition to some 21,000 pages of transcripts produced more than 250,000 exhibits, according to one source. The trial proceedings contain much of historical value to the computer industry.

There is one intriguing question that still hangs over the case: Will Eckert and Mauchly still be regarded as the inventors of the electronic digital computer? While the judge probably won't rule on that question, it is possible that other scientists and inventors—heretofore unheralded—will receive some of the credit for the invention of the computer.

The ENIAC: Feb. 15, 1946 – Oct. 2, 1955

The grandfather of electronic digital computers was born in a cellar of the Moore School of Electrical Engineering at the Univ. of Pennsylvania during World War II. Built to replace a huge mechanical differential analyzer that calculated shell trajectories and artillery firing tables, it was a product of the war effort that was finished too late to contribute to winning the war.

Named the ENIAC (Electronic Numerical Integrator and Computer), it grew out of the genius of many men, but primarily from the ideas and work of John W. Mauchly and J. Presper Eckert.

The machine was proposed to the Army early in 1943 and funded through the Ballistics and Research Laboratory of the U.S. Army Ordnance Corps. It took 30 months and 200,000 man-hours to complete. When dedicated in February 1946, it was the only electronic computer in the world and was capable of calculating at 1,000 times the speed of its mechanical predecessors.

The machine was constructed of 47 panels, each 9 feet high, 2 feet wide, and 1 foot thick. It had something less than 19,000 vacuum tubes, plus 70,000 resistors and 10,000 capacitors among its many components. It used over 150kW of power, and the stories say that the lights in West Philadelphia would dim when it was turned on.

ENIAC was a synchronous, decimal arithmetic machine. Its cycle time was 200 usec, so it could perform 5,000 additions per second. Its word size was 10 digits plus sign, and it could multiply two full words in 2.6 msec. It could also subtract, divide, do a logical compare, and take a square root.

Reading, computing, and writing were done simultaneously. Input could be through dials and switches, and output could be in a light display, but I/O was primarily done through an IBM card reader and summary punch. Since the computer originally had no central memory except for 20 accumulator registers, the punched cards also provided external storage.

The computer was hardwired to do its job, and program set-ups could take weeks. The need for a stored program became apparent after construction started, and a proposal was made for another device. (That second machine was begun in 1946. Called the Electronic Discrete Variable Computer, or EDVAC, it was proposed on behalf of the ENIAC project by a professor named John von Neumann, who also was responsible for giving ENIAC its eventual stored-program capability.)

In its lifetime, ENIAC processed 80,223 hours of work, and was down "only" 30% of the time. In its later years it was upgraded not only with switch-selectable stored programs, but with plugboard programming, and with a 100-word core from Burroughs called the Static Magnetic Memory.

The ENIAC died in 1955, a victim of competition with its own offspring. Its creators, Eckert and Mauchly, went on to build other machines, including one called the Universal Automatic Computer, or UNIVAC for short.

—R.A.M.

Societies

DPMA '73: Quality If Not Quantity

This year it may be all work and no pay.

Although the Data Processing Management Assn. (DPMA) will charge $135 for its four-day International Data Processing Conference June 26-29 in Chicago, the annual affair has little hope of becoming the lush revenue-producing event of better days. In fact, with less than 50 exhibitors signed up in late May for the accompanying exposition and an estimated turnout for the conference of less than 1,700, it probably will lose money.

The 25,000-member association earlier this year hoped that the central location in Chicago would combine with an improved economy to attract at least the 69 exhibitors who bought space in last year's event in New York. It even offered separate facilities to software companies for "live demonstrations." But in late May, there were no takers.

Clearly, its proximity to the five-day National Computer Conference ending June 8 in New York's Coliseum contributed to exhibitor apathy. It will be that way again in '74, when DPMA moves to Minneapolis in the summer and NCC to Chicago. Says DPMA president Herb Safford, it is a situation "that makes us wonder if we should continue to conduct a national conference."

New dimensions

However bothersome the financial aspects, they have not affected the quality of the conference—a four-day presentation of just about every subject a data processing manager would want to address himself to on the topic of "New Dimensions in Information Processing," the conference theme.

It opens on June 26 with six workshops, running from 9 to 4:30, on Banking, Government Applications,

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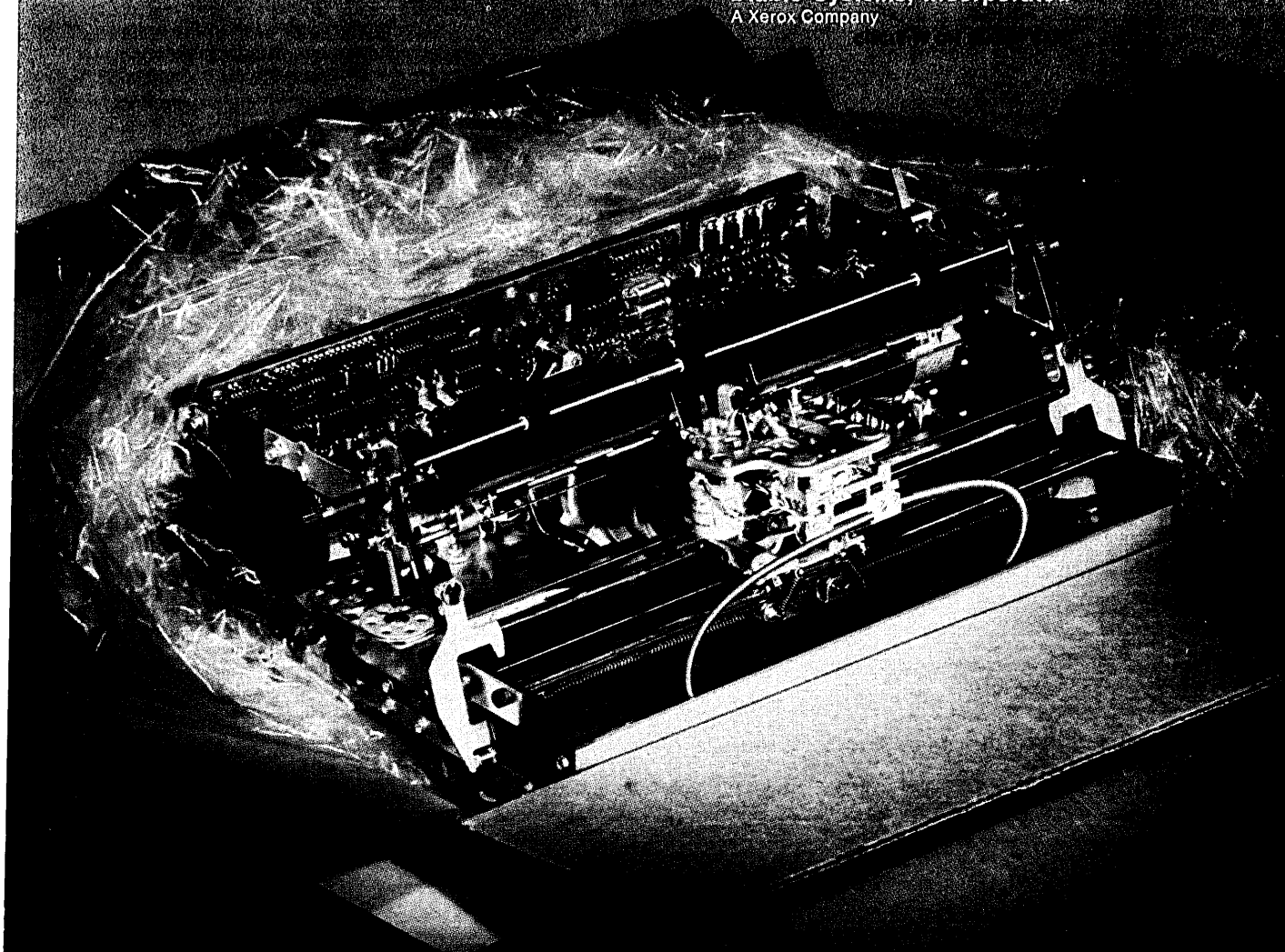

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Insurance, Manufacturing, Medical-Hospital Applications, and System Development. It then moves on during the following three days to a presentation of 24 seminars with 44 speakers on the business of managing data processing.

Richard Nerad, of Arthur Anderson & Co., leads a seminar on a relatively new position in data processing, that of the data base administrator. The next day, Ira S. Gottfried, of Gottfried Consultants, Inc., discusses the security aspects of large data bases, and Kenneth Finn and Raymond Hollenbach, of McDonnell Douglas Automation, present a case history on the planning and organizing of a data base system. And, of course, an IBM man will be around —Herbert E. Cotter—to talk about the impact of virtual memory on systems design and installation.

There will be seminars on data entry devices, data communications, and time-sharing. In other presentations, California consultant Jeffrey Walker leads a seminar on conversion from one computer to another; Herbert A. Cohen offers guidelines on planning a career course in the dp business; and George Ravazzolo, president of Advanced Systems, Inc., suggests in a session on motivating the data processor that today's dp manager doesn't know how to motivate people effectively. The data processing industry, Ravazzola says, is no longer a glamor industry. People in it now must be motivated to work.

WILLIAM L. LINDHOLM
DPMA Conference Keynoter

DR. CARL HAMMER
Man of the Year

The conference keynoter is William L. Lindholm, vice chairman of AT&T, and Univac's Dr. Carl Hammer will receive the DPMA's 1973 Computer Science Man of the Year award. The general conference chairman is Elmer J. Weinthaler. A program and registration information is offered by DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

The association this year is opening the exposition to the public at $1 a head, a move that should swell attendance to 7,000 compared with the 5,200 that had to sign lengthy qualification cards at the New York event a year ago. This would almost double the estimated 4,000 who toured displays at DPMA shows in Houston and Seattle in '71 and '70 when the computer recession reduced paid-up conference attendance to 1,250 and 1,500 respectively.

Safford said DPMA has barely broken even on the annual conference since '70 and that the association's directors, meeting in June, will have to think about this problem. The possibility of adding exhibits to the 13 regional conferences DPMA holds every year has been considered, Safford said, because vendors seem to go for regional shows. Another move would be to affiliate with the American Federation of Information Processing Societies (AFIPS) and merge the annual DPMA conference with the AFIPS-sponsored NCC, "provided we can work out the mechanical problems" (the dues DPMA would pay to the federation and its share in the NCC profits). With both the NCC and DPMA conferences scheduled to clash in '75 in Los Angeles, this may be an irresistibly practical notion.

Companies

CDC: Services Move Begins to Pay Off

During the company's recent dark years of unprofitability, Control Data Corp.'s chairman William C. Norris forcefully resisted pressure to sell off its money-losing services business. He told his critics that services someday would support the company.

Meeting late this spring with shareholders, Norris this time had only to recite facts to show he was right all along. Services had accounted for 30% of computer revenues in 1972 (first year the computer operations have been in the black since 1969) and would rise to 50% by 1976. Data services had the "greatest year" ever for the company, and professional and engineering services "exceeded revenue objectives," although education fell short of CDC's goals. Services will contribute substantially to an earnings rise in 1973, even though CDC has yet to "reap the benefits" of its acquisition of Service Bureau Corp. from IBM at a bargain-basement price (Feb., p. 98).

Significantly, in a top-level reorganization, Norris lumped two previously separate organizations—the computer systems and the computer services groups—into a new company called Control Data Systems and Services Co. and appointed Robert M. Price, former head of the services group, as its president.

Norris also raised the peripherals and marketing groups to company status, naming Thomas G. Kamp president of Control Data Peripheral Products Co. and Paul G. Miller president of Control Data Marketing Co. Paul M. Sheehan is president of Commercial Credit Co. Service Bureau Corp. remained intact with J. F. Williams as president.

The moves are described as a "realignment" that will relieve Norris of day-to-day operating responsibility. He'll turn this over to a seven-man management committee made up of the three new presidents, Sheehan, and newly named senior vp's John W. Lacey, Norbert R. Berg, and Marvin G. Rogers.

Growing relationships

Norris, who remains as board chairman and chief executive officer, will turn his attention to planning and to "growing relationships with other organizations, both in the U.S. and in other countries." The company recently announced a joint manufacturing venture in Romania (May, p. 112) and has been dickering with the USSR to sell computers, open a peripherals products plant and jointly develop with the Russians a nationwide Cybernet-like network in the Soviet Union. CDC also is talking of setting up a trading company, possibly in Vienna, to operate a barter system in which it would receive foreign goods in exchange for CDC computers.

CDC's joint domestic venture with National Cash Register to make peripherals is "exceeding expectations of

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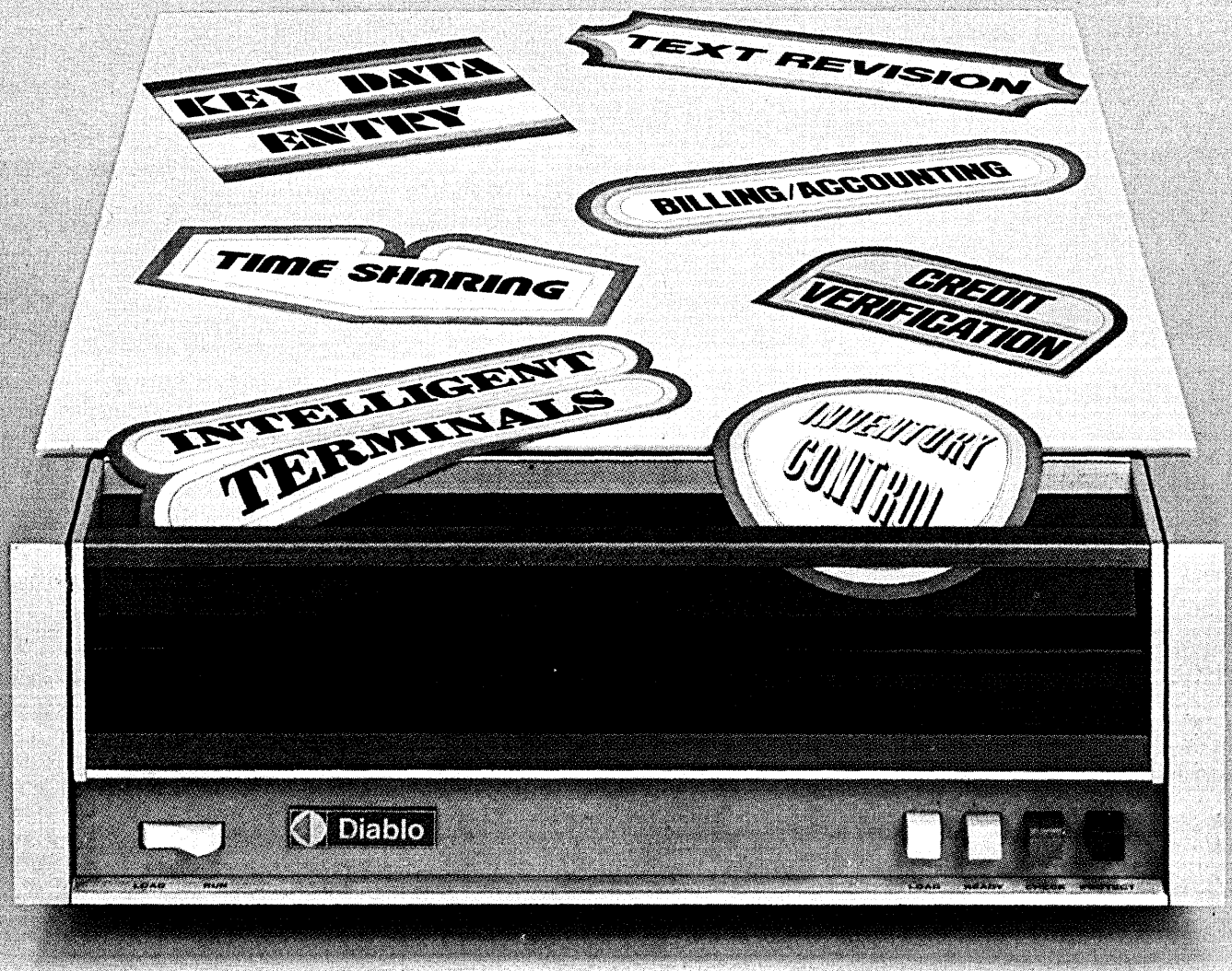

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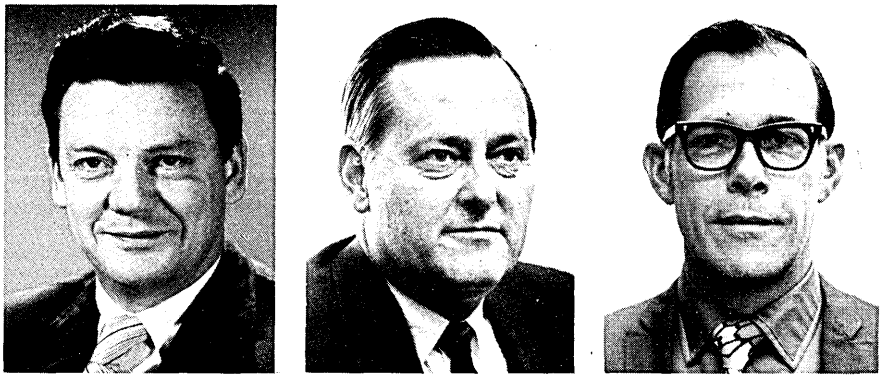


CDC'S NEW PRESIDENTS: From left, Robert M. Price (systems and services); Paul G. Miller (marketing); Thomas G. Kamp (peripherals).

both companies," although CDC is vague on the progress of a "swing" computer development that was announced as part of the agreement. At the annual meeting in Minneapolis early last month, CDC's Price said the two companies "have seen the possibility of doing something better" than developing a common computer line, but did not say what that was. NCR's president William S. Anderson has indicated the two companies may have junked the idea of a common computer mainframe in favor of some sort of common operating system for each other's new lines (May, p. 116).

Meanwhile, the two companies have restricted their announcements to enhancements of existing lines. NCR during the past year introduced improvements to its Century 100 and 200 series, and early this fall CDC's Cyber 172 and 173 system introductions are expected to be enhanced Cyber 70 systems with wide business dp applications. Later, a large CDC machine is expected to emerge in the form of a marriage of STAR and 8600 machine development, probably using semiconductor main memory.

The Only Breaks Are Surf Breaks

Girls, some barefoot and braless, in tattered shorts, sarapes, and hats, saunter past a guitar that one of them will play in a few minutes. Men dressed in Hawaiian sport shirts—or no shirts at all—are busily engaged in activities, simultaneously bobbing their heads to the beat of rock music emanating from a distant speaker. You're in a Synanon workshop, right? Well, no, you're touring the manufacturing facility of Information Magnetics Corp.'s Goleta, Calif., headquarters. The fellow in the colorful sports shirt escorting you around is Richard L. Teague, Infomag vp responsible for the manufacturing of a product line that includes magnetic disc drive heads, access arms, and motors sold to customers such as Burroughs, Control Data, Honeywell, ICL, Mitsubishi, and Toshiba.

Infomag's Goleta facility is "hard by" the Univ. of California's Santa Barbara campus, and most of its workforce is in some way involved with the university, as part-time students, drop outs, wives or husbands of students. Of his manufacturing area Teague says: "Make no mistake about it. This is no country club. We issue some pretty high standards and quotas for our people to meet. It's just that we don't care how they do it—so long as they do."

And the kids seem to be doing all right, according to Paul Coleman, marketing manager recently brought over from Infomag's English division. "Our field acceptance rate of 97% is better than any I've seen either in this country or abroad. I'm thinking that perhaps our tape head division in England should consider running a little looser to see if it would result in the high quality production we've achieved here." A 97% would rate an A+ in anybody's book.

Funny, she doesn't look like an assembly line supervisor—but is, at informal disc head manufacturing plant in California.

"Looser" means shelving such traditional management artifacts as time clocks, break and lunch schedules, rigid attendance requirements, curtailed talking among employees, and more. "Maybe we're luckier than most facilities," says Teague. "These people have higher than average education levels, so we treat them all as professionals. Everyone fills in his own time card and they are all remarkably honest. They are free to take their breaks more or less when they want to. The key is whether the work is getting out. When it doesn't, we have pep talks, but that doesn't happen very often. We are, we think, effectively lax. If we didn't think we were realizing some definite advantages running the company this way, we wouldn't do it."

When the surf's up

One of those advantages is one that would be envied by most any vp. "When we get a priority order in here and time is short, we ask our people to work maybe a few more hours to get it out. They wind up staying so long that we have to ask them to knock off and go home," says Teague.

Attendance? "There are certain problems running a shop like this. When the sun is out or the surf is up the kids like to go to the beach. We understand that—hell, we like the sun, too—and so we staff for it. By our giving in to things like this, however, we are blessed with a very low turnover in personnel so we don't have to continually train new people for critical new positions on the floor," says Teague.

What do Infomag's customers think of the plant operation? "Most are very surprised at first—especially if they are from the East Coast. I don't know what our Japanese customers might think if they walked through here. But they might be impressed with our enthusiastic workers—I understand they have some of their own!"

—M.W.C.

Retail

Who Deserves a Break Today?

It's 11 billion hamburgers now, and the nation's largest fast-food chain, McDonald's, is still looking for *the* point-of-sale system for its 1,500-plus hamburger stands.

Latest in with a proposal to McDonald's Corp. for its 300 company-

owned stores is Comp-Acct Inc., Cincinnati, which has had its Acct I systems installed in franchised McDonald's stands in Ohio and Kentucky for two years. Comp-Acct last month completed testing required by McDonald's corporate HQ, an exercise which many firms trying to penetrate the fast-food market have gone through before them (see March 1972, p. 143).

Acct I is based on a Cincinnati Milacron CIP 2000 series minicomputer. Input is via keyboard with 45 preset keys. Comp-Acct (short for Comprehensive Accounting) also has Acct II with 90 preset keys for cafeterias, and Acct III, for catering operations, with 300 keys.

In a fast-food operation, Acct I is used with what Comp-Acct chairman Gene Dittoe calls an island concept. He said a store doing from $400,000 to $500,000 a month in business could easily be handled by two registers located at an island at the front of the store. A customer gives his order to a cashier who keys it into the system via the preset keys, which is so easy, says Dittoe, "it allows him time for suggestive selling." The register produces a ticket which the customer, after paying, takes to food baggers at the rear of the store. Dittoe said one McDonald's using a two-register system did $1,100 in business in one hour between noon and 1 p.m. on a given Friday . . . this is a store that is only 25 feet wide and 100 feet deep.

Counting potatoes

He said the Acct I system provides total control of labor, inventory, and cash. A manager, he noted, can ask at any time for any one of a variety of up-to-the-minute management reports, such as sales per man-hour. One such report provides what Dittoe calls "yield" control. If a manager finds out that one day he was getting 4.6 orders of french fries per pound of potatoes while the next he got only 3.9, then he knows "somebody's been filling the bags too full."

The system also produces projection reports on needs for inventory and labor based on past experience. Com-Acct is testing a system with a unique projection feature for short-order steak houses. "You can throw on a steak and cook it in minutes," said Dittoe, "but not so a baked potato. This system kicks out projections at 15-minute intervals alerting employees to how many potatoes they should put in to bake." The projections are based on actual experience of a given store on a given hour of a given day.

Dittoe said payback period for an Acct I system in a fast-food operation can be "as quick as a year" in a high-volume operation; and "even in a small chili parlor operation, it was better than two years."

Dittoe believes on-line telecommunications capability is becoming increasingly important to fast-food chain operators, and Acct I has this capability, he said. "Three chains we're talking to now are definitely talking telecommunications."

Comp Acct, said its chairman, has reached the point where, to fill existing orders and to grow, it must sell out to a large firm or "find a Big Daddy." He said they've been talking to a number of big companies toward one of these ends, "both companies already in the point-of-sale field and some who are thinking about getting in." One that was interested was GTE.

Dittoe believes interest in point-of-sale systems among fast-food people is "growing rapidly, and so's the competition." One recent entrant is Digital Computer Controls, Inc., Fairfield, N.J., which has long been a supplier to point-of-sale systems houses and now has a system of its own called the ECR 810. The first units are going to Bonanza, a Texas fast-food chain in which UCC's Sam Wiley has a substantial interest. But it should be only a matter of time before they get around to Ronald's place.

—Edith Myers

Networks

Bank Card Turns Up Nationwide Network

A 24-hour, 7-day-a-week credit authorization system linking computers nationwide has been placed into operation by National BankAmericard Inc. It replaces a Telex network, providing not only faster response times but also a yes or no answer when banks are closed. The system comes into play when a cardholder is making a charge transaction above the floor limit, customarily $50, outside his local bank processing area.

To authorize such a purchase, the merchant would phone his local BankAmericard center and read the card number. This information is keyed into a Sanders 804 crt terminal, linked by 2400-baud phone lines to a regional concentrator, consisting of duplexed Digital Equipment PDP-11/20s. From there, the query is sent to the central computer facility near San Francisco, is switched to the concentrator nearest the bank that issued the card, and from there to another 804 terminal at the issuing bank. But if the latter is closed, the central facility is able to apply tests supplied by the issuing bank to grant or withhold approval of the purchase.

The $3-million system known as BASE (BankAmericard Authorization System – the word Experimental was dropped when the system went operational), consists not only of the 16K PDP-11/20s serving as regional concentrators at four sites–Atlanta, Indianapolis, Long Island, and the S.F. Bay Area–but also duplexed 48K PDP-11/45s at BASE Central. More than 100 Sanders 804 terminals are in use at the 75 BankAmericard centers and at BASE Central. Usually in less than a minute it completes a transaction that required an average 4.5 minutes with the Telex, but which ranged from 3-15 minutes. According to NBI, many banks are cutting the response times even more by linking their computer to the BASE network, thus bypassing the terminal unless human judgment is required.

TRW Inc. developed the system; Compata Inc. and Trippe Data Systems, the software; and McKinsey & Co. did the project auditing.

Responding to questions of privacy, NBI officials stress that the BASE system stores no cardholder financial information. It has only three files: an exception file with a list of lost, stolen, and expired cards; an activity file that contains credit limits supplied by member banks; and an event file listing detailed information on transactions of authorizations performed while the member bank was closed. The latter is reported daily to the member at the start of his business operations. They say that no bank in the system can access any information other than what it has furnished.

Initially concerned mainly with authorization service, BASE is also seen as a base for a broader range of services. Dee W. Hock, NBI president, notes that some banks are testing magnetically encoded cards for use by customers at a point of sale, making possible an instantaneous debit and credit of accounts. Carrying this notion further, a customer with such a card could go to a romote station to deposit, withdraw, transfer, pay, or borrow funds at any time of the day or night. And one is constantly reminded of two-way CATV in the home as a means to carry out financial transactions.

"Quite simply," says Hock, "we believe BankAmericard may soon provide the consumer with complete ability to access and manage both cash and credit assets 24 hours a day . . . for almost unlimited types of service or merchandise."

(Continued on page 133)

DP DIALOG

Notes and observations from IBM which may prove of interest to data processing professionals.

DP DIALOG appears regularly in these pages. As its name suggests, we hope DP DIALOG will be a two-way medium for DP professionals. We'd like to hear from you. Just write: Editor, DP DIALOG, IBM Data Processing Division, White Plains, N.Y. 10604.

The Model 115 brings virtual storage to a new set of users. Also announced for all System/370s up through the Model 158 is the 3340 disk drive using the 3348 data module. This combines disk recording surfaces, access arms and read/write heads in a single cartridge, making for greater reliability and flexibility.

Virtual Storage: Wider Capabilities, New Users

"It's been well accepted."

Thus Gale Aguilar, IBM's director of systems marketing, summed up the immediate customer reaction to IBM's announcement of major virtual storage improvements, along with new and expanded versions of System/370 models.

"Some of our customers put in orders for new virtual storage systems on the day of announcement," says Aguilar. "This pleases us because it shows that virtual storage is paying off for the user as the DP direction of the future."

What do users find attractive about the VS enhancements? "First, they provide an evolutionary growth path. They are compatible with existing programs and applications," replies Aguilar.

"And second, they lead the way to large-scale, online, interactive processing, which many users are convinced will be the environment of the Seventies," he continues.

The improvements and new equipment fall into five general areas.

- OS/VS2 Release 2, an enhanced control program. It features increased virtual storage through multiple address spaces. It also supports both loosely and tightly-coupled multiprocessing.

"Here's just one significant advance made possible by Release 2," comments Aguilar. "Under Release 1, each *system* had an apparent addressable storage capacity of up to 16 million bytes. But under Release 2, each *user or job* gets up to that same 16 million bytes."

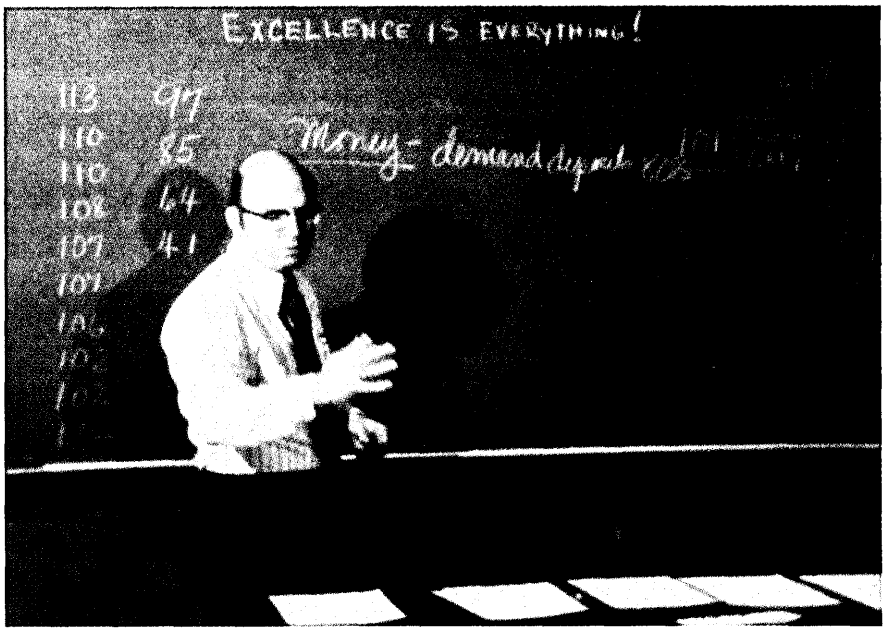
- Two multiprocessing versions of System/370—the 158 MP and 168 MP—for greater systems capability.

"The 158 and 168 MP systems are made up of two 158s or two 168s coupled together—tightly coupled—so they share their combined main storage under Release 2," points out Aguilar. "This means higher availability and resource sharing for online users."

"In addition, loosely-coupled multiprocessing now becomes feasible

(Continued on next page)

Also in this issue...



Bob Warner explains accounting problem to class at Alice Lloyd College.

Faculty Volunteers from IBM Aid Minority Education

Deep inside Appalachia where poverty abounds and unemployment is rife, education is a precious commodity. In this environment Bob Warner has developed the first business curriculum in the 50-year history of Alice Lloyd College, a small (250 students) liberal arts junior college in Pippa Passes, Kentucky—over the mountain from Mousie and Possum Trot, about 140 miles east of Lexington, the nearest major city.

Unlike other members of the faculty, Warner is on loan for a year from IBM, where he has worked for the last twelve years, most recently as a district administration manager for the Data Processing Division in St. Louis, Mo. He is one of a number of IBM scientists, engineers and administrators who have volunteered to teach at colleges across the country with predominantly minority enrollments. While on leave from their jobs, they continue to receive their regular IBM salary and benefits, plus relocation expenses for themselves and their families.

The IBM faculty loan program began in the 1971 school year with 18 black colleges and was expanded the following year to include programs for American Indians, Mexican-Americans and those in the depressed areas of Appalachia. "It evolved out of a real need for 'people resources' among these schools," says Linwood A. McDaniel, IBM's Director of Equal Opportunity. "We decided we had the trained professionals with skills to match the broad range of requirements in these colleges, so we went ahead and contributed our people. In the end, both sides seem to benefit. The students get valuable insights into big business. Our people, in turn, see the problems these young people face in competing for quality education."

At Alice Lloyd College Warner elaborates: "The situation here is a different kind. It's another America, isolated in tradition. The kids here want to know what it's like outside of their own world."

To show them, Warner applies the practical approach in his accounting and economics courses. He explains: "Instead of just talking about the theory involved, I try to tie it in with my own business experience. I also try to convey some idea of the benefits I've had from a business career and some of the mistakes I've made."

Warner's business curriculum at Alice Lloyd College is only part of a wide range of studies being offered at other schools in the IBM faculty loan program. Last year faculty loan volunteers taught such courses as electronics, electrical engineering, computer sciences, mathematics, physics and accounting, in addition to supervising building campus radio stations at two universities and engineering laboratories at two other colleges.

But McDaniel emphasizes: "Our objective is to have each college become as self-sufficient as possible in the programs we have helped develop." **IBM**

Virtual Storage...

(Continued from preceding page)

through Job Entry Subsystem 3 (JES3), equivalent to ASP in a VS environment. Multiple computers can be temporarily linked, with one computer controlling and scheduling the entire complex. This applies to System/370 Models 145, 155 II, 158, 165 II and 168, as well as the new 158 MP and 168 MP systems."

- New memories doubling existing Model 158 and 168 capacities, plus larger Model 145 processors, providing additional growth steps.
- The 3704 communications controller for economical operation of small to medium-sized terminal networks.

"Like the larger 3705 controller announced last year, the 3704 handles many of the communication line-control tasks usually performed by a CPU, thus freeing it for more local jobs," says Aguilar.

- Virtual storage programs and disk storage enhancements which improve systems versatility.

"Of the new programming functions, one of the most significant is the Virtual Telecommunications Access Method (VTAM), which offers many of the capabilities of IBM's teleprocessing methods now being used," comments Aguilar. "It is integrated with the computer's system control programming, enabling it to provide centralized control of an entire teleprocessing network."

"All in all," he concludes, "these innovations make it possible to implement new applications faster and more smoothly, thus removing major restraints on application growth." **IBM**

Program Products from IBM

IBM offers a wide variety of Program Products to save users time and money. Two used in management science are listed here. For more information, write to: IBM Data Processing Division, Dept. 807, 1133 Westchester Avenue, White Plains, N.Y. 10604. Or contact your IBM local office.

1. Continuous Systems Modeling Program (CSMP III). A powerful continuous system simulation language for analysis of complex mathematical and engineering problems.

2. Forecasting and Modeling System (FAMS). A comprehensive set of statistical forecasting techniques, packaged for the development of economic and business planning forecasts.

Computer "Manages" Thousands of Projects at NSP

At the Briar Wood housing development, just west of Minneapolis, Northern States Power (NSP) is organizing construction activities with the help of an IBM System/370 Model 165.

Jim Larson and Rod Kloster review design of Briar Wood project with William Eldridge (right).

NSP construction crews are installing 2,700 feet of underground cable which will serve 76 units when the project is completed. Every day they arrive on site armed with field records and guidance sheets and needed materials—all pre-determined by information fed into the computer the night before.

Briar Wood is just one of several thousand active projects going on simultaneously at Northern States Power, a utility which serves Minnesota and three adjoining states. Over the last two years NSP has organized all these projects under its computerized project management system, which helps standardize project design, reduce material costs and increase productivity among designers, office workers and crews.

Rod Kloster, DP Systems Project Supervisor, explains further: "The project management system enables us to process every local project from beginning to end, including every phase of the operation from project design and construction to scheduling, reporting crew time and finally closing projects." From data gathered in these areas, the system also provides a series of reports for management, detailing amount of productivity, time lost on each project due to bad weather, equipment breakdowns plus short and long-term forecasts of construction expenditures.

At the Briar Wood site customer service representative Jim Larson originally assessed the requirements of the project with the help of a manual which gave him the needed components for the job. Components and other pertinent data on the project were then entered into the computer during the day. Overnight the system printed cost estimates and breakdowns of labor and materials requirements. After the design was completed and approved, the computer ran lists showing what materials were needed at the site for each crew every day. Larson notes with the help of the system "there has been a significant savings in designer time."

Overall William Eldridge, general supervisor for customer services, feels: "This has been an invaluable operating tool. It not only helps us get the job done better but in the end enables us to provide better service to our customers at reasonable costs." **IBM**

Automatic Typewriter Doubles as a Computer Terminal

When president Neal V. Fowler and several other engineers combined talents in 1969 to form Vibration and Noise Engineering Corporation in Dallas, they needed to find a way to quickly solve complex engineering problems relating to noise control—such as calculating the amount of noise lost when vibrations pass through any surface. They also needed an efficient method of producing engineering reports and office correspondence. Fowler recalls: "When we found we could use an automatic typewriter to interface with a computer we knew we had the solution."

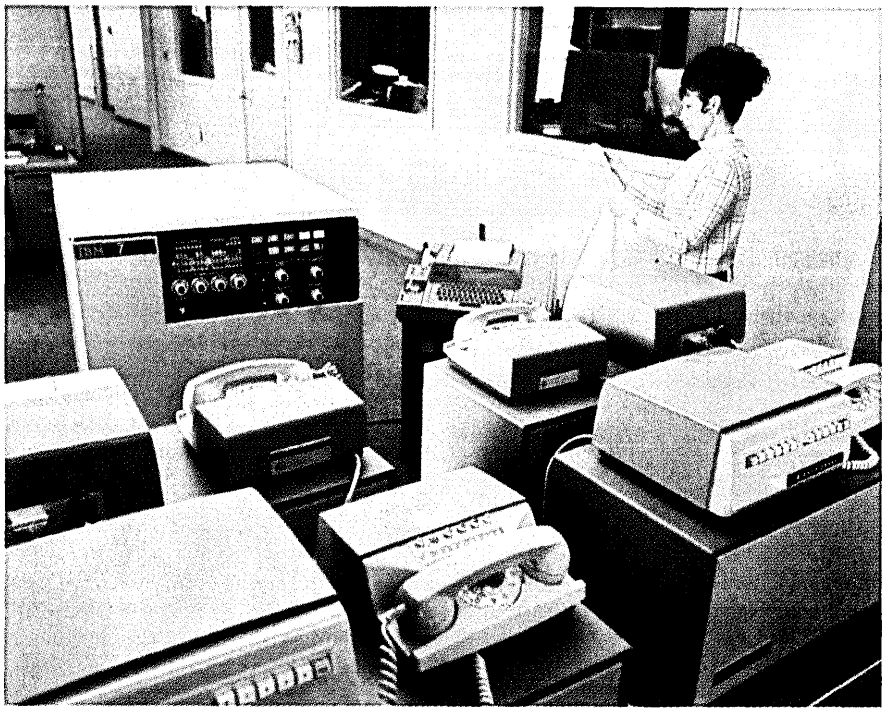
The typewriter is IBM's Communicating Mag Card "Selectric" (CMC). As a power typewriter it can record letters and reports on magnetic cards for automatic retyping, just as it can store short computer programs for computer input and retrieval time and time again. Fowler estimates the CMC is used about 30% of the time as a computer terminal, the rest as a power typewriter.

Salesmen at Vibration and Noise Engineering, who are all trained engineers, find this versatile machine useful in working engineering problems. These mainly involve a series of equations to isolate each noise source from the total noise output in a plant plus another set of more complex equations to help determine just how much quieting equipment is needed for each situation. When solving a particular problem, the user simply chooses the magnetic card with the correct mathematical program, types in the parameters of the problem and "rings up" the remote computer with a telephone data set. The engineering problem and program instructions stored on the magnetic card are automatically transmitted to the computer, which solves the problem and sends back the answer.

Fowler says: "With the help of the CMC we can very quickly project the sound output of any given valve or engine, given the operating parameters. Just as quickly, we can recommend silencing equipment like mufflers and intake filters that will reduce noise to allowable decibel levels." He concludes: "The CMC has been invaluable. Last year alone it saved us at least $55,000 in both reduced clerical and engineering costs." **IBM**

Neal V. Fowler reviews mathematical solution to engineering problem as Treva Wilcox inserts mag card into CMC read/record console.

IBM System/7 Serves Wide Variety of Industries

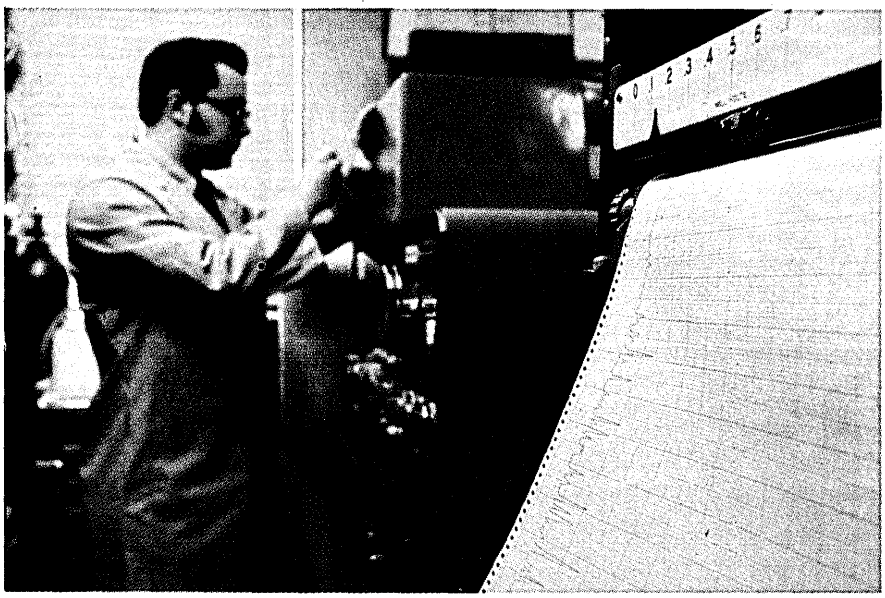


At Friendly Ice Cream to Speed Order Processing

Nearly everything sold or used in over 345 Friendly Ice Cream stores from Maine to Maryland is distributed from the company's commissary and warehouse in Wilbraham, Mass. Regularly, each manager orders from a list of over 400 items. Now, with the help of an IBM System/7 computer, the processing of these orders is completely automatic.

The System/7 automatically places telephone calls to each store at an assigned time using the equipment shown at left. It makes as many as four calls simultaneously without operator intervention.

The store manager keys his order directly into the System/7 using a Touch-Tone® telephone. This data is transferred to an IBM System/3 which processes it and completes all forms needed for immediate shipment and billing.



At W.R. Grace & Co. for Scientific Research

An IBM System/7 computer at W.R. Grace & Co. makes it possible to bypass much of the tedious calculations involved in the analysis of products from catalytic research. In addition costs have been cut and related production has increased.

The sensor-based System/7 collects data directly from the analyzing instruments. A gas chromatograph, being injected with a sample of gasoline, is shown with a chromatogram, the chart which it produces.

The System/7 converts the continuous output of the chromatograph into a series of numeric values. It then transmits the data to an IBM system for final analysis. **IBM**

Academy Award Shared by IBM Systems Engineer

Edward Efron of IBM along with Edward Reichard and Howard LaZare of Consolidated Film Industries won an Academy Award recently for technical achievement from the Academy of Motion Picture Arts and Sciences. The two companies developed a technique for using an IBM System/7 computer to improve the reliability and efficiency of balancing colors used in printing film made for television and theater use.

During the process the computer monitors the printing machine to achieve the exact amount of basic coloring which goes into the makeup of motion picture frames as they are converted from negatives into transparencies for projection. In the event of a color error the computer automatically shuts the printer off and alerts the operator by a flashing light.

"The System/7 enables us to maintain a precise color consistency never before possible in the motion picture industry," says Sidney P. Solow, president of Consolidated Film Industries. "We expect to save thousands of feet of film each month that might have been ruined by color errors during the printing—all of which means considerable savings to us and a consistently higher quality product for our customers." **IBM**

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International

Europe's Boom in Communications

Exclusive rights in Europe to the information gained by Bolt, Beranek and Newman in its work on the ARPA data network have been granted to an Anglo-French consortium. Two companies are involved – SESA of France and Logica of the U.K. These two have acquired BBN's expertise in packet switching and the associated communications protocol.

The agreement comes at a time when the European post and telecommunications authorities are expanding into this form of data network for computer communications over public switched networks. Agreement provides for the European companies to market the hardware and software of the IMP's (interface message processors) and TIP's (terminal interface messages processors) that provide the two methods of entry into the data networks based on the packet-switching principle of transmission.

Logica and SESA will have opposition in that some manufacturers are against the introduction of packet switching on the public service. The network of the U.S. Advanced Research Projects Agency, ARPA, is the first large network based on packet switching. It was developed to use the computing power of the research and development institutions in the U.S. more effectively by linking them in a nationwide grid system, and more than 40 large and medium machines are interconnected on this basis.

The basic function is to allow large existing computers (known as hosts) with different system configurations to communicate with each other. Each host is connected to an IMP which transmits messages to and from other hosts. There is often no direct communication between hosts but via intermediate IMP's which act as small message-switching centres to store and forward information to an appropriate receiving IMP. In addition to their basic packet-switching function, the IMP's regularly exchange information to allow them to adapt message routing through the network. The TIP, or terminal IMP, has a multiline controller permitting attachment of up to 64 terminal devices to the network.

Terminal use expanding

Over the past two years Logica and SESA have been focussing much effort on software development for data network systems. In its most recent assessment of the industry trends, Logica estimates that there will be more than 300,000 general-purpose terminals in Western Europe by 1977 – four times as many as today. The figures for East and West together are proportionately much higher, with developments in the East being 10 times greater than immediate installations. This expansion of the terminal market was derived from a survey of 16 countries in the West and 8 in the East.

The analysis covering 1973 to 1977 was made by BREF, Bureau de Recherche d'Etudes de Formation, and involved more than 500 computer users. The market was examined both by industrial sector and by country for five categories of terminals–keyboard printers, visual display units, remote batch terminals, accounting terminals, and computing terminals. The survey showed that in France and the U.K. there are about twice as many keyboard printers as visual display units, whereas in Germany VDU's are beginning to predominate, partly due to Germany's high communications tariffs. Remote batch terminals are favoured more in France than in Germany, and the United Kingdom leads both the other countries in the use of accounting and computing terminals.

Almost half the visual displays are in the transport, distribution, and finance fields. Bureaus, transport, distribution, finance, and central government use over 50% of the keyboard printers installed. Remote batch terminals are favoured very largely by the bureau world, and the financial institutions are leading users of accounting and computing terminals.

Second sources for printers

A survey of attitudes among users elicited reasons connected with the performance of mainframe makers and the price and reliability of PTT services that influenced practices. Hence only a third of the keyboard printers come from mainframe houses. This is less marked with visual display devices, remote batch terminals, and accounting terminals where the mainframers supply about two-thirds. This greater reliance apparently reflects the problems of interfacing these types of equipment with mainframe systems. In the U.K., Logica measured the effect of the recent recession in the industry by comparing immediate results with 18 months ago. Installations of terminals is 10% down on expectation in 1971, but in compensation the present rate of installation is higher than anticipated at that time.

U.K. Agency's Rigid Software Guidelines

New guidelines for managers of data processing installations in central government in the U.K. are being prepared that should set more rigorous conditions for manufacturers and suppliers of services.

They are emerging from the Central Computer Agency, created a year ago to integrate policy making, purchases and acceptance of equipment, development of project management, and financial control. The guidelines focus attention on a wide range of software problems in project management in the various departments. They will range from proposals for improving aids for converting systems to a new software system for evaluating the effectiveness of compilers.

Perhaps it is important to understand the scale of investment and mixed installation usage which the agency inherited as the owner of the all machinery which it, in effect, leases out to other departments. Emphasis is focussed on 22 types of computer representing 10 manufacturers, some of whom are long gone from the industry. Excluded are installations for technical, scientific and research uses, such as an IBM 360/195 for weather forecasting, a CDC 7600, 6600 and 6400 complex at London Univ., and a CDC 7600/ ICL 1900 special hook-up at Manchester Univ.

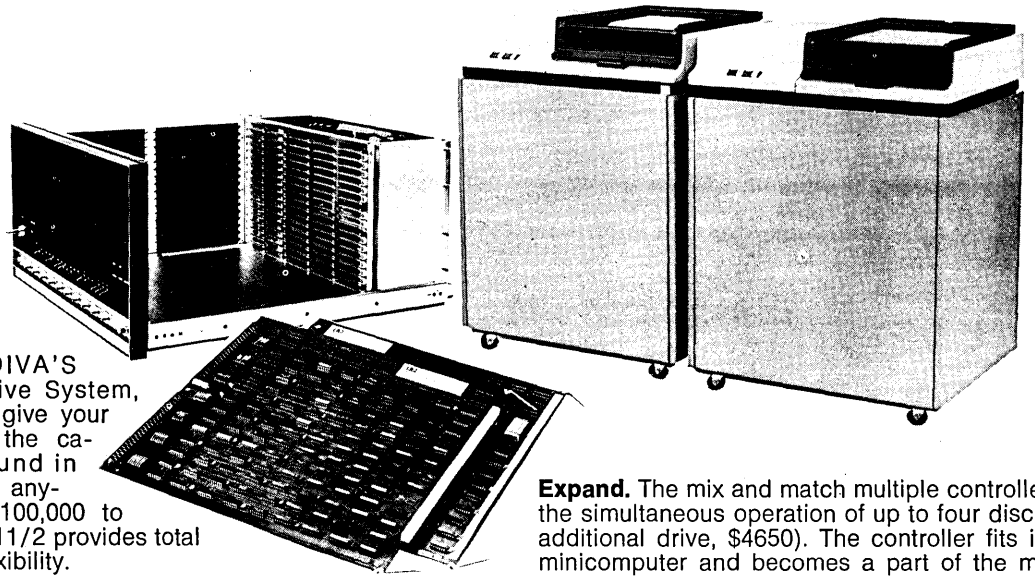
At any one time 10% of the administrative installations are undergoing a major change either in general upgrading or to provide additional facilities by adding front-end processors, terminals, character recognition equipment, and so forth. The installations consume 400,000,000 punched cards a year, absorb 1,000 disc packs, about 10 times as many magnetic tapes, and an incredible 34,000 miles of paper tape. Although work will increase over the next five years, some of these consumables will diminish; the agency expects to spend over $25 million on more direct data entry equipment. Not surprisingly, ICL has reorganized its data entry product line and introduced direct entry facilities on its latest processor in response to this perhaps predictable development. ICL still receives preferential treatment on the domestic market from government.

Advice, not standards

However, in talking about the role of the Central Computer Agency, a number of civil servants have stressed that it is an advisory unit to data processing managers in departments. Its attitude toward industry is one of pro-

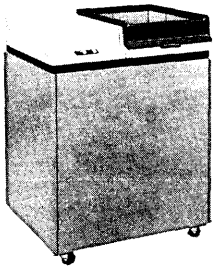
(Continued on page 138)

You can buy an IBM 360. Or you can hook your mini to a $12,500 DIVA Dual Disc Drive System and save $87,000.

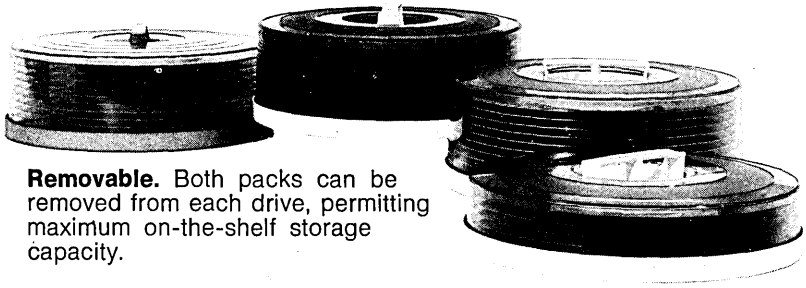


Maximize. DIVA'S Dual Disc Drive System, DD-11/2, will give your minicomputer the capabilities found in maxis costing anywhere from $100,000 to $400,000. DD-11/2 provides total operational flexibility.

Expand. The mix and match multiple controller permits the simultaneous operation of up to four disc drives (each additional drive, $4650). The controller fits inside the minicomputer and becomes a part of the main frame.



Use one. Either drive can be used separately for the storage and retrieval of up to 58 million bits, 7.25 million 8-bit bytes of data.



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Use two. Or both drives can be used together, doubling the capacity; 116 million bits, 14.5 million bytes. With two drives you can copy, transfer, integrate — perform any dual unit function. One drive is always in reserve. Things won't come to a dead stop.

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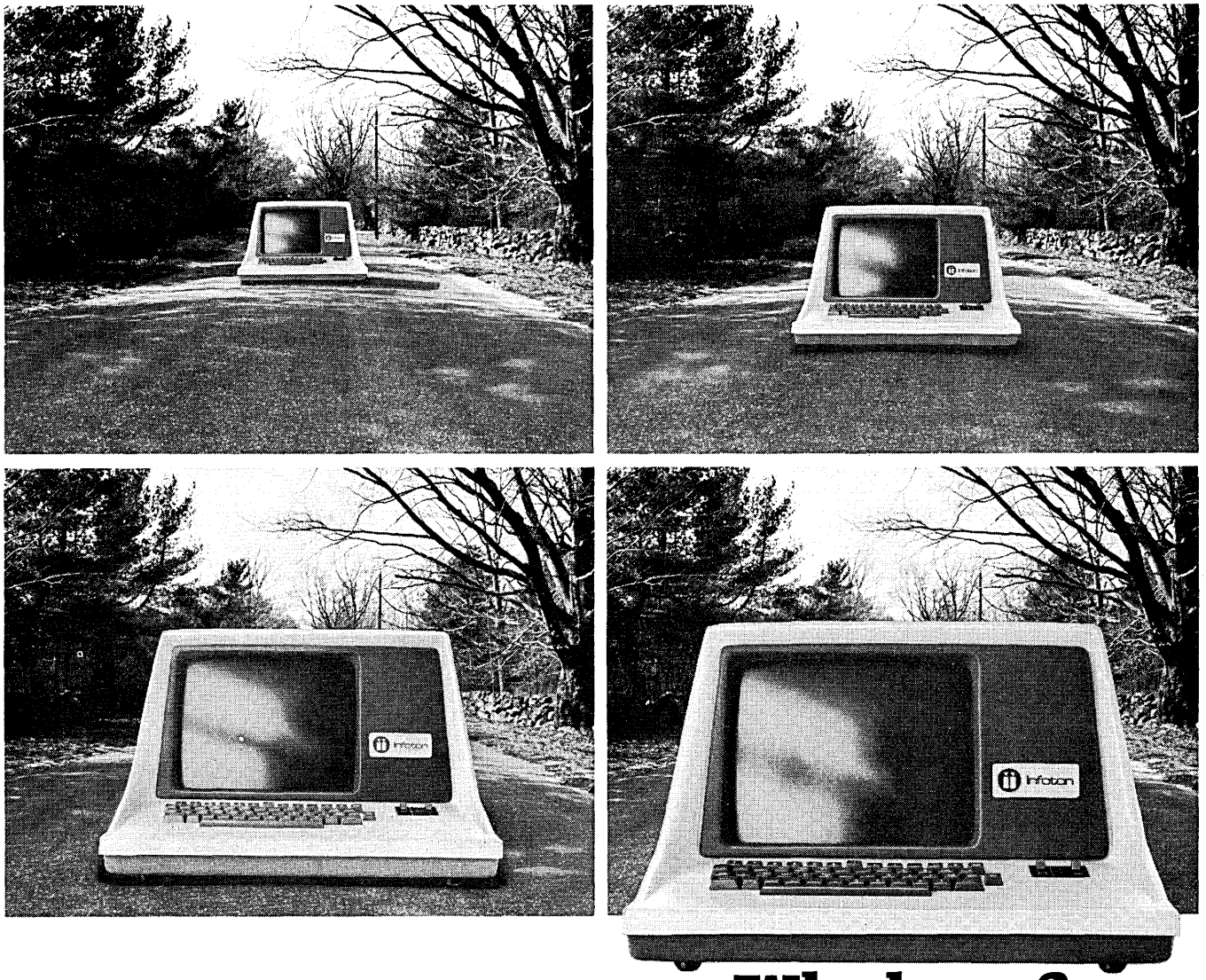

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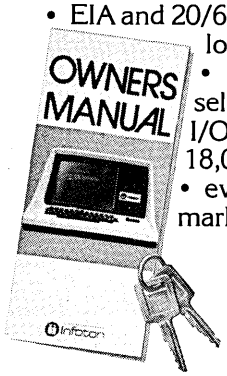

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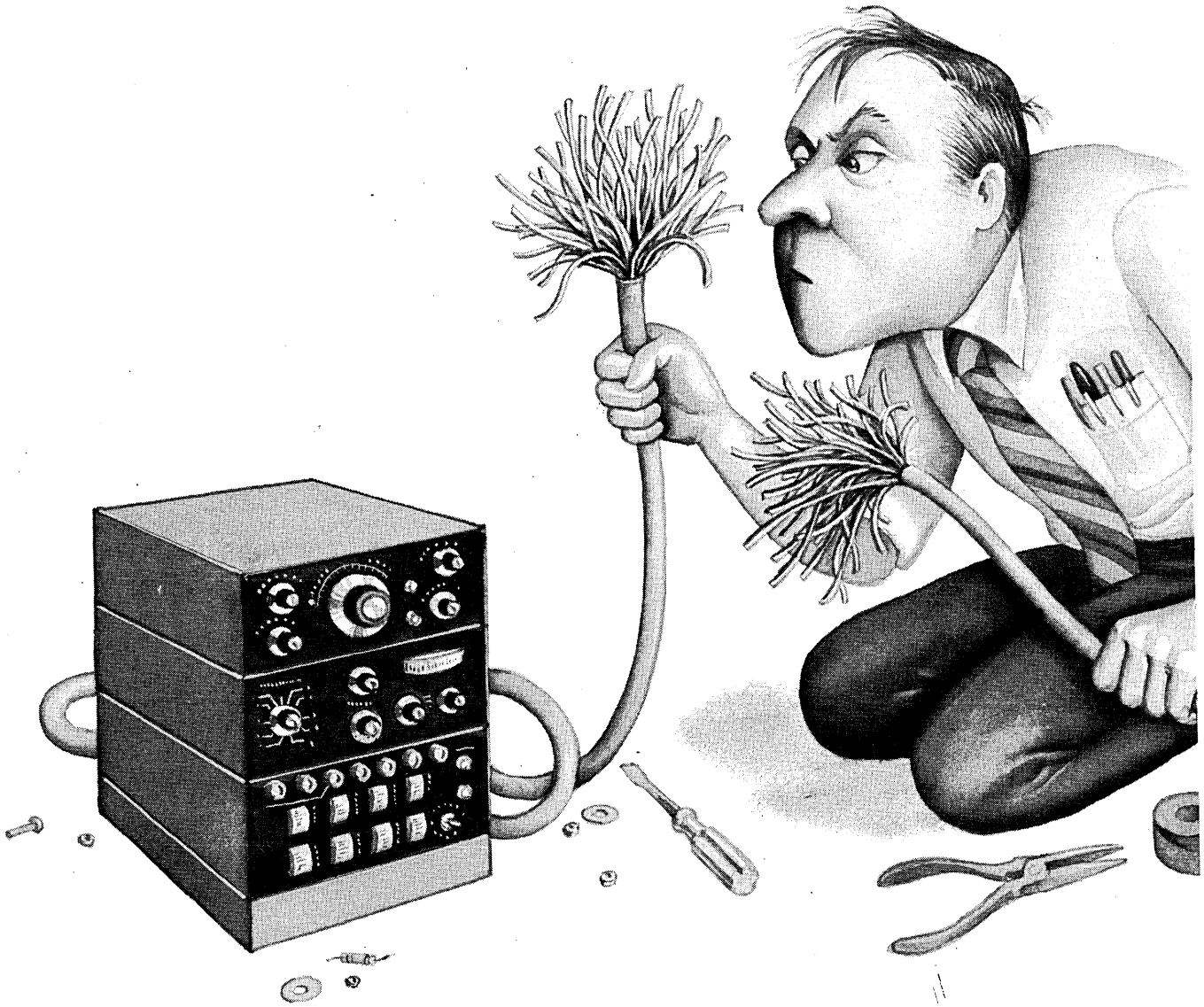

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digital

viding a code of practice rather than setting a new standard, but the code is based on technical assessments that would need to be shown to be at fault if a supplier disputed requirements.

In the hardware field, the policy is to buy from ICL by single tender large computers and those computers that seem certain to lead to larger installations later; to use single tendering from another manufacturer where this involved an overriding question of compatibility; and in other cases to use competitive tendering. Sponsorship of the domestic industry through direct development aid rests with another department. This policy on hardware was well established and in operation before creation of the agency, but with the new unit the needs of central government for software and support services have been receiving closer attention.

One executive of the agency says improved testing of software demonstrates the sharpening up of users stimulated by unbundling. He accepts that the requirements have always been there for getting higher efficiency, but unbundling focussed attention on the penalties for not being more rigorous with the manufacturer and supplier. Even when manufacturers put their software through the most enormous evaluation checks, the manufacturer simply was too broadly based to test for many of the specific conditions of the customer. This applied even to large users like the central government, he says.

Programming first

This set the general background to the series of technique assessments started by the agency and backed with a number of contracts to the software industry this year costing an initial $5 million. The first report to come off the press covers modular programming. In common with the majority of others in preparation, it surveys practice and performance in both the U.S. and Europe. Installations that failed to make a particular technique work are essential parts of the analyses.

Preliminary findings of experience with automatic flowcharting suggests this is the most popular of packages on offer, but it is one that gives minimal benefit. A study on decision tables suggests they are among the most difficult being used, and the best assistance that can be given to data processing managers is to show them how to identify environments in which decision tables are likely to be satisfactory. All of these programming and systems techniques will be produced in a set of volumes available to commercial users as well as in-house to government.

Possibly the most ambitious project so far is the evaluation of the effectiveness of compilers for which software has just been delivered by J. Harwell Data Processing. It enables a series of test programs to be assembled from a comprehensive library in a way that allows the main features and properties of the particular compiler to be put through their paces. In the same way as the agency wants to avoid sloppy compilers spreading among installations, the appraisal software is being tested on one installation to assess its correctness. No progress report will be made until a current series of measurements are completed, but the initial project is concentrating on using the system to assess COBOL and FORTRAN compilers. But the test programs also check the diagnostic facilities of each particular compiler, and the software developed for assembling these tests can also be used for assembling other test routines that can be applied to other types of software or even complete installations.

However, with expenditures on new hardware running at a consistent $100 million a year, the Central Computer Agency believes it will have its work cut out in helping as much with basic

conversion of systems as with honing complicated installations into brightly polished ones.

—Pearce Wright

Japan Delays Investors

Japan again has resisted pressures from abroad to open its computer industry to foreign ownership of business ventures. In the latest, or fifth, round of capital liberalization since 1967, the government has opened a reported 99.5% of all Japanese industries and businesses to foreign investment. But among its exceptions, at least for a while, are computer-related businesses and integrated-circuit manufacturing.

Such enterprises as the manufacture, sale, and leasing of mainframes, peripherals, and terminals are to be liberalized to the 50% level on Aug. 4, 1974, and opened to 100% foreign capital investment on Dec. 1, 1975. The software business moves to the 50% status on Dec. 1, 1974, and to 100% on April 1, 1976. The integrated circuit business is currently 50%, going to 100% on Dec. 1, 1974.

Prior to this move, which went into effect last month, the Japanese government on four occasions had liberalized the extent to which foreign investors could purchase strong equity positions in Japanese enterprises. (This is not to be confused with any easing on the importation of hardware and software products.) The capital control laws were designed to serve as a protective umbrella under which companies such as Sony in consumer electronics and Fujitsu in computers could grow to a position of strength without the fear of being bought out by a financially stronger firm from abroad. With the latest round of decontrol, some 1,000 industries are understood to be open to 100% foreign ownership.

Still too early

The latest announcement reportedly left Japanese computer industry officials very unhappy, for it opens the industry much earlier than they had recommended. Among their wishes, according to widely circulated reports, was that the software field be opened only to the 50% level in 1977. The Ministry of International Trade and Industry (MITI) in the past has acceded to domestic industry pressure in its formulation of policy, notes an American who's actively marketing in Japan. But if those cries of anguish heard clear across the Pacific are for real, he says, maybe this time MITI has chosen to ignore its constituents—which would mark the government decision as a significant move.

On the other hand, MITI has been trying to reorganize the mainframe industry so that the six major manufacturers could be reduced to one or two. It has also been providing subsidies for the development of processors competitive technologically and in price with IBM's 370s. Perhaps the accelerated liberalization schedule, combined with an adequate subsidy, is intended to bring about these results.

Earlier, IBM Japan had reduced prices by 3-9% on some of its 370 models, and it was speculated that this move was designed to counter an anticipated increase in competition from other U.S. companies. Apparently this will not materialize for awhile, but meanwhile Japanese competitors did not take kindly to IBM's price cuts.

—Edward K. Yasaki

Computer Policy for the Common Market

The European Economic Commission in Brussels worries about computers. Officials there, noting that almost 90% of the value of equipment in the European computer market comes from "firms with their decision-making centers and basic interests outside Europe," are thrashing out a unified computer policy for the expanded Community,

(Continued on page 152)

This looks like just another ordinary data terminal.

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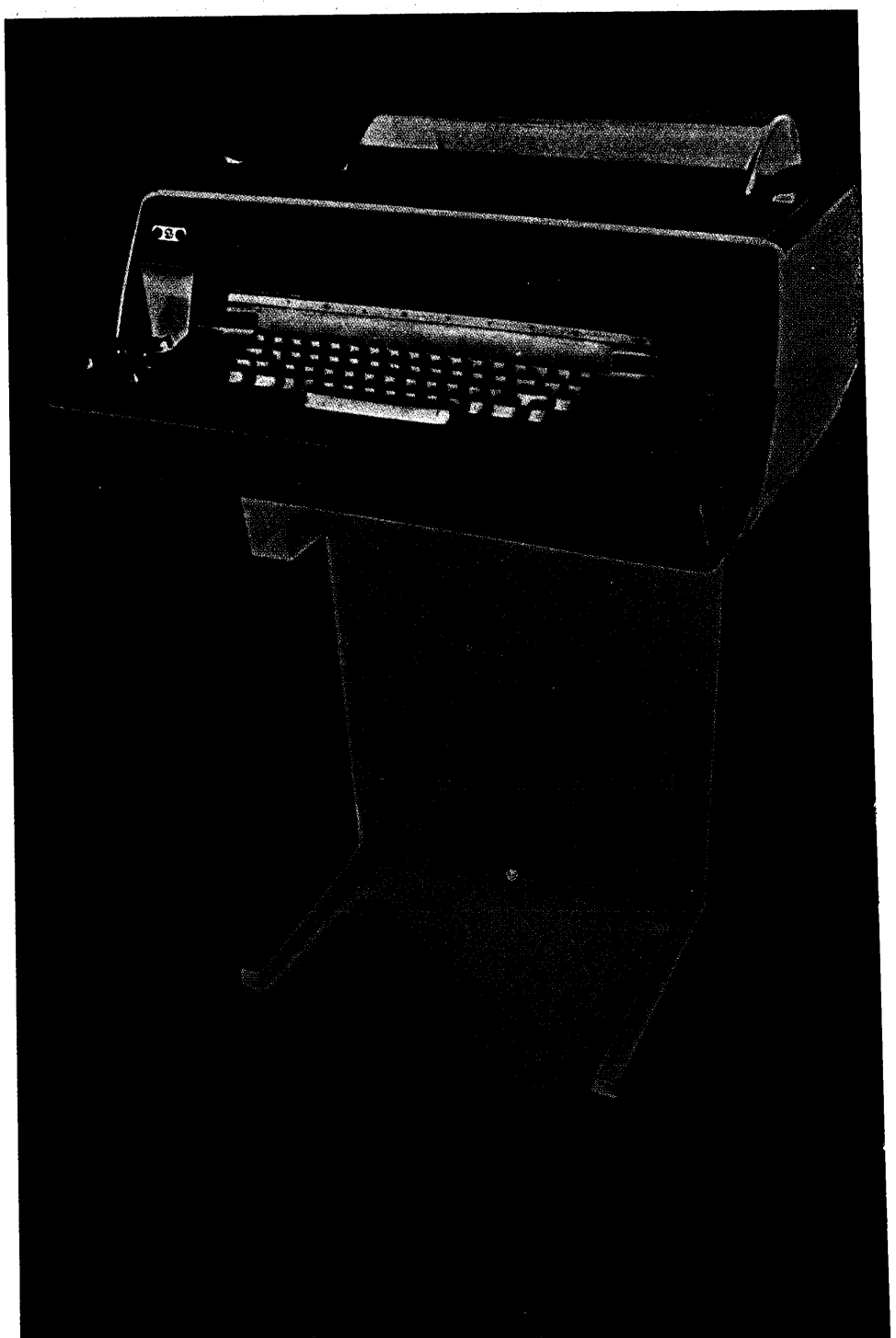

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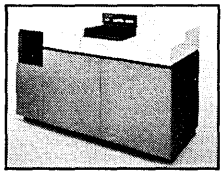

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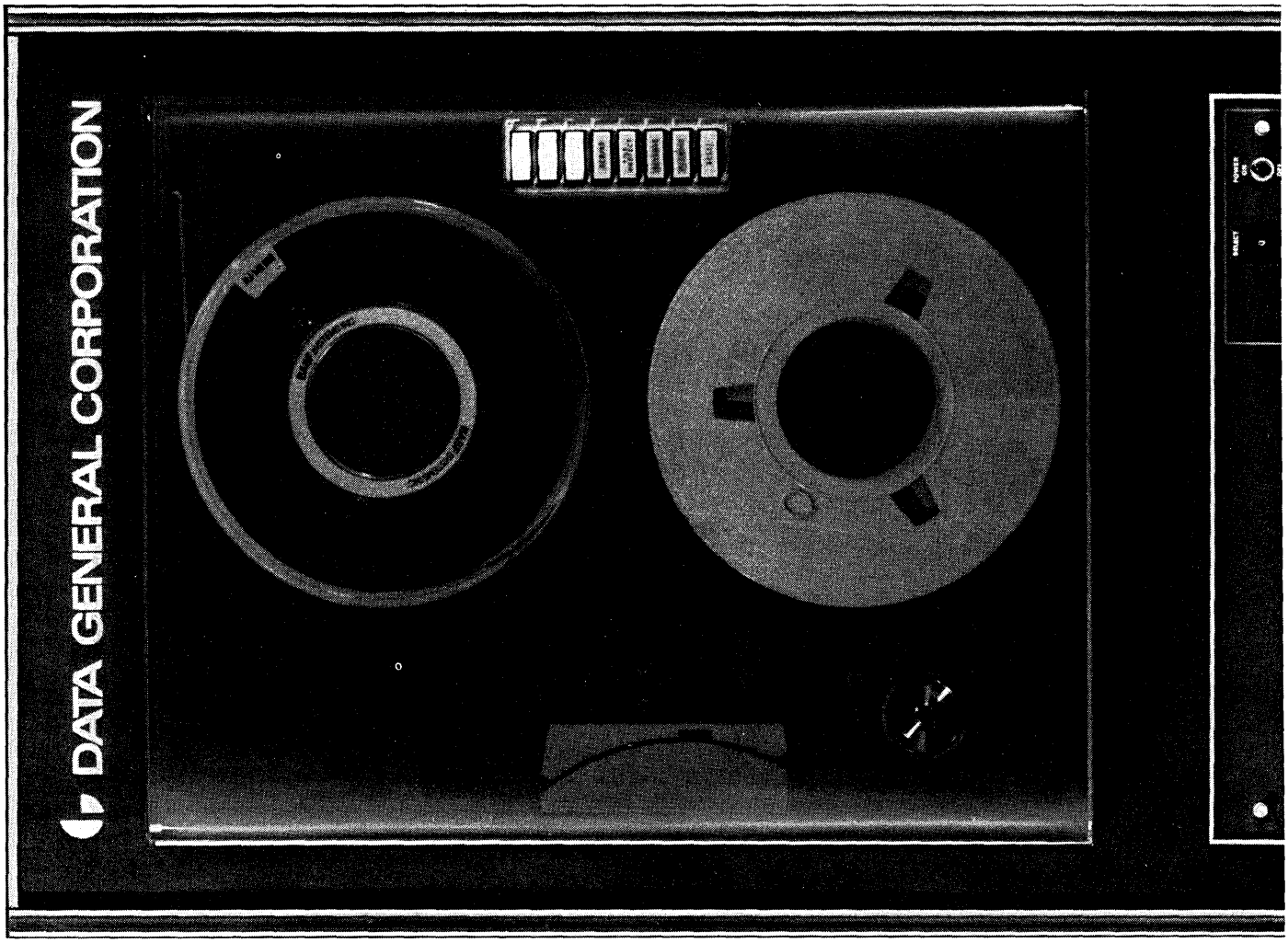

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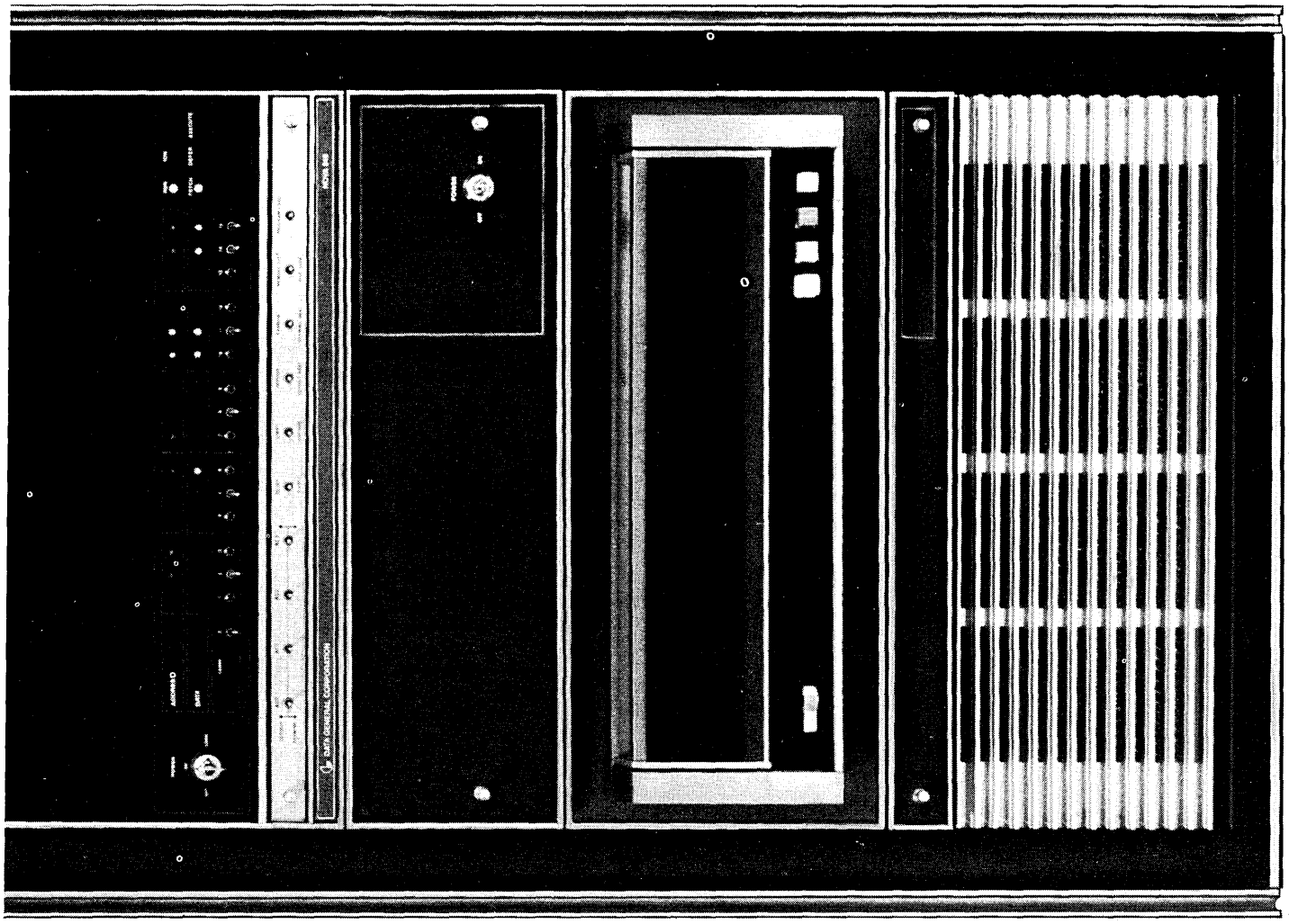

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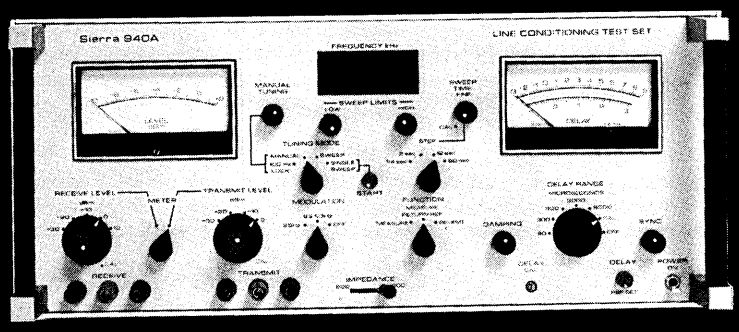

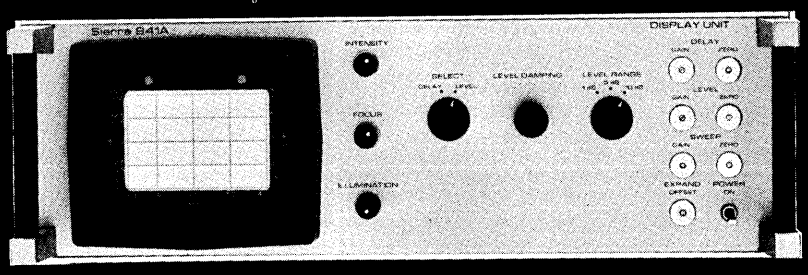

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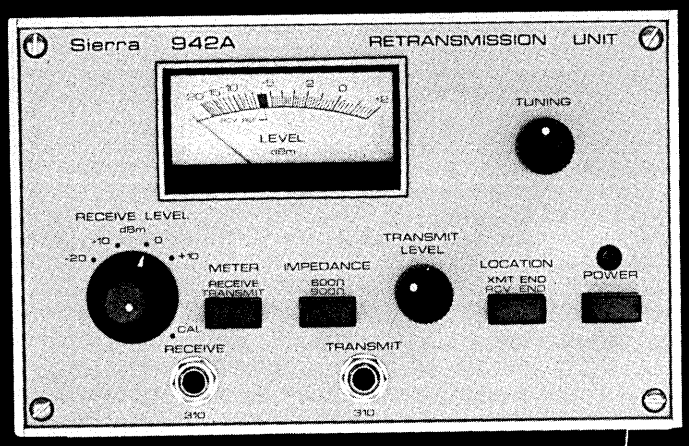

NEW: SIERRA 943A CONTROL UNIT

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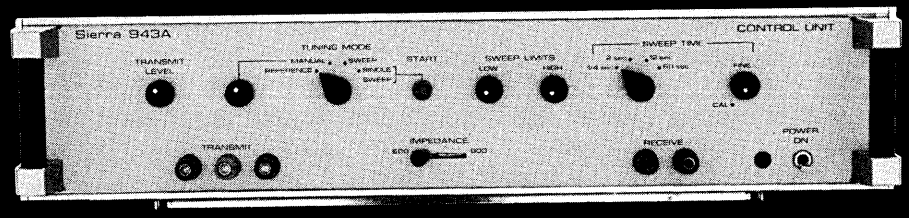

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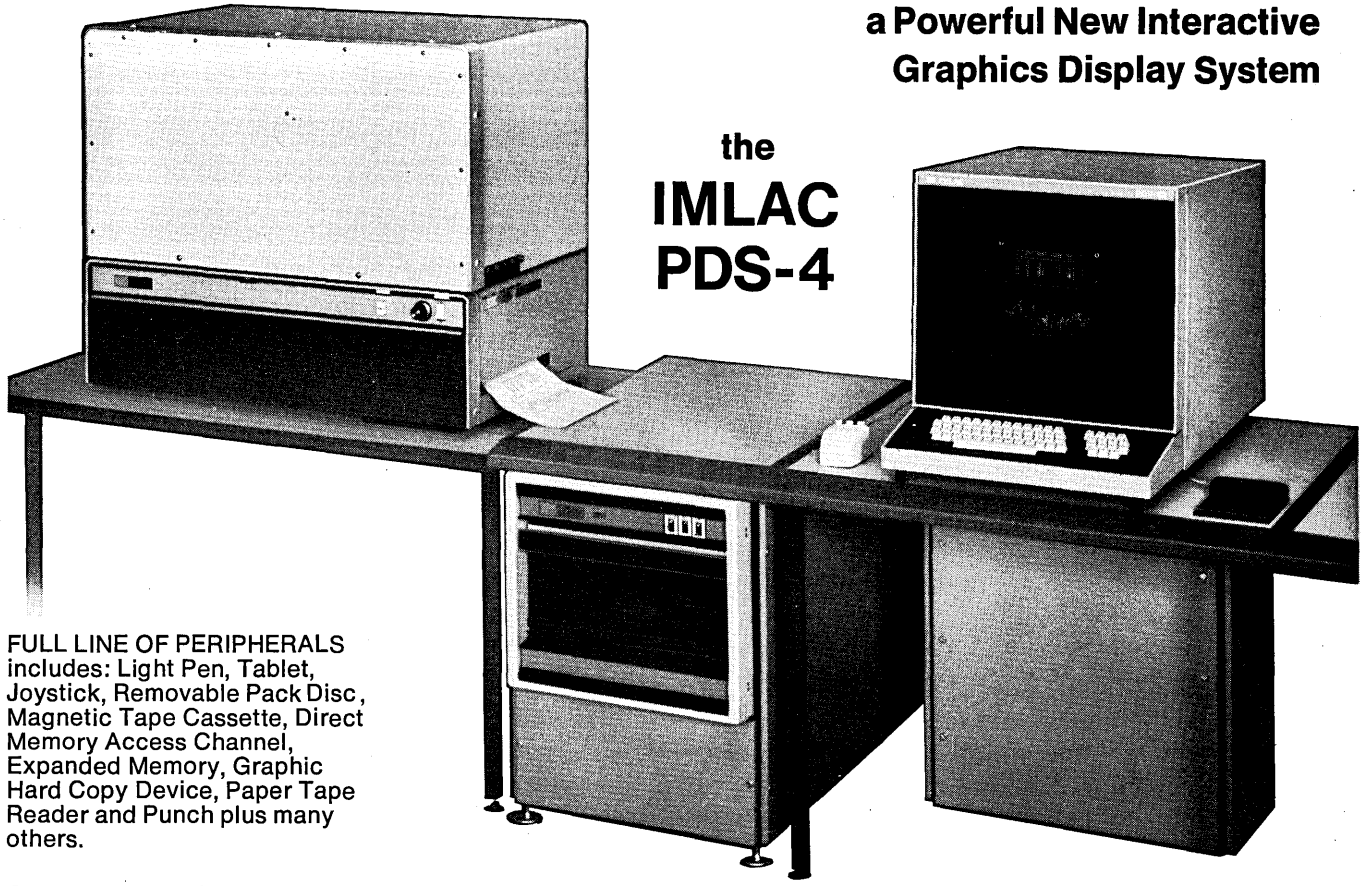

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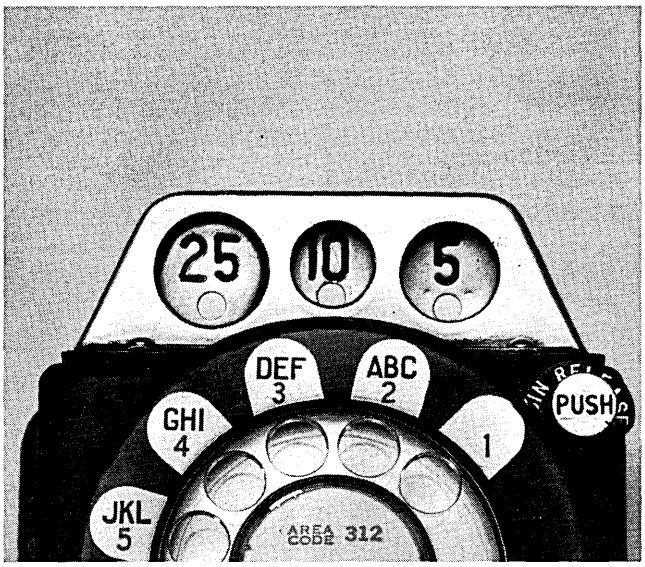

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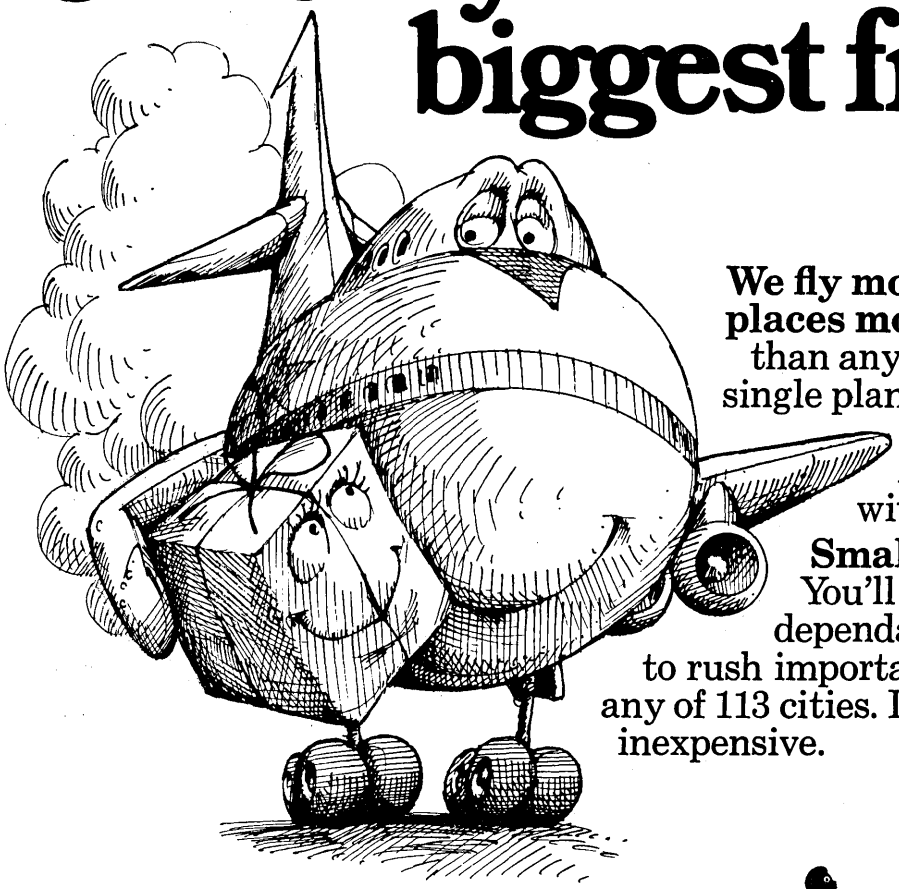

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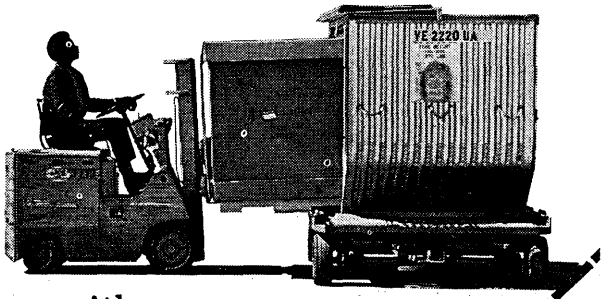

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which took in Denmark, Britain, and Ireland at the beginning of this year.

The computer policy issues in Europe can be oversimplified into two categories: what to do about IBM, and what to do about everybody else who makes computers. The IBM problem is similar to the antitrust problem in the United States (and just about as impossible to solve). Neither users nor competitors get very enthusiastic about a broken-up IBM, yet the highly integrated company continues to have too much control over the destiny of computing in Europe for comfort in Brussels—or any other European capital.

It is possible that Europe might get around to some kind of antitrust suit of its own, on the grounds that IBM as a "dominant concern" is not sufficiently forthcoming with publication of standards and interface specifications. There may also be increased pressure for IBM to sell at least some shares in IBM-Europe to European shareholders.

The Commission's other problem—what to do about the *rest* of the computer industry—is being viewed in a healthy light, with strong emphasis on users and applications, though there are a few relics of traditional views about computing. One of these is a strong belief that only by merger can Europe's own computer companies compete with IBM and the other American computer makers.

The Commission strongly encouraged the Siemens/CII (and eventually Philips) tie-up, as well as the AEG-Telefunken/Nixdorf combination. Now there is further pressure from the EEC for ICL to hook up with one of these (probably Nixdorf) in the interests of economies of scale—in spite of ICL's own unfortunate experiences with eight previous mergers. One fear lurks with considerable strength inside the Commission—that an American partner might come into one of these purely European combinations too soon, thus upsetting the delicate national balances and resolutions before the joint efforts have a chance to gain strength.

This concern is shared in national capitals; it was the British government, not ICL, that leaked the news of a Burroughs takeover bid, and the blandishments of Univac and even CDC (which has been making diplomatic headway not only by sharing large-computer technology but by restraining its force in European deals) are being resisted. Even Honeywell-Bull, which is still, emotionally, a "French" company, is not likely to get much encouragement for its current bid to take part in a transnational link to beat IBM. The formula in Europe is simple: An interloper is a company with its "decision-making center and basic interests" (and shareholders) outside Europe.

Government aid

However, the Commission doesn't waste more than a modicum of time on this ages-old issue. In current discussions much more attention is given to more practical policy matters, such as coordination of government aid and public purchasing.

One of the most important steps in this direction is an attempt to unify the markets (by channeling government support through the EEC) and then slice them horizontally instead of vertically. By 1978-80 the Commission wants to have a unified product line thrashed out between all the European manufacturers (they hope there will be only two large combinations by then), with tidy overlaps and a strong emphasis on applications specialities. Thus the computer makers are jockeying for position as the bargaining begins, and ICL's new computer, revealed at the Hanover Fair in late April, slices neatly into Nixdorf-Philips territory. Both the Community and its computer companies are still hung up on the giant computers, expensive flagships of national fleets, to the detriment of small computer hierarchies and clusters. But their awareness of the lower end of the line seems to be growing.

So far most of the policy proposals take the characteristic political form of "working parties" or committees, and the burden of liaison with member governments and other special-interest groups will be heavy. Nonetheless, a proposed working party on hardware would have major user inputs to look at the needs for specifications and other standards, and the blessing of the Commission might give them a better chance than their U.S. brethren to push some kind of publication requirements into the law-books. The hardware working party would also look at community-wide R&D aid, and a guarantee system to help launch the joint range (and entice the heretofore separate companies into such collaboration).

Development grants

In software they're also proposing a working party, not only for information exchange but to work out development grants, find ways of increasing software portability, and then work on means of legal protection for the resulting property. This kind of approach, unified at the Community level at the right point in time, could evade the nonsense of tax anomalies that bedevils computer users in such places as California.

Teleprocessing is also getting attention, though the field is already cluttered with working parties and commissions and vested interests and national monopolies. Nonetheless, the Community wants to see more attention paid to user needs, and will undoubtedly expend some effort in liaison with COST, CEPT, CCITT, CIDST, etc. Finally, they propose a working party in training, for the noble purpose of harmonizing dp training throughout Europe, working towards equivalence and mutual recognition of qualifications, as well as better facilities for high-level specialist training.

All seem to be sensible goals, and the Commission clearly has some sensible people working toward them at the administrative level. The trouble is, most of them are now fraught with political overtones, and any threat to a member country's computer company is likely to be viewed as a threat to that nation. So the 20 years of delicacy and tact that have brought the Community this far are likely to lead to another 10 years of broad ideas and policy discussions before the real fruits of their labors become visible.

Competitors won't wait

The entire computer policy could bog down in the usual morass of committees and liaison and reports that have deterred other bodies like the United Nations from equally worthy causes in the name of high technology. While all this time is spent in European negotiations and trying to fend off "le Defi Americaine," it is unlikely that the Japanese or American manufacturers will politely stand still.

Even so, the Commission's thinking so far shows a serious attempt to understand a highly complex industry and cope with some of its more severe problems. The real success or failure may depend more on the quality of the people they put into the working groups. If they are the professional working-party members, the outlook is not so rosy. If Europe manages to bring in the computer people with hands-on experience in the real world of commercial data processing, the next few years may be very interesting indeed. Europeans show no "technology gap," and in fact they can be credited with inventions from radar to time-sharing to virtual memory. If the computer companies in Europe feel sufficiently threatened to give up their national markets in favor of Europe-wide product markets, they may indeed give the rest of the world a run for its money.

—Nancy Foy

(Continued on page 156)

Shhhhhhhh

What follows is the best-kept secret in the data processing industry.

There is an intelligent terminal system that can stand alone without technical personnel, and handle up to 20 workstations simultaneously. It's remarkably effective for the price. System Ten by Singer.*

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And it's already installed in all of these industries.

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Mfg—Printing & Publishing
Mfg—Chemicals & Allied Products
Mfg—Petroleum Refining
Mfg—Rubber & Miscellaneous Plastics
Mfg—Stone, Clay, Glass & Concrete Products
Mfg—Primary Metal Industries
Mfg—Fabricated Metal Products
Mfg—Machinery, Except Electrical
Mfg—Electrical Machinery & Equipment
Mfg—Transportation Equipment
Mfg—Photographic & Scientific Instrmnt
Mfg—Miscellaneous Mfg Industries
Motor Freight Trans & Warehousing
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Wholesale Trade
Building Material, Farm Equip Dealers
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Food Stores
Apparel & Accessory Stores
Furniture & Home Furnishings Stores
Eating & Drinking Places
Miscellaneous Retail Stores
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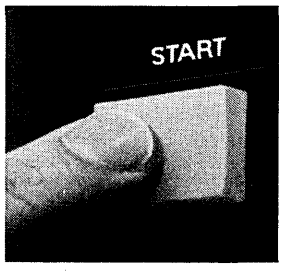


news in perspective

Benchmarks

Policy Shift: As expected, the General Services Administration and the National Bureau of Standards are being given a bigger say in the planning and operation of the federal government's $2.4-billion computer operations. President Nixon last month ordered the computer policy operations of his Office of Management and Budget transferred to the General Services Administration. Its standards activities were shifted to the National Bureau of Standards. No reason for the order was cited immediately.

Rent Control? The General Accounting Office claims the General Services Administration charges too much for equipment it buys for federal agencies out of a special revolving fund. The users, although paying GSA less than they would a commercial supplier, are still paying back into the fund more than was spent to acquire the equipment. After pointing out that GSA, during the next five years, plans to become the sole owner of and sole procurement agent for all general-purpose dp equipment within the federal government, the GAO report (B-115369) recommended that GSA's lease charges be cut so the typical user repays only actual acquisition costs.

NCR's Markets: With a manufacturing reorganization well under way (May, p. 116), the National Cash Register Co.'s new top man, president William S. Anderson, has launched an overhaul of the company's domestic marketing structure. The plan is to reorganize along vertical industry lines instead of the traditional product-line approach via 15 regions, each headed by a vp. Selected last month to do the job was supersalesman E. F. Shipman, 51, who in 26 years with the company has won 18 sales awards and whose Atlanta region has consistently outperformed all of NCR's 14 others. His title is vp of domestic marketing, a post held by Charles L. Keenoy who took early retirement April 30 at 58. Observers at NCR's annual users meeting last month in San Diego considered Shipman's new job a critically key one in the British-born president's plan to turn the company around. "The King has selected his Prime Minister," they were saying.

Supermarketing: The Supermarket Institute convention in Dallas last month was almost a supermarket for supermarket point-of-sale systems, with three firms showing new systems. NCR was there with its long-awaited 255, which it says will do for supermarkets what its 280 does for department stores. Litton Industries' Sweda International division showed what it calls the "Sweda Superregister," a unit which is modular and will sell for from $3,000 to $3,500. Deliveries will start early next year. And Bunker Ramo was there. Its Electronic Store Information Systems Div., newly acquired from Nuclear Data Corp., introduced a system which incorporates what the division calls "Gen-II release 3.0, an improved printer, utilizing a dot-matrix system that provides a larger printout and a capability for checkers to record sales in the event a power or computer failure."

A Law for Lawyers: California lawyers will have a more comfortable time, under the law, using outside data processing services if, as expected, a bill amending the state's Business and Professions and Evidence codes is passed by the Assembly this month. The bill, SB 334, introduced by Sen. George Deukmejian, passed quickly

through the state Senate early last month and was expected to have an easy time in the Assembly. Without the amendments the two affected codes mean an attorney using the services of an outside data processor runs the risk of causing clients to lose the benefits of the attorney-client privilege for information disclosed to the data processor, and of a breach of legal ethics by the disclosure.

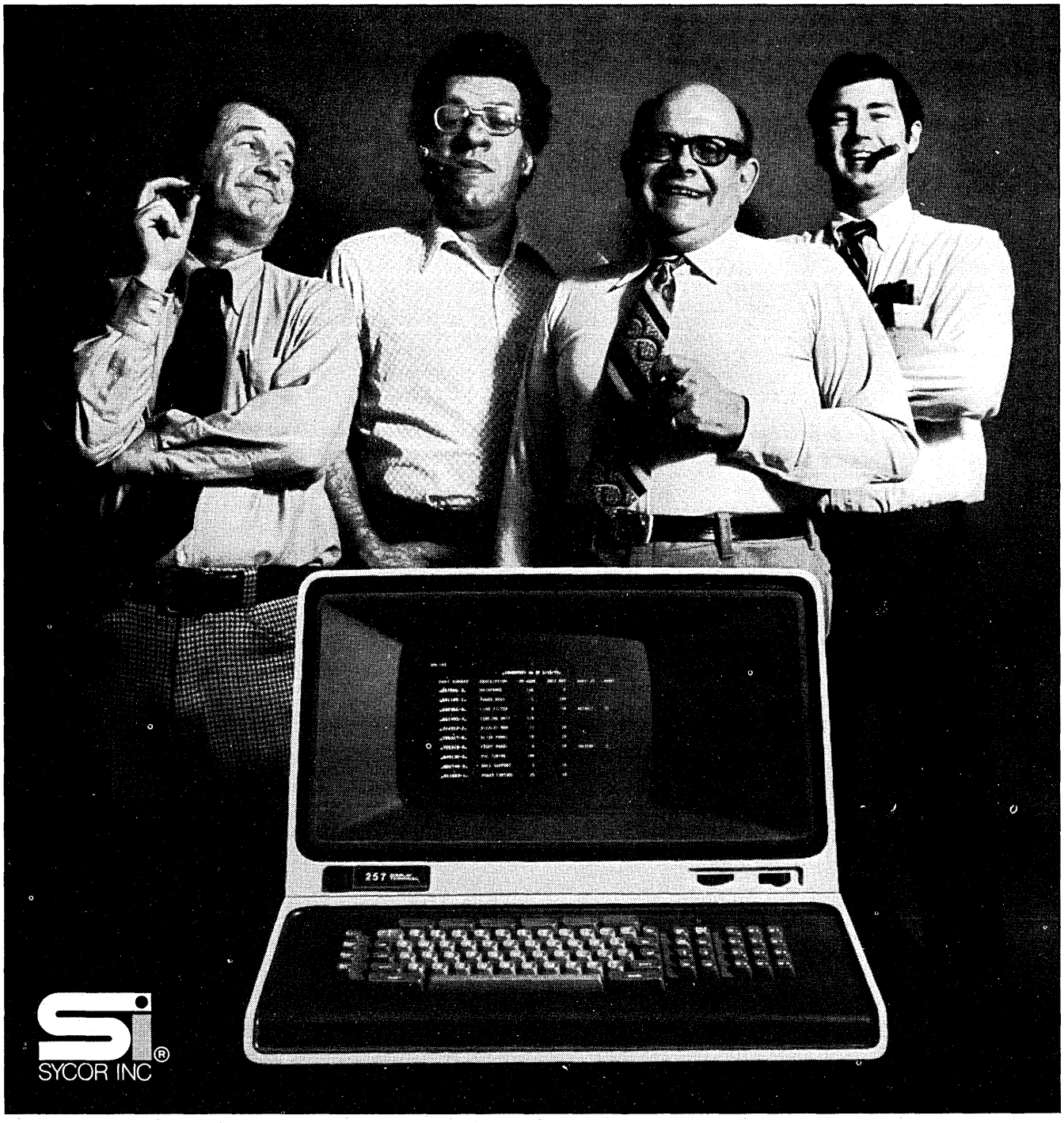
Higher Connection: Phonetele, a California maker of call-limiting devices called Phonemasters, lost its plea to directly connect the devices to telephone lines without having to use connecting arrangements supplied by the telephone companies. Now, the California Supreme Court has agreed to review the company's dispute with the state's Public Utilities Commission, a move considered significant by Phonetele's president Bob Feiner, who has sent copies of his 47-page Supreme Court brief to regulatory agencies in 47 other states. Meanwhile, AT&T, which has supplied 229,263 connecting arrangements to dial-up customers that use "foreign attachments," sent to the Federal Communications Commission the results of a two-month study showing that customers using their own equipment with private line services are causing harm to the networks "in a significant number of cases."

Package Market: A study of 2,000 software users and suppliers disclosed that computer installations spend an average of $30,000 a year to buy software packages. Some reported spending as high as $300,000, according to a report by Frost & Sullivan, Inc., a New York market research firm. It says $135 million was spent in 1972 and this will leap to $410 million by 1977. The report defines a "software package" as a complete plug-in program to perform a specific system, application, or utility function. Despite the high demand, there are many bargains around as major computer users routinely enter the package market as suppliers. It notes the state of Georgia recently made available its library of programs at no cost, and three years ago United Airlines bought a complete reservations package from Eastern Airlines for $1 million.

First Delivery: It took almost three years, but the first all-digital Trans-A-File document storage and retrieval system has been installed. The $600K system purchased by Colonial Penn Data Corp., Philadelphia, will be used to automate its accident and health insurance claims and policy service files. A total of four systems have been sold by Trans-A-File Systems Co., Sunnyvale, Calif. The second reportedly is ready to be shipped to Virginia Commonwealth Univ. to handle medical files. It is to be followed this summer by a shipment to the sheriff's department of Riverside County, Calif., which is developing an area-wide records center for the law enforcement and criminal justice agencies. And at the end of the year, if all goes well, a $1.5-million system goes to the Strong Memorial Hospital, Univ. of Rochester.

Tightening SBC: Although it will be some time before Control Data realizes the full benefits of its January purchase of IBM's Service Bureau Corp., it's been moving quietly to enhance the subsidiary's position as a profit maker. It is building a new development laboratory in Campbell, Calif., to house activities now located in San Jose. And late this summer it will begin consolidating SBC's New York City and Harrison, N.Y., facilities into a single operation in Greenwich, Conn., located only a few blocks away from Greenwich Data Systems, which CDC is rumored to be interested in acquiring from Planning Research Corp. □

WE CROSSED AN WITH OUR INTELLIGENT GOT AN



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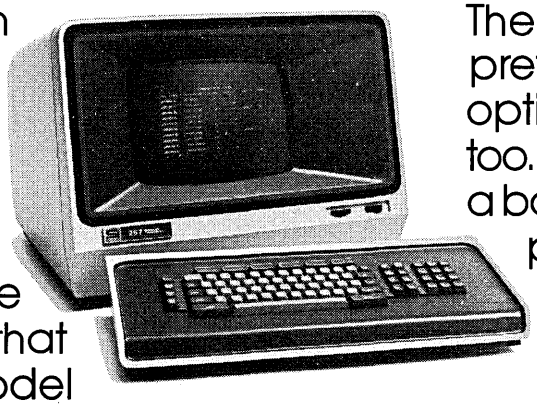
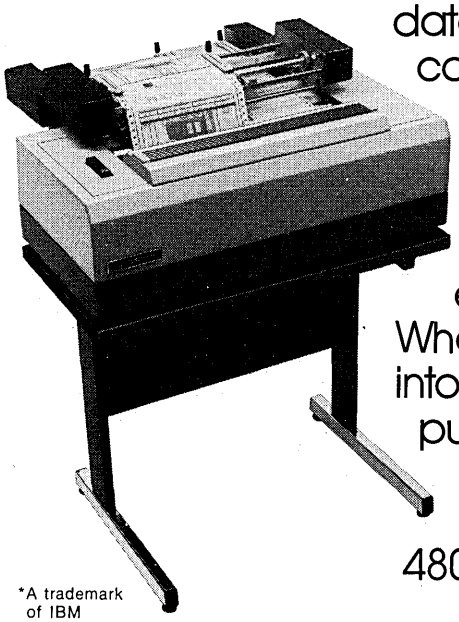
INTRODUCING THE SYCOR 250. It's our new intelligent on-line terminal that's lower priced than IBM's 3270* and compatible in both hardware and software.

In fact, you can just plug it into any IBM network and let it go to work.



But, unlike the 3270, our Sycor® 250 has many of the intelligent features that have made our Model 340 remote batch terminal so popular.

Features that let the 250 check branch office key entry field-by-field instantly, providing clean data to the computer and significantly improving operator efficiency. What goes into the computer goes in clean (at up to 4800 baud)



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—and you spend less time on the line. So, you can install more terminals per line, and probably end up needing fewer lines and ports.

NEW DUAL TRACTOR PRINTER

The 250 has some pretty impressive optional equipment, too. It's available with a badge reader, a light pen and a family of versatile printers.

The printers are our new 2580 series, with 40, 80 or 165 cps speeds. They feature dual tractors that handle two independent continuous forms simultaneously. So now you can combine your forms printing and administrative message traffic on one printer.

HOOK A SYCOR 250 INTO YOUR 3270 NETWORK

See what our 250's intelligence can do for you. We think it's the best in the industry.

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SYCOR

See the Sycor 250 at the National Computer Conference. We'll be in booth 2601.

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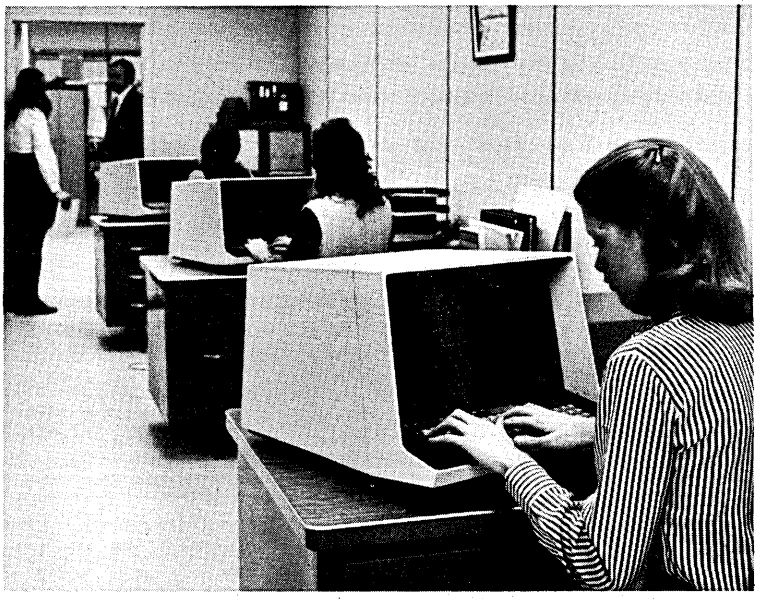

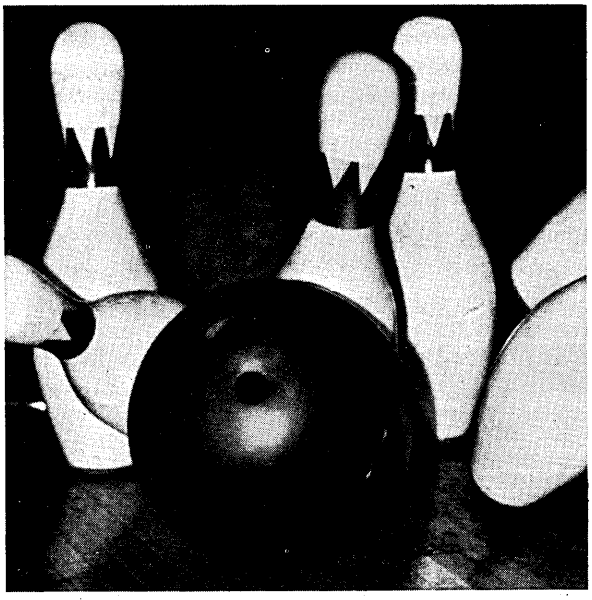

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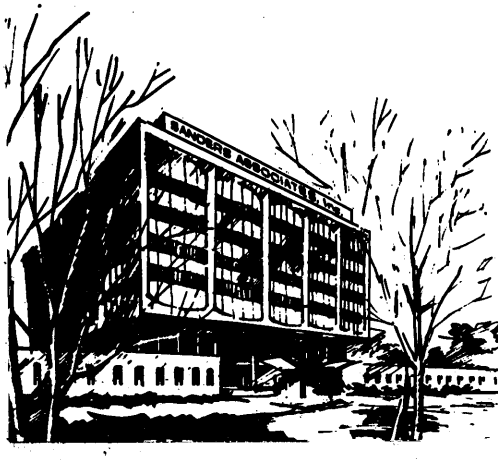

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Corporate Headquarters

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United Video, Inc., is a new and important entry in the specialized common carrier field. We will provide a competitive alternative to standard telephone service for point-to-point direct line voice and data communications throughout much of the United States. As such, we offer major operating and economic benefits to communications users who in the past have had to take standard Bell direct communications service or leave it.

United Video is not a newcomer to the communications field. For a number of years we've carried television signals for CATV franchises in cooperation with our parent organization, LVO Cable, and are making arrangements to provide transmission services for network television signals in a major southeastern routing. All told, the company currently operates 1300 miles of microwave routes, and has filed applications with the FCC for an additional 5000 miles.

At the same time, we've been constructing a 700-mile Dallas to St. Louis data transmission network utilizing the most advanced microwave technology which is scheduled for service in Fall, 1973. This network will form the basis for the company's communications capability through much of Mid-America. Application for additional routes has also been filed. This specialized common carrier service is designed both for companies located in the midwest and south and for those in other regions of the country wishing "pass along" services on message traffic going from coast to coast.

In offering these services, United Video looks to best the competition, old and new, in two key areas: 1) ***cost***—For long term users standard UVI tariffs will be approximately 30% below the recently filed new Bell tariff and only half of the current Bell charge—and 2) ***responsiveness***—unlike the telephone company, the direct line user will be our primary revenue source and we aim to do everything possible in our power to make sure he's getting premium, trouble-free service.

Our abilities to deliver in these key areas are among the reasons why we think you'll want to take a closer look at this new alternative to your present approach to direct line service. There are more, but these should give you the general idea. For further information on United Video's capability in data and voice communications, call collect to (918) 587-1171 or write: United Video, Inc. Att: Marketing Department, P.O. Box 2686, Tulsa, Oklahoma 74101.

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Off-line

The threat of shortages and skyrocketing prices of business forms in the U.S. are every bit as real as for gasoline, says the consulting firm of Arthur D. Little. Pollution legislation has forced the closing of a number of plants, and the capital drain of retrofitting other plants with pollution control devices has precluded construction of new mills. Production is currently running at the maximum level of available capacity, and Little estimates that it will be 1976 before production capacity can be significantly increased. By that time it's estimated that consumption will have gone up nearly 50% from 1972 levels.

The advent of the processor on a chip will almost certainly lead to computer architectures unlike any that exist today. One of the more interesting proposed layouts comes from Britain's ICL, which would like to build a computer with 50,000 individual processors for such applications as weather forecasting. A year of R&D has convinced ICL that the machine is technically feasible and that if Parliament doesn't hurry up and support it, those pesky colonists will build a similar machine first.

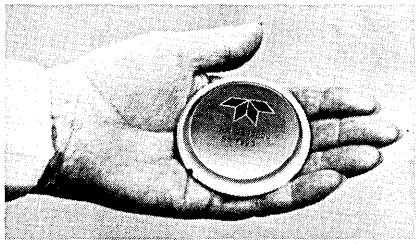
Fully 30% of the minicomputers now in use are being used in business applications, and this number can be expected to increase in the future, says the Diebold Group. In analyzing figures for its 1972 computer census, the firm found a total of 111,867 computers in use at year-end, with 65.3% of them classified as minis (less than $3K/month and selling for less than $150K).

Rumors persist as to the existence of a Univac model 1195, a bridge machine that would be offered to the nearly 90 users of the 30-bit-word 494 used in large-scale terminal applications to bring them over to the 36-bit-word 1100 series. It's thought that a team of personnel from British Airways (the combine of BOAC and BEA) were at least shown designs for the machine while touring the U.S. recently.

Compact Computers

This product represents a new definition of the state of the art of computer miniaturization. The palm-size device contains not only a processor with a 47-instruction repertoire, but also 2K of 16-bit memory. The totally MOS/LSI unit has been supplied only to government customers in the past and is just now being offered to commercial systems designers.

Interfacing the series TDY 52 computers into other products doesn't appear to present a problem to its buyers, as the 120 leads around the flange of the computer all talk TTL. The 52 series can be supplied in 4-bit, 8-bit, and 16-bit orientations, and there are a number of support modules available



for it, such as read-only memories, programmable read-only memories (PROM's), and regular read/write memories.

There are a number of buses and registers inside the hermetically sealed ceramic package, with the 16-bit model having 16 16-bit registers (the machines are fully parallel in organization). Performance is on the order of 10-50 usec for 2's-complement add operations. Performance also takes into account reliability, and in this category the series 52 really shines. If malfunctions do occur, the package is mailed back to the vendor for refurbishment. This may not happen very often, as the predicted mean time between failures is 25 years! About all that is required to start computing with the 52 series is an external power supply.

Programming is accomplished by supplying the vendor with logic lists that will be fed into a program to generate ROM masks, or the software necessary to do that can be purchased separately from the supplier. Excluding this mask generation charge, the 52 series sells for approximately $1000 in orders of less than 10, but oem's should contact the developers for specific requirements and pricing.

Weighing in at only 25 grams and dissipating only seven watts of power, the 52 series will probably find itself incorporated into applications requiring something more than the power of hardwired logic models and less than the power of larger (and more expensive) minicomputers. TELEDYNE SYSTEMS CO., Northridge, Calif.

FOR DATA CIRCLE 222 ON READER CARD

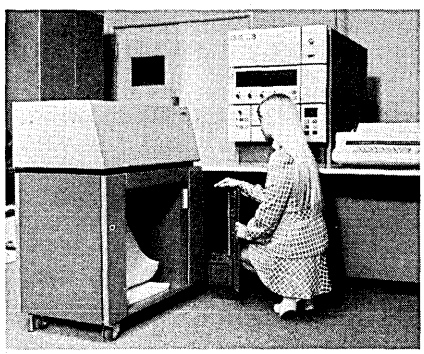
S/3 Add-on Memory

During his 17 years at IBM, the head of this small new company is said to have participated in the design of memories as small as the 1401's and as large as the two-megabyte 2316 LCS unit for large 360s. Not surprisingly, his first product is a core memory system for the IBM System/3 that permits users to add to or replace memory above the first 8K up to the 64K limit in chunks of 8K and 16K.

The BST/3 memory is said to be totally transparent in operation to the system—enough so to earn IBM's *approval* to attach the memory to the S/3. Separate diagnostics present on the BST/3 can be used to determine whether any problem that might arise is located in the add-on memory or in the cpu. No changes to user or diagnostic software routines are required.

The complete memory system and power supply is contained in an 18 x 18 x 6-inch enclosure that is usually mounted under the left side of the S/3 console but optionally can be located anywhere the user desires within the limits of a 10-foot cable. The BST/3 comes in all standard S/3 colors.

Units sent to the field must first complete a 100-hour (minimum) con-



tinuous performance test. Installation takes approximately two hours. Nationwide maintenance is included in the rental rates and will be performed by the supplier or Ampex Corp., depending on location. Rental varies from $174 per month for 8K to $999/month for the full 56K addition. The standard lease requires only a 30-day notice of cancellation, downgrade, or upgrade. Several units have already been installed, and delivery is currently about 30 days. BUSINESS SYSTEMS TECHNOLOGY, INC., Orange, Calif.

FOR DATA CIRCLE 223 ON READER CARD

Line Printer Family

Features such as extensive acoustic insulation, positive paper stacking, and easily changeable print chains make the 0770 line printer series one of the most domesticated lines introduced to date. The printers will be available for Univac 1100 series computers in September and will be extended to the 9700 cpu toward the end of the year. Using a 48-character set, the three models are rated at 800, 1400, and

2000 lpm across a standard line length of 132 columns, with 160-character lines optional.

Judging by all the features present in the 0770 series for the people who actually use them, there is a strong possibility that Univac polled a number of computer operators to get their design inputs. Ribbons do not have to be wound to the end of the spool in order to change them; they can be changed at the point the operator determines they are defective simply by moving a ribbon shield. The 17 print chains, containing from 24 to 384 characters per set, are housed in closed cartridges that do not have to be carefully aligned when they are installed in the printer. Special attention has been paid to forms handling functions, too, with a print line gauge to assist the operator in aligning forms more accurately, and a positive paper stacker mechanism that should save operators and control personnel considerable time in unscrambling badly stacked output. Finally, the vertical format control is all done with program control instructions, obviating the need for paper tape loop bands, used in many conventional printers, which are often misplaced, mismounted, or break during print operations,. causing many printers to spew out output until an operator can reach the scene.

There are features for the people who read the output, too. Each print cartridge has a unique code that can be interrogated by the program to insure that the proper character set is installed in the printer, and an automatic print gap adjustment feature compensates for various forms pack thicknesses to assure high print quality.

The model 0770-00 (800 lpm) sells for $43,370 and rents for $1255/month. The 0770-02 (1,400 lpm) sells for $51,875 and rents for $1525/month; and the 0770-04 (2,000 lpm) sells for $73,455 and rents for $2120/month. All rental figures are based on a one-year lease and include a self-contained control unit and maintenance. Print cartridges are all priced at $400 and can be rented for $20/month. UNIVAC, Blue Bell, Pa.

FOR DATA CIRCLE 225 ON READER CARD

Text Editing System

The APS-12 is a data entry and text editing system whose proprietary cpu design, optimized for its intended application, measures 16K by 16 bits in standard form and can be expanded to 32K of 1-usec core. To the cpu are attached a 600-cps paper tape reader that looks at 6- and 8-channel tape, a 9-track tape drive, and a 2.4-megabyte disc unit for intermediate storage.

Inside, the cpu runs a program called Text-12, which provides random retrieval of any page from among 1,000 25-line pages in milliseconds, generation of 163 discrete character codes (standard output is IBM EBCDIC with ASA first-character forms control), and handling of such chores as concatenation of documents and insertion/deletion of data.

There are two types of operator terminals available for the system. Data can be entered through a Selectric-type typewriter and paper tape unit designated the APS-41. When this tape is entered into the system, it can then be edited on a 14-inch crt screen. Alternatively, the crt can be the input device.

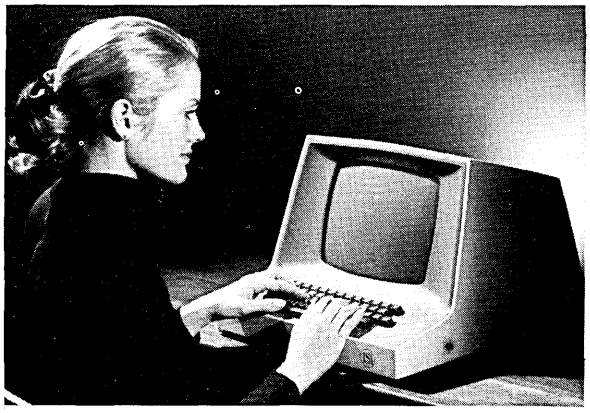
The cpu, supporting peripherals, software, and crt are priced at $59,650. Each APS-41 entry terminal is priced at $3450. Delivery is approximately five months. ALPHANUMERIC PUBLICATION SYSTEMS INC., Los Angeles, Calif.

FOR DATA CIRCLE 224 ON READER CARD

Performance Evaluation

The recent rediscovery of all the virtues of virtual memory management has probably done more to awaken user interest in measuring computer performance than any other single de-

product spotlight



$1500 Crt

There is currently a rush to find the bottom of the market for crt terminals, and the ADM-1 seems to have the honors so far, at least for end-user quantities. The tty-compatible displays a *minimum* of 12 rows of 80 upper case ASCII characters and can be expanded to 24 rows. Features expected in higher priced units are here, too, including block mode or full-duplex transmissions, field-changeable transfer rates from 110 to 9600 baud, user-defined protected fields, automatic repeat for any of the 53 tty standard keys, and the ability to send a whole page of display or only the unprotected data fields.

The unit's single-quantity starting price is $1500, but this is reduced to $1200 for orders of 100 or more and to less than $1000 for really big buys. An optional editing package (character or line inserts or deletes, read cursor, etc.) adds about $85 per unit. Further, to confound Hazeltine and others advertising rentals under $50, the ADM-1 is available for just over $25/month. (The hooker is that Hazeltine's price includes maintenance and is for a 12-month term; the ADM-1's is before maintenance and for five years; still, the $25-plus per month should move this unit into lots of installations.)

Initial production will begin in the fall, and servicing will be handled nationwide by Honeywell. However, since a reduction in the number of components is a corollary of low price, reliability should be high. LEAR SIEGLER, INC., Anaheim, Calif.

FOR DATA CIRCLE 221 ON READER CARD

velopment. The DSP-1 performance monitor is billed as being very adept at monitoring virtual memory computers, as it is intelligent enough to be able to communicate with the system paging algorithm and analyze its activities.

The package consists of the DSP-1 processor, asynchronous interface, 96 sensors, associated cabling, and crt display/control terminal. Nearly every facet of system operation can be monitored, including memory activity for up to 8 megabytes, cpu instruction register activity, channel activity, and peripheral performance down to the level of actual seek times and number of cylinder accesses. The DSP, operating either locally or remotely with the host cpu, does all the processing; but users can have all or selected portions of the performance statistics transmitted back over the interface for host cpu processing or printing.

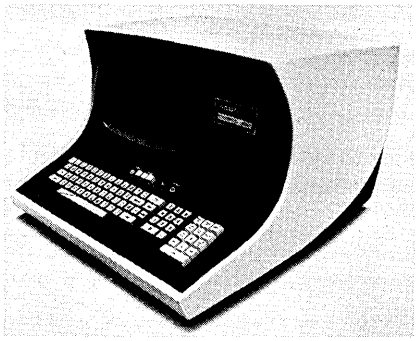
Here is how the DSP-1 would typically be used. If you wish to find the address of an instruction that appears to enter into undesired instruction loops, for instance, the cpu ships the starting address of the subject program and several other parameters over to the DSP-1. The performance monitor then looks at all address references in the relevant memory partition. When the program exits, the host cpu can command the DSP-1 to cease monitoring. The crt then displays memory accesses as vertical bars. The memory locations are decoded and displayed on the screen in hexadecimal form simply by moving a cursor over to the vertical bars that are higher than the others. Also displayed are the number of memory accesses and the time of day.

Although the DSP-1 software is biased toward IBM products (virtual memory machines or not), the hardware is not. Priced at only $16K, the DSP-1 could conceivably pay for itself in a relatively short time by proper use. COMPUTER PERFORMANCE INSTRUMENTATION INC., Kitchener, Ontario, Canada.

FOR DATA CIRCLE 226 ON READER CARD

Crt Terminals

June is busting out all over with crt terminals. Here are two more. The "A" series is designed for use in polled communication environments, where up to 96 terminals can share a single line (up to 9600 baud) operating either as stand-alone units or in clusters. The terminal is available in two versions: 16 lines of 64 characters, and 24 lines of 80, supplied in rack-mountable and table-top models. Characters are drawn from a set of 64 ASCII codes and displayed in 5x7 dot-matrix form. There are editing features for character insert/delete, character overwrite, and horizontal tabbing, with messages transmitted either by line or by page. The 12-inch diagonal screen is refreshed at 60 Hz, and for a change it's black characters on a white background display. The screen can hold fixed data displays if desired and transmit only variable data. Another bonus on the "A" series is graphics



capability as an option, made possible by a screen resolution of approximately 12,000 elements. Also optional are a 30-cps printer, and a 2400-baud cassette recorder. Prices for the crt start at $2430. Deliver is currently 45 days.

FOR DATA CIRCLE 242 ON READER CARD

If you're looking for something more like a straight tty-compatible terminal, ADDS has a new one of these, too. The Consul 580 is identical in appearance to the two-year-old Consul 800 but contains none of its predecessor's editing and formatting features. This display has a larger memory than most other tty-compatible units we've seen, with 24 lines of 80 ASCII characters on the 12-inch diagonal screen. Switch-selectable transmission speeds start at 110 baud and go up to 9600 baud over an RS232C interface. The operator can manually inhibit or enable upward scrolling of data across the screen and can also control the flow of data to the printer interface, which is designed to drive any serial ASCII printer with an EIA interface. Cursor controls and various erase functions are also available. As in the "A" series described above, black characters are displayed on a white background, which is said to result in less eye fatigue. The 580 is priced at $1,795 and is available in 60 days. APPLIED DIGITAL DATA SYSTEMS INC., Hauppauge, N.Y.

FOR DATA CIRCLE 227 ON READER CARD

Floppy Disc

Actually, the FX 300 is floppy only inside its protective covering when it's not running. When inserted into the dual drive, the cartridge is raised approximately one-half inch and spun at 3600 rpm, whereupon it becomes more rigid.

The FX 300's vendor has put a great deal of design effort into making sure that discs created on one drive can be read by any other drive of the same series. The disc cylinders are prerecorded at the plant, and the single readhead zeroes in on just that track. In other words, the head doesn't just move a notch over to the next track and hope it's there, but rather moves to where the track should be and seeks servo and transducer information that tells it where the next track really is.

Some specifications: capacity of 2.2 megabits, a transfer rate per second somewhat greater than its total capacity, and an average access time of 300 msec. The drive is priced at $975 in quantities of 1-10. Cartridges are $7. Near completion is a controller in pc card form that will serve up to 16 drives on a daisy chain basis, but its price has not yet been determined. Initial FX 300 units are scheduled for delivery next month. DYNASTOR INC., Boulder, Colo.

FOR DATA CIRCLE 228 ON READER CARD

Accounting Computer

In many ways, Litton's newest accounting computer, the model 1251, resembles the nine other systems in the series—with one striking difference. This one has a whopping 100,000 bytes of storage, organized as 20,000 40-bit words that can be packed with five data bytes to the word. That amount of storage provides a great deal of flexibility, and the 1251 comes with a choice of 41 applications pro-

grams for performing almost any typical business accounting function. If by some chance one of those 41 programs cannot be tailored to your specific application, either by you or by one of Litton's programmers, the firm will assist in writing a new program from the ground up. In addition to the large memory, the 1251 consists of a 35-cps console printer, full alphanumeric keyboard, plus a paper tape reader/punch rated at 50 cps that is also capable of processing edge-punched cards. The price of all this is only $27K, which seems like a bargain. Delivery is said to be immediate. LITTON AUTOMATED BUSINESS SYSTEMS, Carlstadt, N.J.

FOR DATA CIRCLE 230 ON READER CARD

It's everything you've ever wanted in a peripheral for your mini. With a price/performance ratio superior to every other electrostatic printer/plotter on the market.

In fact, the Gould 5000 gives you 1200 lines per minute—or 600 more than Brand V. And at a lower price.

That means you get high speed for improved mini throughput efficiency. Low cost for economic justification. And, of course, high reliability backed by Gould's reputation for quality.

But you also get a lot more. Resolution of 100 dots per inch. Full alphanumeric and graphic capabilities. 132 characters per line. A 64 ASCII character set. Fan fold and roll paper. 8 bit wide data path.

Optional features? The Gould 5000 is loaded. 96 ASCII character set, upper and lower case. 128 ASCII character set custom designed to your requirements. On-line mini-computer and off-line magnetic tape interfaces.

What's more, Gould software is the most efficient and flexible available anywhere. It lets your mini print and plot considerably faster than competitive units.

We say that the new Gould 5000 is the best buy on the market, with the best features of any mini-computer printer/plotter. And our Pete Highberg or Bill Koepf can prove it to you. Get in touch with them now at Dept. D6, Gould Inc., Data Systems Division, 20 Ossipee Road, Newton Upper Falls, Mass. 02164.

The new Gould 5000. Twice as fast as any printer/plotter ever designed for mini-computers.

DATA SYSTEMS DIVISION

GOULD

Serial Impact Printer

The announcement that a small new firm is out to tackle two well-established competitors is usually greeted with skepticism by oem's, but maybe this won't happen to Baltica Business Machines, whose president claims to have spent the last 17 years designing printers and other peripherals for such companies as Burroughs, IBM, and Univac. The SELECTRO-PRINTER series 60 is out to compete with IBM's Selectric (which it resembles) and the 30-cps Diablo unit. The model 60 prints 7-bit ASCII characters (other codes optional) across 132 columns at 60 cps using a rotating disc that can hold any alphabet except Chinese. The print quality on up to six copies of 15-inch wide paper is said to rival that of standard typewriters.

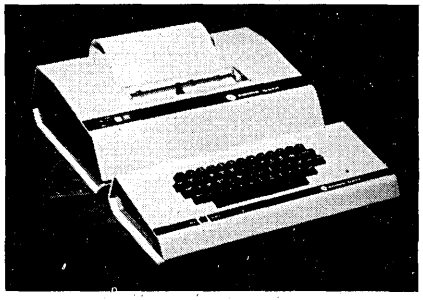
Two submodels differ in the horizontal tab and paper feed specifications. The 60/1 can be manually set for 10 or 12 spaces/inch horizontal tabs and 6 or 8 lines/inch vertical positioning. The 60/2 has 60 spaces/inch bidirectional horizontal tabbing capability and 48 spaces/inch vertical positioning. Both units operate on standard 115 V current and are supplied with parallel 20-line "demand/response" interfaces. Single units are priced at $1600, with prices dropping to approximately $1K for orders of 1,000. BALTICA BUSINESS MACHINES, Malvern, Pa.

FOR DATA CIRCLE 229 ON READER CARD

High-speed Terminal

It looks as if product designers who managed to retain their jobs during the recession spent a good portion of that time thinking up interesting new products, and that the series 200 heavy duty terminal is one of them. It has a number of features that make it attractive to end users as a time-sharing terminal and to oem's looking for high performance and reliability specifications.

The 200 uses electrostatic printing techniques to operate asynchronously



at switch-selectable speeds from 75 to 2400 baud, yielding 240-cps rates across 80 columns of friction-fed paper. The 200 recognizes the entire 128 character set of ASCII and prints 96 of them (upper and lower case) in 7x9 dot-matrix patterns. Standard features include a paper out signal and audio alarm, adjustable margin, print density control, and push-button paper advance.

The 200 has only five moving parts, which should contribute measurably toward high reliability. All control function modules in the terminal plug in and out, so most problems can probably be cured in minutes. The MTBF of the 200 is thought to be around 4,000 hours, but the designers aren't sure, as none of the early models have failed yet, we're told. Production models are available this month. The printers and keyboards are separate in design and price. The printer sells for $1800, and the keyboard lists for $350. SCOPE DATA, INC., Orlando, Fla.

FOR DATA CIRCLE 231 ON READER CARD

Terminal/Printer

With its tty model 33 style keyboard, the MOD/II teleprinter can be used as a time-sharing communications terminal that operates at 110, 150, or 300 baud, full- and half-duplex, over an EIA RS232 interface. Then the terminal can be used to generate reports on up

Microdata unwraps a bold, new communications package.

We've combined microprogramming with communications and created a system which outperforms them all at a price no one else can match. It's the new Microdata 1600/60. And it features our Twin Mini, a processor with two microprogrammed CPU's each having separate high speed control memories and I/O facilities. The Microdata 1600/60 handles up to 256 asynchronous lines, up to 32 synchronous lines or any combination of the two at the rate of 40,000 characters per second. Find out why our entry into the communications market is the finest package available today. Write for details. Microdata Corporation. 17481 Red Hill Avenue. Irvine, California 92705. (714) 540-6730.

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CIRCLE 60 ON READER CARD

hardware

to six copies of standard size sprocket-fed forms up to 132-columns wide. Another interesting feature of the MOD/II is its throw-away roller, eliminating the need for ribbon changes. (Rollers come 12 to a box for $50.) Carriage return operations start from wherever the print line ends, and in no case takes longer than 385 msec. The standard character set is 64 ASCII, switch selectable for either 10-bit or 11-bit transmission. Two versions of the MOD/II are offered, a KSR unit ($135/month) and an ASR model ($200/month), with rentals based on three-year lease contracts. Purchase prices start at $3750. Nationwide maintenance has been arranged. NATIONAL DATA INDUSTRIES, INC., Somerville, Mass.

FOR DATA CIRCLE 232 ON READER CARD

Crt Terminal

Current and prospective tty-compatible teleprinter users who don't absolutely require hard copy may want to consider paying the slightly higher cost per month ($49 on a one-year lease, including maintenance) of the Hazeltine model 1000 crt terminal, with its higher speed, quiet operation, and attractive packaging. Also, the customer can choose any two speeds (from a list of ten) ranging from 110-9600 baud, which then become switch selectable. The standard character set is 64 ASCII characters entered through the tty-compatible keyboard, with 31 additional characters (including 26 lower case letters) optional. The 12-inch (diagonal) screen can display 12 lines of 80 5x7 dot-matrix characters transmitted to the 1000 in switch-selectable half- or full-duplex mode. Parity generation and checking also are standard. Options include a cursor, printer interface, and RS232 or 202C interfaces. Purchase price of the 1000 is $1790, and delivery is currently 60 days. HAZELTINE CORP., Greenlawn, N.Y.

FOR DATA CIRCLE 233 ON READER CARD

Multidimensional Graphics

The Digicoder graphics output device will find homes in applications where very large volumes of data must be studied. The system provides hardcopy output which is said to be four-dimensional because it displays various intensities (blackness in this case) of print as well as the expected x-y values.

The system divides the 11-inch paper width of a Versatec matrix plotter into either 128 or 256 rows and prints a stream of optically weighted characters in each row. Input can be from an attached mag tape or directly from a cpu channel (although cpu interfaces have not yet been readied).

The user must supply records of 6-bit or 8-bit characters representing the numbers 0 to 15. These characters are simply translated to optically weighted ones (a "16" is printed almost as a black square) and plotted at 2300 cps. The darkness of the characters is also

controlled; four shades of gray are used, making up the "fourth-dimension" of display.

With tape drive, controller, and printer, the system sells for under $20,000. Deliveries are quoted as 60 to 90 days. DIGICOM INC., Chelmsford, Mass.

FOR DATA CIRCLE 234 ON READER CARD

Tty Lower-case Printing

The DTC-2 is an upper/lower case font conversion kit for Teletype Corp. model 33 teleprinters or their equivalents. Text is printed from either the machine's own keyboard or by the sending device attached to the tty. On ASR models, paper tape is punched with either capital or lower case codes as they are printed. Used in conjunction with a two-color ribbon, the tty equipped with the DTC-2 kit generates copy that in our opinion is more pleasing to the reader's eye. DATA TERMINALS & COMMUNICATIONS, Campbell, Calif.

FOR DATA CIRCLE 235 ON READER CARD

Enhanced Mini

Data General has gone back to the drawing boards with its 800 Jumbo minicomputer and equipped it with a hardware memory management and protection unit that provides memory mapping in 1K 16-bit word blocks on up to 128K of memory. The modifications also provide protection for I/O devices and main memory. The recently announced RDOS real-time operating system can be used to take advantage of the new features, but the Nova 840 will also run under the yoke of DG's other monitors. A 16K version of the

840 with the new features is priced at $16,530. DATA GENERAL CORP., Southboro, Mass.

FOR DATA CIRCLE 236 ON READER CARD

Clustered Crt's

The 2204/15 is a 9-inch diagonal crt capable of displaying up to 960 5x7 dot-matrix characters in 12 lines of 80 characters. Such specifications usually indicate a tty-replacement terminal, but the 15 is oriented more toward on-line data base inquiry operations through its associated control unit.

Three controllers are available for handling one, six, or nine terminals, and the terminals can be blocked off into half-screen (480 characters) or quarter-screen displays, upping the number of active displays the controller can support. In addition to the standard alphanumeric keyboard, the 2204/15 has a 10-key numeric pad and 16 special function keys that can be used to issue interrupts to special subroutines resident in the host system. A printer interface is standard, and hard copy units are optional. The 2204/15 rents for $36/month on a two-year lease, with maintenance of $15/month. Controllers start at $89/month. BUNKER RAMO, Trumbull, Conn.

FOR DATA CIRCLE 237 ON READER CARD

Computer Interfaces

Computers are being tied to other computers more and more often, and here are three different types of interfaces that might simplify the job for current or prospective users of the Digital Equipment Corp. PDP-11 product line. The hardware interlinks are called the UNIBUS switch, the UNIBUS window, and the UNIBUS link.

The switch allows duplicate system components, or groups of components, to be dynamically switched in or out of one system, or switched from one processor to another. This would be a good choice for use in on-line applications requiring back-up capability, as the actual switching is accomplished in about 1 usec. There is a minor performance drop under certain conditions when the switch is used, such as when a main storage unit must operate through it. In that case, if the memory normally operates at 900 nsec, it might be slowed to as much as 1.2 usec through the switch. That seems like a small price to pay for the increased system reliability, however. The switch is priced at approximately $8500.

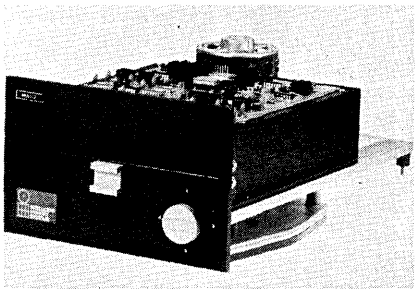
The UNIBUS window enables two PDP-11 systems to access addresses on each other's data path and is thus intended for applications where throughput is the main consideration. The window is priced at approximately $6500.

The UNIBUS link functions as a DMA channel between processors in a network configuration, supporting transfer rates up to 500K 16-bit words/second. Its price is something under $4K. Delivery of the products depends on the complexity of the intended implementation and may run as long as 6-9 months. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 238 ON READER CARD

Floppy Disc Drive

The MU 100 series floppy disc drive is one of the more unusual design variations we've seen. Three models are available: one that stores 500,000 bits on a removable sealed cartridge, and two other models that resemble (in concept) the 5444 disc that appeared with the IBM S/3. These units combine the floppy cartridge with either 16 or



32K bytes on a fixed disc. All heads are flying, noncontact units to reduce wear, and there is a four-position knob on the front of the unit that shifts the read/write heads into different positions to access different portions of the recording medium. Depending on model desired, the 100 series varies in price from $760 to $1025 in small quantities. Cartridges are priced at $5-10. Initial deliveries begin in another 30 days. INTELLIGENT MEMORY SYSTEMS, INC., Boulder, Colo.

FOR DATA CIRCLE 240 ON READER CARD

Remote Terminal

Distributed computing has long been a major feature of Control Data product planning, and its latest terminal, the model 714 multistation terminal, does not differ from this philosophy. There are two controllers, two displays, and two printers from which to configure a 714. The choice depends on how much the terminal is used to do such applications as daily financial reporting, order processing, inventory management, or record retrieval.

CDC usually thinks big, and both controllers can handle up to 15 active display terminals or printers. The smaller of the two controllers is the 714-10, recommended where the printer activity is relatively light. The 714-20 can handle up to seven printers. For hardcopy output, the 714 can be equipped with either a model

711-120, a 30-cps (5x7 dot matrix) electrostatic unit whose low noise level makes it suitable for office environments, or, for multiple copies, the 30-cps 711-121 impact printer that generates up to six copies. The line lengths are the same as those of the crt display at 80 ASCII characters.

The 714-122 is the standard display

unit, showing eight lines of 80 characters, with a second model doubling the number of lines. The terminals are offered with either 64 or 96 ASCII character sets and have cursor controls as standard features, with editing functions optional. Transmission to host computers is performed at a choice of 2000, 2400, or 4800 baud. A configuration of one controller, five displays, two nonimpact printers, and one impact printer would range between $30,810 and $34,810 ($810-903/month), excluding maintenance charges. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 241 ON READER CARD

120-cps Terminal

Western Union claims that the EDT 33 MSR is the lowest priced 120-cps data terminal on the market, starting at $108 per month for its keyboard send and receive version. The KSR includes a cassette mag tape, a Model 33 Teletype, plus an interface for either a Bell 103-compatible modem (for up to 30-cps operation) or for a Bell 202-compatible modem (for the higher data rates). An automatic send and receive version, with paper tape, is also available. It runs $121 per month.

The cassette's buffer can be read or written from the cpu site, as well as locally, and provides for a 20-character answerback. Other features of the MSR include fast forward or reverse searching and backspacing for corrections. The paper tape/mag tape version allows for operation nearly like a dual mag tape unit; functions like operator prompting can be done using the paper tape. WESTERN UNION DATA SERVICES CO., Mahwah, N.J.

FOR DATA CIRCLE 239 ON READER CARD

19,200 Baud Transmitter

Voice-grade lines with C2 conditioning can support full-duplex communications transmissions to 19.2 Kbps using the Model 296 Biplexer. Not a modem, the 296 is a kind of switch that splits a 19.2 Kbps line into two serial streams of 9600 bps each, and sends each stream over its own voice-grade line.

The advantages over wideband communications are price and fail-softness. Over a distance of 100 miles, the 296 and its attendant 9600-baud modems and C2 lines would cost $1948/month, the vendor claims, compared to $2300/month using 303B datasets and Series 8000 lines. At 500 miles, the prices are $3020 and $7175. Fail-softness comes from the ease of finding more voice-grade lines compared to the difficulty of getting more wideband.

Also, if the voice-grade lines falter at 9600 baud each, the modems can be switched to 7200 or even to 4800 baud. Even at 9600 baud, conservative estimates of error rates are said to be one in 1,000,000 bits.

The Biplexer is priced at $5000 (or $150/month including maintenance). The 9600-baud modems run $9750 (or $265/month). CODEX CORP., Newton, Mass.

FOR DATA CIRCLE 243 ON READER CARD

Commo Processors

Varian now has one of the most complete data communication systems on the market with the introduction of some "missing links" in its product line. It has had the very fast V73 minicomputer for some time, and the VORTEX real-time monitor even longer; but an intelligent multiplexor that handles data transfers on a message basis has just been added, and the software engineers have come up with VTAM (Varian's Telecommunication Access Method) that extends VORTEX control out into the network. The multiplexor takes care of all the line sampling and servicing for up to 64 full-duplex lines. The result is the V73-DC, a communications processor said to be 6-10 times more powerful than IBM's 3705, with a sustained throughput rate of 60K bytes/second claimed for it.

There are a wide number of configurations possible. One is in a laboratory environment where both analog and digital input is processed and sent to an IBM 370 running under OS/HASP. This configuration was priced at approximately $70K, less terminals. Another configuration is a small remote concentrator with 8K of memory priced under $20K. Delivery times may vary, as systems can be built from multiple cpu's, multiple multiplexors, etc., but typical configurations should be ready in about 120 days. VARIAN DATA MACHINES, Irvine, Calif.

FOR DATA CIRCLE 244 ON READER CARD

Tape Security

The Data Lock is installed into the mounting hub of tape canisters where its interlocking jaw should make it nearly impossible for unauthorized personnel to gain access to the tape file stored inside it without destroying the tape. The installation time is said to be "5.9" seconds. The circular keys cannot be duplicated on conventional key-cutting devices, and no two keys are exactly the same. Data Locks are also available for flexible tape seal canisters. The lock/key combinations are $12.50 each, or $6.50 each in orders of 1,000. DATA PROCESSING SECURITY, INC., Park Ridge, Ill.

FOR DATA CIRCLE 245 ON READER CARD

Dp Presentation Aids

Quick flip charts can be made up using the Chart-eze kit of templates and labels. The kit contains three 8½ x 11 inch plastic templates with 14 chart-size dp flowcharting symbols, 168 pressure-sensitive labels, a circle aid for diameters to 24 inches, a chart pointer, and a how *not* to do it booklet. If you have to sell your concept before you can code it—or even if you're near-sighted—the $19.75 investment might prove worthwhile. NEWELL-WHELAN ASSOC. INC., Melrose, Mass.

FOR DATA CIRCLE 246 ON READER CARD

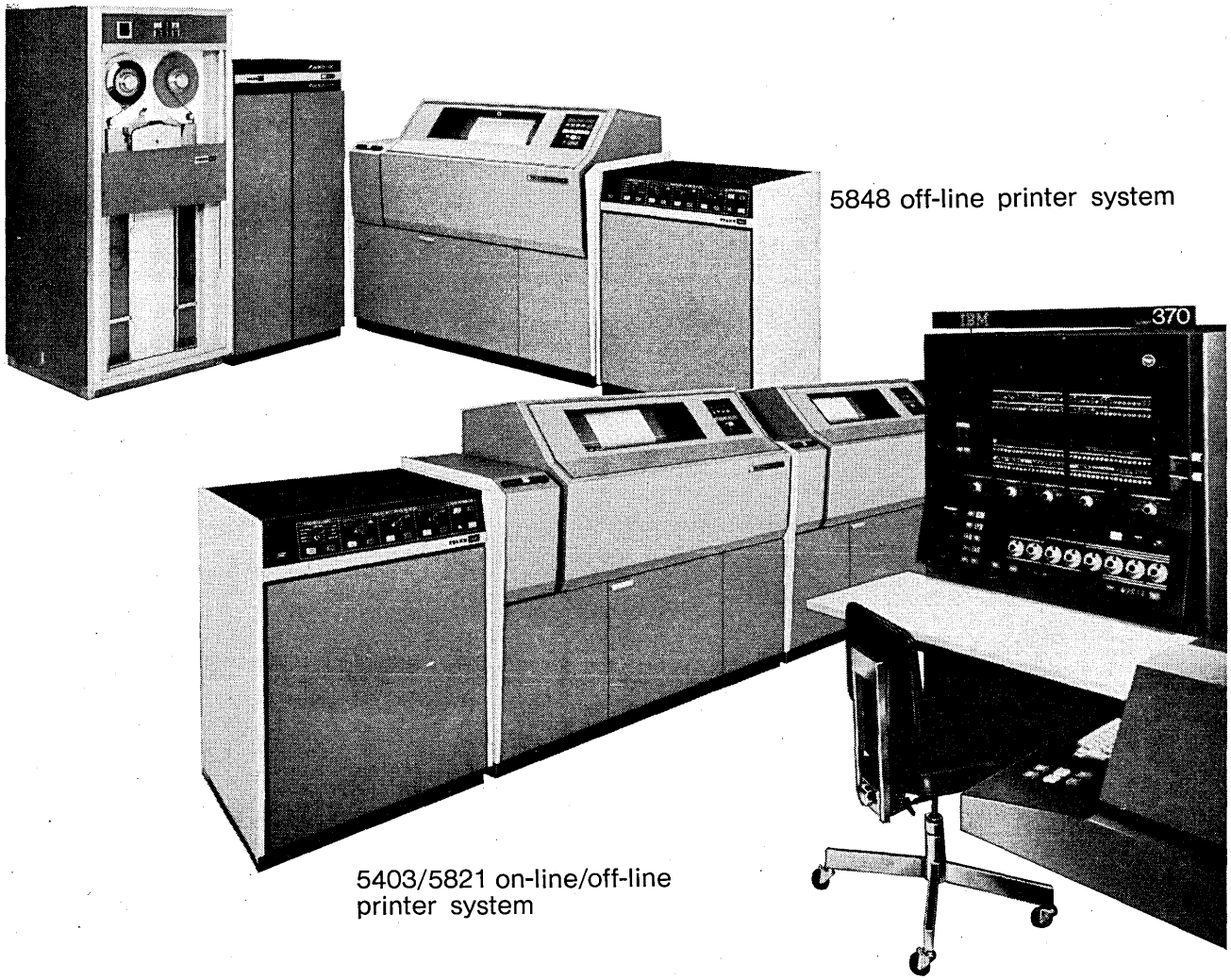
Cassette Storage

The series 3000 EIA is a single- or dual-cassette storage device that can be attached to any equipment having either the RS232C or European CCITT interface standards. Standard Philips cassettes are used to store information, and recording/transmission is done at eight switch-selectable rates ranging from 110-3600 baud. There are five modes of operation, including off-line (just the terminal and the cassette unit talk to each other); tty, for entering asynchronous information, and automatically storing it on tape in one-line records; on-line to terminal (bypassing the tape); on-line to tape directly through the modem; and a monitor mode so that the crt or tty device is driven, as is the cassette. A high-speed search option retracts the tape heads and moves tape at 120 ips. The 3000 can also be used in unattended operation. Typical end-user versions sell for approximately $3300, $2500 in quantities of 100. SYKES DATATRONICS INC., Rochester, N.Y.

FOR DATA CIRCLE 247 ON READER CARD □

PLUG IN

THE HIGHEST QUALITY PRINTING AVAILABLE TODAY, AT SUBSTANTIAL SAVINGS.



5848 off-line printer system

5403/5821 on-line/off-line printer system

Three families of TELEX printer systems — 5403/5821 On-Line/Off-Line, 6721 On-Line only and 5848 Off-Line only — provide you price-performance flexibility to optimize your printer requirements.

Whether you choose the compact new TELEX 6721, the TELEX 5403/5821 system, or the TELEX 5848 off-line printer system, you'll be upgrading your system while lowering costs. TELEX high speed train printers use the same reliable, horizontally-stable printing technique employed by the 1403-N1. Print quality is dramatically improved, and continuous printing speeds as much as 30% higher are made possible by advanced TELEX design features.

TELEX printers also offer enhanced operator convenience. The standard features of the IBM printer (operator interchangeable train, complete operator panel and quietized cabinetry) have been augmented by full opening, 180-degree tractors to make loading and forms positioning faster and easier. Push-button operator controls permit convenient verification printout of type array, forms alignment, fold—no fold modes for only upper and lower case printing and block data check conditions.

The basic electromechanical assembly incorporated in TELEX printers has been thoroughly proven in hundreds of installations. Reliability is further assured by the use of optical rather than brush-contact format tape reading. Improvements in circuit design and use of MSI and LSI integrated circuit logic, give the TELEX printer system capabilities and reliability unmatched by any other system available.

Additionally the TELEX 5403/5821 on-line/off-line printer system allows for interfacing the 2540 card read punch.

PLUG IN A TELEX TRAIN PRINTER SYSTEM.

Significant cost savings over comparable IBM configurations can be achieved by the selection of a TELEX replacement system. Lower rental and purchase prices, coupled with TELEX unlimited-use plan, result in dramatic overall dollar savings even as compared against Integrated Printer Adapter configuration.

All of these advantages are enhanced via TELEX Field Service—the largest, most experienced network in the peripheral industry. If you are looking for genuine economy combined with advanced technology, look to TELEX for System 370 and 360 peripherals. You will find that the TELEX product line comprises the broadest range of peripherals in the independent industry . . . Tape, Disk, Printer and Memory Subsystems. Get the complete story from your TELEX representative.

SUMMARY: The Peripheral Company advances state-of-the-art technology with a broad spectrum of on-line and off-line train printer systems designed for System 370 and 360 main frames. All units are functionally compatible with the 1403-N1 Printer and 2821 Controller, offer higher print speeds, greater flexibility and significant dollar savings.

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6721 on-line printer system

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Software & Services

Updates

Eight years of research by Drs. Ivan Sutherland and David Evans of the Univ. of Utah have resulted in a technique by which abstract data is translated by a computer into animated visualizations similar to tv pictures. Complex formulas are fed into a control program capable of drawing continuous tone images and animating the sequence by updating the image 30 times a second. Future applications are thought to be virtually limitless, but one mentioned is that a highway designer could visually construct three or four alternative roads and select the best choice by "driving" them by computer.

According to the Institute for Automatic Information Processing (AIV) in Darmstadt, Germany, the recent revaluations of the dollar in comparison to the German Mark have brought it close enough in parity to make it easier for leading German software houses to attract U.S. personnel. In particular demand are people familiar with remote processing in large installations and teleprocessing applications on large data bases.

When it was estimated that eight man-years would be required to convert its DOS program library to operate under OS/360, Qantas, Australia's international airline, decided it had better projects for its programming staff to work on and opted instead to use University Computing's DUO 360/370 package which permits DOS jobs to run as is on Qantas' four 360/65s. Qantas has agreed to maintain DUO for other customers in Australasia.

After evaluating dozens of circuit design programs from around the world to incorporate into its computer-aided design system, Boeing's design automation section in Kent, Wash., selected a package from Redac Software Ltd., Tewkesbury, England. The software runs on two DEC PDP-15/35 minis, and together with a large 360 the CAD system is credited with reducing printed circuit board layout costs by 65% and development timetables by 50%.

Internal Sorting

An internal sorting package is available to IBM DOS and OS users that is said to result in drastically reduced sort times for files that can be stored entirely within main memory. A recent benchmark of the sort program on a 360/50 showed a reduction of nearly 50% on a 10-minute sort, and longer sorts show even more improvement, it's claimed. The PL/I program can be called by any host programming language sort statement and generates sort programs according to user-supplied parameters that typically require only 1K bytes of storage.

The parameters specify up to 16 keys that can be used on ascending or descending order files of the following types (and record lengths): byte (1-256), packed decimal (1-16), zoned decimal (1-16), binary (2 or 4), and floating point (4, 8, or 16). Called GENASORT, the package is priced at $375 and is used by its vendor to generate sorts for customers on an as-needed basis for $75 per generation. A special version for use with the five most common types of FORTRAN data is also available for $160. S&B SOFTWARE PRODUCTS, Northridge, Calif.

FOR DATA CIRCLE 206 ON READER CARD

Autoflow Additions

The AUTOFLOW flowcharting program introduced in 1967 has undergone constant change and expansion since that time, enough to attract over 2,000 users. The latest additions, however, have prompted ADR to dub the package AUTOFLOW II, and it will be supplied free of charge to all current AUTOFLOW users.

There are two major new options: cross-program auditor (CPA), and extended text compositor (ETC). For the first time, AUTOFLOW can extract information common to any number of input programs, rather than being limited to analyzing one program as an independent entity. The option can be applied to production programs, as well as those "under construction."

A number of reports are generated by CPA to help with maintaining, enhancing, auditing, debugging, and converting application programs. The package can be commanded to perform syntactical diagnosis of COBOL source statements, or accept any source language as input. The feature is priced at $2750 under a licensing agreement.

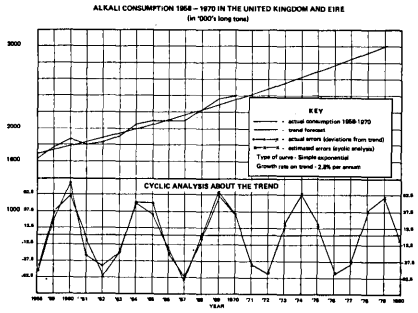
Fully aware that cross-reference listings and flowcharts don't tell the whole story about programs, ETC is designed to generate narrative documentation of the subject package. There are numerous controls for specifying page format, generating table of contents entries, and even orienting the text toward users with different levels of technical proficiency. This option is priced at $1980. On a license agreement with one year of free maintenance, AUTOFLOW is priced at $3630, with language processors ranging from $990 for IBM assembler to considerably higher for unusual languages. COBOL adds $2750, and PL/I is $3300. APPLIED DATA RESEARCH, INC., Princeton, N.J.

FOR DATA CIRCLE 207 ON READER CARD

Forecasting

A medium- and long-term forecasting program used by its developers for two years to process in-house applications is now available to other users. Developed in the U.K.—where a chemical firm became its first buyer—the nameless program can be used to set production and sales goals, plan future growth, and assist other kinds of forecasting.

The FORTRAN IV program first identifies growth patterns from historical data, automatically selecting the best fitting trend curve, and extrapolates the trend as a forecast. Next, it compares the actual data with the trend and searches for meaningful variations which can be characterized as cycles, or in terms of an independent variable such as the index of industrial production. If a cycle is found, the program combines it with the original to produce a corrected forecast.



The program edits and smooths the historical data and automatically selects the best fit from the six commonly used trend curves (straight line, simple exponential, parabola, log parabola, modified exponential, and Gompertz). If desired, the user may override the automatic selection and specify a trend curve, and there are other options, such as regression analysis. The program requires approximately 100K bytes of storage on 360 and 370 equipment and is supplied in source state-

MARK IV: the mark of excellence.

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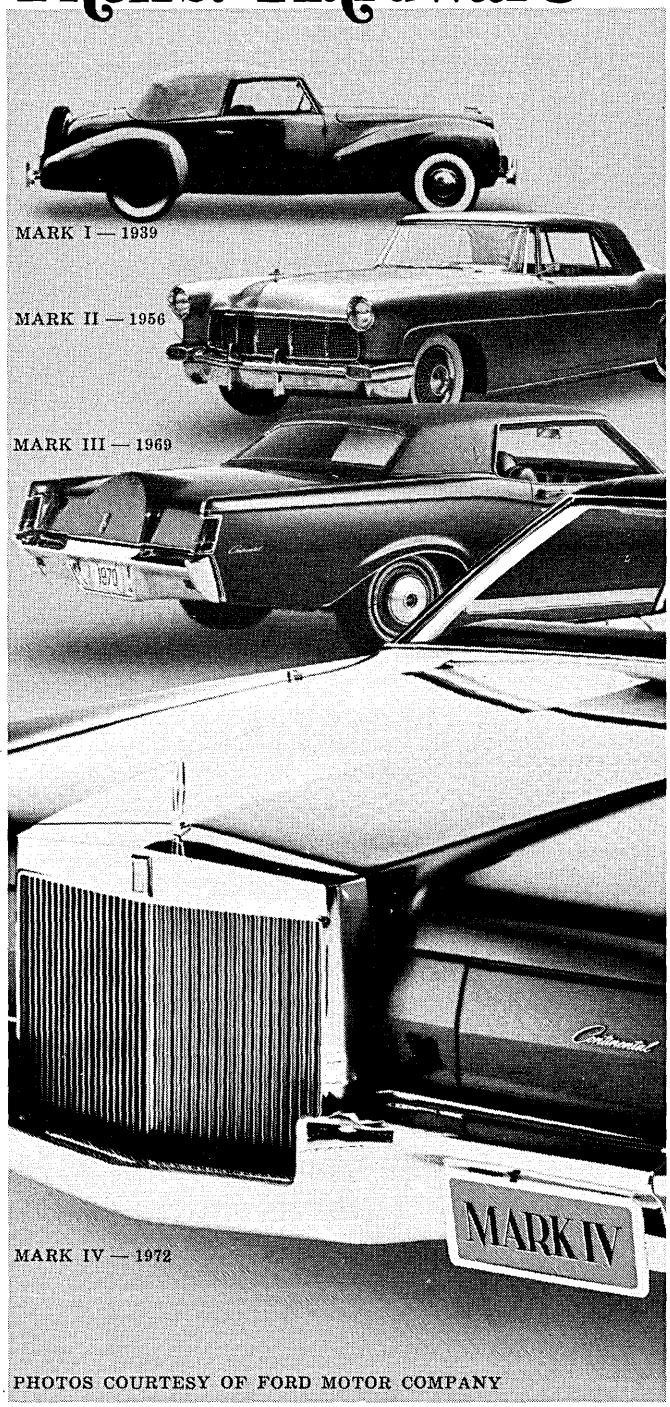

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Our carefully engineered computer software products have grown and improved during the past five years—improving with deliberate built-in excellence.

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ment form for $10K, including documentation. BROWNING & PEARCE ASSOCIATES, Cheshire, England.
FOR DATA CIRCLE 213 ON READER CARD

File Management

IRS (Inquiry and Reporting System) has been out for some time, long enough to have over 40 installations, but some very significant changes have just been made to it. It's now a free-format, on-line, interactive system instead of being limited to batch runs. This should help it compete more effectively with products like Informatics' MARK IV.

Sigma Data feels that as good as IRS' file management is, its true strength is in file extraction and report generation functions. The package cooperates with IBM's TSO or Sigma's own Intercomm handshaking submonitors for message processing. IRS is a load-and-go system that edits parameters entered in free form, displays diagnostics if required, and then either executes the report parameters or stores them for later execution via Intercomm or TSO commands. IRS can deal with four distinct master files, organized in any manner, and none of which contains common data elements. Each of these four master files can have up to 10 shared files.

The assembler language object program can support a number of users, limited by the host cpu's configuration. Machine requirements are an IBM 360 or 370 model 25 and up with at least 32K, DOS or OS. On-line IRS sells for $30K and rents for approximately $1K/month. The National Institutes of Health has become the first user. SIGMA DATA COMPUTING CORP., New York, N.Y.
FOR DATA CIRCLE 211 ON READER CARD

CDC Operating System

Users of CDC's 3000 series of medium-scale computers can start signing up now to receive a totally new operating system early next year. The MSOS 5 monitor is billed as being better in every way than its most sophisticated predecessor, MSOS 4 release two, especially with regard to interrupt response times, greater job control capabilities, and somewhat reduced memory requirements. Additionally, the new OS will support new upper memory limits of 64K words on the 3100, 3170, and 3200 models, and channel expansion capabilities on the two smallest models to better equip them for business dp.

MSOS 5 can support up to five active jobs, four of which can be priority programs (two of these can be real-time tasks), with batch processing in the background. The new monitor also performs automatic I/O spooling and supports processing from remote job entry and teleprinter terminals; remote batch support is planned. The system is separately priced, with a $500 one-time charge and a monthly rental of $100. CONTROL DATA CORP., Minneapolis, Minn.
FOR DATA CIRCLE 212 ON READER CARD

Real-time Monitor

Digital Equipment Corp. considers its new RSX-11D real-time monitor one of the most significant products it has developed in a long time. It has offered real-time monitors for some time, but the new one is described as a quantum jump improvement over predecessors, in part due to the sophisticated hardware in which it runs—PDP-11/40s and 45s equipped with hardware memory management of up to 124K 16-bit words.

The operating system supports a number of foreground real-time tasks and concurrent background batch processing, but no rigid distinctions are imposed on the two modes; i.e., there is no need to reserve a special partition or memory environment for background processing. Batch jobs run in any available memory just like the real-time applications.

Programming statements for real-time tasks are very simple. For example, to schedule a task to commence running at 11:10 a.m. and every two minutes thereafter, all that is required is the statement SCHEDULE (task name) 11:10:10/RSI=2M. Users are provided with 250 distinct levels of priority, with each task assigned a default priority that can be altered at run time to accommodate changes in priority level.

Although RSX-11D requires only approximately 6K of storage, DEC expects that it will be used by more sophisticated users with systems of 48-64K. The monitor is available now to customers under a licensing agreement for $5K. DIGITAL EQUIPMENT CORP., Maynard, Mass.
FOR DATA CIRCLE 214 ON READER CARD

Tape Inventory Control

VALU-LIB functions as a mag tape inventory control program in that it maintains a data base of mag tape files, their labels, serial numbers, and use history, and then produces a variety of listings for operations, including an on-site inventory report by volume serial number or by serial number within application label, a scratch tape listing,

a data set audit (which files are on which physical reels), and an off-site inventory (what's in the vault, for instance). It goes beyond inventorying in its abilities to optionally generate sticky tape labels on an operators console, and to list the tapes to be used each day depending on the jobs scheduled.

VALU-LIB needs 50K and 50 disc cylinders to run and can use tapes with standard labels, nonstandard labels, and even without labels (though presumably you would not have many of the latter). It maintains its inventory files with a lot of help from OS' SMF routine, and semiautomatically through prepunched cards under DOS. It allows for tracing data sets from tape to tape, or tracing tapes from job to job. It is priced at $6000 for OS, $4000 for DOS, including one year's maintenance. VALUE COMPUTING INC., Cherry Hill, N.J.

FOR DATA CIRCLE 217 ON READER CARD

software spotlight

Dp Cost Allocation

Dp managers interested in getting a better handle on the costing and budgeting of their installations are offered Bottomline, a cost allocation system specifically designed to perform this function. The PL/I program can automatically generate predictive budgets for all dp activities, compare budgeted with actual costs, and assess the impact of price changes with cost modeling and simulation aids. The program accepts activity schedules which often bear on costing, and all of the algorithms in Bottomline can be readily tuned by its user. Accounting is provided for all elements of the dp center: administration, equipment, processing, and staff.

Reports are generated for each separate cost area identified by the user. A report is provided for each user of the center (user in this context might represent an entire division or subsidiary) telling what was run, when it was run, what it cost to run it, what resources were used, and what it was budgeted to cost. There is a report on each job for each resource, for each shift, of every work day, by month, and a year-to-date summary. Bottomline requires approximately 130K bytes on PL/I-equipped IBM machines supporting OS/360. It is supplied in object deck form for $10K or source code form for $12,500; both prices include five days of on-site installation assistance and supporting documentation. TESDATA SYSTEMS CORP., McLean, Va.

FOR DATA CIRCLE 205 ON READER CARD

Brailler

BRIALL, a software package that converts computer output into Braille, was developed some seven years ago by Electronic Processing Center, Inc., Philadelphia, but has not been marketed actively until now. Output is converted into representations of individual letters composed of "period" characters. A plastic strip is fitted over the print hammers to puncture the paper. BRIALL requires approximately 16K words of storage and will run on any Honeywell machine that understands Easycoder language. Honeywell supplies the program free, with only a nominal charge for the plastic strip and supporting documentation. HONEYWELL INFORMATION SYSTEMS, Wellesley Hills, Mass.

FOR DATA CIRCLE 208 ON READER CARD

On-line Receivables

VOLAR, an on-line accounts receivable system that additionally provides for on-line invoice entry and credit inquiry, operates under the IBM CICS submonitor, and is said to be able to

service up to 125 active terminals on a 370/135 with typical response times of 0.1 second. VOLAR isn't choosey when it comes to what types of terminals it can work with; it currently talks to IBM 3270 series displays, and the developers say it can talk to any standard ASCII-based crt. VOLAR operates in a 60K-byte partition either OS or DOS. The package is available as a service in the New York City area and on a franchise basis to any service bureau outside the New York City area; it is offered for sale at 25K to individual installations. The price includes installation assistance and documentation, but there may be an additional charge for the COBOL source statement version. COORDINATED COMPUTER CONCEPTS, INC., New York, N.Y.

FOR DATA CIRCLE 209 ON READER CARD

Banner Generator

We've all seen messages such as "Merry Christmas" and "Happy New Year" that are printed in very large letters on line printers by using hundreds of letters. Only trouble is, most of those programs weren't designed to accommodate variable inputs and wind up being used only once or twice a year. But with the BANNER program, parameter cards are used to control the 200-card FORTRAN source deck, one card designating letter width and height, and the second card containing the intended message. BANNER is currently operational on an IBM 360/65 and somewhat surprisingly requires 80K bytes of storage. The source program and a data deck are available for only $25. UNIV. OF GEORGIA COMPUTER CENTER, Athens, Ga.

FOR DATA CIRCLE 210 ON READER CARD

Cobol Efficiency Courses

According to the vendor, these courses teach programmers to view program development, operation, and maintenance from the management's viewpoint, and this leads to more efficient coding. The courses on "Efficiency in ANS COBOL" consist of four films and four workbooks covering "Strategy and Tactics," "Input/Output Considerations," "Table Look-up Techniques," and "Data Manipulation and Arithmetic." The "strategies" session in particular presents ways for programmers to think about things like the costs of maintaining programs.

Available on lease, subscription, or a purchase basis (at $250 per film), the materials can be used in self-teaching or classroom environments. The total course on videotape or Super-8 film runs under 40 minutes, not counting workbook and test-taking time. EDUTRONICS SYSTEMS INTERNATIONAL INC., Wakefield, Mass.

FOR DATA CIRCLE 215 ON READER CARD

Tape Library Control

Tape Inventory Control (TIC-1) is offered for shops which employ standard labels on 50% or more of their tapes. The program produces six kinds of reports, including: a job set-up list, tape release list, tape status report, data set retention list, tape cleaning list, and library status analysis. As implied in their names, the reports help the librarian pull the right tapes before run time, scratch outdated files, and keep track of which physical reels have which data. Further, the information can be obtained on-line without waiting for the reports.

The vendor claims that TIC-1 modules become integral parts of IBM's OS so that they can retrieve the file update information as it is generated. The program needs about 20K bytes of space and expects some help from ISAM. Priced at $6000, including one year's maintenance, the system is in COBOL and BAL; it is expected that installations will be able to maintain their own copies. ADVANCED DIGITAL SYSTEMS, INC., Mohawk, N.Y.

FOR DATA CIRCLE 216 ON READER CARD □

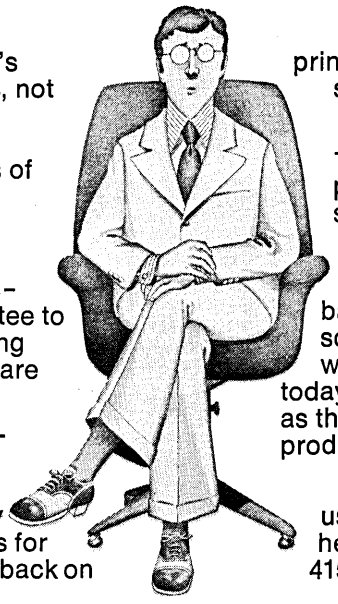
Speaking of data and reality....

that "free" IBM software could be costing you plenty.

How so? Simple, because IBM's main business is computer systems, not software products. And many IBM users have found that IBM software requires lots of equipment, and lots of computer time.

That's why more and more IBM customers are coming to Software Design, Inc. We're strictly in the systems software business. We guarantee to deliver more for your data processing dollar through software than hardware ever could. And we do it.

One of our systems, GRASP, increases available computer time by 20% or more, helping to cut overtime costs of people and hardware. Many GRASP users have cancelled orders for additional hardware. Some have cut back on printers and punches, even eliminated a second computer.



GRASP can be installed within 15 minutes, with no change to existing programs or procedures. And the savings start immediately.

Hard to believe? We've got a global family of enthusiastic customers who back up those statements—and then some. That's why GRASP is the worldwide best seller in systems software today. That's why SDI is recognized as the performance leader in software products.

If your 360/370 installation is still using IBM software, you can use some help from SDI. Call us today at 415/697-3660, or send in the coupon.

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alumnam in cursu academico ——— studiis praestantem ad gradum Baccalaurei in Artibus cum laude admiserunt eique dederunt et concesserunt omnia insignia et iura quae ad hunc gradum spectant. In cuius rei testimonium litteris Academiae sigillo munitis die XXII Iunii anno Salutis Humanae MCMXXXXVIIII Collegiique Radcliviani LXX Praeses auctoritate rite commissa nomen suum subscripsit.
W K Jordan Praeses
Collegio Radcliviano discipulam supra dictam ad gradum Baccalaurei in Artibus admittenti Praeses Sociique Collegii Harvardiani ex lege de Collegio Radcliviano instituendo postquam comperuerunt omnia ei esse ad impleta quae in Universitate Harvardiana iniunguntur eiusdem gradus candidatis consenserunt.
Jacobus Bryant Conant Praeses

Congratulations.
You just spent twelve thousand dollars so she could join the typing pool.

You've got this daughter and she's smart. Why not? She's yours. She's heard you talk about your work all her life. She had the same education as her brother. God knows she's brighter than those boys who come around.

Pity. When she goes job hunting she'll hear two questions over and over. What's your typing speed? Can you take dictation?

And those boys? They'll start at higher salaries, go into executive training, get raises and promotions faster, have more job freedom, and better expectations. They can make nearly twice the money for exactly the same job as your daughter.

It's not fair. But more important, it's just not sensible. When there's never enough talent to go around, why block half of it right at the beginning?

What's your company policy on hiring women? Where do they start? How far can they go? What opposition does a woman face that's not on the company books, but stays firmly in the company tradition?

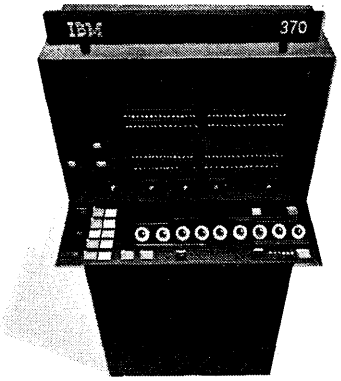
This is one place you could help move the world a little. For your daughter and all the daughters and all the brains behind all their bright young faces.

After all, it doesn't always have to be "Jones & Son."

Womanpower. It's much too good to waste.

For information: NOW Legal Defense and Education Fund Inc., 127 East 59th Street, Dept. K, New York, New York 10022

FOR $26,123 A MONTH, IBM WILL RENT YOU THIS:



FOR $25,022 A MONTH, ITEL WILL LEASE YOU THIS:

The big difference between IBM and ITEL shows up on your financial statement.

As an example, for $26,123 a month, IBM rents you a System/370 Central Processing Unit alone, but for $25,022, ITEL will give you the 370 CPU plus one megabyte of AMS Monolithic Memory, 8 ITEL disk drives plus controller, as well as 8 ITEL tape drives and one controller.

A full computer system for less than the IBM cost of the CPU alone.

Rented from IBM, the same complete system would cost you $51,405 per month, more than double the ITEL cost.

And that's only one example. We'll lease any kind of computer package (360 or 370) on 3- to 8-year terms at proportional savings. Which explains why we have $300 million of IBM computer equipment on lease right now.

When you're making a data processing move, you'll save big by calling the Data Products Group at ITEL—the financial alternative to IBM.

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The first VTY* to break the $1,000 price barrier.

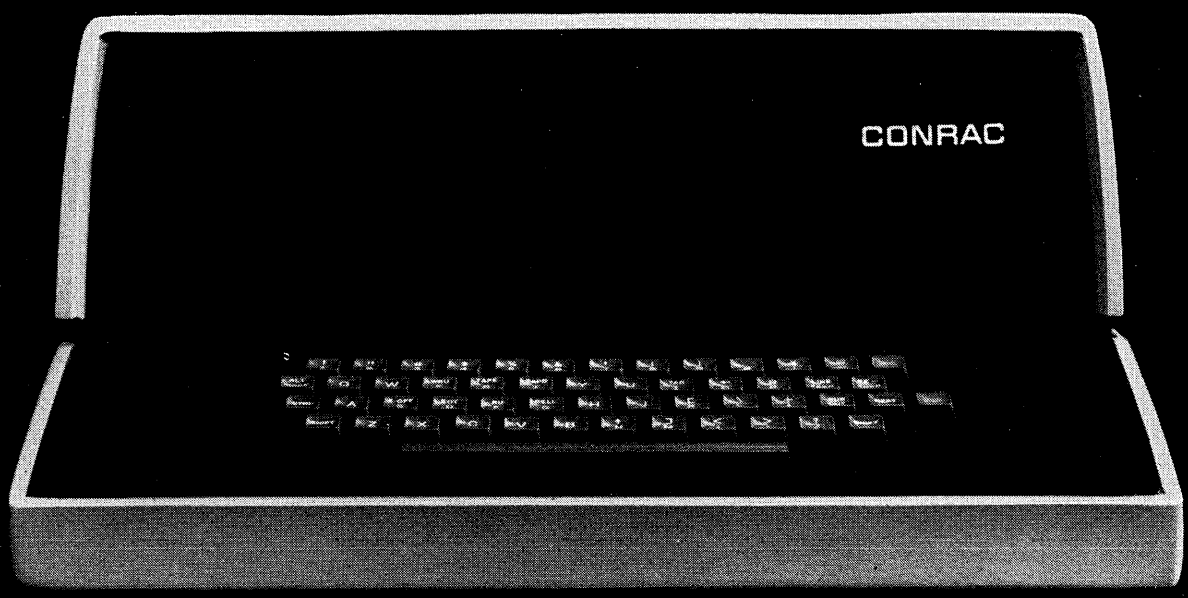
CONRAC TTY PLUS

The new Conrac Model 480 TTY PLUS is the first teletype compatible VTY* to break the $1,000 (in quantity) price barrier. With its size, styling, and TTY compatibility, it fits into just about any soft copy application—credit verification, data entry, or interactive information systems.

Basically, the TTY PLUS was designed to be a direct replacement for impact-type teleprinters. But, as the PLUS in its name indicates, it's a whole lot more too.

To get the full story, contact Elton Sherman. At the same time, ask him about the Conrac 401 Adaptive Terminal, big brother to the TTY PLUS.

*VTY—Video Teletype Terminal



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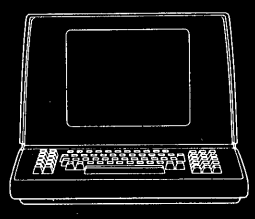


Conrac 401 Adaptive Terminal

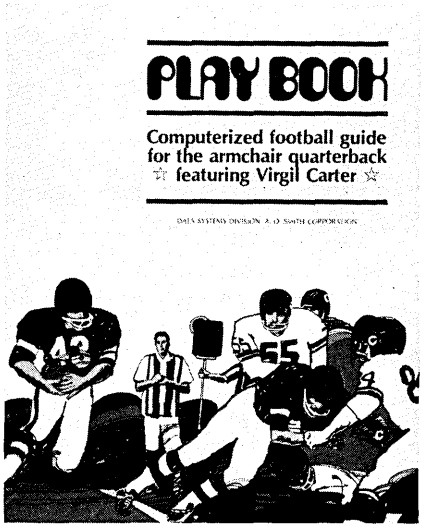
Conrac Division 600 N. Rimsdale, Covina, CA 91722 (213) 966-3511. Telex 670437

CIRCLE 40 ON READER CARD

Literature

Computerized Football

A six-page brochure, "Play Book: Computerized Football Guide for the Armchair Quarterback," shows how to view football with an enlightened perspective—through the help of a com-



puter. Virgil Carter, Cincinnati Bengals quarterback, and Dr. Robert Machol, systems professor at Northwestern Univ., teamed up to perform a computer analysis of pro football from a data base of the first 56 NFC games in 1969, coding several dozen variables for each of the 8,373 plays. A. O. SMITH CORP., Milwaukee, Wis.

FOR COPY CIRCLE 300 ON READER CARD

Education Newsletter

Published five times a year and now 44 pages long, EDU is a newsletter for educators who want the latest information on computers and new educational technology. The current issue includes articles on educational computer applications, excerpts and reviews of books, "how-to" articles for teachers introducing computing to their classes, and many games and puzzles. Write on school or college letterhead to DIGITAL EQUIPMENT CORP., 146 Main St., Maynard, Mass. 01754.

Video Display

An eight-page brochure describes this company's video display terminals and systems, emphasizing the custom-designed features in these off-the-shelf products. The DELTA 5000 series has special function keys, custom-designed keyboards, 3,072 characters of usable display without computer memory, and the PAGING memory to recover rolled-off screen data. DELTA DATA SYSTEMS CORP., Cornwells Heights, Pa.

FOR COPY CIRCLE 305 ON READER CARD

Computer Leasing

A 22-page booklet entitled "Twenty-Two Questions from Your IBM Salesman" gives Computer Leasing Co.'s replies to questions IBM salesmen ask customers who are considering leasing a computer from another company. COMPUTER LEASING CO., Arlington, Va.

FOR COPY CIRCLE 301 ON READER CARD

Federal Standards

An eight-page report outlines the objectives of the Federal Information Processing Standards (FIPS) Program, covered by Public Law 89-306, and identifies requirements for specific standards to accomplish the objectives. Emphasis is on the Dept. of Commerce responsibility for recommending uniform automatic data processing standards to the President of the United States. Order prepaid, SD Catalog No. C13.52:23, 35¢. U.S. GOVERNMENT PRINTING OFFICE, Superintendent of Documents, Washington, D.C. 20402.

Technology Reports

This wall-size catalog describes Auerbach's looseleaf product line dealing with dp technology, operations, and management. Services recently introduced are the Data Processing Manual for computer operations and management, the Minicomputer Notebook, Microform Reports, and Edp Notebook/International. AUERBACH PUBLISHERS, Philadelphia, Pa.

FOR COPY CIRCLE 302 ON READER CARD

Image Digitizers

A six-page brochure tells how image digitizers convert film transparencies to computer-compatible forms and how the computer may be used to extract relevant image features and photometric data by program control. Five basic company models are compared. DICOMED CORP., Minneapolis, Minn.

FOR COPY CIRCLE 303 ON READER CARD

Pinfeed Forms

The administrative and accounting pinfeed forms described in this 8-page catalog are available for use on high-speed tabulating equipment and manual typewriters equipped with pinfeed attachments. KIMBALL SYSTEMS, Paramus, N.J.

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Cobol Utility

A 36-page booklet gives information about the essential elements and use of METACOBOL, a software product which can assist in all phases of COBOL program development. For the programmer, METACOBOL provides facilities for developing, maintaining, testing, debugging, standardizing, optimizing, and converting COBOL programs. For management, METACOBOL produces documentation for program review. APPLIED DATA RESEARCH, Princeton, N.J.

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Dp Bibliography

A special 20-page sample issue of the *Quarterly Bibliography of Computers and Data Processing* contains the complete list of periodicals covered, the guide to use, and all subject classifications, as well as extracts from different sections. APPLIED COMPUTER RESEARCH, Phoenix, Ariz.

FOR COPY CIRCLE 307 ON READER CARD

Handprinting Reader

A 119-page report discusses a research effort to develop a handprint alphanumeric reader capable of human recognition rates. The research involved the collection of a large data base of unconstrained handprinted alphanumeric characters and the design and implementation of a separate programming package for data base editing. Order AD-755 936; paper copy $3, microfiche 95¢. NATIONAL TECHNICAL INFORMATION SERVICE, U.S. Dept. of Commerce, Springfield, Va. 22151.

Remote Data Logging

A 16-page brochure describes a battery operated data logging system, listing all electrical and mechanical specifications. Applications include oceanography, pollution monitoring, meteorology, seismology, and other remote data logging requirements. DATEL SYSTEMS, Canton, Mass.

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Banking System

A 12-page brochure describes S-3000, a new banking communications system which automates wire & cable and money transfer functions. The operator-assisted, computer-communications system is compared to other procedures. TELEPROCESSING INDUSTRIES, INC., Mahwah, N.J.

FOR COPY CIRCLE 312 ON READER CARD

Drafting Systems

Two four-page brochures describe the Series 1000 and Series 2000 automated drafting systems, which can be used on-

literature

or off-line. Both series have the "revolutionary" Xynetics/Sawyer linear motor drive, accuracy of ±0.005-inch, ±0.001-inch repeatability, and a maximum speed of 40 ips; the Series 2000 has a larger drawing area. XYNETICS, INC., Canoga Park, Calif.
FOR COPY CIRCLE 313 ON READER CARD

Writing Manuals

A 12-page brochure shows how Word/One remote word processing service, which requires only a typewriter-terminal and a telephone, can print out formatted copy and maintain manuscripts of manuals. Word/One can be used for text editing and processing, photocomposition, list maintenance, data manipulation, and other word processing services. BOWNE TIME SHARING, New York, N.Y.
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KeyProcessing Reports

A 16-page brochure describes three types of management reports generated by the CMC 5, 7, and 9 KeyProcessing Systems. Through these status reports, performance statistics, and productivity analyses, the key-to-disc data entry systems internally measure and report performance of each operator, keystation, and job. COMPUTER MACHINERY CORP., Santa Monica, Calif.
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Financial Modeling

A 12-page mini-manual describes the financial modeling system available through Time Sharing Resources. This system enables managers to generate suitable financial reports, analyze historical data, forecast future performance, and test alternative plans of action. The manual includes an analysis chart of competitors' services and a sample model with a printout of reports. TIME SHARING RESOURCES, Great Neck, N.Y.
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Graphic Display

An eight-page brochure describes Anagraph, a multiterminal graphic display system which uses digital techniques to bring low-cost computer graphics to management information, computer-aided design, and command-and-control systems. Software is available for IBM 360/370 users. DATA DISC, Sunnyvale, Calif.
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Monarch has the bar code that works, and a choice of "tools" to create and capture data accurately, efficiently, economically.

The bar code that fits you.

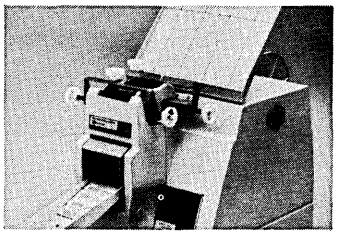
Whatever your size, Monarch has the bar code and complete systems you need for fast, accurate information control. The CODABAR™ code is flexible and reliable; compatible with your present operation. Complementing the code is a choice of systems to create and capture it economically; plus a wide range of equipment for attaching encoded tags to merchandise. The CODABAR code and related Monarch bar code products are currently in use with Pitney Bowes-Alpex SPICE®/PEPPER™ Systems.

An automated input system is vital to your future. Monarch has one that fits you. For more information on the CODABAR code and related products . . . how and why they can serve you best . . . write to Vice President for Marketing, Dept. 288, Monarch Marking Systems, P.O. Box 608, Dayton, Ohio 45401.

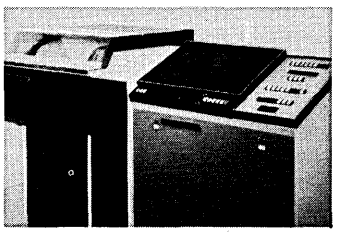
Monarch Marking Systems

Pitney Bowes

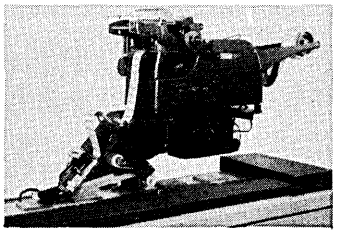
3 ways to create it.



Model 104 Dial Printer is a low-cost, easy-to-operate in-store printer. Accurate . . . you can see what you dial. It prints what you see . . . both eye readable and machine readable. Has a nominal speed of 174 impressions per minute on all sizes of tags and labels.

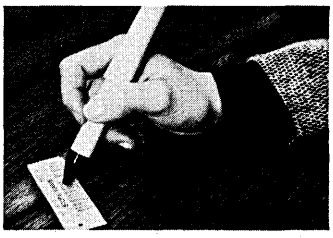


Monarch 2000 CODABAR Encoding System is a high-speed computer-controlled line printer with programmable logic and expandable memory. Ideal for high-volume distribution center printing of bar-coded tags and labels.

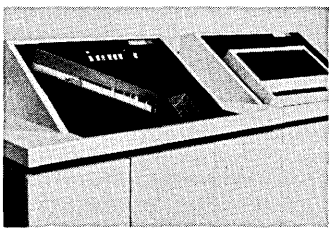


Model 2023 Rotary Imprinter is a fast, simple and reliable rotary mat printer. Enables vendors to print data on conventional merchandise tag and label supplies right on their packaging lines.

2 ways to capture it.



Model 2243 Bar Code Scanner comprises a hand-held light pen and logic for encoding the CODABAR code with an interface. Data is checked seven times in the logic to assure accuracy before being released to the interface and entered at point of sale.



Model 2310 Batch Reading System is a high-speed data collection center. Reads 400 encoded tags per minute, feeds automatically, requires no tag orientation, records data on computer-compatible magnetic tape.

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People

DR. CARL HAMMER, director of computer sciences, Univac Div., Sperry Rand Corp., this month will receive the DPMA (Data Processing Management Assn.) 1973 Computer Science Man-of-the-Year award . . . ELLIOTT LEVENE is the new president of Control Data Corp. subsidiary, Ticketron. He had been marketing vice president and before that was with another computer-based ticketing service, the now defunct Computicket, a subsidiary of Computer Sciences Corp. . . . The Data Systems Div. of Sierra Research Corp., Burlington, Mass., producer of data acquisition and process monitoring equipment, has a new management team consisting of RAYMOND N. SMITH, formerly with Control Data, vice-president, marketing; HERB SHANZER, vice-president and general manager; and BILL TURNER, vice president, operations.

A Dp Route to the Top

JOHN BONNESS, vice president and controller, Braniff Airlines, is something rare: a computernik who escaped into "top management." Bonness joined Braniff as vice president, computer services, in April 1971 (see May 15, 1971, p. 137). He joined because "the advanced nature of the systems work in the airlines appealed to me. There seemed to be a great deal of room for ingenuity in a business approach to the management of an airline computer services Function."

John Bonness

Bonness was elevated to his present post this spring following resignation of corporate controller Ed J. Swatak. He is corporate vice president and controller and is responsible for Braniff's treasury, controller, and computer services functions.

He began his career in data processing in 1940, at North American Aviation where, in the mid-'50s, he supervised first a centralization of computer activities and subsequently a decentralization. In 1962, he helped form Advanced Data Systems, which developed an automatic revenue control system used by transportation companies, and was acquired by Litton Industries in 1964.

Bonness later became vice president of planning for Litton's Business Equipment Group, remaining with the group until 1970, when he joined Penn Central affiliate, Great Southwest Corp., as vice-president, computer services. He later was elected president of ailing Scientific Control Corp., Dallas, acquired by GSC shortly before the Penn Central bankruptcy dried up GSC resources. This he did until April '71 (see April 1, 1971, p. 52) when SCC was sold and Bonness joined Braniff.

PAUL O. WIERK, formerly manager of data processing for Northrop Corp., Los Angeles, has been named a corporate vice-president . . . FRANK P. CONGDON, JR., is the new international president of the Assn. for Systems Management. He is manager of management information systems for RCA's Aerospace Systems Div., Burlington, Mass. . . . C. GORDON BELL, vice president for engineering for Digital Equipment Corp., Maynard, Mass., and a leader in development of the minicomputer, received Carnegie-Mellon University's Mellon Institute Award for 1973 . . . ALFRED W. FERA, formerly head of northern European division for

Univac (see May, p. 17) has been named to a new Univac post—vice president of marketing, worldwide.

Too Busy for Rebuttal

Although 20,000 have taken the DPMA Certificate in Data Processing exam, that's only a fifth of those who qualify. So when a joint venture of 10 professional societies comes into being around July 1 to administer the program, its first task will be a promotional one, says JOHN K. SWEARINGEN, vp and general manager of Environmental Research Corp., a Las Vegas subsidiary of Computer Sciences Corp. As a representative of DPMA, Swearingen is co-chairman with ACM's Fred Harris of a committee organizing what is now being called the Computer Foundation.

John K. Swearingen

Swearingen, who developed the program for DPMA, agrees with critics that the CDP fills "only part" of the requirements for measuring the "technical and intellectual" qualifications of dp professionals.

Swearingen's distinguished 28-year career in dp started in 1945, when he was supervisor of machine operations for the Army in Heidelberg, Germany. With a B.S. in accounting from the Univ. of Louisville in 1949, he plunged into the then-pioneering days of dp, first as a tab projects planner with the Central Intelligence Agency in 1950 and three years later with General Electric as that company took its first unsure steps into business dp. When he joined CSC in 1970, he had spent 14 years with GE and three with LTV. His most exciting days were with GE when in the early '50s it was consolidating appliance manufacturing at a new plant in Louisville, Ky., and Swearingen was with the group that adapted a Univac I for business dp. "We were the first anywhere to put a payroll on a computer. There was a lot of publicity about our problems," he recalls, "most of it unjustified. Sure, we worked around the clock, but we were making it happen . . . and there was no time to go out and set the record straight."

Emphasis on Research

"It's the research orientation of the group" that attracted BRUCE W. ARDEN to the electrical engineering department of Princeton University, where he will become chairman July 1. At Princeton, that department is the home of computing, and Arden sees his new post as "an opportunity to join a group of top people who have made great contributions in computing." The department has 21 faculty members who teach as well as doing research, "but the emphasis always has been on research."

Bruce W. Arden

Arden leaves the University of Michigan, where has been since 1951, always involved in some aspect of computing. In his early days at the U of M, he participated as a detail engineer in the design of Midac, a variation on Seac, the first stored-program computer. He subsequently programmed on Midac, which was built for the Air Force and used in air defense programs and eventually was dismantled. Eight years ago when the University of Michigan established a computer and communications sciences department, Arden became a professor in the department and has been its chairman for the past year. □

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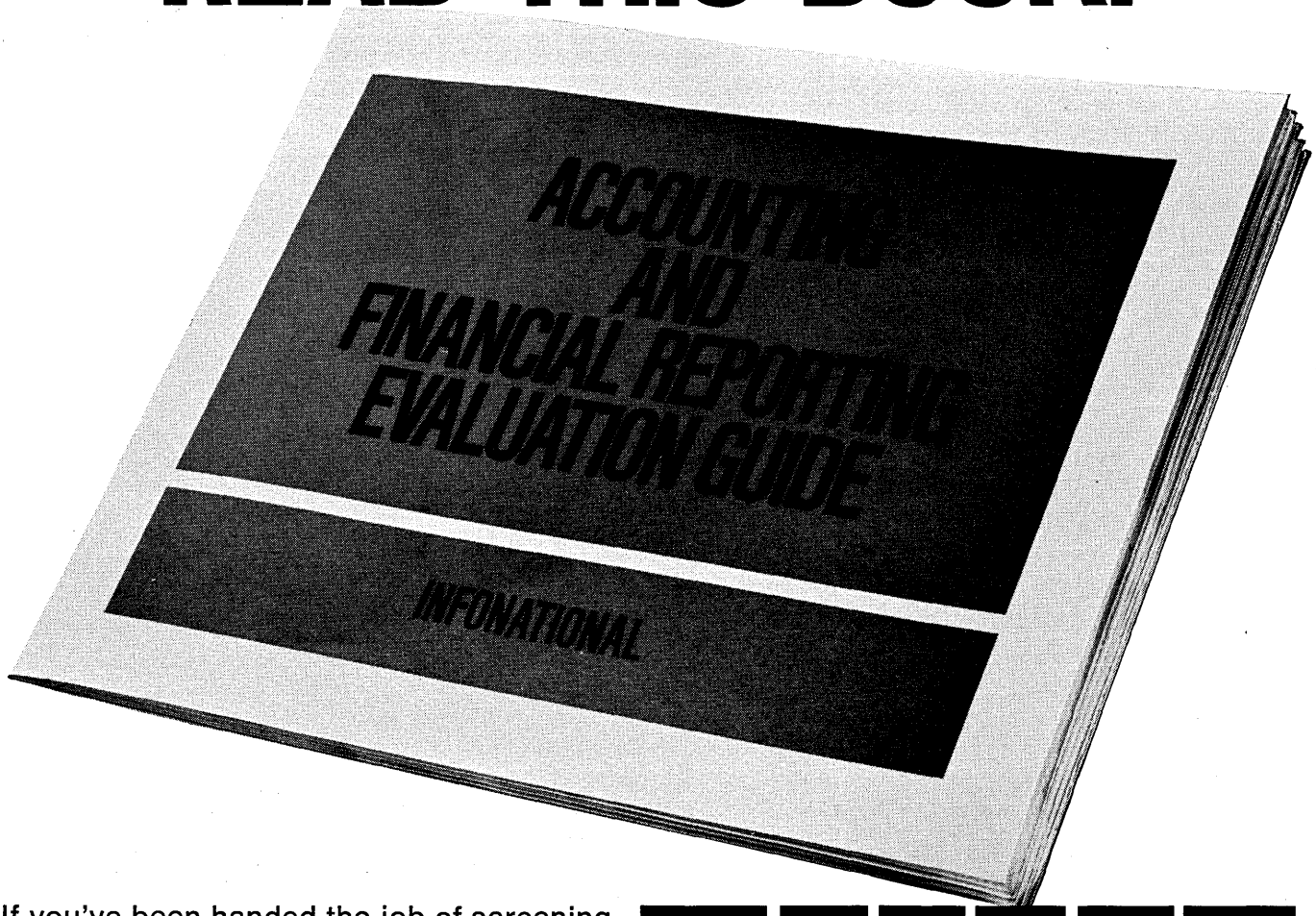

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Books

A Computer Perspective
Office of Charles & Ray Eames
Harvard University Press
SBN-674-15625-0
175 pp. $12.95

A Computer Perspective is more than an important book. It is an institutional commercial that you'll be happy to purchase as a work of art—sort of an IBM counterpart to Andy Warhol's "Campbell's Tomato Soup Can." You can open to any page and not need to go forward or backward to understand the idea. Your first impression (from simply glancing through the book) is that the perspective is gray. Your second one (after reading a bit) is: it's gray. Since the book is a direct by-product of an IBM exhibition done by the Office of Charles & Ray Eames, it is probably the most elegant gray book ever produced.

The philosophical viewpoint is innocuous—the bringing together of three lines of machine development (calculating, statistical and logical). Any researcher knows that you can always discover a history to support a given philosophy. IBM got Professor I. B. Cohen from Harvard to validate this history. As we read along, we come to believe that the computer was just a tool that happened because folks wanted it about the same time that they needed it. For example, T. J. Watson read a report in 1929 that only two per cent of the accounting in the U.S. was being done by machines. "Think of that!", Watson said. "Two per cent! Think of the field we have to work upon." The possibility that accounting itself might be the anachronism was never considered and technology as its own justification became the foundation of the world's richest corporation. Since people never know what they want, make them an offer they can't refuse, and then clearly that's what they want.

The history in *A Computer Perspective* begins with the 1890 Census and carefully interconnects social needs with the inventions of the time. There are, however, less sanguine views of progress than I.B. Cohen's, "historical forces that produced the modern computer." For instance, I view the pervading genius of the book as Sir Francis Galton, who founded "the science of eugenics" and "launched the statistical measurement of man." Galton leads to Binet in 1908 with his concept of testing for mental age which ". . . underlies the vital role that such testing has come to play in business and industry, in the military, in education, and in medicine." By 1928 IBM was supporting the work of Columbia educator Ben Wood who believed in "the measurement of knowledge." Then in 1937 Wood authored the National Teacher Examination Project. Galton at least was up front when compared to our modern "educational eugenicists." He was an avowed elitist who sought to improve the race by selective breeding. His science of statistics was an attempt to predict and control for "desirable" physical and mental characteristics based on his interpretation of his cousin Charles Darwin's Theory of Natural Selection. It's not all that different today when statistics are applied to social problems.

However, there were those who expressed horror at a statistical view of man. Charles Dickens' comments were not used either in the exhibit or in the book in order to protect a lovable old author from contemporary derision. Upon reading a report of a train wreck in which the fatalities were expressed as percentages, Dickens suggested that if we got used to reporting fatalities in this manner, we would lose compassion for our fellow man. He was apprehensive that people would look at the results of technological devastation as merely body count and thereby avoid any feeling of responsibility for creating the product.

Another story of applying technology for people's "own good" starts with Senator James Garfield's unsuc-

cessful attempt to have the 1870 Census go beyond counting noses. The idea of government knowing what its people did was then generally considered outrageous and dangerous. By 1880 he was President and a census of manufacturers was added. In 1890 Herman Hollerith's "statistical pianos" were needed to compile "the complex inventory of such population characteristics as immigration, health, racial composition, literacy and employment."

This equipment spawned what became IBM and the die was cast in the Social Security Act of 1935—"The machines established the ability of government to implement national programs in individual terms, for example, the introduction of the withholding tax in 1943." Even then it was not generally supposed that this idea could be extended to provide for political surveillance. Today only a few champions, like Senator Sam Ervin, still fight for a citizen's right to privacy.

There is much current concern about depersonalization and the degree to which machines in and of themselves contribute to anomie. *A Computer Perspective* is an apologia that states, ". . . the computer appears to be the result of many people trying to solve many problems in many fields—as a natural consequence of getting on with the business of life in general." It's not surprising that it took the effort of a million-dollar IBM exhibit to make a businesslike view of life seem so attractive.

Another general perspective from the same material is that several freaks were into crazy calculating trips and unfortunately some frightened power heavies used these inventions to create their idea of order from a world of chaos. Consider the major character, John von Neumann, a Hungarian mathematician who pulled together the essential ideas necessary to design the electronic computer. He had come to America to study theoretical physics and his ". . . participation in the Manhattan Project gave him an interest in problems of application and convinced him of the great potential of automata." That's quite a rationalization for building an atomic bomb. A statistical view of expected fatalities must provide emotional insulation for this kind of endeavor and allow the inventor to sleep nights.

At the end of the book are seven pages that list the credits and acknowledge loans of artifacts. Every name of any person who lent anything, whether used or not, is listed. The "IBMers," however (and some, myself included, spent years on the project), signed a paper renouncing their identity outside the corporation. We are all lumped into an anonymous paragraph: "The assistance of IBM employees in the development of the exhibition and this book is especially acknowledged." Thanks a lot.

—Lynn Stoller

Book Briefs

Computer Science

Organization for Economic Cooperation and Development, 1750 Pennsylvania Ave., N.W., Washington, D.C., 1972
51 pp. $1.75

Subtitled "Problems and Prospects of Fundamental Research in Multidisciplinary Fields," this OECD report concludes that there is an urgent need for a theoretical effort directed to the deeper aspects of computer science. The main troubles of the current research situation were found to be: 1) the dominant influence of commercial interests, particularly of the largest computer manufacturers; 2) pressure for immediate, even if poor, results; 3) lack of sound traditions and pressure for spectacular achievements; 4) shortage of highly qualified experts, teachers, managers; 5) slow and inadequate acceptance of the field in academic circles; 6) insufficient contacts between theorists and practitioners, particularly in the development of

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large systems; and 7) lack of coordination between users and manufacturers in the development of large systems.

Patient Monitoring: '72-'75-'80
Frost & Sullivan
106 Fulton St.
New York, N.Y. 10038
142 pp. $395.

In 1972 medical electronic equipment manufacturers will sell approximately $100 million of goods and services in the domestic patient monitoring market. By 1975, that should have increased by 60.9%; by 1980, 84%. This market report includes a management summary and covers definitions and historical development, types of systems and manufacturers' equipment offerings, end user classes, industry structure, research and development, legislation, marketing trends and strategies, and forecasts for the future.

Terminals Review
GML Corporation, 594 Marrett Road, Lexington, Mass. 02173

This booklet, updated and reissued quarterly, is a guide for buyers, salesmen, and others who need to know the characteristics and prices of all keyboard remote terminals marketed in the U.S. The first edition, issued in January of this year, is very complete. Each issue is divided into four parts: nonprinting (mostly crt) alphanumeric and graphic terminals; printing terminals; rental prices for popular KSR and ASR model teletypewriters from nationwide leasing companies; and a manufacturers directory, with addresses and telephone numbers. A one-year subscription is $28; two years, $50; three years, $70.

The Computer in Secondary Schools: A Survey of Its Instructional and Administrative Usage
by Charles A. Darby, Jr., et al
Praeger Publishers, 111 Fourth Ave., New York, N.Y., 1972
135 pp. $12.50

Because many of the more widely known current educational applications of computers are aimed at the elementary level and at higher and continuing education, the American Institutes for Research conducted a survey sponsored by the National Science Foundation concerned with the educational and administrative uses of computers in secondary schools. The study consisted of a mail survey of the 23,000 public secondary schools in the continental U.S. and follow-up interviews at nearly 100 schools reporting instructional applications.

Some of the conclusions: 1) The ratio of non-users to users is roughly 2 to 1. 2) While the use of computers for instructional purposes appears to be growing rapidly, the domination of administrative over instructional use is approximately 2.5 to 1. 3) Most schools tend to prefer expansion of present applications rather than the initiation of new types of applications. 4) The computer is more frequently used as a tool in instruction than as the object of instruction. 5) The mathematics department frequently initiates the use of computers; if the use spreads, it does so in a relatively unplanned manner. 6) One of the greatest benefits derived from the use of computers in instruction results from its capacity to motivate students.

Major problems center around the fact that students frequently learn more about the computer than the teachers do; few schools have an individual or organizational element recognized as the promoter of computer use; and the curricula of most schools presently make it difficult to introduce innovations. Controversies are common over formal vs. informal instructional use, whether an on-site computer is necessary, the instructional merits of a small- vs. a large-scale computer in the context of cost-effectiveness, and the type of computer language that students should be taught. □

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letters

Continued from page 26

plaintiff wins it, he has effectively secured a quick, final, and relatively inexpensive victory.

The second point is the pendency of an important case, bearing on the current viability of trade secret law, before the U.S. Supreme Court. *Goldstein v. California* deals with whether a state can legislate in an area where there is Constitutionally authorized federal legislation, or whether the latter pre-empts the former. Specifically, Goldstein alleges that California's "tape piracy" statute is unconstitutional because pre-empted by the federal copyright laws. Should the Supreme Court agree, it could conceivably indicate that the federal patent laws pre-empt part or all of the state trade secret laws.

The patent laws, designed to provide incentive for invention and discovery, have themselves with increasing frequency failed to function in the manner contemplated—in general because of the patentee's increasingly poor track record in court, and with particular reference to software because of the inherent unsuitability of the law to many types of software, as well as because of *Benson*. It would therefore be most ironic if the patent laws were now held to pre-empt trade secrets. For then, beyond proving impotent themselves to protect technological subject matter, the patent laws would have served as the instrument for destroying one method which has steadfastly proven most effective (and which is the most frequently utilized method of software protection).

Goldstein may well put the pre-emption problem to rest without any inroads on trade secret law. But if not, those desiring protection for software might do well to save up their carfare.

DAVID BENDER
Attorney at Law
New York, New York

Primitive definitions

It would be very helpful if Richard Beck (Letters, April, p. 169) would define some of the symbols used in his formulas. (Is it too much to ask that he define them all?) Like f and T and e, the "error" under consideration whose probability of occurrence he seeks. Why solve for minimum N? What defects have been prevented by using the formula, as implied in his table ("% Defect Prevention")? Mr. Beck is concentrating on only one aspect to system design, but his approach is fasc'nating. If there is indeed "any real difference between having one 'module' of N operations, or N modules of one operation each" in the vein of his discussion, then I for one would like to know more about it.

R. A. BAKER
Houston, Texas

Mr. Beck replies: The formulas and tables included in my brief letter summarize research into development of optimum-size modules to reduce the probability of error in complex computing systems. I had assumed the symbols used were fairly obvious. T and N are expressions for the number of basic functions in a system and the number of modules in that system —that facilitates expression of the number of primitives in a module. T(e) is the probability of error, and f is the standard function identifier used throughout mathematics. The expression demonstrates that past a certain optimum end in the direction of too few or too many modules the probability of error becomes exponential. I agree this is only one aspect of systems design, but we have to start some place.

Patent disadvantages

I refer to the overall excellent article entitled, "Software, Carfare & *Benson*," by Roger M. Milgrim, in the April issue (p. 75).

On p. 76 (Patents vs. trade secrets), Mr. Milgrim referred to the May 1972 DATAMATION article, "Legal Protection of Software," by Mr. David Goldberg, and erroneously stated that said article "did not consider any of the drawbacks of using patents to protect software."

On the contrary, Mr. Goldberg's article covered this point explicitly. See pp. 66-67 of Mr. Goldberg's article which highlights five major disadvantages of patent protection with regard to software.

ROBERT W. JOHNSON
New York, New York

Humor hero

All of the pieces in your recent "April Foolishness" were clever, but the item "Man/Machine Interface" by Donald Kenney was absolutely hilarious, and there was even a rather explicit message for those who aren't satisfied with just good fun. Anthologists of edp humor will surely include Mr. Kenney's effort.

J. O. PULLMAN
Durham, North Carolina

Great new cause

Now that DATAMATION has solved (read solved?) the great programmer/programer debate, it seems that the momentum of what is clearly a worthwhile effort should not be lost, but channeled into another equally important task.

My suggestion for the next project is a determination of the true value of "ϕ" and "o." Is a numeric "ϕ", "o" or is it "ϕ"; and if it is a "o" or "ϕ", what is an alpha "o", "ϕ" or "o?"

Most programers and many programmers use the "ø" for an alpha character as a means of making a distinction to the keypunch department, which may be using one of the many display-key-tape devices that use the "ø" as a numeric character. One might also observe the character displayed when the numeric "o" is depressed on any tty-type terminal.

For a solution to this dilemma, I hereby offer a reward of one dime (1ø cents, or is it 10 cents?).

STEVE WILLIAMS
Los Angeles, California

Data preparation

Your March articles on data entry reveal no knowledge of a simple and low-cost data preparation method which has been established in the U.K. and Europe for some years.

Where a large number of remote sources have relatively low volumes of data, such as retail shops or savings banks, the cost of daily data collexion can be prohibitive, although the global volume may be high enough to justify expensive central reading facilities. One way to overcome this problem is the use of add-lister machines to prepare journal rolls in ocr characters and to mail these overnight to the dp centre for reading onto magnetic media.

This method means low-cost equipment at each remote station, with daily collexion, but relatively high-cost ocr reader at the centre—which in total can give a very low-cost data entry system. The main advantages are:

1. Simple and high-performance (12,000 strokes/hour) operation—who cannot use an adding machine?

2. Economy of operations, since verification is visual check while keying, batch controls are built up during keying, and document controls can be zero-proved during keying; i.e., three conventional operations plus a document control in one.

3. Environment for data preparation can be normal user office or shop.

Banks are using these machines as teller machines on the counter, sending journal rolls to the centre daily, and receiving back reports by the following morning. Retail shops use this method for point-of-sale data capture for cash control, and merchandising control. With a good range of overnight mailing services available in the U.K., daily turnaround is practical at negligible cost.

If our U.S. colleagues can cap this with an even more efficient system, we should be glad to hear from them.

E. CRISPIN
Manager
Peat, Marwick, Mitchell & Co.
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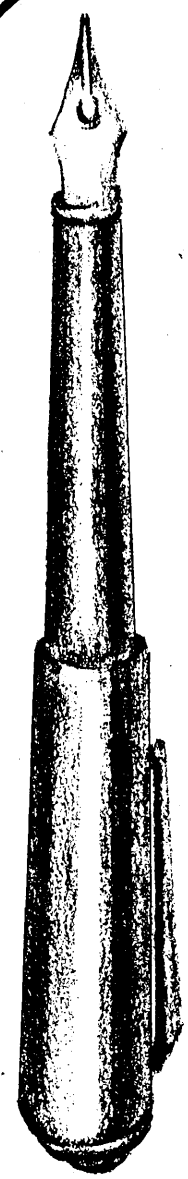

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Look Ahead

(Continued from page 18)

the mag tape-to-Xerox copy system will harm it. It's an off-line printing world, anyway, they say, and a COM user needing hard copies now has a handy device with which to make them, using the same tape reel.

A "SOFTWARE LOCK" FOR IBM'S BANKING TERMINAL?

European banks are awaiting the announcement of IBM's new banking terminal, due out there by the end of the year. An example of its potential market: the two leading banks in France, Credit Lyonnaise and Banc Nationale du Paris -- both heavy IBM users -- are said to be talking about more than 10,000 terminals. One user, incidentally, is worrying about whether IBM will have a "software lock" that will make using anything but its terminal with the VS 370 systems "very difficult."

One IBM source claims that the new banking terminal may find a customer at Barclays in London, where Burroughs cpu's were recently bounced in favor of IBM 370s. He said Barclays won't throw out the Burroughs TC series terminals it owns, but it will need more units of the kind IBM will offer -- not as smart as the Burroughs product and presumably cheaper.

RUMORS AND RAW RANDOM DATA

Burroughs customers are said to be installing networks of TC computers without a central processor where local offices do stand-alone processing and minor interchange of data among them. This trend seems to be extending to the B700 with its added advantage of disc files...Bill Lonergan, former president of International Reservations Corp., is now director of market planning at Burroughs. He's reportedly looking for ways to modify the Illiac IV and the company's other big machines -- i.e., developing simpler operating systems -- to increase their market appeal...Sy Joffe, Datran's chief marketeer ever since the company was formed five years ago, has joined Graphic Sciences, Danbury, Conn., as executive vp for marketing...Datran's parent, University Computing, officially changed its name to the Wyly Corp., after founders Sam and Charles Wyly, at the stockholders meeting last month...Seymour Cray, CDC's ex-resident supercomputer designer, is rumored definitely planning an independent venture for manufacturing super systems and is out getting money for it...Even the Boy Scouts are computer sophisticates. When Digital Development Corp., San Diego, offered them free a power-devouring Alwac II, they declined, opting instead to purchase a General Automation mini... Most U.S. computer makers are looking for merger or buy possibilities with home-grown firms in Europe. One Philips source, asked if he expected the new CII-Siemens-Philips combine to team up with a U.S. firm, said, "eventually." And which company would he prefer? "IBM, of course."...IBM apparently is upset with the strong "buy national" mood in many European countries. So much so in fact, that Jacques Maisonrouge reportedly gave a "hellfire" speech on it to an IBM conclave in Europe this spring -- and the hotel they were in caught fire (no one hurt)...Claiming more installed file management systems than even IBM, Informatics will rename its Software Products Co. subsidiary Mark IV Systems Co.

We regret to announce that Harold Bergstein, editor of Datamation from 1961-63, died May 23 in Los Angeles. After leaving Datamation he served as assistant to the president at both Computer Sciences Corp. and Scientific Data Systems. A vigorous, outspoken, and articulate editor, he was a key factor in the early development of Datamation and the industry.

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Compiler Development
Design and implementation of compilers for language such as COBOL, FORTRAN, PL/1 data base, ALGOL and software implementation language. Positions require 2 or more years of compiler design and implementation experience and a BS degree in physical sciences or computer science.

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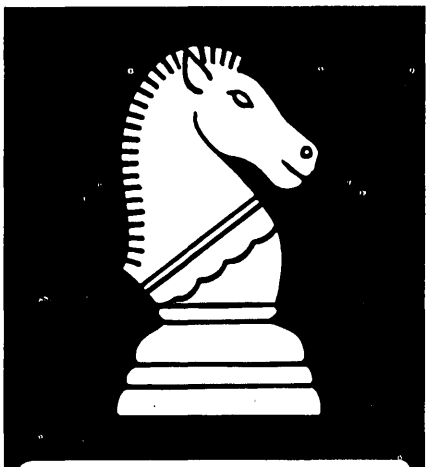

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This forum is offered for readers who want to express their opinion on any aspect of information processing. Your contributions are invited.

The Forum

Management Tips from a Programmer

I believe it is my turn. Everyone in computing has been telling everyone else how to do his job. Managers, especially, think they have a right to tell programmers how to program. Such a favor must be returned. I, a programmer, have a few tips to present to managers. Not to all. Most managers, like most programmers, already know how to do a proper job. These managers run good shops, enjoy their work, and make life satisfying for their subordinates. May they grow and prosper. May I someday find myself in their employ. May they forgive me for the cruel things I must say to the few poor souls who give managers a bad name, programmers a hard time, and customers fits.

Do your job: manage. It is painful to note that some managers do not know what they are there to do. They think they are supposed to improve their social standing, prepare for promotion, insure the moral rectitude of their subordinates, or write letters to trade publications. Such an approach does lead to a good salary, envious peers, and o'erweening pride, but has the serious disadvantage that it encourages others in the same attitudes. The goals of the organization become lost. More than one hot-shot skilled at internal politics has risen to head his firm, leaving a wake of embryonic politicians growing behind, only to have the shop collapse because nobody was left to actually do the work of booking orders, planning programmer allocations, etc.

Manager, you are there to manage. You are there to provide direction for your subordinates so that they will work to fulfill the goals of your organization. In order to do that, you must have and hold a clear concept of those goals (say making money) and of what the jobs of your subordinates are. You and your subordinates must know who reports to whom, when, and why. A manager of programmers should be able to tell them what to program, how to program it, when to get it done, and what to do next. Let me assure you that a well-defined, well-directed project is much more pleasant to work on than one in which you are told, "you know what we are trying to do, make a contribution." It is much easier to work within the confines of a realistic job description than simply have the freedom of the title programmer/analyst. It is better for my ulcers to work with people who know what they are doing and why than to be one of a flock of lost sheep. Whence my second tip.

Make decisions, even wrong ones. Consider the fate of a programmer engaged in the development of a large system with many related modules to code and many open "policy" questions. He codes module 1, resolving open questions in some reasonable manner, and bucks it upstairs for approval or disapproval. Now he skips module 2, which depends on the exact form of module 1, and moves on to modules 3 and 4. He bucks them upstairs, skips modules 5 through 9 because they depend on 2 and 4, and works on 10, which he

discovers actually depends on 1. So he asks his manager for a go/no go on 1, and is told that the questions raised have been passed on to a study group to achieve a consensus on the policy implications, and please do not bother him further, just go and code. Either the programmer forms a study group in the nearest bar, or starts managing from below, presenting faits accomplis with serious policy implications at an ever-increasing rate. Finally the manager calls him on the carpet for either doing too much or too little. The programmer pays little attention, for he is already looking for another job.

Now, I realize that there are risks in making decisions. You might be wrong. The programmer who has to implement that wrong decision might think you are an idiot. Higher management might start to form a batting average on you. So what? If you really belong in a managerial position, you will make more right decisions than wrong ones. If you are usually wrong, then it is better to find out early while you are still young enough to find other work.

Be responsible. Now that I have convinced you to make decisions, may I induce you to be responsible for them. Every manager wants his subordinates to care about their work. Set a good example. When the accounting routines you just had your people install blow up and charge everyone double or nothing, take the flak from the users and the front office yourself, so maybe your people will have the time and peace of mind to fix the problem. When you discover past decisions now set in concrete no longer accord with reality, do not leave your programmers frustrated. Get an air hammer and break the concrete. It is no disgrace to admit that a past decision was wrong. An installation I know of needed everything short of dynamite to blast it out of an accounting system set up for a monoprogrammed second-generation computer, which was misaccounting a multiprogrammed third-generation computer. The tier of management that set it up was very reluctant to make a case to the users and the front office saying that the system no longer made sense. When they finally got the courage to do it, it turned out that the users and the front office didn't really object; they just wanted a smooth transition which wouldn't upset their budgets.

No matter how afraid you really are, spare your programmers your insecurity. Back your decisions to the hilt as long as they make sense. Then make new decisions.

Give everyone a shovel. Being decisive is not enough. Someone must implement the decisions, hopefully with verve. One sluggard can dampen the enthusiasm of a whole programming group. An authorized sluggard is doubly deadly. Be certain that everyone feels that everyone else is working at least as hard as he is, and that his manager is working even harder. Do not reserve the scut work for

junior people. Prima donna programmers who write large blocks of undocumented code are made by managers who accept the bribe of special performance in exchange for recognition of the absurd contention that some people are too good to document, too valuable to waste time talking to users, too temperamental to work regular hours or do anything not quite to their pleasure. Make just one like that, and every other skilled programmer will make that same status his goal. Your best people are exactly the ones who must do the bulk of the documentation, must help users, must be available during regular hours, since they can do the messy jobs with the least waste motion, get them done, and train others in how to do them.

Finish something. That brings me to my final tip. Every once in a not-so-great while, finish some programming project. Programmers have the gnawing fear that they are writing code for the waste basket. Such fears hurt less, even when they are justified, if something gets into production. It may be good programming practice to totally plan a system before code is written and completely debug all code before using any of it, but that requires confidence in the validity of the planning which is beyond the capacity of many programmers. Small maintenance projects and useful applications packages can be used to keep programmers from feeling rusty while the specs of your new super-duper system are being firmed up. Then you won't have to mention those dirty words: "system freeze." Despite all appearances to the contrary, programmers do like to program. May those who must manage for a living enjoy their work as much.

—Anon.

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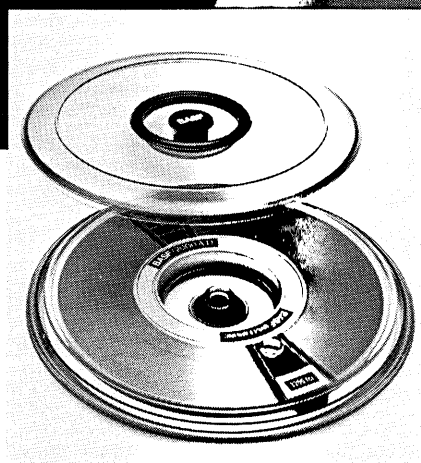

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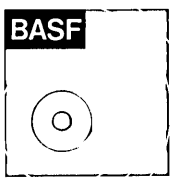

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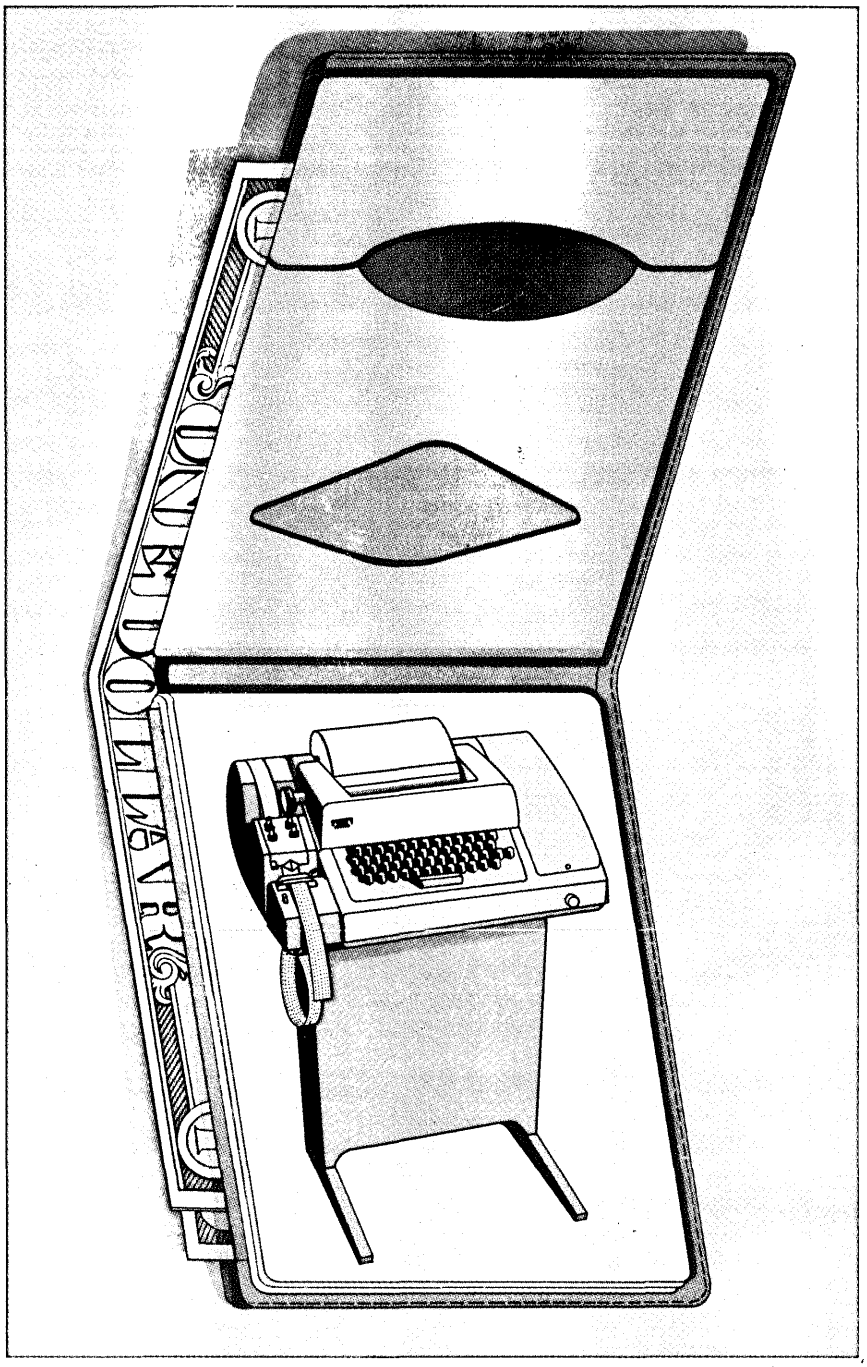

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