

DATA MATION[®]

'73

July

DISTRIBUTED PROCESSING
Also...minicomputers everywhere,
cross-assemblers, and a computer/computer dialog...

VTAM, the VORTEX Telecommunications Access Method. Hook up with your big computers and multiple terminal networks. Fully integrated in Varian's own V73 with VORTEX (our multi-task real time operating system), it's an off-the-shelf communications software capability and it's second to none.

VTAM is the only telecommunications system which includes file management systems, simultaneous foreground/background processing, and multi-threading as integral parts of the package.

Our VTAM is an articulate, price/performance conscious executive with an open ended system structure. It provides teleprocessing controls for our communication controllers, modems, terminals, communications networks, and network operator controls.

Terminal and teleprocessing I/O are handled as logical units. VTAM is extraordinarily easy to use; application-level programming is all that's required.

Perhaps the most important feature of VTAM is its flexibility. It functions equally well as a base in a broad range of communications applications—from systems dedicated to functions such as store and forward message switching or front end processor. Or, the communications may be a supplemental function to other processing tasks. Like remote inquiry into an instrumentation data base. Or satellite processor connection with a distributed processor network. Even data exchange with a remote host computer after local processing.

And modularity lets VTAM handle systems that range from one or two low speed lines to large multi-node

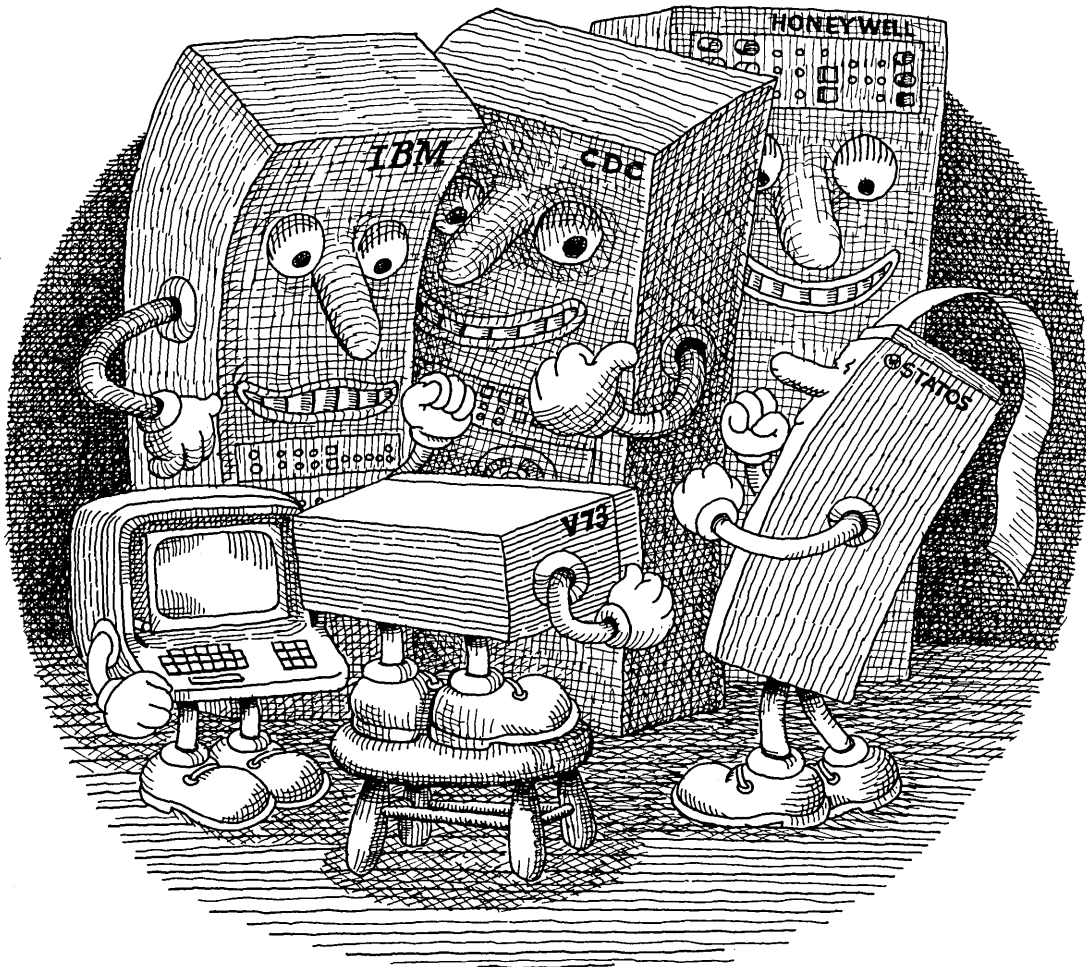
networks. From simple teletypes to the most complex line disciplines.

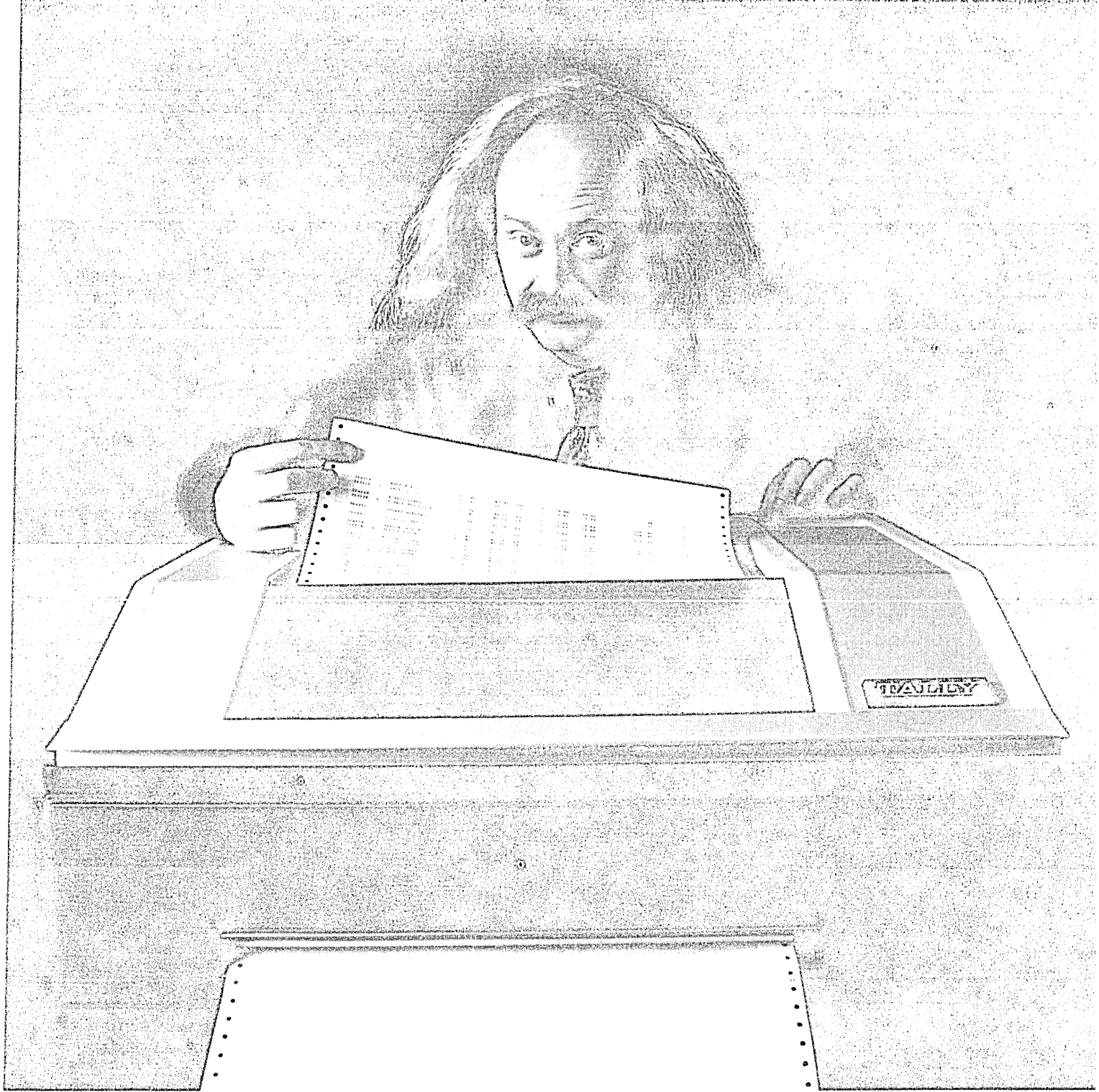
Our microprogrammed, message mode Data Communications Multiplexer completes the hardware/software package and takes full advantage of our multi-bus, extendable architecture 330 nsec V73. With message mode communication, software overhead is minimal. VTAM and our other data network or stand-alone packages are available now. At far less cost than you would have thought possible in a system this size.

For the full story write Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664 or call (714) 833-2400.

varian data machines 

VTAM. Varian's reply to some very big communications talkers.





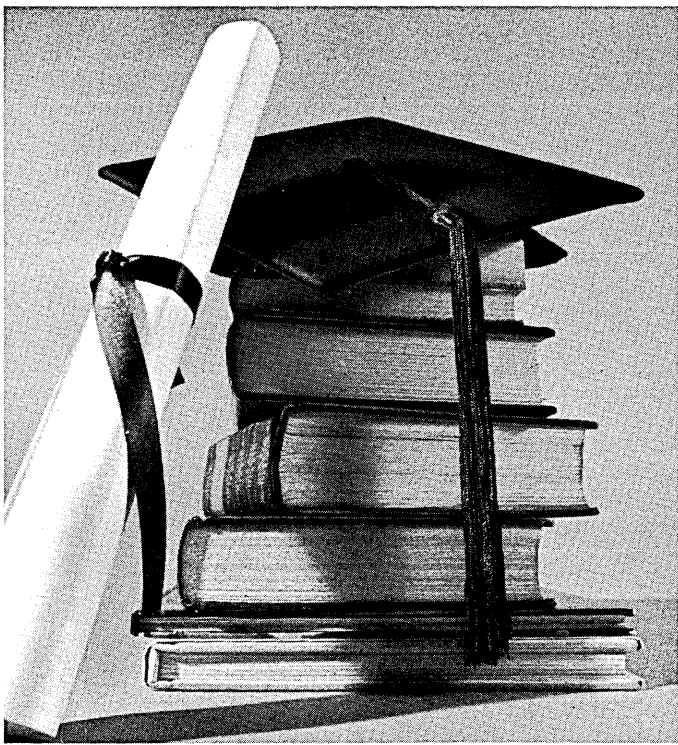
Watch this!

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 it's the ultimate choice of computer system manufacturers and users who need unqualified dependability.

Before you buy, before you specify, before you do anything about any medium speed printer, watch this one do its stuff! Call your Tally man now for a demonstration.

TALLY



For 21 colleges and universities, Sanders data terminals help to calm information explosions in areas relating to student registration, administration, office payments, vocational training, library research and a variety of processing and retrieval activities. Sanders' technology copes with every kind of information-handling problem.

COLLEGE DEGREES AND EKG'S

For detail-harried hospitals, Sanders data-terminal systems help process electrocardiogram read-outs, billing figures, payrolls, inventories . . . and miniaturize masses of administrative and patient-related records and procedures. Sanders has total-systems hardware, including the most advanced "intelligent" data terminals available today.

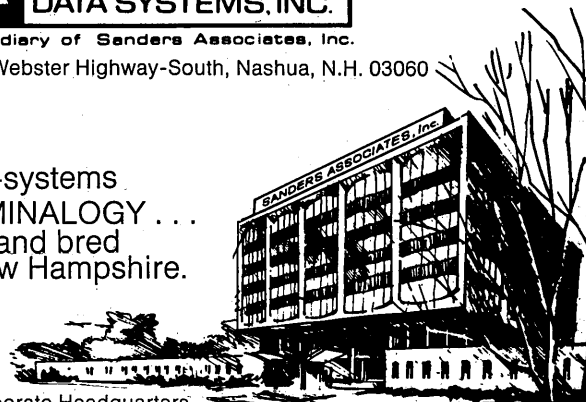
Let us show you how Sanders **Terminalogy** can meet your total hardware/software/maintenance needs. Contact your nearest Sanders office . . . or call our National Sales Manager at 603-885-3727.



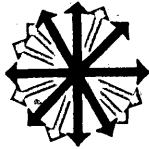
A Subsidiary of Sanders Associates, Inc.

Daniel Webster Highway-South, Nashua, N.H. 03060

Total-systems
TERMINALOGY . . .
born and bred
in New Hampshire.



Corporate Headquarters



JULY, 1973

volume 19 number 7
This issue 116,722 copies

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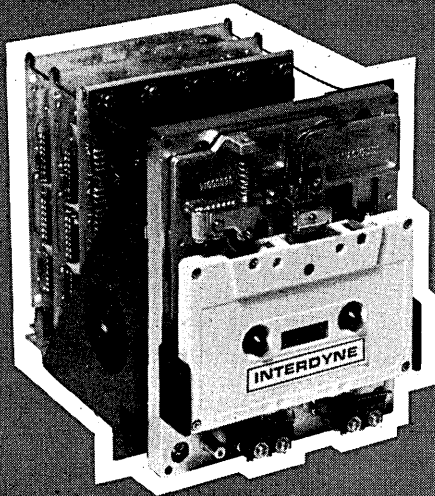
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From Japan, a plea for marketing flexibility.

There's gotta be a reason...



Why our customers and competitors say this digital cassette drive is the one to beat.

Thru the grapevine

During the past couple of years our digital cassette drive, along with scores of others, has been painstakingly evaluated by the largest makers of digital systems, point-of-sale recorders & remote terminals.

And time after time our IC2500 has been rated tops in performance and reliability.

Thru the grapevine, we've heard that customers and competitors call ours the one to beat.

There's got to be a reason for these unsolicited testimonies. Matter of fact, there's a bunch of reasons.

A classic in simplicity

What beautiful emptiness! No complex assortment of mechanical levers, banging solenoids & belts. Just a DC servo capstan motor and a pair of reel motors to precisely control tape velocity and tension.

Designed to mate with computers

The IC2500 isn't a warmed-over audio retreat, but has been carefully designed as a true

computer compatible peripheral. The velocity controlled servo capstan drive precisely, yet gently, handles the tape — just like the big reel-to-reel machines. We've even gone them one better by replacing the digital tach with an ingenious back-EMF sensing servo circuit.

This all adds up to a documented data reliability of one error in 10⁹.

The importance of life-cost

The initial cost of a digital cassette drive is like the tip of an iceberg. The actual cost includes downtime, maintenance, data reliability and a host of other things over its operating life.

A major customer recently proved that our machine would save him hundreds of dollars per unit over a 5-year period, compared to a cheaper drive he was evaluating.

Don't sit there—do something

Your system is only as good as your peripherals. And Interdyne is setting the pace in digital cassette drives for both machine & data reliability. Call us today.

INTERDYNE

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CIRCLE 92 ON READER CARD

DATAMATION.

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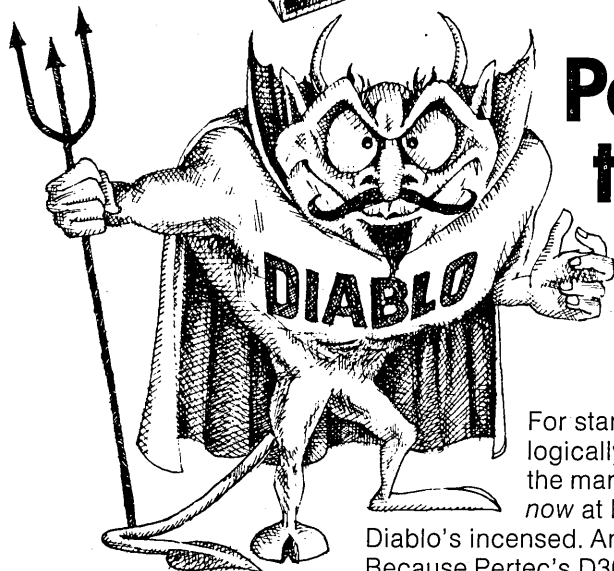
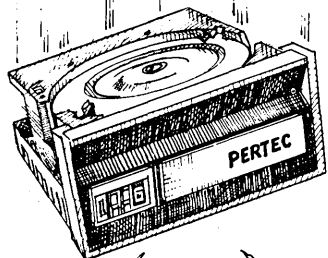


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DATAMATION



Pertec's out to beat the devil at his own game.

For starters we've developed the most technologically advanced and complete disk drives on the market. They're available and deliverable now at Pertec.

Diablo's incensed. And for good reasons.

Because Pertec's D3000 disk drives are available in top and front loading versions, plug-compatible, and identical in interface and size (8 $\frac{3}{4}$ " x 26"). Both offer 35 msec access time, margin testing, a choice of electronic or mechanical sectoring, an optional fixed platter. And a built-in power supply—all within the drive and identical in both configurations.

And you get the same assistance in design; development and maintenance of your system with our disk drives as you do with our tape drives... Factory training for your service people. Back-up by a service and support network spanning 30 U.S. cities and 20 foreign countries.

All at surprisingly low prices.

Pertec is serious about satisfying your disk drive requirements, and we're proving it.

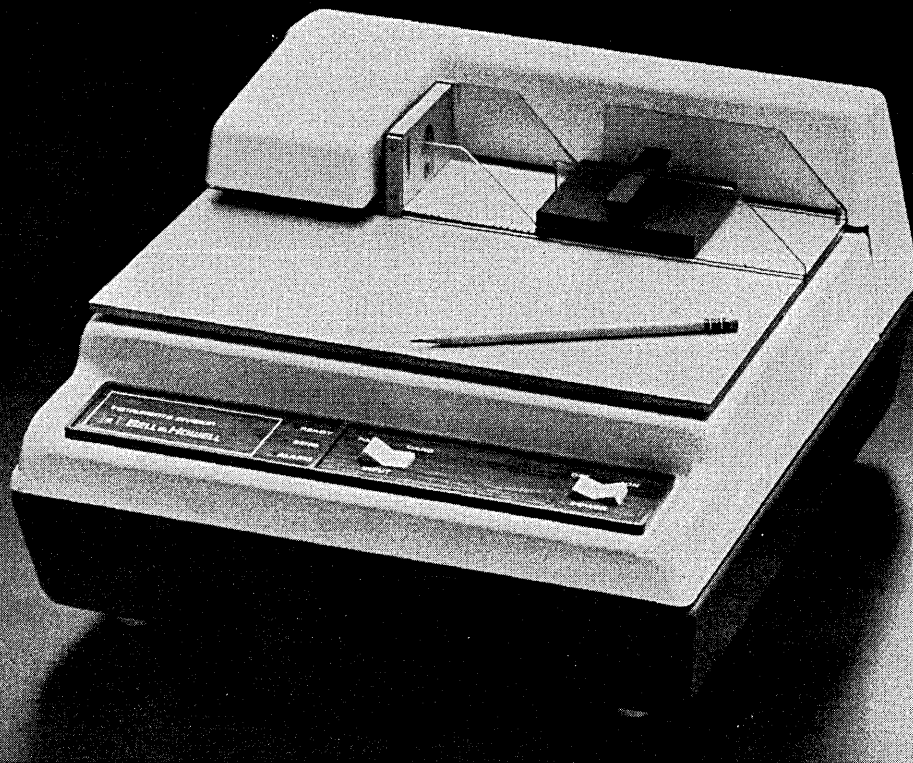
Find out more. Call us collect in the area nearest you: Boston (617) 890-6230; Chicago (312) 696-2460; Los Angeles (213) 996-1333; London (Reading) 582-115. Or write us at 9600 Irondale Avenue, Chatsworth, California 91311.



The best values in computer peripherals come from

PERTEC

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



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.

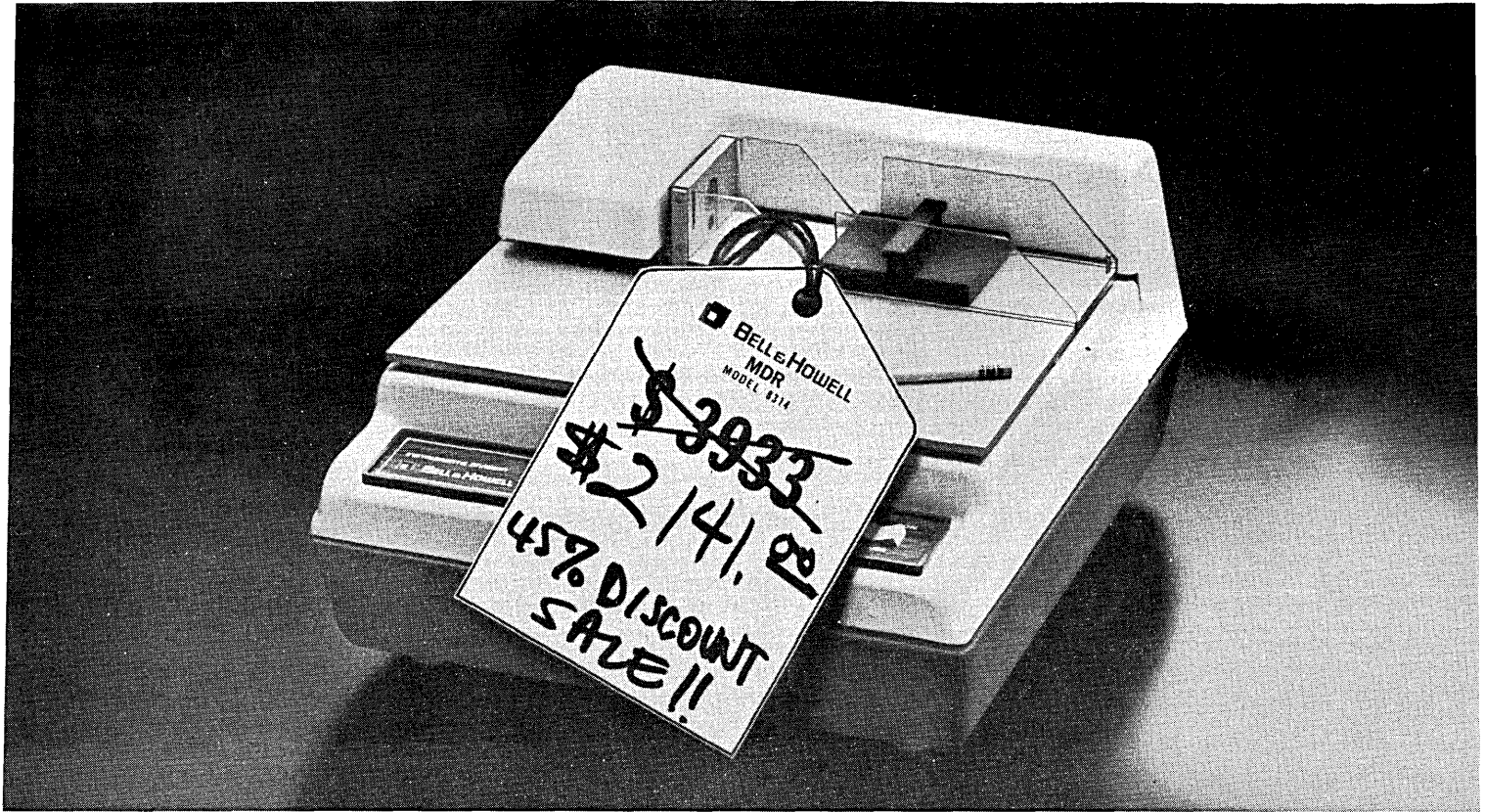
Why the interest in quantity orders?

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.

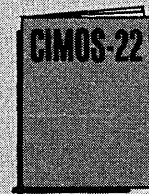





Minicomputer SOFTWARE

Here's an exciting new operating system with RPG that dramatically simplifies and speeds data processing applications

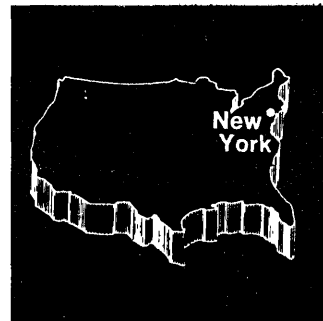
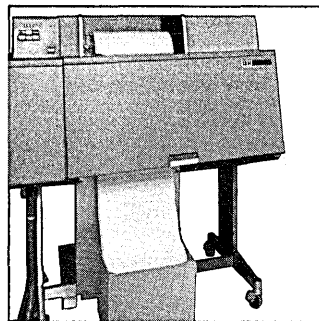
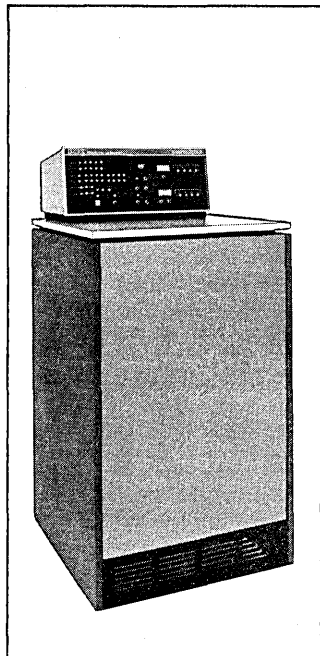
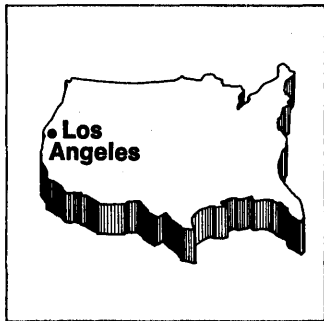
CIMOS-22 is a disk-based operating system for the CIP/2200 minicomputers which consists of language processors, programming and debugging aids and services that simplify data processing applications. The capabilities of CIMOS-22 are packaged in a flexible system design so that each user can tailor the operating system to his individual needs. From either RPG or assembly language programs, the user can take advantage of the high-level data management facilities of CIMOS-22. These facilities include the ability to organize, catalog, store, retrieve and update data files. From a system console or assembler language program the user can create and delete disk-based files. On-line editing capability permits the user to build and maintain data files as well as source and object program libraries. There is much more to CIMOS-22 that you should know about. It's all detailed in our new brochure shown here . . . and it's yours free. Cincinnati Milacron, Process Controls Division, Lebanon, Ohio 45036.



FREE

minicomputers
 **CINCINNATI
MILACRON**

**Machine Tools
Process Controls
Chemicals
Plastics
Plastics Processing Machinery
Abrasives**



This Is a 3000-Mile I/O Channel

Or 500 miles. Or 2000 miles. Or whatever you need! It's Paradyne's revolutionary PIX—the unique, new data communications system that allows your 360 or 370 to talk to remote I/O devices as if they were right in your computer room. PIX helps you do Remote Job Entry, Remote Input/Output, and Remote Processing with the same standard peripherals and software you use for local processing.

Yes, now you can extend standard IBM line printers, card readers, card punches, or computers to remote sites and drive them with standard IBM unit record software—with PIX!

And PIX Saves You Money
The PIX will replace both your IBM transmission

control unit (2701, 2703, 3704, or 3705) and your high speed (4800 or 9600 bps) modem with a single unit. PIX will eliminate communications software—like BTAM, QTAM, TCAM, and the RJE package. PIX enables even small processors like System 360/30's to handle remote Input/Output applications—without *expensive up-grading or degradation of system throughput!*

It's Easy To Use
PIX requires no teleprocessing software personnel. It's simple to operate—just like running a peripheral on-site. And, you can program remote applications in COBOL, Assembler, or any other standard language! Simply use READ/WRITE statements or GET/PUT macros to perform every

Input/Output task through remote peripherals. You can even "input" and "output" jobs through remote peripherals by using standard Readers and Writers.

Great Performance On Dial-Up Or Leased Lines
Dial up lines? No problem! PIX provides as much as four times the throughput of a 201A operating with IBM TP. With private lines PIX provides "true" full duplex transmission—two separate 4800-9600 data paths—on one line.

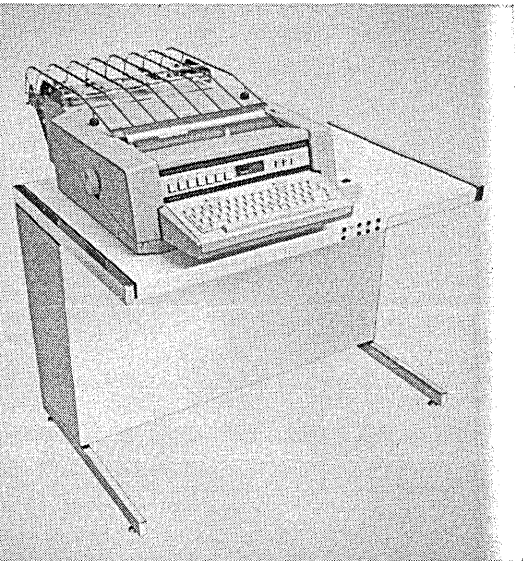
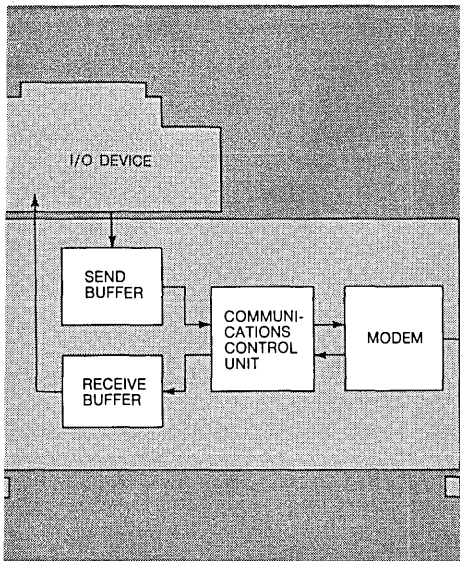
Proven Performance
Join the ranks of some of the biggest users in the country who are utilizing the revolutionary PIX in three-shift operation. They're already realizing unparalleled cost-savings and operating efficiencies. How about you?

paradyne

Corporate Headquarters: Paradyne Corporation, 8550 Ulmerton Road;
Largo, Florida 33540 Tel: 813/536-4771

Marketing offices located in: New York, Boston, Philadelphia, Washington, D.C., Atlanta, Akron, Detroit, Chicago, St. Louis, Dallas, Houston, San Antonio, Los Angeles, San Francisco, and Pittsburgh.

Wiltek data commu can move all th of typewr a big corporati



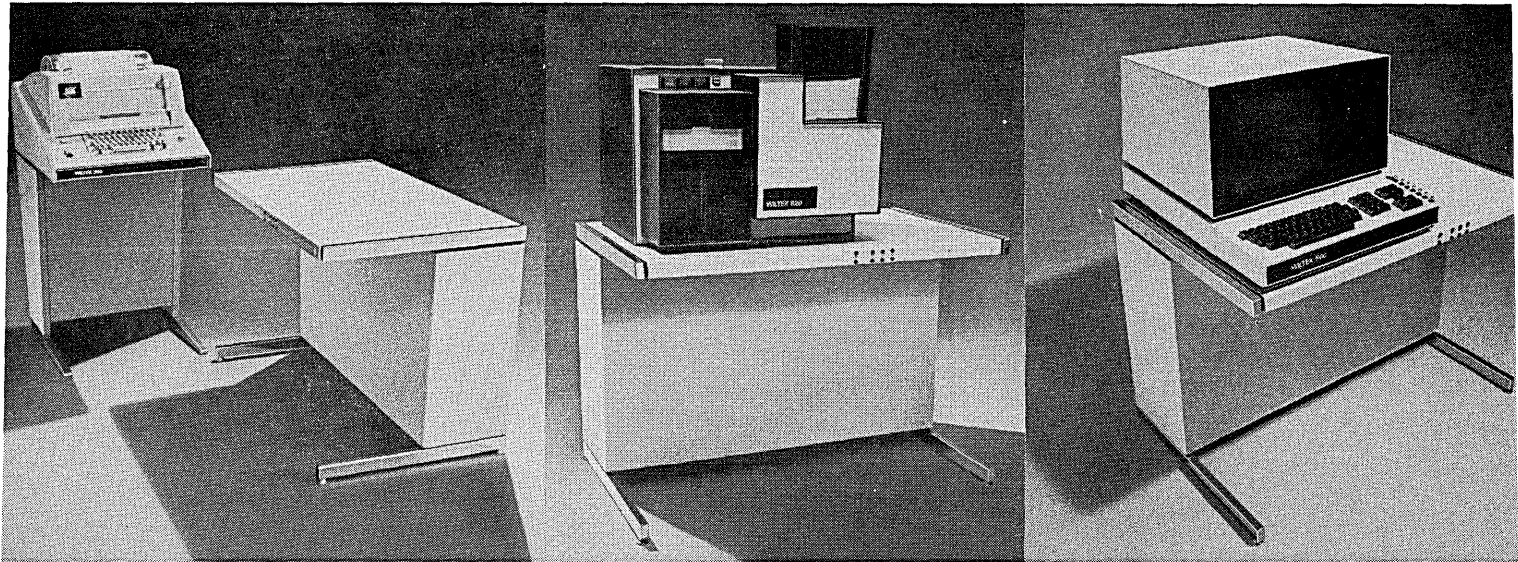
The Wiltek difference. The Wiltek terminal combines high speed with the ability to batch data and transmit it *automatically* over standard dial-up facilities. Two unique 50,000 character storage buffers are built into the Wiltek terminal. One temporarily stores incoming data, the other outgoing data. The buffers enable the terminal to send and receive large amounts of data during a single call — *and with no interruption of data entry*. Data moves fast, phone calls are brief. Transmission costs go down more than 50%!

The Wiltek Model 300 is the most economical Wiltek keyboard entry terminal, suitable for low to medium volume locations. Like all Wiltek terminals, the Model 300 automatically makes error checks during transmission. At a large oil company which recently installed 300's in its regional field offices, terminal operators used to spend hours each day re-entering garbled messages. Automatic detection and re-transmission has resulted in more efficient operation and considerable cost savings.

The Wiltek Model 400, with its 30 cps KSR, is perfect for high volume locations. Several corporations use the Model 300 (left) at all remote locations and the Model 400 at corporate headquarters. A packaging company uses 400's at a central location to receive reports from offices around the country on the status of shipments in transit.

and save hundre of dollars in

Communications terminals in different kinds of data environments generate...



The Wiltek Model 350 is used where many copies are required or where almost continuous operation is expected. A chemical company uses 350's at its regional offices where sales orders are entered on four-part forms, and at its plants where the orders print out on eight-part forms.

The Wiltek Model 820 terminal transmits punched card data from remote locations. A major manufacturing corporation has installed Model 820's to transmit payroll data from forty plants to a single computer center for centralized processing. The same system also employs Model 400 terminals at all locations to handle administrative messages.

The Wiltek Model 500 terminal uses an advanced CRT with 2000-character display. The 500's editing features make entry of formatted data fast and easy. A nationwide delivery service using the Model 500 to enter package tracers increased operator output by 50% over the previously used teletypewriters.

Our new booklet shows how Wiltek's terminal concept can make corporate data communications more efficient and less costly. Write Robert Colella, Commercial Marketing Manager, Wiltek, Inc., Glover Avenue, Norwalk, CT 06852.

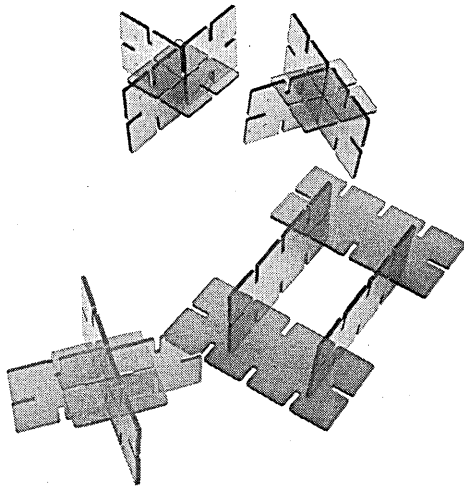
WILTEK

ds of thousands the process.

IBM, UNIVAC
and DEC
users: **Tired of
computer add-on
double-talk?**

fact:

No other independent supplier designs, manufactures and services all his computer peripherals—magnetic tape, disk and mainframe memory enhancements.



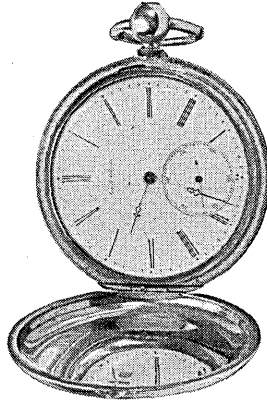
fact:

Ampex computer peripherals cost up to 40% less than OEM's such as IBM, Univac and DEC.



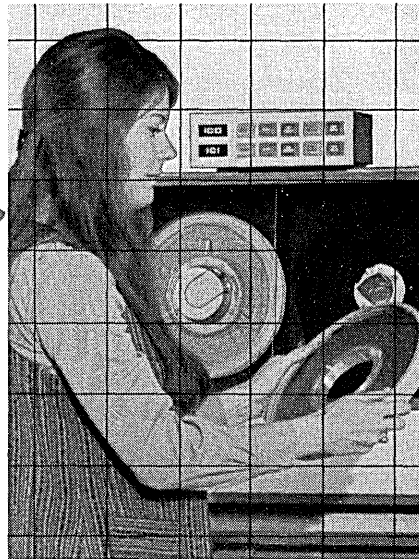
fact:

Nobody makes more reliable computer subsystems.



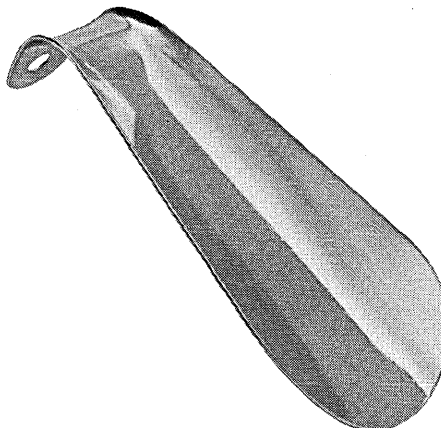
fact:

You can't get better performance and human engineering than are offered by Ampex peripherals.



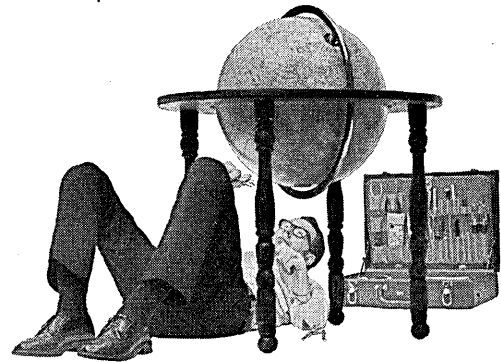
fact:

No peripheral manufacturer is more concerned with computer-room space restrictions.



fact:

No independent offers better service, worldwide, on its products.



These facts add up in your favor. In Ampex tape, disk and memory subsystems. For IBM 370. For IBM 360. For Univac 400 and 1100. For DEC System 10.

It will pay you to take full advantage of Ampex one-source shopping for all your peripherals needs.

Ampex, the biggest and best name in computer peripherals.

For details, call 800-421-6554, toll-free.



AMPEX

AMPEX COMPUTER PRODUCTS DIVISION
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Marina del Rey, Ca. 90291 (213) 821-8933

Calendar

AUGUST

National Assn. for State Information Systems Annual Meet-

Aug. 6-8, Chicago. For state, local, and federal government executives concerned with the application of systems technology to government problems and for others interested in government management. The program includes speeches, discussions, a joint workshop with the National Legislative Conference, and panels on federal/state/regional MIS and systems sharing. Fee: \$40, members; \$50, others. Contact: Carl Vorlander, NASIS, P.O. Box 5377, Lexington, KY 40505.

International Symposium on Computers and Chinese Input/Output Systems, Aug. 14-15, Taipei, Taiwan. This symposium will focus on new designs for Chinese i/o systems and on the use of computers, especially minicomputers, for various problems in computer graphics, picture processing, pattern recognition, and data communication. Proceedings will be available before Dec. 31. Fee nominal. Contact: Julius T. Tou, Center for Informatics Research, Univ. of Florida, Gainesville, FL 32611.

Fourth Annual Seminar for Directors of Academic Computing Centers, Aug. 19-22, Snowmass, Colo. The theme of this program is "Innovations in Resource Availability." Fee: \$150. Contact: E. R. Krueger, Univ. Computing Center, Univ. of Colorado, Boulder, CO 80302.

International Symposium on Applications of Computers and Operations Research to Problems of World Concern, Aug. 20-21, Washington, D.C. The program is directed mainly toward people in industry, government, and universities and includes sessions on municipal applications of computers for such purposes as air pollution abatement, energy allocation, law enforcement, health care delivery, land use planning, production scheduling, bus routing, and traffic control. Fee: \$30 in advance; \$35 at conference. Contact: Paul Morgan, U.S. Naval Ordnance Laboratory, White Oak, Silver Spring, MD 20910.

Third International Joint Conference on Artificial Intelligence, Aug. 20-24, Stanford, Calif. This program, for computer scientists, linguists, psychologists, educators, and others, will include, in addition to submitted papers, tutorial talks, on current topics in AI, special informal discussion sessions, and field trips to nearby laboratories. Fee: \$40, advance; \$45, regular. Contact: IJCAI-73, Box 2989, Stanford, CA 94305.

ACM '73, Aug. 27-29, Atlanta. On the theme "Computers in the Service of Man," the technical program of this annual conference will include both theoretical presentations and discussions of business data processing applications. In the commercial program, hardware and software firms will present new products. Fee, including Proceedings: \$45, ACM members; \$80, others; after July 31, add \$5. Contact: ACM '73, P. O. Box 4566, Atlanta, GA 30302.

SEPTEMBER

Western Electronic Show and Convention (WESCON), Sept. 11-14, San Francisco. Exhibits in the approximately 500 booths will be in the categories of computers

and communications equipment; instruments and instrumentation; electronic components and solid state circuits; and production, fabrication, and packaging. The technical program will stress trends in electronics technology, needs for new equipment and systems, and applications of new technology and hardware to major job areas. Fee: \$5. Contact: Don Larson, WESCON, 3600 Wilshire Blvd., Los Angeles, CA 90010.

Society for Management Information Systems Fifth Annual Conference, Sept. 13-14, Chicago. Speakers from business, government, and education will examine the theme "The Management Decision Making Process—More Than Information Systems" in a program including both technical and general experience sessions. Fee: \$200, members; \$75, faculty members; \$230, others. Contact: Patrick F. Cannon, Suite 2026, 221 N. La Salle St., Chicago, IL 60601.

Course on Law and Computers in the Seventies, Sept. 13-15, New York. Sponsored by the Joint Committee on Continuing Education of the American Law Institute and the American Bar Assn., this course is designed to introduce lawyers to the wide variety of legal facets of computer use in business, industry, and government and to alert non-lawyers to the types of considerations necessary to prevent or minimize difficulties. Fee: \$225. Contact: Paul A. Wolkin, ALI-ABA Joint Committee on Continuing Legal Education, 4025 Chestnut St., Philadelphia, PA 19104.

Sixth Annual Workshop on Microprogramming, Sept. 24-25, College Park, Md. Sponsored by ACM SIGMICRO, Micro6 will have parallel research and tutorial sessions. The research sessions will consist of panel discussions and presentations of brief reports by university, industry, and government microprogramming researchers. The tutorial sessions will provide an introduction to microprogramming, background on current applications, information on techniques, and a survey of user microprogrammable machines. Fee: \$25, ACM SIGMICRO members; \$30 ACM only or SIGMICRO only members; \$40, others. Contact: John Roberts, U.S. Naval Research Laboratory, NRL Code 5494, 4555 Overlook Ave., Washington, DC 20390.

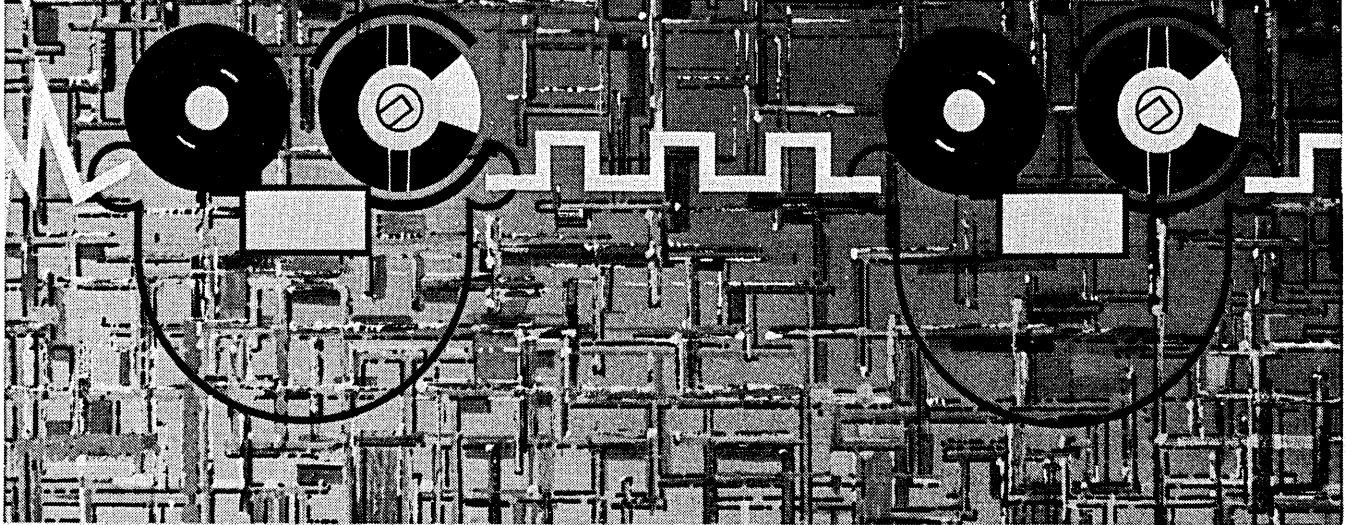
Tele-Communications Assn.'s Eleventh Annual Conference, Sept. 25-28, San Diego. This year's conference, on the theme "Telecommunications—Horizons Unlimited," will include an exhibition with over 100 displays of products and services as well as workshops on communications terminals, data communications, international communications, network design, telecommunications cost control, and toll measuring devices. Registration deadline Aug. 31. Fee: \$25, members; \$50, others. Contact: C. H. Buxton, TCA, P.O. Box 2869, Anaheim, CA 92804.

OCTOBER

International Colloquium on Memory Systems, Oct. 23-26, Paris. The purpose of this interdisciplinary conference is to bring together people concerned with storage hardware and computer system organization, as well as users of large memories. Part of the program will be on memory reliability and testing at the component or system level. Fee: 550 F.F. Contact: Secretariat du Colloque, 16 Rue de Presles, 75740 Paris Cedex 15, France.

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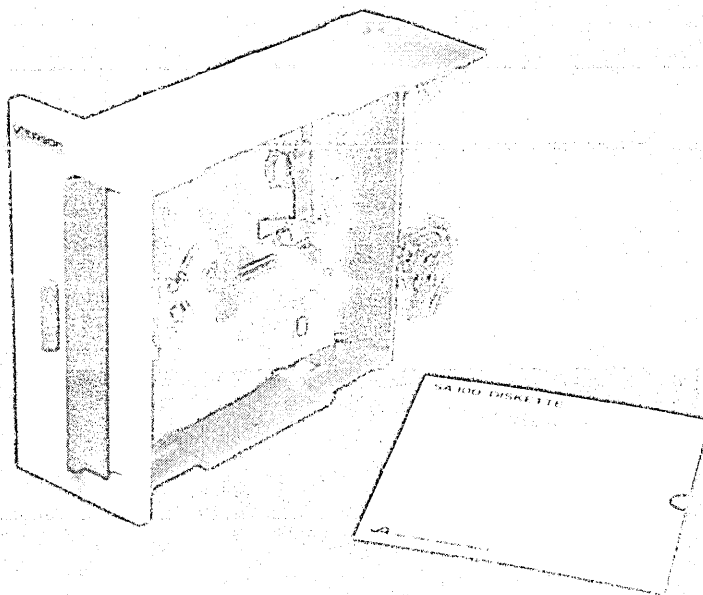
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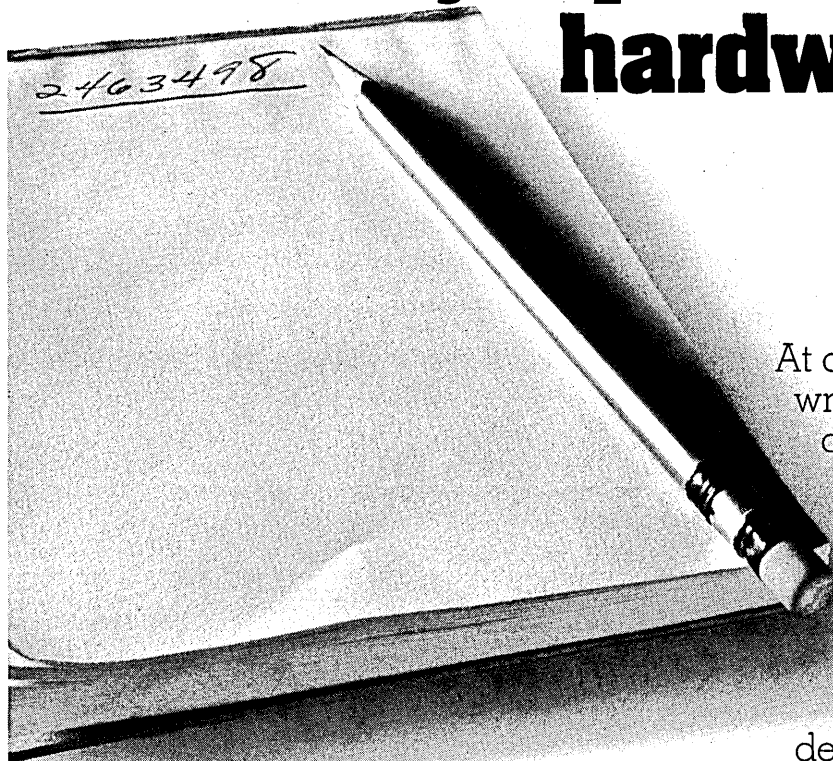
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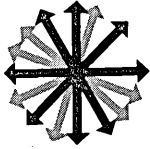
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Look Ahead

"BOTTLENECKS OF JUSTICE"

IBM distributed a brochure at the NCC in New York that contained a section exalting ways "the computer speeds justice" in the courts. In a section entitled "Bottlenecks of Justice" the IBM booklet outlined some of the problems created by the load and complexity of court cases. "Computers promise to help ease part of the problem," the IBM brochure stated.

The brochure, however, is not likely to be distributed in the federal court in New York where the Justice Dept.'s antitrust case against IBM has been tangled up for four and one-half years. An IBM charge that the government has destroyed government documents has prompted the Justice Dept. to complain that the IBM charge represents an attempt by the computer colossus to delay the already long-drawn-out affair.

Another development that will tend to delay the case is the refusal of IBM's attorney, Bruce Bromley, to turn over certain IBM documents to the Justice Dept., although he was ordered to do so. Bromley's move could consume several weeks -- even months -- before it is resolved. Meanwhile, the Justice Dept.'s staff on the IBM case has been further weakened by the resignation of one of its top attorneys, Kenneth Newman, who has left to join a New York law firm.

A PROTECTION PACKAGE FOR THE 1130?

Although denying it, IBM is understood to have an emulation package in the wings to protect its 1130 scientific computer customer base. The company may be withholding announcement because there still is high demand for the machine which IBM stopped making some 18 months ago. And there's a waiting list for machines coming off rental.

A source tells us IBM will announce an emulation package to run in the microcode of the 370/125 which, by the way, rents for four times the 1130's average monthly charge of \$2,300. Although such competitors as General Automation and Digital Scientific Corp. are successfully offering functional equivalents of the 1130, the announcement won't be made until the competition has made stronger inroads into IBM's 3,900 domestic installations.

SO LONG, FORTRAN; GOODBYE, COBOL?

IBM spokesmen quietly are leaking the warning that object code may not be available to its users in the near future, and that users should not plan to always have compilers for FORTRAN and COBOL. Some read these hints as meaning that the next operating system will be written in PL/S (Programming Language for Systems), the PL/1 subset that is already showing up without explanation in some system routines. If so, PL/1 programs could be processed nearly directly, and other languages would be interpreted, not compiled. The move would give IBM a marketing advantage with its "favorite son" language.

NBS ENCOURAGES CONVERSION TO ASCII

National Bureau of Standards (NBS) is promoting a new federal dp policy aimed at increasing use of ASCII (American Standard Code for Information Interchange). If it's accepted by the Secretary of Commerce, the Office of Management and Budget and the General Services Administration -- which seems likely -- federal dp users will get extra funds, beginning in FY '75, to pay for file and program conversion. And we understand some additional "persuasion"

Look Ahead

aimed at users' reluctance to accept ASCII is likely.

NBS economist J. A. Dei Rossi is now studying conversion at typical government dp sites. He's trying to develop cost yardsticks. The bureau has included \$100K in its FY '75 budget for a technical staff to help users convert to ASCII. The staff would provide consulting services and design the conversion software, possibly on a centralized basis.

SECURITY MAY BECOME BIG BUSINESS

The mainframers hasten to assure anxious users they're on top of data security. Representatives from IBM, CDC, Honeywell and Univac paraded to the podium at a National Computer Conference session on Secure Data Systems to talk of their present systems and their current studies on the matter. Burroughs Corp. has formed a 30-man "Security Council" with representation from throughout the company, including the public relations department. A security guidelines document is almost ready for publication.

At its Milwaukee users meeting last month a small group of firms which use a data management program called ASI-ST formed a special interest committee to recommend security measures for implementation by the supplier, Applications Software, Inc., Torrance, Calif.

A higher-up within IBM's marketing apparatus says unofficially, "don't be surprised if IBM overreacts" to a \$4 billion class action suit filed against it in connection with the celebrated Equity Funding scandal (June, p. 88), although the company has called it "preposterous." The implication is that there's a potentially massive market in security systems if the Equity Funding affair is kept alive.

Concern with security may be reaching paranoiac proportions, but it's not without the lighter side. Current joke going the rounds at IBM these days: "Did you hear that the \$40 million (ex-chairman) Vincent Learson put aside for that five-year security study has been stolen?"

MCI: SWITCH ON SWITCHABILITY

Microwave Communications, Inc. has changed its position that a switched data transmission network is too expensive. It says by mid-'74 it will offer switched private line service "at rates a little lower than Datran," and that it is evaluating "four or five" computers for the system. It says all 34 of the cities MCI expects to service by mid-'74 will have switching capability.

In previous public statements, MCI officials have said switched networks wouldn't be profitable until the late 80's. It's reversing this stand, now, to concentrate on a "primary market" of low volume users who now rely on telephone dial-up lines or Telex/TWX networks. They'd access the nearest MCI switch via local dial-up lines, if the telephone company doesn't object.

MEMOREX: BACK WHERE THEY STARTED

Memorex Corp. has begun a renewed emphasis on the computer media business--mag tape and disc packs. It's the business that first put them on the map and, according to new vp-marketing of computer media products Philippe Yaconelli, continues to generate more revenue than rentals from disc spindles. He says within a year the industry won't recognize the company from the changes they're instituting in this end of the business.

As starters, media salesmen also won't have to handle hardware

(Continued on page 117)

HP: WE DELIVER COMPUTER SOLUTIONS — NOT JUST COMPUTERS



From order to delivery, HP data systems simplify distribution.

HP's computerized data management systems are designed to give you complete control of distribution. From the moment a clerk enters an order until it is shipped and billed.

Our dedicated, user-oriented systems give you a better way to tighten up the order cycle, and file and control documents, invoices and waybills. Even backorder documents can be automatically and correctly prepared.

You have firm control of reports on order status, prices, inventory and much more. It all adds up to better data — and better data means more efficiency, less inventory and more profit. In short, simpler distribution.

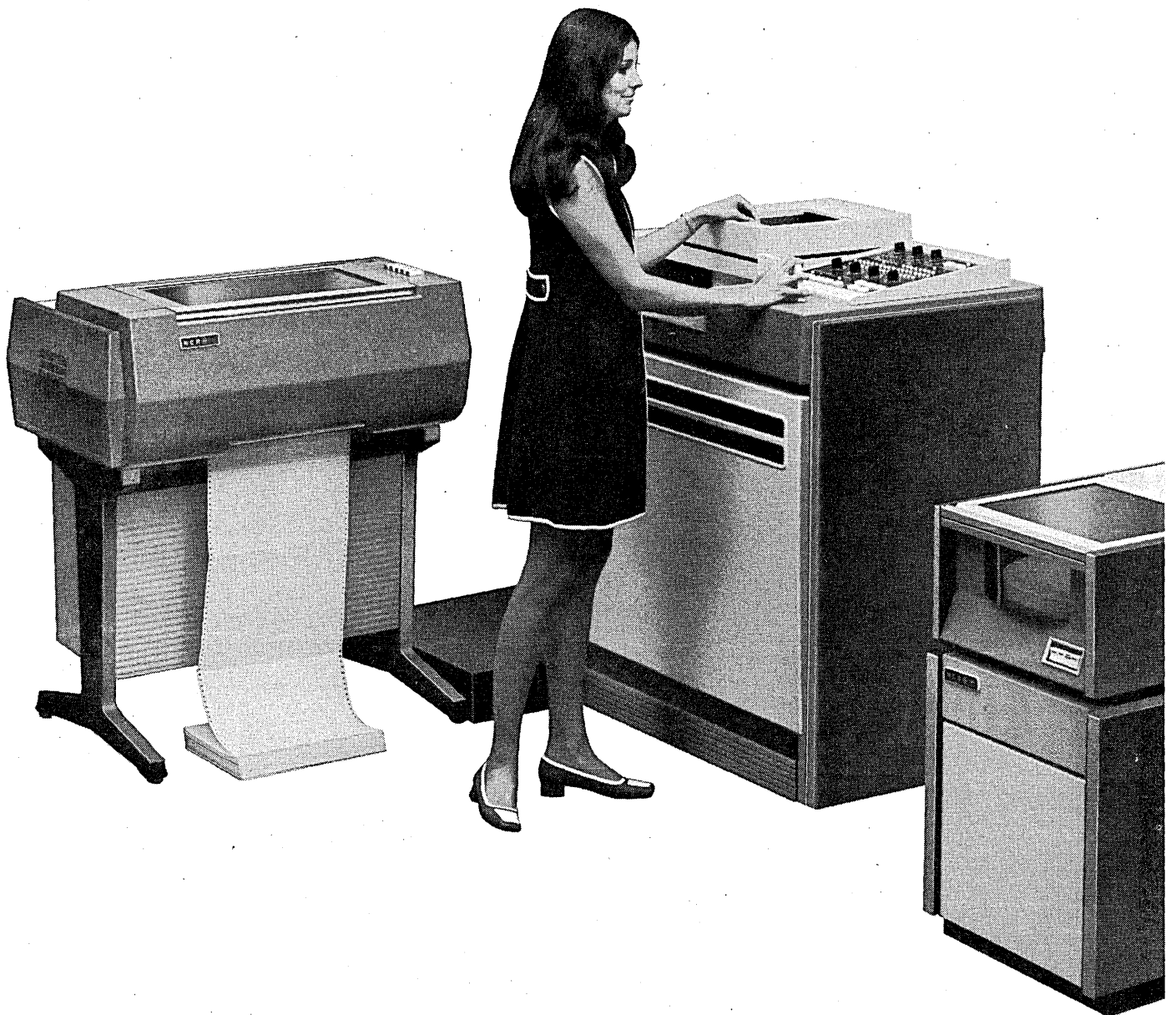
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Big Performance.

Century 101.

Now small and medium size businesses can have the big kind of computer power they need to grow.

The newly released peripherals for the NCR Century 101 processor are small in size and low in cost, yet they provide the power and versatility of units twice their size. This basic 101 system, including processor, card or paper tape reader, line printer, and one dual platter disc unit covers no more space than 2½ feet by 10 feet! It can be placed in rooms where larger computers just won't fit. And, because it generates little heat, air conditioning requirements are minimal.

Big advantages in small packages include freestanding add-on dual platter disc units, each having a storage capacity of 10 million bytes. A line printer that turns out 300 lines of crisp printing per minute. And an optional 30-character per second I/O Writer.

The 101 processor, heart of the system, includes features like a high-speed memory that can expand in practical increments from 16K to 64K. An optional multiplexor that provides control for 10 communications lines, with no increase in cabinetry. Seven-way to nine-way simultaneity. And many other features just as significant.

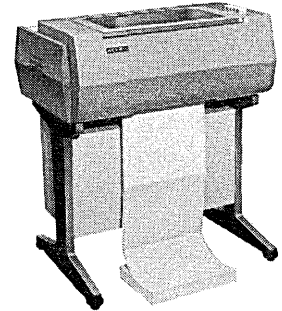
Later, as your business grows, you can expand this modular system to meet increased information requirements. Larger capacity disc units and higher speed printers can be added if and when you need them.

For the price, this new system from NCR offers big performance for businesses on the grow. Average systems range from just \$1820 to \$3800 per month!

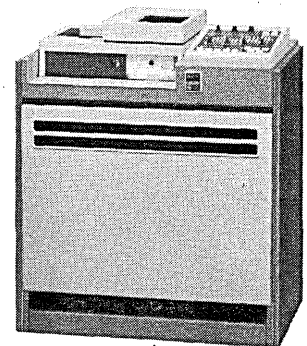
Call your local NCR office for the specific advantages your business can expect from this newest member of the NCR Century family.

NCR

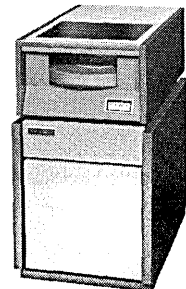
Computers & Terminals



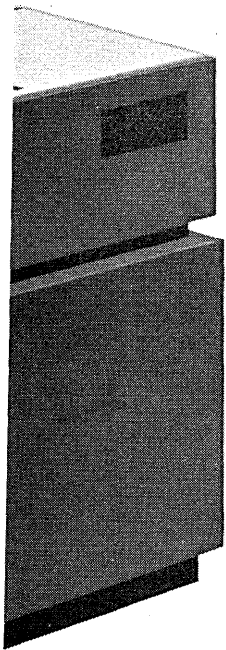
lightweight, pedestal type LINE PRINTER turns out 300 lines of crisp printing per minute.



the 101 PROCESSOR features high speed expandable memory, optimum hardware/software efficiency, dramatic throughput capabilities. CONTROL CONSOLE facilitates communication between operator and processor. Hard working CARD or TAPE READER (COT) assures fast, reliable coded input.



DISC FILE storage provides ten million bytes of ready information in each single spindle dual platter disc unit.



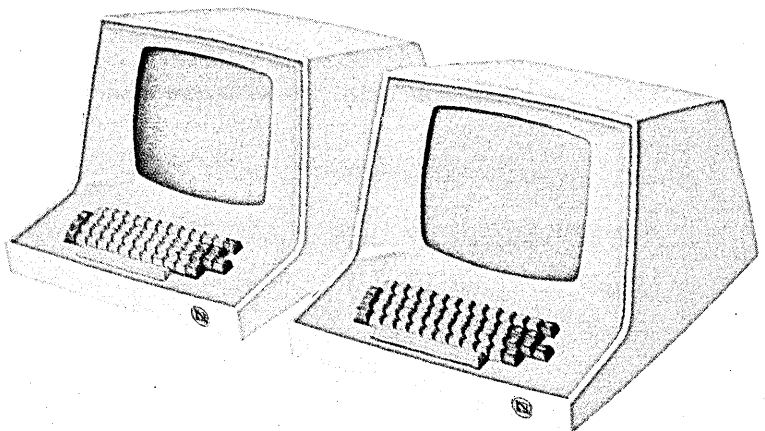
You no longer have to wait in line for a data terminal,



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Two ADM-1 Terminals for the same investment you've been making for a single terminal. State-of-the-art design brings the ADM-1 into **the \$1000 to \$1600 range.*** And with even more capabilities: 960 or 1920 characters on a full-size 12" screen, complete 53 key TTY board, total cursor control, full editing capability with options, RS 232 point-to-point interface at Baud rates from 110 to 9600, underlined control characters, dual intensity protect mode, character repeat—all housed in a compact, 45 lb. answer to your budget, operations, and standing-in-line problems. Call or write for the ADM-1 brochure.

*OEM pricing available



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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.

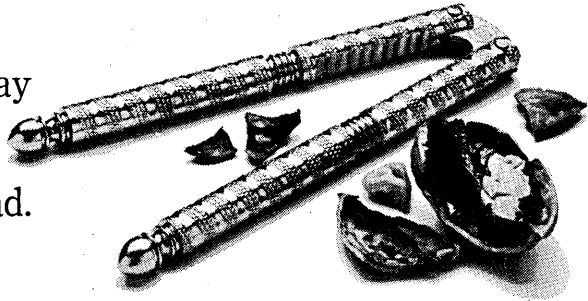
It's a unique approach to digital tape storage that's priced like a cassette but performs like a 1/2"-compatible drive.

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 1/4" 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.

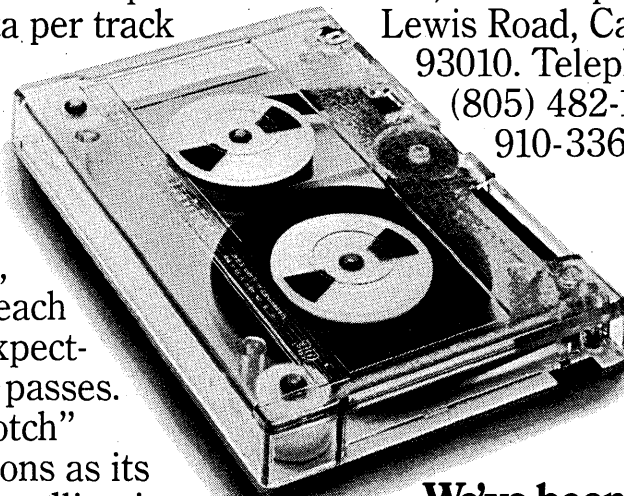
And if you need more information, you've got a choice there, too.

Just contact any of the major peripheral manufacturers or Data Products, 3M Company, 300 South Lewis Road, Camarillo, Calif.

93010. Telephone:

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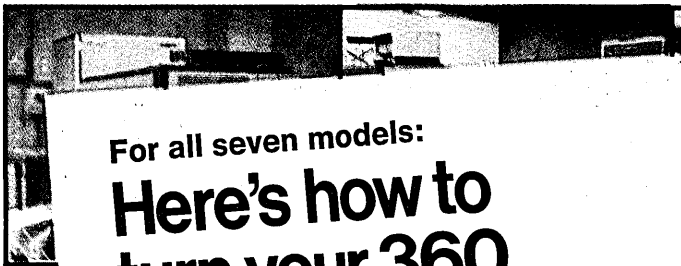
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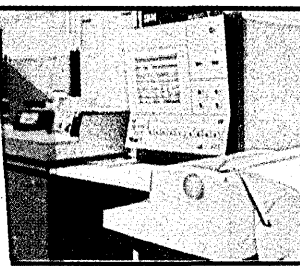
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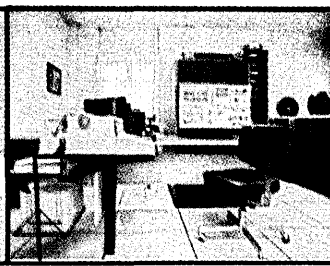
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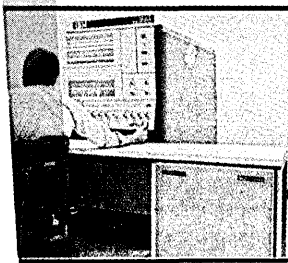
+ from 24K to 64K



25 + from 16K to 48K



30 +



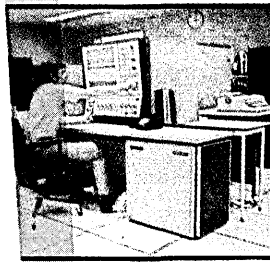
from 32K to 64K



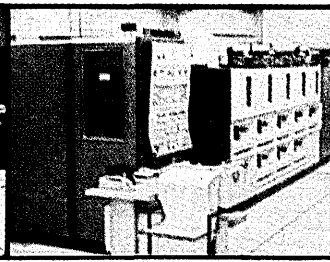
40 + from 32K to 384K



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om 64K to 96K



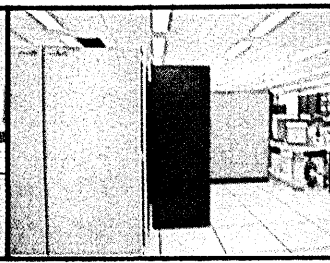
44 + from 256K to 448K



30 + fro



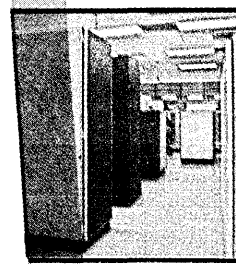
m 8K to 64K



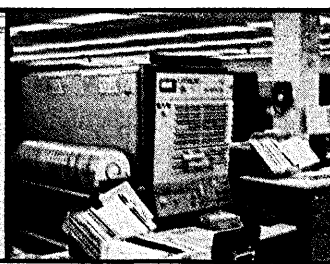
50 + from 512K to 768K



50 + from



256K to 512K



65 + from 256K to 512K

Letters

No sale

I would like to thank Mr. Zaphiropoulos for mentioning "Teledeltos" recording paper in his article, "Nonimpact Printers," in the May issue (p. 71).

It is with delight that I must inform him that "Teledeltos," which is Western Union's trademark for our electro-sensitive recording paper, has never been used by the L.L. Lab for processing their information. Someone else's electro-sensitive paper is being used that has all those drawbacks.

Please! Please! Do not tarnish my product—I can't afford to lose an account I do not have.

J. GAGLIARDI

Manager Paper Sales

Western Union

Upper Saddle River, New Jersey

Not exactly

In the tutorial article on nonimpact printers (May, p. 71), the statement is made that the Data Interface magnetic printer does not use fanfold paper, has no graphic capability, and has seven-track vertical resolution.

The DI-240 does in fact accept roll fed or fanfold paper and operates with both friction and sprocket-fed media in the standard configuration. The vertical writing space is divided into 12 tracks, giving us 12 x 10 matrix resolution for high-definition upper and lower case characters.

While the most common application for this printer is alphanumeric only printing, the process is capable of quite respectable graphics . . . and a graphics model, the DI-240PG, capable of reproducing an 11-inch page in less than 30 seconds, is offered.

OWEN J. OTT

President

Data Interface

Danbury, Connecticut

The underground

Thanks for the outstanding issue of May 1973, in which programming realities seem to have finally been given an historical context in the articles by Boehm and Kean. Lindhorst's article on "Scheduled Maintenance of Applications Software" was particularly meaningful to me, as I'm sure it will be to many of your readers, and I wonder if I might add a little historical perspective to it as well.

In the late 1950s, when we were busily programming the tracking system for Project Mercury, we became aware of a trickle and then a flood of change requests coming down from on high. Since we had no hope of getting as high in the NASA bureaucracy as Mr.

Lindhorst did in The Boatman's National Bank, we evolved an underground system which had much the same effect as scheduled maintenance.

First, we did insist that the change requests come in writing—a radical idea at the time—and moreover, in writing in a standard form. Each request was then filed away for a cooling-off period, during which time we said it was "under consideration." We observed that, even without a maintenance *schedule*, many of the benefits Mr. Lindhorst cites were obtained just by letting things sit for a time.

But we also discovered one more benefit that Mr. Lindhorst did not mention: When requests were accumulated for a month or two, approximately 20% of them paired up with another 20%. For example, change B would completely supersede change A, so that by changing B only, both requests were satisfied. Even more striking were the numerous cases in which change B was in fact to "undo change A." In these cases, all we had to do was send back a report that both A and B had been implemented—thus clearing the file of two requests without touching a single line of code.

GERALD M. WEINBERG

Binghamton, New York

Trojan horse

The article by Mr. Roger Milgrim ("Software, Carfare and *Benson*," April, p. 75) was certainly timely but appeared to miss the real reason why software people want the means to patent their work.

The trade secrets concept is a great tool in the hands of a court being pushed by a large corporate enterprise. And Mr. Milgrim is right in that this group of corporations already has this court system of protecting ideas and does not need the further encumbrance of a patent system. But I certainly don't want to leave software development and new creative software concepts and processes under a trade secret court system.

The purpose of a patent is to permit a person or group to invest huge amounts of time and capital in developing and marketing a product, assured that the basic processes are theirs and that no other group can cannibalize their company of its basic processes and concepts. Since the patent and the application for patent is the one method of obtaining a guarantee that the software concept is protected, software companies need this guarantee to protect their investment.

The point is that the right of patent is required in the software industry to encourage original work and insure that the creator of a new concept will receive sufficient remuneration for his

efforts. There is no rationale in the rule that only the circuitry can be patented and not the methods, concepts, and processes that make the computer go.

The trade secret is a risky method of guaranteeing anything except the right to a complaint filed with a court. The patent is the best method of guaranteed protection (although like any method applied to a new field it needs changes to its procedures) of a technical development and must be expanded to include the software industry. Articles that suggest trade secrets give the protection of a patent issued from a patent system developed to cover computer software processes are dishonest.

We must all stop avoiding the required modification of the patent system to cover software and begin developing the required changes to fit into the system. Mr. Milgrim does all computer software people a disservice by offering us this Trojan Horse of trade secrets with the large computer corporations lurking inside.

DANIEL J. RYAN

Brecksville, Ohio

No less an advantage

Mr. Ryan's view (see preceding letter)—that the best way to protect software programs would be to extend patent protection for them—is shared by many and merits the fullest advocacy before Congress. I do question, however, some of Mr. Ryan's statements.

Nothing in the article suggested that the law of trade secrets affords protection which is the equivalent of that granted under the patent laws. Rather, the article observed that trade secret owners have no rights with respect to independent developers and that "In this respect trade secret protection is entirely different from patent protection which gives the developer (inventor) exclusive rights in the invention (a so-called 'monopoly')—in exchange for public disclosure and ultimate dedication to the public after the patent expires—provided that the first developer can meet all the requirements of the Patent Act." Since the article was so clear on this point I find Mr. Ryan's assertions of dishonesty as astonishing as unmerited.

Mr. Ryan's suggestion that my article harbors and advocates the interests of "the large computer corporations" is both unfounded and wrong.

My article was primarily intended to acquaint non-lawyers with the comparison between patents (under *Benson* probably not available for software) and trade secrets (presently available) and the characteristics of trade secrets which make them a viable alternative even were patent protection

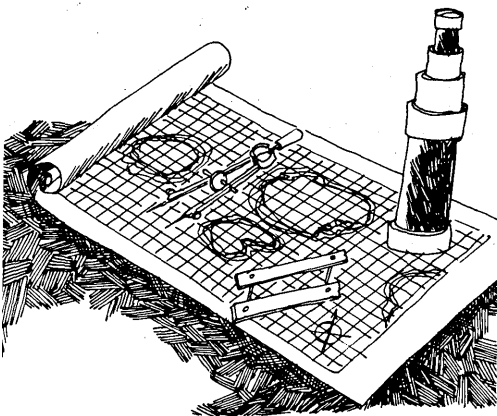
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CIRCLE 84 ON READER CARD

letters

—which has many drawbacks—available.

Mr. Ryan's letter merely asserts that patent protection is the surest form of protection but does not analyze many important concepts implicit in such a conclusion, such as the time that would be required to secure a software patent in comparison to the anticipated useful life of software, and the cost of securing and enforcing such a patent. Also, nothing is said about the critical problem of *policing* a software patent which discloses the program to the world.

I envy Mr. Ryan's certitude in his preference for patents. After a personal involvement with both patent and trade secret litigation, my experience leads me to a less certain but somewhat opposite position. What is not open to debate, however, is the plain fact—of which Mr. Ryan may be unaware—that large corporations have no less an advantage in patent litigation than in trade secret litigation.

ROGER M. MILGRIM
New York, New York

Computer stamps

A number of stamp collectors are beginning to specialize in "computer stamps."

These are stamps which portray computers, peripherals, input/output media, persons involved in the development of computers, events related to computers, etc.

The specialty is growing. With the help of fellow collectors, I have compiled a list of 96 stamps in this category. Any of your readers who would like a copy of this list can get one by sending me a stamped, self-addressed envelope.

ROBERT V. BOOS
66 Crescent Street
Hicksville, New York 11801

Glass house gang

While wiping the mud off my 1963 DPMA Certificate as a result of your Editor's Readout (May, p. 47), a few thoughts came to mind, and I would like to share them with you and Mr. Armer.

1. Ten years ago DPMA, nee NMAA, was doing something about a certification program while other organizations, as well as you and Mr. Armer, were talking about it.

2. Today DPMA is doing something about a certification program while other organizations, as well as you and Mr. Armer, are still talking about it.

3. It may come as a shock to you,

but I'm proud of my 1963 Certificate and would welcome a series of self-assessment exams. I am very concerned about personal professional obsolescence and would readily endorse such a program.

4. The day doctors go to a five-year license, I would be more than willing to go to a five-year Certificate.

5. It's too bad that there isn't a certification program for editors, because I don't believe the ones sitting around in glass houses throwing brickbats would pass the test.

FRED H. SIMMONS
Jacksonville, Florida

Oracle speaks

Re the Look Ahead item on ORACLE (April, p. 8): The overall tone of the story implies that the ORACLE system's failure to operate to date is directly related to the Ampex Videofile. We deny any failure in the Ampex system and feel a reply is in order.

It should be kept in mind that ORACLE is a Los Angeles County project, of which Ampex is a part to the tune of \$7.4 million, as you correctly report. We refute that our system is faulty in any way, and we feel we ought to clear up the implication made to our portion of ORACLE as being "beset with communications and retrieval problems."

Your implication that the system as sold would have file data on-line is erroneous. It has always been planned that once an operator locates and mounts the correct reel on the retrieval system, depending on the particular file, it is a matter of seconds until the required material is located on the Ampex system. The County's test files were always intended to be large, in the 200-reel range as you describe them. At no time was it anticipated that all 200 could be simultaneously in readiness.

Regarding the "poorly planned communications system" and microwave capability of ORACLE, it should be noted that this is not a part of the Ampex system. Those other portions in the area of communication and microwave systems are County design responsibility and are supplied by other manufacturers.

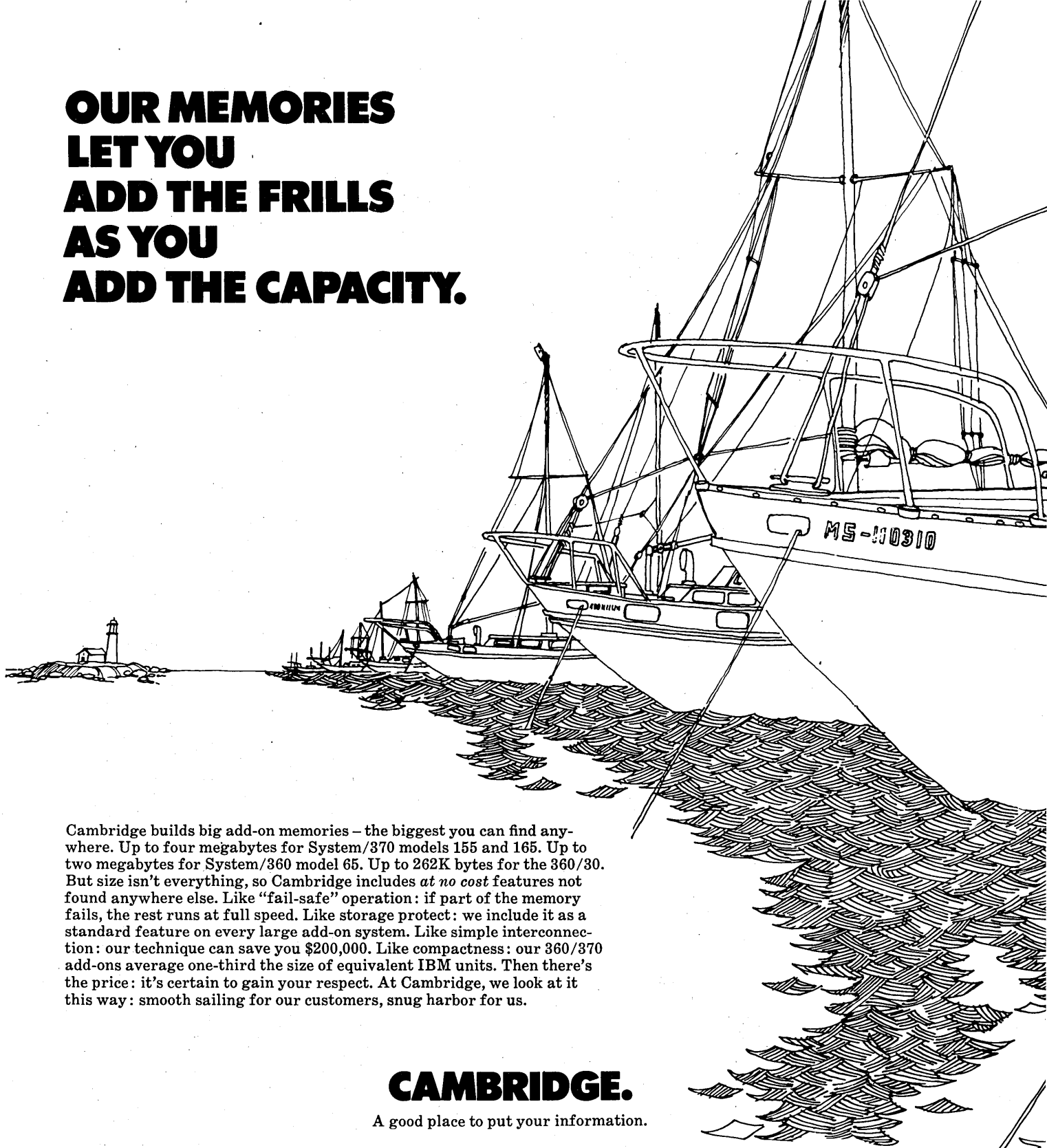
Our portion of the ORACLE system, as we have said before, is fully operative within our agreement with L.A. County and meets all design requirements.

MILAN TELIAN
Manager, Videofile and
Instructional Systems Department
Ampex Corporation
Redwood City, California

This case is now at the suit-countersuit stage. See June News in Perspective, p. 116.

Continued on page 109

OUR MEMORIES LET YOU ADD THE FRILLS AS YOU ADD THE CAPACITY.



Cambridge builds big add-on memories – the biggest you can find anywhere. Up to four megabytes for System/370 models 155 and 165. Up to two megabytes for System/360 model 65. Up to 262K bytes for the 360/30. But size isn't everything, so Cambridge includes *at no cost* features not found anywhere else. Like "fail-safe" operation: if part of the memory fails, the rest runs at full speed. Like storage protect: we include it as a standard feature on every large add-on system. Like simple interconnection: our technique can save you \$200,000. Like compactness: our 360/370 add-ons average one-third the size of equivalent IBM units. Then there's the price: it's certain to gain your respect. At Cambridge, we look at it this way: smooth sailing for our customers, snug harbor for us.

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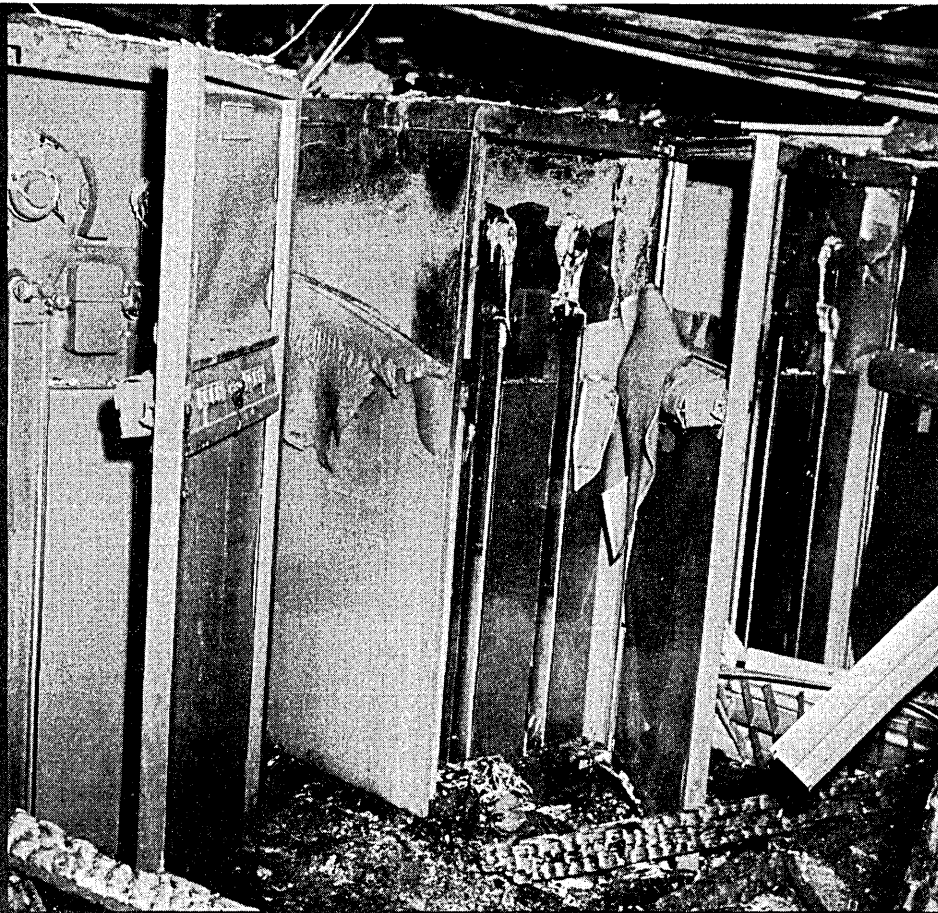
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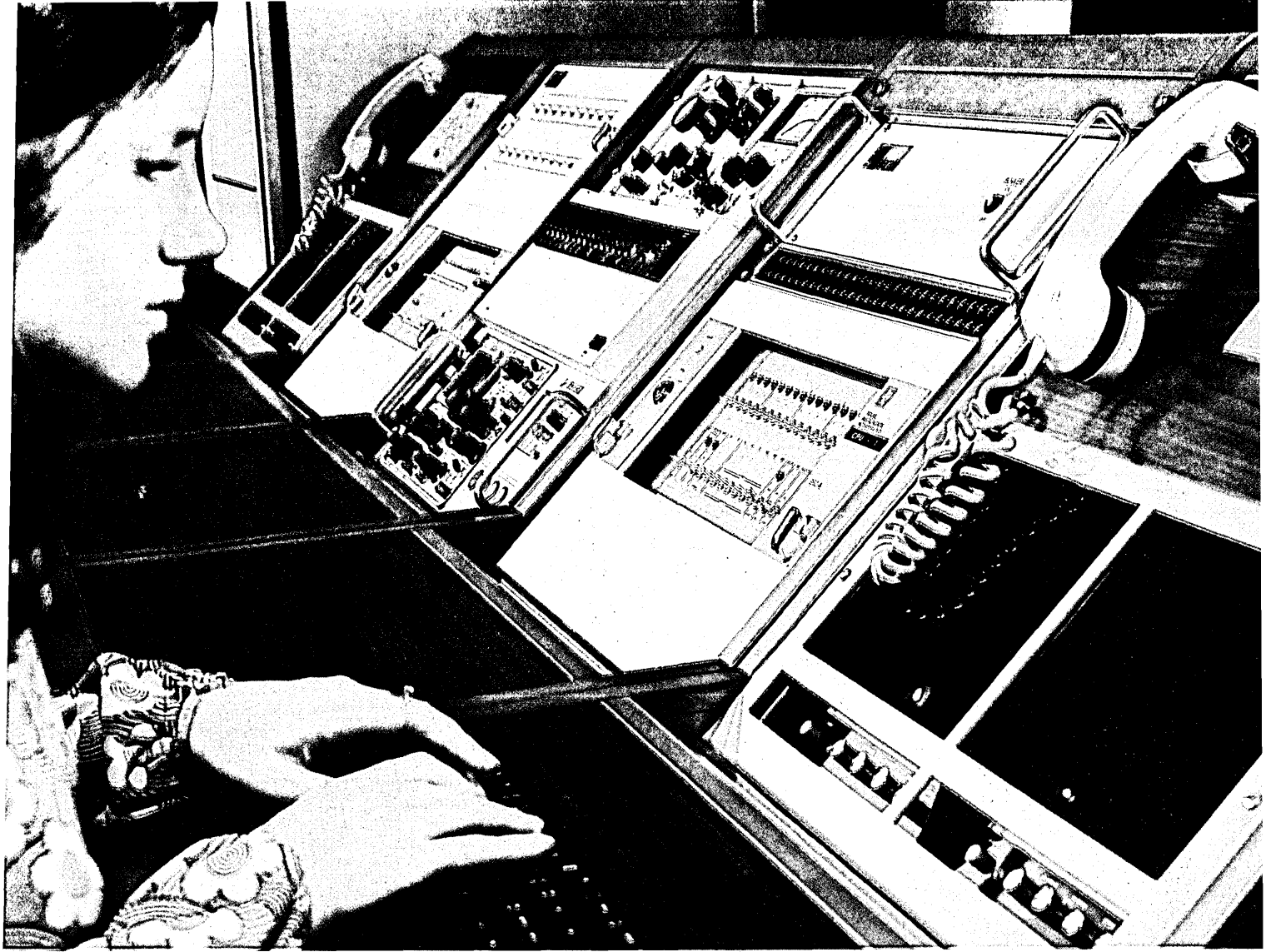
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Telerate triples business after going "real time" with TI computers

Last October, Telerate Systems of New York installed Cantor Fitzgerald Securities Corp's real-time Government Securities Trading (GST) system...the first of its kind. Telerate also uses the system to supply real-time information on the short-term money markets.

Since seconds are often crucial in money markets, Telerate customers have a big advantage...so big, in fact, that the Telerate customer list jumped from 60 to more than 200 in the first six months.

Texas Instruments supplied both hardware and software for the system. Cost was low because two

960A mini-computers were used instead of the large-scale computers usually considered necessary.

Other equipment included disc, card reader, multiplexer, and CRT terminals located in customer offices across the nation.

Information is organized on a page basis. A customer can call for the desired page...and real-time information is displayed on his screen.

Neil Hirsch, President of Telerate, reports:

"TI was able to demonstrate the high reliability required, and performance has been good.

"Response time on service has been excellent. TI is much easier to work with than many large companies. It's almost like working with an individual."

What's your problem? Maybe it's process control, manufacturing automation, or a different type of data communication. TI engineers are working every day to improve productivity and profits in all these fields. Put them to work for you by writing or calling Texas Instruments Incorporated, P. O. Box 1444, Houston, Texas 77001. Phone (713) 494-5115, Ext. 2745.



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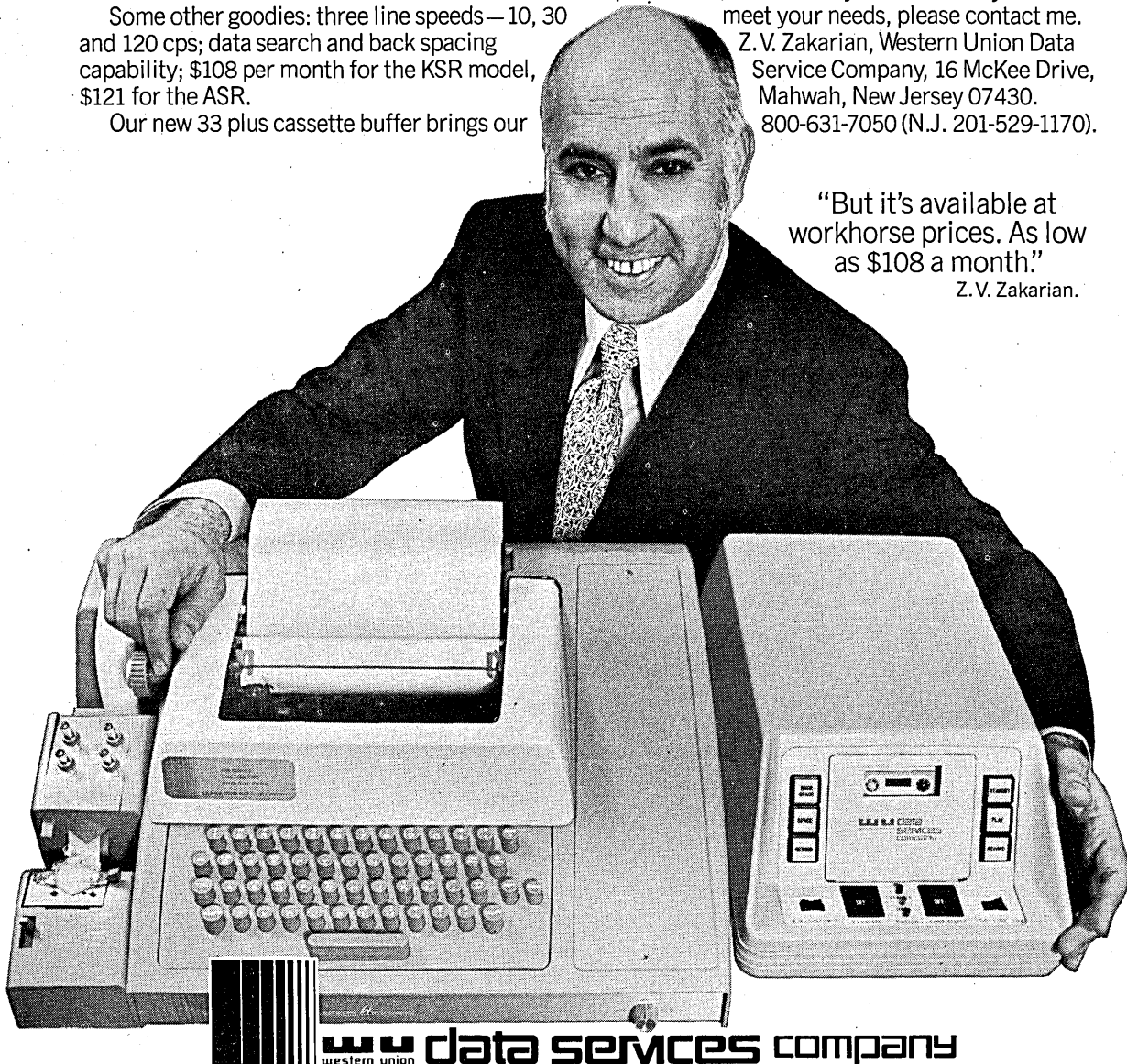
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STARAN is not everyman's computer. But for those who have problems that require high speed searching of a dynamic data base—or those whose problems require high speed operations on similar data streams—the STARAN associative array processor may very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

STARAN is a combination system that does both



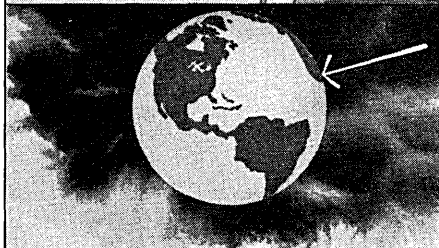
whether it's friend or foe



who the criminal is



who is talking



where it's located



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Datapoint delivers at Tiburon Vintners

Tiburon Vintners, Windsor, Calif., is one of the fastest growing wineries in the United States. Utilizing a marketing program based largely upon direct mail, the company has combined its fine Northern California wines with a unique personalized label program to go from zero in 1966, its startup year, to over \$6 million in sales in 1972. Because the company's marketing operation is based largely on mailings, one of its most valuable possessions is its master customer list. This list, now containing more than 300,000 names and constantly growing, is maintained and updated via two Datapoint 2200 business computer systems and associated magnetic tape and serial printer units.

The Datapoint 2200's with their typewriter-like keyboards and video displays allow easy entry to the master mailing list of all changes — new names, address changes, deletions, updates to cumulative purchase totals and other key buyer data. These changes are keyed in by the operator, visually verified on the video display and stored in the system's cassette tape for subsequent "pooling" on a larger tape in the peripheral unit. This data in turn is integrated directly into the master list. The speed and accuracy of data entry attainable with the 2200's plus their ability to accept and store different categories of entry information makes it possible to handle swiftly a large volume of list changes. At Tiburon these changes now average more than 1,000 a day and range much higher in peak sales periods.

Since the 2200 is a fully programmable general purpose computer, it's easy to change programs for each different use made of the system simply by changing tape cassettes, a process little different from changing a stereo tape deck. Special requirements, such as storing of new names requesting literature in a special register, and subsequent

printing out of gummed Cheshire labels on the Datapoint printing unit for same-day response, can also be accommodated. Similarly, data on productivity of various mailing lists used to solicit new customers can be readily tabulated via the Datapoint and used to guide subsequent new marketing efforts. And, unlike standard keypunch machines, use of the Datapoint, with its typewriter-like keyboard, requires no special training.

"The Datapoint systems give us speed in data conversion and entry where and when speed is important to us," said Charles Blake, Tiburon data processing manager. "We bypass the punched card and go directly to high speed computer media. The ease with which we can change programs allows us a versatility simply not attainable with other entry systems. For instance, we can display a number of different entry formats and store and tabulate various categories of information for special management reports. I'd estimate that the Datapoint systems increase our data conversion and entry productivity in this area by about 25%, and give us a capability for on-site data handling just not attainable otherwise."

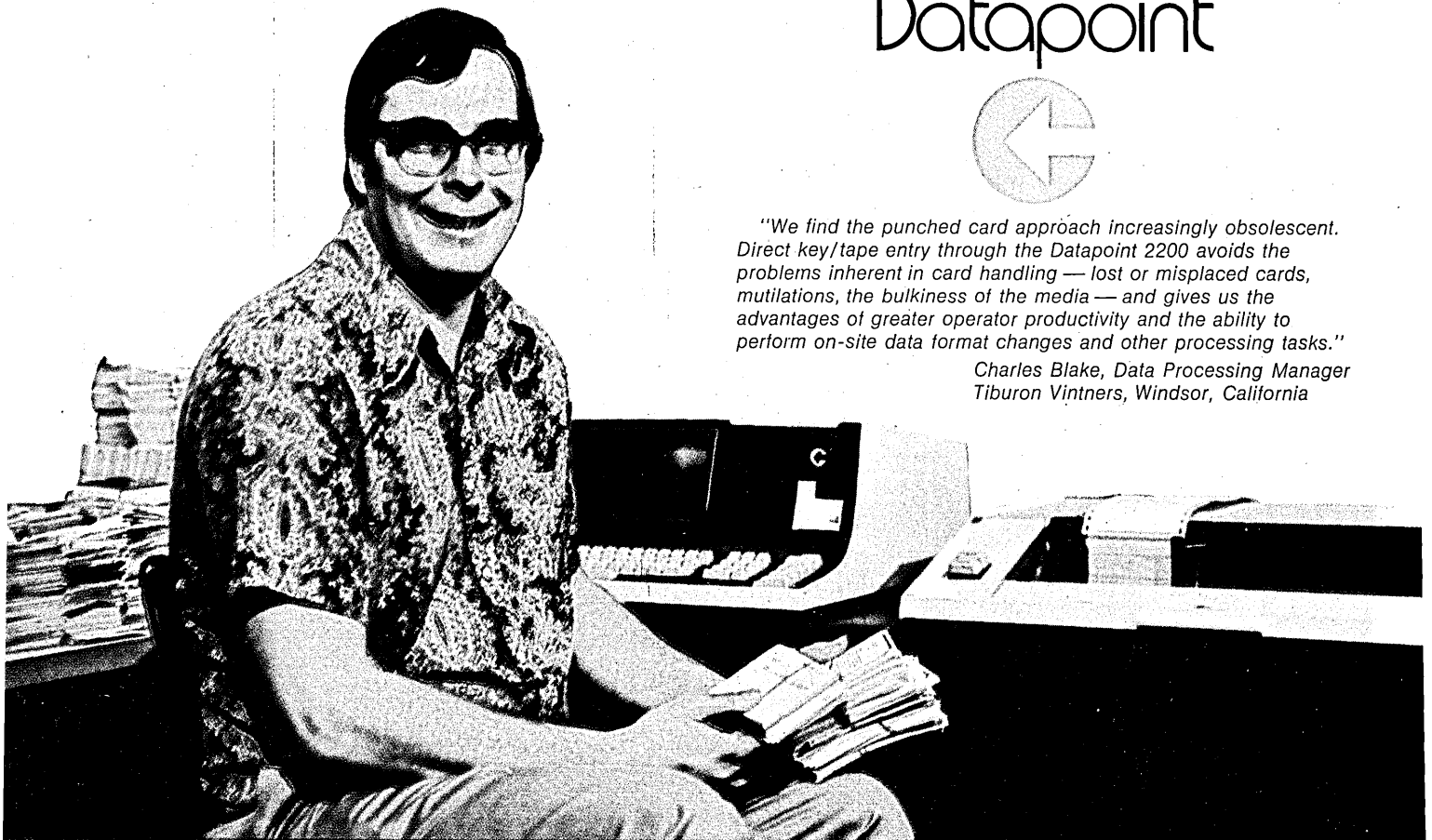
Tiburon Vintners' experience with the Datapoint 2200 is not unique. The power and flexibility of this system, the ease with which programs can be created and changed, and the availability of peripheral systems, have made it ideal for a variety of complex data conversion and entry requirements, for data transmission and for on-site data processing at numerous installations around the world. Prices on the Datapoint 2200 begin at \$6,040. For further information contact the Datapoint sales office nearest you or write or call Datapoint corporate headquarters.

Datapoint



"We find the punched card approach increasingly obsolescent. Direct key/tape entry through the Datapoint 2200 avoids the problems inherent in card handling — lost or misplaced cards, mutilations, the bulkiness of the media — and gives us the advantages of greater operator productivity and the ability to perform on-site data format changes and other processing tasks."

*Charles Blake, Data Processing Manager
Tiburon Vintners, Windsor, California*



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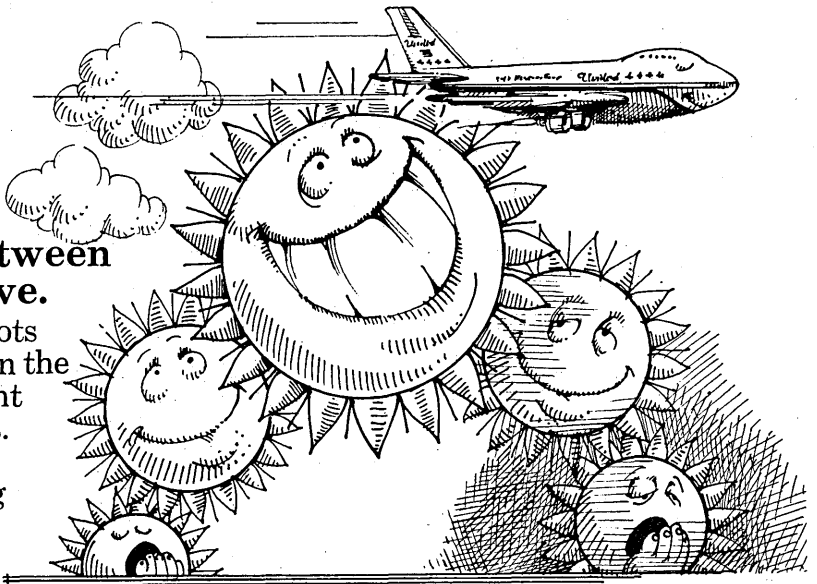
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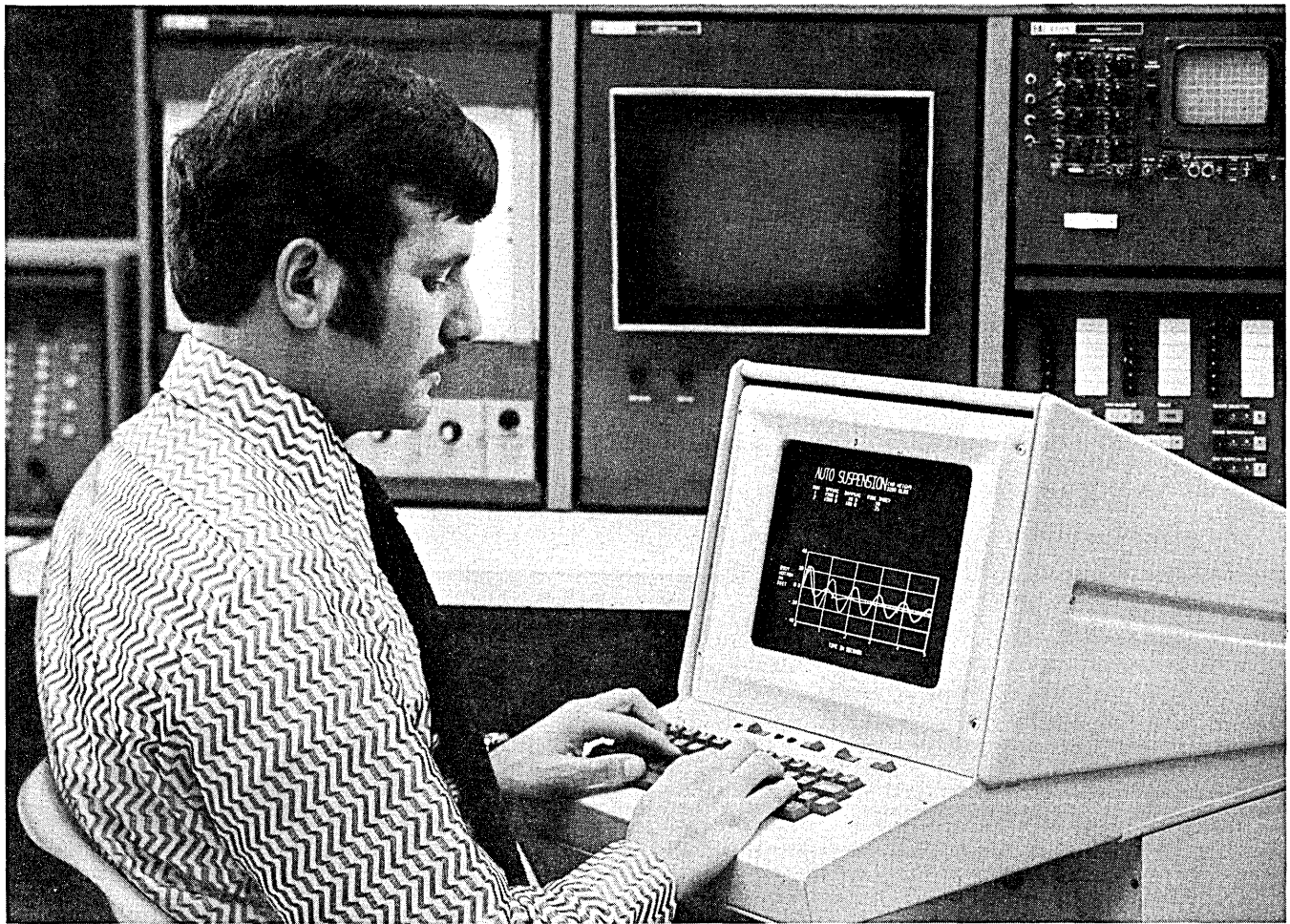
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(example: LD-3 container vs. LTL*)

Stowed Density (Per cu ft.)	10lbs.	12lbs.	14lbs.	16lbs.	18lbs.	20lbs.	21 lbs.
Wt. of LD-3 Contents (max. lbs.)	1500	1800	2100	2400	2700	3000	3160 (max.)
United's New York-Los Angeles Flat Rate Charge of \$289.†							
LD-3 Cost Per 100 lbs.	19.20	16.00	13.71	12.00	10.67	9.60	9.20
Truck Rates							
LTL* Class 77½	12.37	12.37	11.69	11.69	11.69	11.69	11.69
85	13.58	13.58	12.83	12.83	12.83	12.83	12.83
100	15.96	15.96	15.06	15.06	15.06	15.06	15.06
125	19.97	19.97	18.86	18.86	18.86	18.86	18.86

*Less than truckload. †Based on airport to airport Time of Tender (Daylight) rates. These rates are effective February 1, 1973, and are subject to change.

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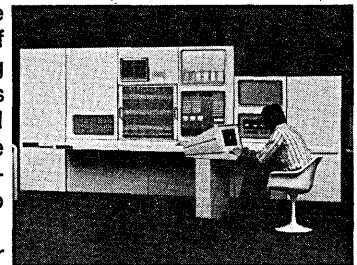
The PACER systems simply deliver far more solutions per day or per dollar than any alternative systems.

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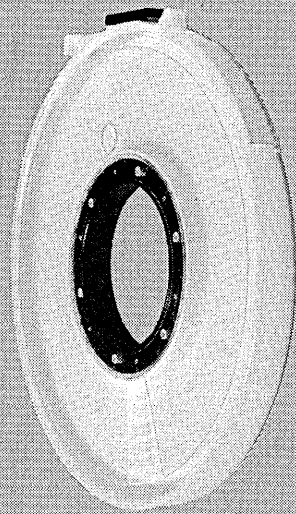
For details on our whole PACER story, please write or call today.



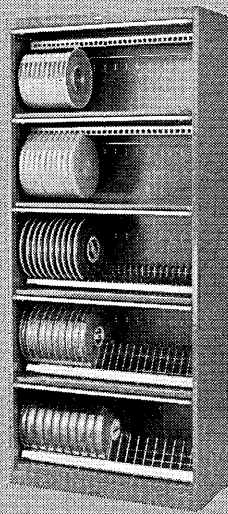
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Tab has 700 ways to make your computer work better

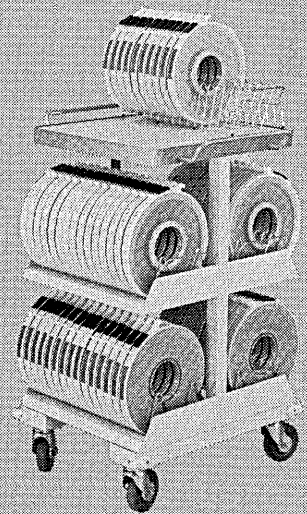
Here are some for Tape



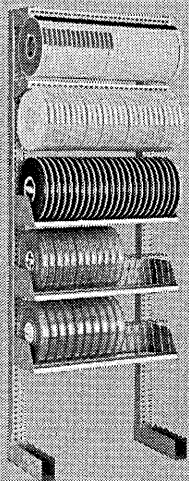
Tab Super Seal features molded-in hook, polypropelene plastic throughout. Get full tape protection, plus a lifetime far longer than ordinary seals.



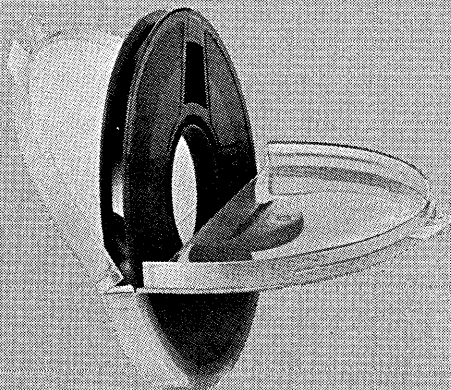
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 **APPLETON PAPERS**
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Editor's Readout

The Ghosts Return

The very latest horror stories in the newspapers have the curious effect of reviving the oldest ideas.

That new soap opera, *As The Watergate Spills*, has brought into current usage such neglected words as "honesty" and "integrity." And the Equity Funding caper, featuring attacks from all directions on computers and the people who make them work, resurrects issues that have agitated the computer industry from time to time ever since Eckert met Mauchley. Professionalism, system security, financial auditing techniques, and even the fine old "electric brain" bogey are among these issues.

The last mentioned is the only entertaining one—and even it has some serious aspects. This time it comes in the form of a lawsuit making the remarkable claim that the manufacturer of the computer is at fault in the Equity Funding case. IBM and others, the suit contends, "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 . . ." Ludicrous as this seems, it's not inconceivable that large sections of the public, fed up with billing systems that don't even provide a means for answering customers' letters when something goes wrong, might take it seriously.

Professionalism, of course, is another of the issues raised by the case. As Dick McLaughlin reported in his article last month (p. 91), the American Institute of Certified Public Accountants quickly formed a special committee after the scandal was revealed, charged with determining if changes should be made in present auditing methods. One can't help but wish that

similar action was open to computer people through their association with a strong, unified organization dedicated to establishing codes and standards for its members—and protecting their rights. But the catch is that dp people are employees, not independent contractors. Generally they have only two alternatives if they suspect there's dirty work afoot—update the resume and look around for a job calmly, or tell a reporter and look around for a job hastily.

System security is a third issue. Even the most elaborate safeguards, of course, will not prevent fraud if the management of a company is clever, crooked, and determined to carry it out. But the right precautions can surely hamper such schemes. For one thing, the number of people who would have to be involved would greatly increase the probability of word leaking out. Apparently IBM management realized, with their usual marketing foresight, that security would become a major problem when they announced last year the allotment of some \$40 million for development centers dedicated to improvement of data and system security. Some help from an independent source is on the way too. John Gosden's Systems Improvement Committee, supported by AFIPS, expects to complete a first draft of its checklist for ensuring secure systems in time for field-testing early next year.

Perhaps the fourth issue raised—the effectiveness of financial auditing techniques—offers the most hope for immediate action. Only the biggest auditing firms have the computer experience and facilities needed for thorough examination of a company's records. And at least some of the state regulatory bodies responsible for the insur-

ance companies' behavior have no computer expertise at all.

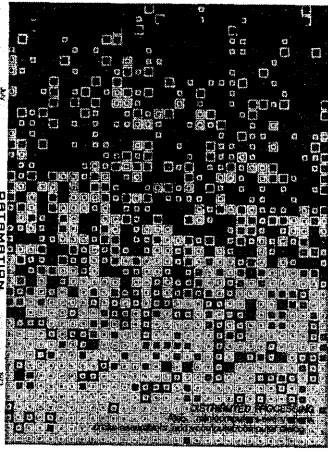
For example, recent public hearings conducted by the California Assembly Finance & Insurance Committee revealed that the California Department of Insurance didn't have even one examiner with training in computer audit methods. Although Illinois regulators had the primary responsibility for Equity Funding, since that's where the company is chartered, there are about 150 other insurance companies that are chartered in California. Asked at the hearings why there were no dp people used as examiners, the insurance department representatives testified, according to *The Los Angeles Times*, that fraud "wasn't expected."

We don't think either auditors or regulators can be expected to do a competent job if they are trying to check computer operations with pencils and desk calculators. Instead, they should be prepared to take an active role in tracing machine operations—to acquire transaction tapes and run them against master files, comparing results to those reported by the company; to count records; to compare premiums against expected billing receipts . . . in short, to deal on equal terms with today's business methods.

Fortunately, there's an organization that has been interested in these matters for some time, the EDP Auditors Association, Inc. They have chapters in various cities and just held their annual meeting in June. (A report on the conference appears in the News In Perspective section of this issue.)

We urge you to take advantage of their accumulated experience—and to consider the implications of the Equity Funding debacle in planning for your own organization.

—William J. Rolph



Our distributed processing cover this month is a reproduction of an untitled serigraph in three colors by Georg Nees from Art Ex Machina, a portfolio of six original computer art prints published by Editions Gilles Gheebrant, 2130 Crescent, Montréal, Canada.

Connecting 54 cities with 37 processors, Tymshare's network is now able to arrange for the tie-in of customers' own computers

TYMNET: A Distributed Net

TYMNET is the name chosen by Tymshare, Inc., for its international data communications network (Fig. 1). It is a distributed network because data goes from point to point, as opposed to a star network where all traffic must be routed through a central location. TYMNET is also unusual because even though computing capability and data transmission are distributed, network control is centralized.

Fully operational since 1970, the network is continually evolving. Its design accommodates change as communications requirements vary.

Today, not only are Tymshare's computers connected, but outside organizations may share TYMNET to expand their areas of computer access.

TYMNET currently¹ connects 54 cities with 37 large-scale computers utilizing over 40,000 miles of leased telephone lines, including a dedicated channel on a trans-Atlantic line which connects to a Parisian computer center. The total network has over 30 million terminal channel miles.

The network consists of 80 communication processors called Tymsats (Tymshare satellites). At least one "remote" Tymsat is located in each city serviced. The heart of the Tymsat is a Varian 620 minicomputer with at least 8K words of memory. Each satel-

lite is equipped with hardware to handle up to 32 asynchronous low-speed ports (110-300 baud) and up to three synchronous ports (2400-4800 baud).

Connected to the asynchronous ports are either Bell 103/113 or Tymshare's equivalent Mark xv modems. The Tymsat provides automatic baud rate detection and code conversion on these ports, so virtually every terminal in the 10-30 cps range may be accommodated.

When logging into TYMNET, the user types a terminal identifier character. The Tymsat then adjusts for speed, code conversion (if not an ASCII terminal) and any individual terminal features such as a fast carriage return.

Tymsats are connected with C2-conditioned Bell long lines utilizing Bell 201 and 203 modems. Terminal data is transmitted ordinarily in ASCII in full duplex mode, although half duplex is also permitted. Tymshare built its own hardware interface, a multiple synchronous adapter, to these high-speed lines. The adapter assembles a bit stream into 16-bit words. Interrupts, therefore, are cut by a factor of 16.

For each synchronous line, a fixed number of groups of virtual circuits is established. Each group represents 16 such circuits. Most long lines can handle two or three groups, up to 48 simultaneous users.

Experience has shown that a mix of

users with 10 to 30 cps terminals will average five to six character transmissions per second. Thus, a 2400-baud line can accommodate 40 users while a 4800-baud line doubles that. If the average increases temporarily, the output to the highest-speed terminals will slow down and no data will be lost.

Error detection

High reliability was of major importance in the design of TYMNET. Since noise on a long line commonly occurs, the network must cope with the problem. A check-summing algorithm was devised to detect errors on the synchronous lines connecting Tymsats. The stream of outgoing characters on the line is divided into blocks of between 12 and 66 characters. A 16-bit vertical check sum and a 16-bit spiral check sum are placed at the end of each block. When a block is received, that block's number is returned to the sending Tymsat as part of the next outgoing block. If an error is detected, the block is disregarded and not acknowledged. An unacknowledged block is automatically retransmitted by the sending Tymsat.

Although the Bell System tariff allows for one error in 100,000 or 1×10^5 good bits, Tymshare's system will compensate for error rates grossly below those standards. This algorithm provides an undetected error rate bet-

¹April 15, 1973

work

by Bill Combs

ter than one bit in 4×10^9 bits transmitted.

Note also that a burst of errors may still only show up as one error because of the block mode of error detection, whereas continuous background line noise would result in many blocks of data being in error and many retransmissions. Because of this, switching noise is not a great problem.

Tymsats also incorporate power failure/automatic restart hardware and software. If power fails, manual intervention is seldom required. The mean time between hardware failures on the Tymsat exceeds eight months.

Since TYMNET consists entirely of Tymsat nodes, there is only one level of network performance. Error detection and retransmission with automatic

baud rate detection is routine in every city serviced.

A Tymshare computer is linked to the network through a Tymsat base. Although the bases utilize the Varian 620, this equipment differs from the remote Tymsat in that it has no asynchronous ports. It connects directly to a memory buss on a host computer and has five synchronous ports for connecting to other Tymsat bases or remotes at 2400 or 4800 baud.

The controller of TYMNET is the network supervisor, a program that runs under time sharing on a TYMCOM-IX (XDS 940). It handles log-ins, builds circuits, performs diagnostics, keeps statistics, and oversees all other matters of global importance to the network.

Perhaps the best reliability feature is alternate routing. Rather than using redundant synchronous lines between Tymsats, there are various routes the supervisor will use when building a circuit. Normally, routing would be the most direct route, the one passing through the least number of nodes. If a line on this route is inoperative, or the circuit groups are full, the supervisor selects another path. Again, it selects the most direct routes available.

Procedures

When a user accesses the system, a Tymsat accepts his terminal identification character and prompts with the

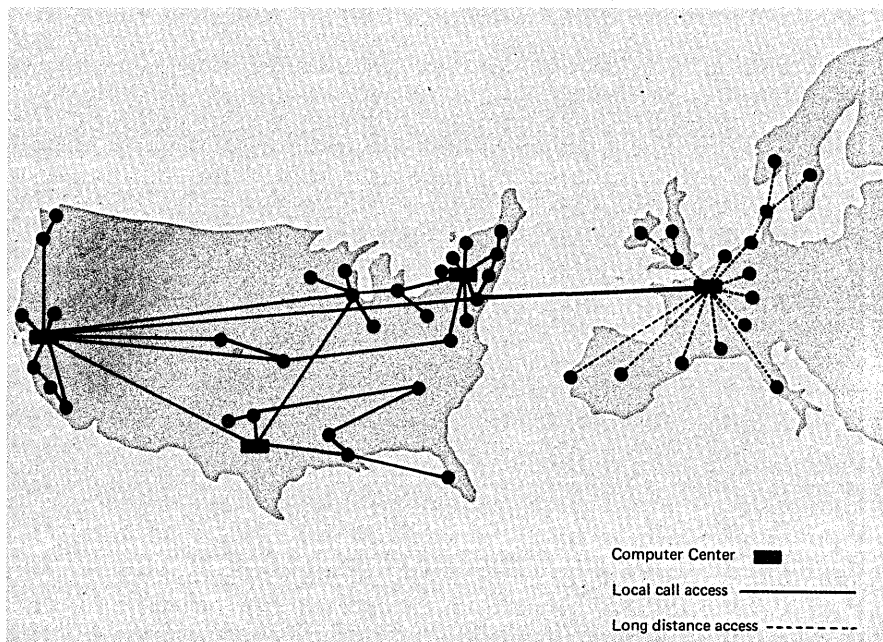


Fig. 1. Tymshare's international remote computing network.

TYMNET: A Distributed Network

message PLEASE LOG IN: He is immediately connected to the network supervisor, which checks the Master User Directory and validates that user name and password. The supervisor then determines which computer is associated with that user and connects him to the appropriate system, called the "home system." At that time, the supervisor transfers control to the "home computer" and data is transmitted directly, rather than through a central point as in a star-type network. Whenever he "logs out," he is then returned to the network supervisor which prints: PLEASE LOG IN:

The log-in process can then be repeated, or the user may hang up the telephone. If the supervisor determines the home system is unavailable, the user is so informed and asked to log in again on his backup system.

If he is validated on another system, a slight change in the procedure is necessary. For example, user JONES' home system is 19 and his backup systems are 7 and 38. To access system 19, his user name is just JONES. To access system 7 or 38, he enters JONES:7 or JONES:38, respectively, as his user name. His password is the same on all systems. The colon option is available whenever the same user name is valid on more than one computer.

During the log-in procedure, the user receives explanatory messages if a circuit cannot be built, such as "System Unavailable." These messages inform the user as to what is happening and prevent the user having to wonder what continuous ringing or busy signals really mean.

To provide complete backup, the supervisor program operates on four computers: two in Cupertino, Calif., one in Englewood Cliffs, N.J., and one in Paris. Only one, however, is active at any given time. This active super-

visor is aware of the status of every node line and computer in TYMNET, any equipment in operation, errors occurring on the lines, and load conditions of each node.

If the supervisor computer goes down, another takes over, inquiring into the condition of each node and computer, until it is up to date on the network status. Because the supervisor is only active, as far as the user is concerned, during the log-in procedure, no current user is affected by a new supervisor takeover. Only those users trying to log in during this transition period are delayed.

TYMNET builds circuits only once during log-in time, as opposed to routing at each node as information is received. Total overhead is estimated to be 10% while each pass-through node adds only a minimal delay. Overhead is also kept minimal by sending a small number of data characters rather than packets of a thousand or more characters. Of course, as transmission rates increase well above those currently being used, system capacity will be increased accordingly.

Supervisory log

The supervisor, in maintaining records, provides a complete chronological log of all happenings in the network. These include:

1. Any host computer down.
2. Any Tymsat failure, such as a power failure.
3. Telephone long lines out of channels.
4. Telephone long lines inoperative.
5. Telephone long line error rate (number of retransmissions).

The supervisor permits manual intervention and inquiry. These functions include the ability to:

1. Determine how many users are connected to a host.
2. Determine where host users have originated a call and which nodes they pass through en route.
3. Stop new use of a poor quality long line. This will not affect existing users but new users will now be routed down alternate paths.

Since the supervisor permits any terminal user to connect to any computer, a natural extension was the sharing of facilities. Operating under Tariff FCC No. 260, "Joint Use Arrangement," other companies have been allowed to connect their computers to TYMNET. To date, various models of IBM 360s and 370s, Burroughs, Control Data and Digital Equipment computers have been interfaced. These are in addition to Tymshare's three PDP-10s and 24 XDS 940s.

The interface is different for outside users than for Tymshare's own computers. Tymshare connects directly



"First you forget logarithms. Then you forget how to do long division. Then the multiplication table begins to go . . ."

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into a memory buss, which involves significant software changes to the operations system, but other users treat TYMNET similar to a rotary of Bell 103/113 modems. A modified Tysat called a TYMCOM III is placed adjacent to the user's communications controller. Up to 30 channels operating in ASCII code at 300 baud are hardwired into this communications front end. As with other Tymshare customers, the supervisor will recognize the user name and password and set up a circuit between the user and the host. From that point, the network is transparent to the user's normal work, including the validation of user identification specific to that computer. TYMNET is not the policing function for the host.

Several other options have been developed for the TYMCOM III. If the host computer is down, any type of message can be sent to the user. Instead of "System Unavailable," a more distinctive message such as "Software change is being implemented between 11:00 a.m. and 2:00 p.m. today" could be sent. Also, if data is not transmitted between a user and his host for a specified time, he will automatically be disconnected.

Monthly, Tymshare provides a chronological listing of each log-in. This list, which may be in machine-readable form, shows the city from which the user called, type of terminal, user ID, port on the host machine, time on and off, characters transmitted in and out, and seconds connected. A sort of this information gives valuable statistics about effectiveness of the user's data communications.

This data, along with the error detection and retransmission, alternate routing, and a variety of diagnostic routines used to check Tymshare's equipment and the telephone lines, provides a value-added service. Unlike many of the new proposed communications services, TYMNET provides only the bandwidth the user needs, rather than a fixed bandwidth from point to point.

Each month, users are billed by the common carrier (AT&T) for the shared line costs of communications. Users are also billed monthly by Tymshare for the processing resources they actually employ. These include use of the supervisor, node buffers, modems, etc. The billing factors involved are:

1. Each hour of terminal connect time.
 2. Each 1,000 characters transmitted.
 3. Each log-in to the network.
- Additionally, there is a fixed monthly charge for the TYMCOM III.

Besides Tymshare itself, the National Library of Medicine in Bethesda, Md., is the largest user. With nation-

wide access to their Medline Data Base on an IBM 370/155, NLM serves more than 200 libraries, hospitals, and university medical centers. NLM has been using the network since February 1972.

As terminal speeds increase, so will the network's. By 1974, 600 and 1200-baud terminals will be common. To accommodate these speeds, asymmetric modems of 150/1200 baud can be placed on many of the remote Tysats. High-speed synchronous lines between Tysats can have bandwidths increased to either 7200 or 9600 baud, and more lines can be added.

To handle the higher speed lines, Tysats also have to evolve. Minicomputers with faster cpu's and larger memories will be added. Additionally, a hardware character assembler will be utilized to cut down the Tysat cpu load. At this time, bits are assembled into characters by software.

As the high-speed lines are installed, Tymshare is adding high-speed printers in many of their field offices. These are directly connected to the remote Tysat and offer local service to customers requiring large volumes of printing.

When new long lines are required, optimum routing is of major concern. Initially, all users were provided with the best path to their Tymshare host. But as "outside" computers were added in cities other than Tymshare centers, routing was changed. An optimization program was developed and used in conjunction with a history of load distribution. Main lines were taken out of the calculation to force overloads on others. Then a reconfiguration simulation was run to determine where additional long lines might improve the service. Presently, there are five paths from east to west coast, with two of them direct. Additional direct lines between east and west coast cities are now installed.

One of the things we've learned is the maximum speed and number of synchronous lines a Tysat can presently handle. Improvements in software and minicomputers used in the Tysat can greatly enhance TYMNET's speed and flexibility. Some of these new features have already been added.

Improvements

First, a dual-base Tysat has been installed in several locations. This allows two Tymshare host computers to connect to TYMNET through a single base, cutting out a pass-through node. The ultimate effect will be faster access to the host computers for our customers.

Routing within a Tymshare computer center could previously involve many nodes before accessing the required host. The major limiting factor

was a maximum of five high-speed lines on a Tysat base. A faster mini-computer now permits eight lines and more interconnecting routes. When completely implemented and coupled with the dual-base project, no user should ever pass through more than two bases, significantly speeding up response time.

Looking to future advances, Tymshare will continue analyzing possible use of higher-speed lines and alternate suppliers. Presently, 50KB lines offer no advantages over six 9600-baud lines at approximately the same price but with much redundancy. The emergence of new transmission companies may offer another source of services. These, along with AT&T's proposed new high-density tariffs and planned Data Under Voice service, should lead to lower costs and more reliable common carrier services in the future. The exact role of the new companies, however, still is not clearly defined.

In summary, TYMNET is the first commercially distributed value-added network. Yet, it has a proven record of four years of operation. It offers low-speed terminal users the ability to access any host on the network, including their own company's computer.

When the users are scattered over a large geographic area with relatively few terminals in each city, the network provides high reliability at a fraction of the cost of other common carrier services.

Finally, the management of a company's total communications requirements is handled by one organization. Now, a communications manager need not deal with multiple vendors and the associated problems. TYMNET, with its error detection and retransmission, alternate routing and complete operating statistics, allows him to work more effectively. □



Mr. Combs is director of systems marketing for Tymshare, Inc., responsible for the marketing of network services to outside companies. Before joining Tymshare in 1971 he was vice president of Dialog Computing and general manager of Australian General Electric. He has a BS in petroleum engineering from the Univ. of Texas.

Through satellite processors,
service for 20,000 terminals over
100,000 miles of communications lines

Distributed Processing on Wall Street

by Joseph C. Marshall

In 1964 the Bunker Ramo Corp. put into operation a complex of computers and communications networks to implement a real-time distributed processor system called Telequote III, disseminating information on securities and commodities to the financial community. It was designed to provide a major extension of the market information service being furnished through a system of automatic electromechanical stock display boards that the predecessor company, the Teleregister Corp., had innovated in 1929 to replace chalk boards and ticket boards in stockbrokers' offices. The system was a natural evolution of the company's work in real-time processing, which extends back to the early 1950s, when it designed and installed airline reservation systems using wired program, decentralized processors with control from a central unit.

Historically, the Telequote III system was conceived in 1961 to solve two problems then facing the company. The first involved the stock quotation display boards, which were threatened with technical obsolescence because the main sources of their data, the New York and American Stock Exchanges, had both announced the imminent introduction of new, 80% faster stock tickers. The driving arrangement for the 800 boards in brokers' branch offices was a broadcast—so-called because it reached all customers' offices in the system, as distinguished from transmissions addressed to specific stations. The messages were carried to receiving units in all brokers' offices via telegraph lines from a relay transmitting station in New York, after being manually entered through modified teletypewriters. The receiving units selected from the broadcast those messages applying to the stocks displayed on the local board. Since no board displayed more than a small fraction of the total stocks transmitted, the hard-working receivers spent much of their

time reading and rejecting prices on stocks which were of no interest to them. The receivers were designed with telephone type relays, whose maximum operating speed was just adequate to cope with the peak output of the then existing quotation sources, leaving no margin for the inevitable increase in traffic that the new tickers would produce.

The second problem concerned the furnishing of a new service that the company planned to develop to augment the stock quotation board operation. This service would provide desk terminals to interrogate a computer for price and other information on individual stocks. Estimates of the traffic that might be generated by such a system with the expected complement of users indicated that a processor of very high throughput capacity would be needed, with an elaborate network of private line communications to connect the brokers' branch offices to the central computer. The concept of communications lines extending across the entire country for each small group of customers was very unattractive from the cost standpoint, as was the prospect of installing and programming a cpu with sufficient capacity to handle the ultimate system load before a single customer could be put in service.

Satellite processors

Both of these problems seemed to point to a system of decentralized satellite processors located at large population centers and serving customers within their geographical region. The concept included a central processor, the sole function of which would be to collect, organize, and edit source information, and prepare updating messages to the satellites. Each satellite would maintain its own data bank, which would be kept updated in real-time, and which would be the source of data to permit the interrogation-re-

ply operation and the stock boards to be serviced.

Selected as the cpu was the Telefile, a general purpose processor developed by the company for real-time applications and used also in several on-line banking systems. This computer, small and slow by today's standards, maximized throughput by using a five-bit word size suited for BCD operation. In downtown New York, a Telefile Financial Service Center called Telecenter was established. The system there includes three Telefiles, three mini-computer front ends, 10 drum files configured to enable all three Telefiles to access any of the drums simultaneously, and an audio response system to service the American Stock Exchange's Amquote subscribers. The satellite update operation is carried over 2400 baud channels with dial-up fallback, and messages may be addressed to individual satellites, groupings of satellites, or to all satellites. At peak periods, traffic may reach 20 messages per second.

Because the satellite update function, the board drives, and the query-reply operation could all be treated within a framework of standardized message formats, it was decided to use, as satellites, a special design of wired program machine with a drum store. The objective in the design of the satellite was to produce a unit with a moderate size store (1.5 million word capacity) on which any of 16,000 to 20,000 stock records could be reached within one drum access time by a dozen or more servers operating independently. After a prototype was tested, 10 satellites were built and installed in eight population centers. As the system grew, satellites were added, bringing the total to the present complement of 16.

The board drive problem was solved by furnishing facilities in each satellite to generate up to 12 independent

board broadcasts. Each broadcast, or unit of transmission, would be limited to only those stocks displayed on a small group of boards, and the boards would be grouped to maximize the mathematical "intersection of the sets" comprising the stocks on each board. This fractionalization reduced considerably the number of stocks, and hence the activity, on each broadcast line, resulting in much less spinning of wheels at the subscriber's receiver and enabling it to accommodate the increased traffic of the new tickers without modification or replacement. The magnitude of the improvement obtained is suggested by the statistic that with 16 satellites in operation, about 150 independent broadcasts were available instead of the previous single broadcast.

The Telequote III query-reply service was implemented with a desk terminal featuring a block keyboard with a crt display giving three prices, or other items of information relating to a security, in response to a customer's inquiry. The terminals function with a control unit, which was designed in several versions for large, medium, and small branch offices. Queuing calculations indicated, and field experience verified, that about 100 desk terminals would generate traffic on a line at a rate that would enable responses within one or two seconds, within the design objective's acceptable spread.

The satellite design provided for up to 32 regional line terminals, each line serving up to 15 branch office control units. The line terminals funnel their requests for data held in the drum records via four access ports, which conduct simultaneous searches for the queried stock records. While all four ports are so engaged, the stock record update server could be searching for a stock record to write in a new price, and all 12 board drive units could be looking for changed stock prices to be broadcast. The satellite has a theoretical capability to handle this traffic at a rate of 1,000 messages per second, but the practical peak activity is about 100 per second.

Inquiry responses

The multi-drop lines to customers' offices are 1200 baud, C-1 conditioned, voice grade private line channels using data sets, or modems, owned and maintained by Bunker Ramo. The customers' control units are continually polled for query traffic by the satellite line terminal unit, and they respond with either a no-traffic signal, or a query containing a stock symbol (one to five letters), and a function character indicating the type of information desired (last-bid-ask prices, open-high-low prices, dividend-price-earnings-ratio, etc.). A no-traffic response trig-

gers a poll of the next drop on the line. A query message is passed on to the drum through one of the four query ports, and, within one drum revolution, the stock record is located and the requested data read out to a temporary buffer for transmission back to the calling control unit. If a query is mutilated by a line hit so that it is unrecognizable, or if it calls for a nonexistent stock symbol, a response is generated to the user, prompting him to retransmit or to correct the improper stock symbol. A polling message that is altered in transit so that it no longer conforms to the proper format, or addresses a nonexistent control unit, or one without power, waits for a predetermined interval, and then times out, causing the next station in the polling sequence to be called.

The satellites perform an additional function, offered to Telequote III customers as an option, called Telequote Trends. Once a minute the Telecenter generates and transmits to the satellites a list of 10 statistical items relating to the stock market. There are six such lists, covering the commonly published statistics of ten most active, ten most advanced, ten most declined stocks, Dow Jones and Standard and Poor's Averages, and market upside-downside

figures. With one updated list transmitted each minute, the six items are repeated in a six-minute cycle, and all current values are kept in satellite store. Reception of a new list gates all query-reply lines at the satellite to expect a Trends broadcast and, as soon as the line operation then in progress is completed, a special Trends poll is transmitted, conditioning all control units on the line to receive the broadcast that follows. At the broker's option, the control unit may be wired to ignore the broadcast, or to display it on large (23" or 27") crt's or on the small desk terminals.

These services found acceptance in the brokerage community, and eventually more than 20,000 desk terminals were in use in nearly 700 cities in the U.S. and Canada. The private line mileage of well over 100,000 miles devoted to this use is the largest network of any single commercial user. The entire equipment complex has operated in its real-time environment for almost a decade with an enviable record of up-time. The service is available to customers 24 hours a day, and since its inception has averaged more than 364 days a year when all lines are roll-calling customers all day; in other words, equipment failures account for less



"I just heard that Bill Watson has been fired and shredded."

© DATAMATION

Distributed Processing

than one day's outage per year of the roll-call operation on any of the lines in the entire system. File maintenance and housekeeping chores are performed during the late evening and early morning hours without cutting off the customer's ability to query stock records. The availability of instant prices on any stock changed brokers' operating habits so, over the years, the stock quotation boards shrank both in size and number. Today, the boards are used mostly for posting arrays of commodity prices or other specialized services rather than stock prices, and the satellite function of generating board drive messages is diminishing in importance. No vacuum was left in the wake of this shrinking service, however, and, as the potential of an "electronic trading desk" came to be realized, a market for a much more sophisticated service developed, encompassing such office functions as portfolio retrieval, order processing, message switching, computing trade acceptances, and many others. The time had come for Telequote III to be augmented with a more powerful system.

Newest addition

Bunker Ramo named its new system Market Decision System 7 (MDS-7). Initiated in 1972, MDS-7 also uses distributed processing, with decentralized equipment sites located at satellite installations. Each site includes a communications processor, an applications processor, disc stores, hard-wired interface units, and appropriate fall-back equipment units. The customer's office equipment includes a Bunker Ramo designed, general purpose, mini-computer control unit, and two sizes of keyboard desk terminals. The control unit can be arranged to operate with a customer's own computer for automating front and back office functions, or with a Bunker Ramo switching processor for interconnecting branch offices to trading floors and to each other. Almost any office service that requires manipulation or retrieval of data, or dissemination of information, is a fair prospect for the programs of this tool.

MDS-7 offers the user four operation modes, with three independent displays available in each mode. The makeup of the three-part display and the four modes is selectable by keyset operation at the customer's desk terminal, and may include individual stock information, three versions of preselected Stock Watch (changeable at will), stock price displays, dozens of statistical items, management information services, including automatic notice

when stock prices reach predetermined limits or are the subject of a news item, management directives to all registered reps in an office, statistical data on stocks reaching back as long as three years, an electronic scratch pad and much more. News displays and moving ticker record of transactions are also available.

In performing its function of supplying quotation information on stocks, MDS-7 interfaces with the satellite drum store, and also uses the satellite update line. Processors located on the east coast, in the midwest, and on the west coast distribute the operating load and keep the regional circuits to customers' offices confined to these geographical areas. The regional circuits are multidrop, 2400 baud, voice grade private lines. Ticker and news wires are brought into the customer's office separately, but are processed in the customer's MDS-7 control unit. As in Telequote III, customers on each line are polled continuously, and a desk terminal query for stock information is answered in about one second average. Stocks kept on display and preselected stock lists on Stock Watch are automatically updated whenever prices or other displayed data change. Any operational condition other than the normal one that results in an immediate response is signaled to the desk terminal so that the operator can take appropriate action. Changes in the selection of modes for any desk terminal and changes to a desk terminal's Stock Watch list may be made at any time.

One of the more recent inputs to Telequote III and MDS-7 customers is furnished from Bunker Ramo's NASDAQ data center in Trumbull, Conn. This operation, sponsored by the National Association of Security Dealers, collects bid and ask prices on 3,500 over-the-counter stocks from market makers all over the country, and representative values of these prices are transmitted to the Telecenter via a 2400 baud line. A minicomputer mixer adds these prices to the satellite update data stream. Another new service, now being implemented, will give MDS-7 customers the ability to retrieve news stories relating to companies whose stocks are in the system. A keyset operation will cause the recall of the entire news item from a central data bank for display on a desk terminal. Subscribers will be alerted to the appearance of a news item on the wire by an appropriate flashing signal on any display of the affected stock on any desk terminal.

Enhancement of services

These services add up to a much more comprehensive information system than Telequote III, so it is expected that the traffic on MDS-7 will be con-

siderably higher than on the earlier system. All operations and transmissions are faster, however, and queuing calculations and simulation runs indicate that an MDS-7 site will be able to service about as many desk terminals as its affiliated satellite. This ratio is bound to change, since brokers tend to find more uses for information of this kind once it is easily available. When their operations are simplified by automatic aids, brokers change their operating habits to conform, and this opens up new areas of simplification which lead to more uses for the equipment in a constantly expanding framework. MDS-7 has provisions in its design for almost any foreseeable enhancement of services. Some are already well along in planning, such as the Consolidated Ticker System soon to be implemented by the Securities and Exchange Commission, while others are awaiting a somewhat later stage in MDS-7 growth or customer awareness of its potential.

For many years Telequote III and the stock boards operated over independent networks, even though many brokers subscribed to both services. But this is no longer true. Most board circuits are carried "piggy-back" on Telequote III lines, using channel multiplexing techniques. A similar merging of Telequote III and MDS-7 circuits will be implemented when the latter's customer list grows to include most of the Telequote III cities. The line baud rate will be raised as necessary to accommodate the total traffic of all services. Additional MDS-7 processing centers will be opened as required—several are planned for the remainder of this year—thus reinforcing the concept of system operation by distributed processing. □



Mr. Marshall, who recently retired from Bunker Ramo, has long been an innovator in development of on-line systems. He joined Teleregister Corp. in 1929 and helped design the original electric stock quotation boards. In the 1950s, he was project manager of the first airline reservation system. When Teleregister became Bunker Ramo, he headed the Telequote III project and then participated in design of the new Market Decision System 7, now being installed.

A network of 45 computers supervises this Canadian/U.S. oil pipe line that transports over a million barrels a day

Monitoring/Control by Distributed Computing

by G. S. Speers

In 1972 the Interprovincial Pipe Line Co. (IPL) had to transport more oil than ever before to meet the rapidly increasing demand for energy placed by Canadian and U.S. industries—delivering 1,115,000 barrels per day. A team of 45 computers was kept busy monitoring and assisting in control of 5,206 miles of oil transmission pipe line network.

Interprovincial of Canada and its U.S. subsidiary, Lakehead Pipe Line Co., own and operate the largest oil transportation pipe line system in the Western Hemisphere. The system includes three parallel pipe lines, from Edmonton, Alberta, to Superior, Wis., with the complete system stretching from Edmonton to Toronto, a distance of 1,900 miles. The pipes range in size from 16 to 48 inches in diameter. To facilitate the movement of oil the system includes over 100 storage tanks, ranging in size from 14,000 to 390,000 barrels capacity. There are 66 locations strategically situated along the pipe line network, and the prime movers at the various pumping stations are either electric motors or diesel engines. The system is connected to a number of Canadian and U.S. refineries and oil transportation pipe line companies, thus representing a significant element of the nation's oil and other liquid fuel transportation complex.

The first effort by IPL in remote pipe line control dates back to the mid-50s, when a conventional hardwired monitoring and control system was implemented at Superior, Wis., to control the 30-inch pipe line to Sarnia, Ont. This was followed by a similar system at Sarnia. Both of these systems use

low-speed data transmission telemetry. By 1966, the complexity of the complete system had reached the point where additional control assistance was required. The computer, with its "softwired" logic, offered a high degree of flexibility, thus lending itself to easy future expansion and reduction of the ever-present risk of obsolescence. The goals set forth during the initial design phase of IPL's computer-based control system included:

1. Provide maximum speed and flexibility in operation and be at least as flexible as the pipe line system itself.

2. Be capable of handling three separate pipe lines through each pumping location, three separate pumping stations at each location and as many as 13 pumping units at each location.

3. Permit reallocation of stations to lines and pumping units to lines without confusion to the remote operator.

4. Record all operating data and present this data to the remote operator with a minimum effort on his part.

5. Provide maximum reduction in operating manpower consistent with safe pipe line operation.

6. Be capable of accepting data from existing remote control equipment at Superior and Sarnia.

In its present configuration the monitoring and control system used by IPL (Fig. 1) represents a computer network comprised of a DECsystem-10 central or host computer and 44 control minicomputers (PDP-8s), used as the "intelligent" remote terminals. The communication between the DECsystem-10 and its 44 satellites is done by leased, voice-grade telephone lines.

The communication system is designed so that the remote control computers do not communicate with each other. All communication is done through the host computer. The "handshaking" is established by the central computer system. It sends the call letters of a particular station down the line and receives an acknowledgment. After this, instructions are sent to the remote computer requesting it to perform an operation, report the current status of the location, or report only changes in status. Then, the central computer waits for a reply message. If there is no reply within four seconds, retransmission is made before the location is considered to be "out of communication."

Remote locations

The remote control computers monitor and control each pumping station at its location. There are a total of 71 pumping stations that require constant monitoring and control. This includes:

1. Stop/start control of 230 pumping units ranging from 1,000 hp to 5,000 hp (both diesel and electric).
2. 325 individual station pressures.
3. 47 different flow rates.
4. 23 gravity and viscosity readings.
5. Electrical powerload readings.
6. 920 various unit status indicators.

7. 1,380 station alarms and control of 85 pressure control set points.

A remote computer scans all critical points at its location and reports any changes in system status to the central computer. It also responds to control commands or takes independent actions if unsafe conditions arise.

Monitoring/ Control

A general remote computer program provides control for the three lines and up to 13 pumping units per location. Now, a new computer program capable of controlling four lines and up to 20 units per location has been developed. This is a good example of the flexibility and the ease of expansion that the computer-based control system can provide.

Each remote location is checked by the central computer on an average of 30 times every 15 minutes. A complete system scan requesting the current status of every location on the system is done in a predetermined sequence and takes approximately 1.5 minutes. The scan is triggered automatically every 15 minutes. A scan for changes

and alarms takes only 25 to 30 seconds.

Since the pipe line network system was put under computer control, most of the pumping stations operate almost totally unattended, with a minimum of required maintenance.

The host computer

The central control system is shown in Fig. 2. It consists of a medium sized DECSYSTEM-10 computer and a secondary back-up PDP-8/I. In this configuration the DECSYSTEM-10 system includes: 96K, 36-bit word core memory; disc, tape, line printer, card reader/punch, communication control, crt, hard copy terminals and a swapping drum. The back-up PDP-8/I has 12K, 12-bit words of core storage and 32,000 word disc.

The DECSYSTEM-10 was operational in March 1972. Its mixed mode multi-programming capability is used for the

pipe line control, batch processing, and time-sharing for oil movement scheduling, as well as program development.

The real-time, high-level language (BASIC, FORTRAN, COBOL) capability of DECSYSTEM-10 was taken into consideration in choosing it for the job when it became necessary to update the existing system—IPL wished to use their own people, familiar with over-all system operation, for computer-based system control and its programming. Today there are 11 terminals used at the IPL central facility.

The major functions of the central system in the pipe line control-assistance application include:

1. Communication with remote control computers.
2. Response to commands and requests from the four dispatching operating consoles.
3. Data handling.

The current information is maintained on discs to provide rapid response to command validation and crt display requests. A permanent storage is retained on magnetic tape so that a chronological sequence of events and statistical analysis can be obtained. Interfacing the computer to the dispatching operator is performed by Digital vt06 crt's, which can display 1800 characters, 25 lines of 72 characters each. Any information that has been processed by the central computer is available to the dispatcher on the vt06 screen for assistance in operating the pipe line.

The display of unit status and pressure is automatically updated when changes occur. Alarm conditions are written on the screen of the operator for his line, and in the case of location alarms also written on the shift supervisor's crt. Also, the information is made available to the operator on a "display request" basis. This includes maximum and minimum allowable pressures, set point readings, last 20 gravity readings, alarms recorded and a number of others. Any of these displays can be directed to the line printer if a hard copy is required.

The crt keyboard can be used for data entry, such as: changing allowable pressure settings; advising computer system of unavailability of devices such as crt, console or magnetic tape; or sending alphanumeric messages to a remote computer printer.

When the DECSYSTEM-10 is not available to the control system due to scheduled maintenance or for any other reason, the back-up PDP-8 will assume control. This mode of operation is less sophisticated. Emergency power is available to the PDP-8/I computer crt's and the dispatchers' consoles.

There are four dispatching operating consoles (Fig. 3), each capable of controlling all or any part of the pipe line

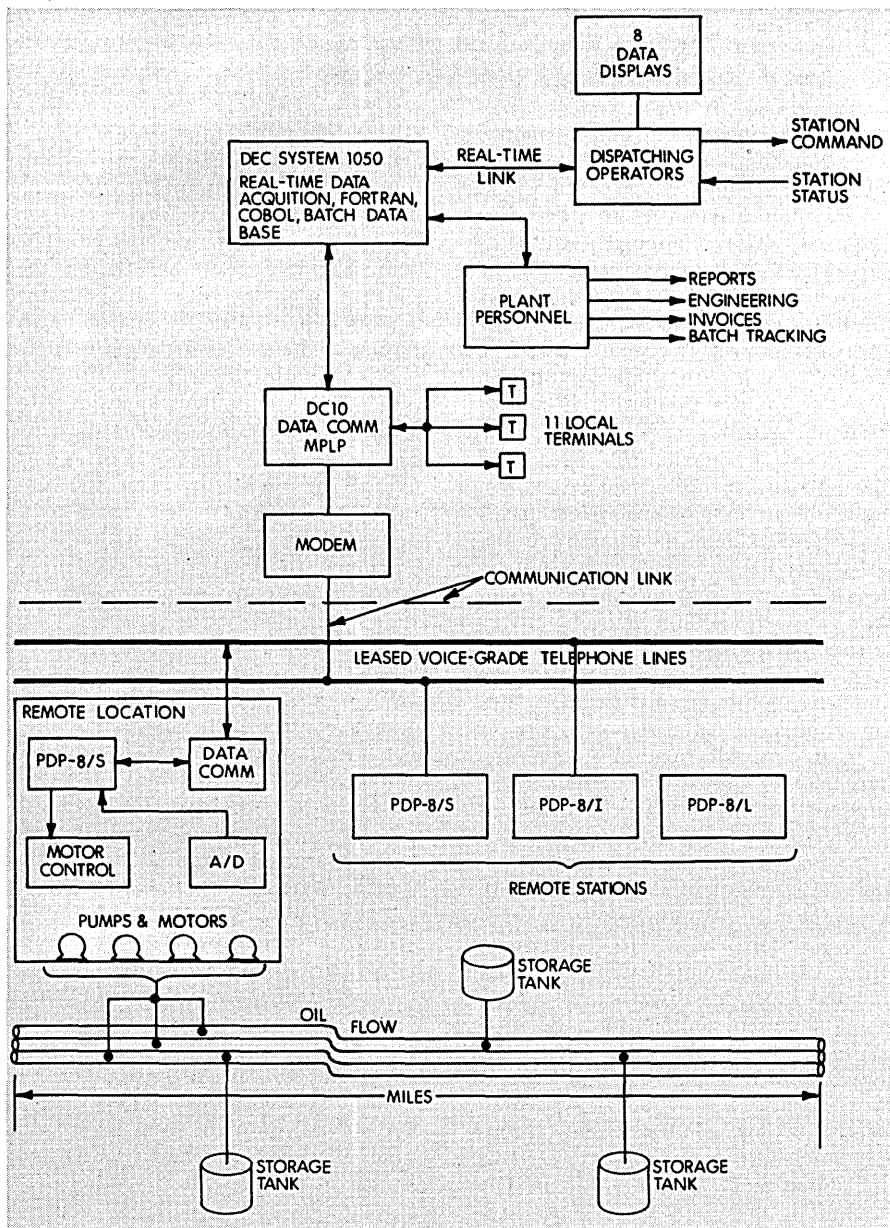


Fig. 1. Configuration of IPL's monitoring and control system.

systems. The dispatch operator reports to the central computer as to what section of the system is under his control. The central computer assures that there is no splitting of pumping power within a station to prevent dual command problems.

All operational commands initiated by the central operator are subjected to a "two-pass" system. On pass "1," the command to be executed by a remote computer is checked by the host. On pass "2," the command (if valid) is allowed to be passed on to the communications line for the remote computer. For example, if the central operator generates the command: "Line 1, Hardisty station, start unit 4," the central computer "reads" it and answers the following questions.

1. Does this console control line 1 at Hardisty?
2. Does unit 4 pump on line 1 at Hardisty?
3. Are there any faults with unit 4?
4. Is unit 4 in "off" condition?
5. Is line 1 at Hardisty already at maximum discharge?

Questions 1 through 4 deal with command validity and 5 with whether

or not the command is reasonable. Most valid commands, whether reasonable or not, will be accepted on pass 2 for execution. Exceptions to this general rule include a "start unit" command which would cause an existing electrical power demand to be increased beyond the limit set by the company operating policy.

Saving on electricity

Much of the power source for the Interprovincial/Lakehead Pipe Line is electrical. The computer system assists in the control of 425,000 electrical hp. As with most pipe lines, the throughput during the winter months is significantly higher than during the rest of the year. Most electrical power contracts base the monthly cost on a historical peak energy demand created during the past 11 months. In many cases the full energy demand is carried forward, which results in significantly higher operating costs during the low throughput months than would otherwise be the case.

The main reasons for using a computer system in controlling electrical energy are:

1. To allow maximum peaks of

energy demand only under controlled conditions.

2. To prevent the continued misuse of electrical energy.

The company has established the maximum demand to be permitted at any location for the throughput conditions in the particular month. This figure is then inserted into the computer. Most locations have a kilowatt demand meter continuously monitored by the control system while at others control is by maximum electrical horsepower permitted on-line.

Whenever the dispatcher commands the control system to start an electrical unit, the additional kilowatts, or horsepower, are added to the existing readings and if they exceed the allowable, the command is rejected and the reasons given. Should an accidental local start take place, the system is immediately aware of it and corrective action can usually be taken before the peak demand is recorded.

An analog signal proportional to the instantaneous energy (kilowatts) is used to provide readings which are translated by the computer into kilowatts and then shown to the dispatcher as percentage of the allowable load.

At some locations there are up to three electrical stations on separate lines and the loads are for the entire location. Since peak throughput or load demands do not always occur simultaneously on different lines, the electrical usage for any given station may vary, but the total for the location is always controlled.

The cost of instrumentation to provide this control, and the computer programming, is very low in comparison to the financial returns and is justifiable when significant throughput changes occur during the year and when a large amount of electrical horsepower is controlled by the dispatcher. □



Fig. 2. Central control consists of a DECsystem-10, PDP-8/I and peripheral units.

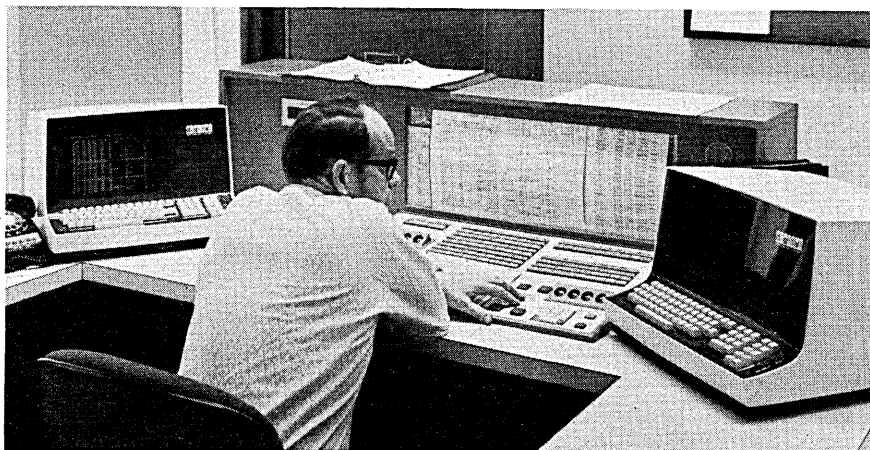
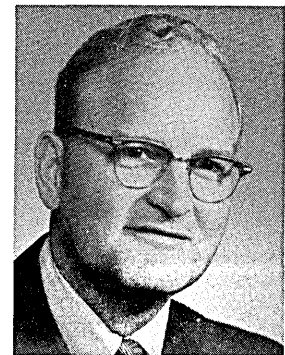


Fig. 3. Each of the four dispatching operating consoles can control all or any part of the pipe line.



Mr. Speers joined Interprovincial Pipe Line Co. from Imperial Oil in 1950 and served in various capacities within the accounting department. He became a member of the computer services group when it was formed in 1967 and is now manager of that department.

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GENERAL AUTOMATION 18/30 DMS

At home, in coal mines, aboard surveyors' airplanes, minicomputers now sort trash and direct taxis

Those Omnipresent Minis

by W. David Gardner,
New England Bureau Manager

Dr. Stephen D. Senturia of the Massachusetts Institute of Technology might be described as a trash freak. He has built the electronics for a trash sorter that takes pure unadulterated trash and sorts it into different categories.

"We couldn't have conceived of building the system if that inexpensive minicomputer hadn't been available," says Dr. Senturia. Indeed, the trash system's mini, a Computer Automation cpu, costs less than \$5,000 including a teletypewriter.

Minis can be fun

Dr. Senturia and his minicomputer are illustrative of the underground boom in minicomputers. The minicomputer explosion is not just isolated to traditional usage in control, scientific, time-sharing and data communications applications; the mini is also turning up more and more in offbeat applications. In short, the minicomputer, normally looked upon as just another electronics black box, can be fun.

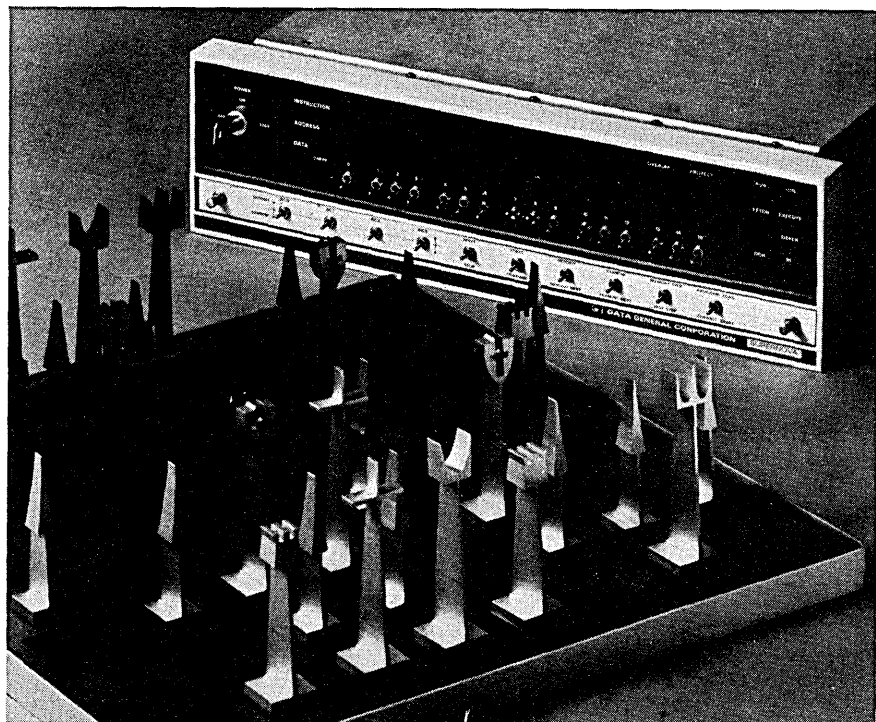
"I think we're just beginning to see the offbeat uses of minicomputers," says Andrew C. Knowles, vice president of Digital Equipment Corp.'s minicomputer operation. "For instance, some of our programmers will buy PDP-8s and take them home. We try to encourage this by giving them a bargain price."

The Massachusetts company's president, Kenneth H. Olsen, has had a mini at home for years. Most minis in the home are still used by scientists and technicians in their work—although minicomputers in the home see some use as novelty items by game players—

but the feeling is that there will be more interest in minis as novelty luxury items in the future by people who don't have technical backgrounds. Knowles foresees the days when minis will be sold through catalogues. In fact, a few years ago Honeywell offered a minicomputer through the swank Neiman-Marcus Christmas catalog. The so-called "kitchen computer" was programmed to provide menus and recipe references to five famous

cookbooks. The computer could also be used for checkbook balancing and other household tasks. Although no housewife found a Honeywell "kitchen computer" in her stocking, Neiman-Marcus received several inquiries about the computer from both men and women.

Another who thinks that some minis will be sold as novelty items is Edson D. de Castro, president of Data General Corp. "Look at all the electronic



Data General mini with appropriate special chess set.

calculators that were bought last Christmas for people who have no use for them. I wouldn't be surprised to see the same thing happen with minis."

De Castro points out that a minicomputer can be viewed as a novelty item for playing chess or other games. In addition, minis can serve educational purposes in the home—for instance, for teaching youngsters programming. De Castro feels more minis will end up in homes as more and more children get hands-on experience with computers in their elementary and high schools.

Who's got the mini?

De Castro would just as soon forget some of the adventures involving his minicomputers. The completion of Data General's first Nova, for instance, was an event that was celebrated with much jubilation by de Castro a few years ago. The mini was sent by plane to Data General's first customer but the machine was lost by the airline and it stayed lost for several weeks. (Minis are small enough to be relatively inconspicuous.) Then, some months later, when Data General shipped its first Nova to Europe, the machine was placed in the back seat of a salesman's car. The car was stolen and the mini later was found in a ditch. The Nova was cleaned up and delivered to the customer in working order. Last year, when a group from de Castro's Canadian operation, Datagen, visited the Peoples Republic of China, they learned that a Nova had been smuggled into the Asian country.

Just what is the current definition of a minicomputer? First of all, as its

name suggests, minicomputers are little. Sometimes they are called small computers, small control computers or dedicated application computers. A minicomputer is also inexpensive, usually costing less than \$10,000. Although the cpu's tend to shrink with the widespread use of LSI, the business is booming. *EDP Industry Report*, for instance, says that value of shipments in the minicomputer industry—which the newsletter prefers to call the dedicated application computer business—increased last year 50% or so from \$360 million to \$550 million. IBM, which dominates the general data processing market, is usually not considered to be a factor in the traditional minicomputer business. The computer colossus markets a small "sensor-based" computer—the System/7—that features an architecture similar to the popular minicomputers, but the System/7 is substantially more expensive than the regular mini.

Perhaps the best testimonial for the rising popularity of minicomputers is that a PDP-8 was stolen from an MIT laboratory by a group of undergraduates. The incident has led some ways to forecast the eventual appearance of a market for "hot" minicomputers like the market for hot television sets and stereos.

Minicomputers were even the object of violence at the college student outbreaks of a couple of years ago. In the absence of an accessible edp site at one Boston area university, a group of self-appointed radical students set fire to a PDP-8. After the fire was extinguished, the casing was taken off the machine and soot and debris fell into the printed

circuit boards. But when the PDP-8 was plugged in, it still worked!

Many minicomputers are ruggedized for heavy duty applications and to meet certain military specifications, but what is becoming increasingly apparent is that the plain old garden variety, nonruggedized mini is a tough machine. For instance, a Digital Computer Controls mini is used to weigh coal cars deep in a coal mine in British Columbia. Forty tons of coal rumble past the machine's sensors daily. Some years ago, Varian Data Machines cut one of its 620s in half and stuck it in a U. S. Department of the Interior helicopter. For years, the mini has worked reliably for Interior Department surveys of remote land tracts in Alaska.

The minicomputer has gone to school in a big way, too. For example, take the experience of Hewlett-Packard minicomputer systems, which are used extensively in schools, particularly time-shared systems. H-P machines are in use in several elementary schools and, on the other end of the educational spectrum, they are installed in many colleges.

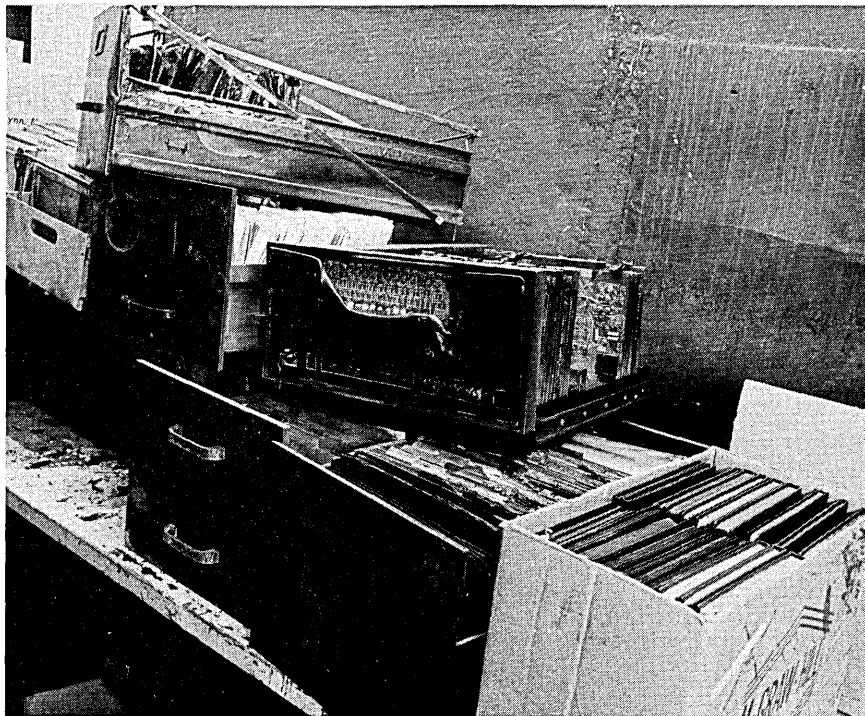
Students love them

"There are fifth and sixth graders writing sophisticated programs at the Burnsville Elementary School District in Minneapolis," says an H-P executive. "Generally the minis are used by very bright kids who often are bored with school and they become very proficient with minis by the time they enter high school. On the other hand, we have six systems in the Los Angeles schools for remedial work—for drill and practice. It's the same equipment in Minneapolis and Los Angeles, but the uses are nearly opposite."

Indeed, as an educational and vocational tool, the minicomputer is turning up just about everywhere. Besides the expected places like elementary and secondary schools and colleges, H-P machines are in use in prisons as a vocational tool. Officers play war games on a time-shared H-P mini at the Armed Forces Staff College in Norfolk, Va.

As more and more people learn to use minicomputers in school, they begin using them as tools in their work. The manner in which MIT's Professor Senturia picked his for his trash sorting system is somewhat representative of how many of them end up in oddball applications.

It started with an unusual project: David G. Wilson, a professor of mechanical engineering at MIT, initiated the trash sorting project in the summer of 1969. Senturia soon joined the program to work on the electrical and electronic elements of the system. He was immediately attracted by the low



A mini was among the scorched remains of a student demonstration.

Omnipresent Minis

price of minicomputers. "A minicomputer costs just about the same as a good oscilloscope," Senturia points out. "We had to take several sensor inputs from the trash and make a decision in a tenth of a second. The minicomputer was our answer."

In the trash sorting system, trash and refuse is loaded onto a wire mesh vibrating screen, which shakes out objects by size. The objects are then moved along a conveyor belt, passing a simple metal detector like those being used to screen airline passengers. An infrared reflection spectrometer can sort the objects into different categories, such as cellulose, plastic, glass and various metal objects. An impact sensor with an accelerator and a small hammer can differentiate surfaces. For instance, it can tell the difference between wood and paper.

Finally, the sorted refuse is automatically loaded onto buggies by categories of trash. At this point the minicomputer comes in, monitoring four carts simultaneously and performing the classification calculation. "We shoot these baskets out at the rate of three a second to their proper unloading stations," says Senturia. "It's like a Gatling gun."

The MIT scientists have built sections of a preliminary prototype system, which they are currently perfecting. Because of the enormous size and expense involved—a completed system will probably cost more than \$1 million—a full system couldn't be constructed until an actual end user decides to build one. Senturia says the scientists working on the project have been discussing construction of a system with several communities. "There are a lot of solid economic reasons for the system," says Senturia. "It is expensive but it would only be a fraction of the cost of an incinerator and the trash sorting system would make an incinerator all the more efficient."

Senturia picked a Computer Automation minicomputer and that company, like other minicomputer manufacturers that offer inexpensive models in their lines, sees many of its minis end up in offbeat applications. Digital Equipment Corp. and Data General, for instance, have the longest lists of offbeat applications, while General Automation Inc., although an important factor in the mini business, could find none of its minis being used in nontraditional applications. General Automation concentrates in specialized systems markets, such as automotive production.

Digital Equipment Corp. claims to have delivered more minicomputers

than all its competitors combined. It follows, then, that DEC computers would end up not only in the most places but also in the strangest places. Several DEC minicomputers, for instance, are used by individuals in their homes. Some run stock market analysis for business or pleasure; others conduct laboratory and scientific tests. Many people take a DEC mini home to continue working on a project they started at their regular jobs. Inevitably, the children use the machine.

For entertainment

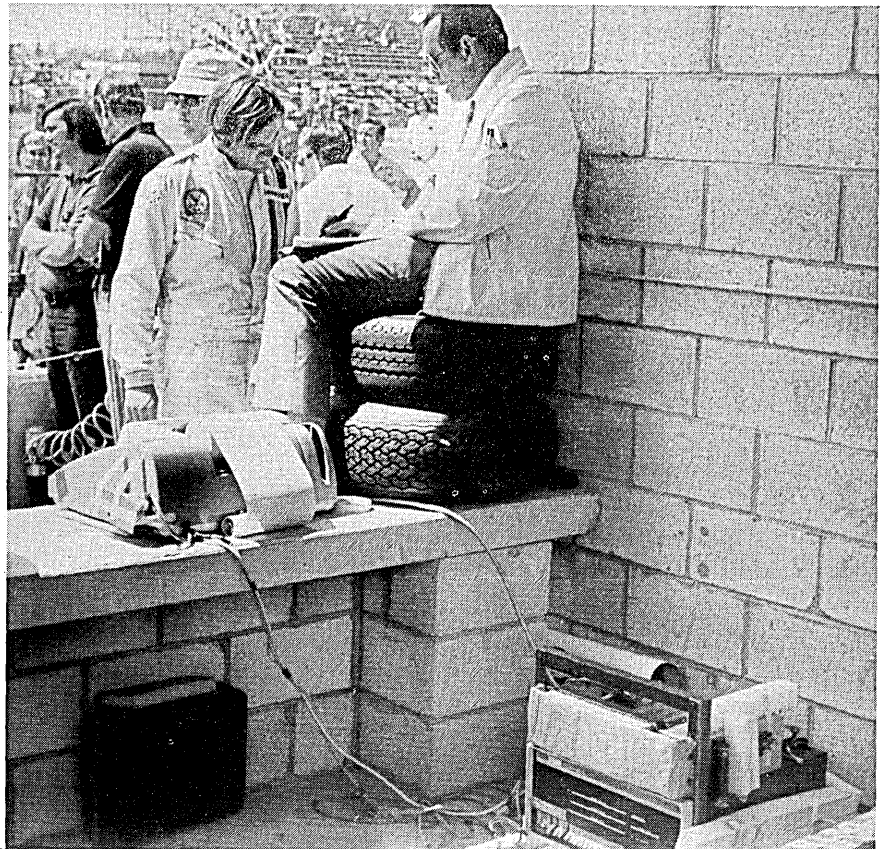
When Thomas Prugh of Silver Spring, Md., bought his DEC mini a few years ago, he looked upon it as a hobby. "Many people," said Prugh, "buy yachts, fancy sports cars or airplanes for off-hour amusement." Prugh bought an \$8500 PDP-8 and his mini has been used for just about everything at his home from computing taxes and mortgage interest to preparing menus and assisting the Prugh youngsters with their homework.

Moreover, Prugh, an electronics engineer, was particularly interested in developing what he called "home control" uses. Indeed, the whole area of a mini for control purposes in the home has also caught the eye of DEC management. DEC's Andrew Knowles believes that optical and voice recognition applications will be commonplace by the end of the decade and that

many home applications will be controlled by minis. "You should be able to order your groceries over the phone," says Knowles. "Your voice will be recognized by the computer and your account will be billed." In addition to the more logical household tasks—like tax computation, menu compilation, and opening and closing garage doors—minis should be able to answer phones and take messages, serve as a burglar alarm system and, in the event of a fire, the mini should be able to sense it and automatically alert the fire department.

Perhaps the most famous of the DEC offbeat applications is the PDP-8 that was set up to control an automated potato picker in Scotland. In another unusual application, a student at Carleton College in Laconia, N.M., programmed a DEC mini to assist him in writing a movie script. Although the finished result is not expected to produce any Academy Awards, many moviegoers would undoubtedly vouch that it's as good as the stuff they see at their neighborhood movie theaters. DEC and Interdata minis have been used successfully for years for motion picture animation.

It's only natural that minis work their way into sports. The animated 274-foot-long display scoreboard of the Pittsburgh Pirates baseball team is controlled by a PDP-8. The board not only keeps a running record of the



Ferrari driver Sam Posey scans lap count and time data from a PDP-8/L mini at Watkins Glen.

sports events in progress at the Three Rivers Stadium at any given time, but it can flash spot announcements, give newscasts and commercials, and lead sing-alongs and cheers. In sports car racing, a PDP-8 is used by the crack Ferrari team to keep track of numerous racing cars and their complicated lap counts.

Minicomputers are smart, too. Data General points to the instance where one of its chess-playing Supernovas—with 32K bytes of memory—checkmated an IBM 360/91 in just 25 moves. The IBM system had a memory capacity of more than 2 million bytes. The match was held at Columbia University whose Department of Electrical Engineering and Computer Science owned the Supernova. The IBM machine belongs to Columbia's computer center.

The sport of kings, too, has not been immune from the minicomputer invasion. Race tracks in several countries are using minicomputers—usually equipment from Varian Data Machines—to handle betting operations. Several parimutuel systems have been configured around the Varian machines by Western Totalisator of Montreal. The system compiles betting information and at the same time calculates odds and dividends. In addition, the system constantly updates the track infield board and auxiliary displays around the clubhouse.

"Our typical system is so fast," says a Western Totalisator executive, "that by the time the horses are in the backstretch in each race, a complete sales report for that race already has been generated by two high-speed printers."

Horsing around

And, with all those minicomputers around the horses, it is only natural that there are rumors of people using them to do their own personal handicapping. There has never been any evidence of this, but the temptation to use a mini "to beat the horses" must be overpowering. There is something of an analogy in the story of the man who uses a minicomputer to follow fluctuations in the Dow-Jones tape to play the stock market. The story is that he's successful at it, too.

Even when a minicomputer company stakes out a specialized field of expertise, its cpu's often end up in unexpected situations. Interdata, for instance, is big in data communications so it didn't surprise anyone when the company nailed down the contract to supply a clutch of minis for the complex communications network of the Royal Canadian Mounted Police. The network uses some 25 Interdata cpu's and will eventually handle 1,000 terminals.

Interdata president Daniel Sinnott

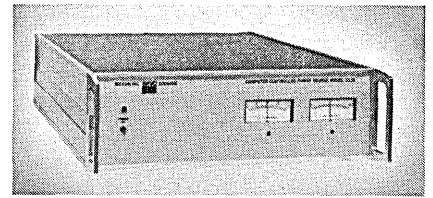
has been taking some good-natured ribbing about Mountie Nelson Eddy riding off into the sunset singing "Indian Love Call" with an Interdata mini on his horse. "I can't quite see a cpu or a terminal on a horse, although a lot of people joke about it," says Sinnott. "But I can visualize a Mountie in a remote outpost surrounded by 15-foot snow drifts with his trusty data communications terminal at his side."

An Interdata mini is also an unsung star of the silver screen, being an instrument used frequently by Hollywood's noted special effects man, Doug Trumbull, who is best known for his special effects in the film "2001." Also in the science fiction film "The Andromeda Strain," the complicated sequences of the mysterious viruslike crystalline life form that invades earth were developed by the Interdata mini, Across the continent, in Cambridge, Mass., another Interdata machine is in use at MIT recording the random bumpings of blocks by gerbils. The gerbils' activities are being recorded in a scientific project studying random behavior.

What of the future? While many are predicting the widespread growth of minis in the home and office, there are indications that they will touch people increasingly in unusual ways. A few years ago, Honeywell was excited to report that its minis were playing an important role in the automation of Paris' Metro system, but now that application is taken for granted. And lately a Honeywell mini has been operating an experimental driverless taxi in England. The passenger simply inserts a magnetically encoded ticket into a slot in the taxi and he is whisked to his destination. Perhaps that application will be taken for granted in a few years.

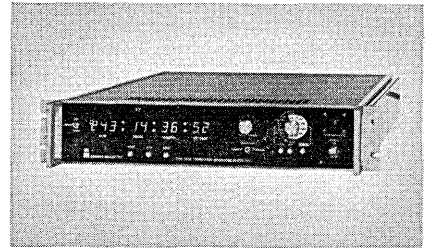
More than anything, though, it is the sheer force of the minicomputer boom that is likely to spread the unusual applications. It is a matter of simple arithmetic: The more machines there are, the more machines there will be in offbeat applications. And, in this regard, as far as the dropping prices of minis are concerned, Data General's Edson de Castro has some blasphemy for those who worry about price cuts. "I expect to see the prices of minis continue to decline at the same rate, or even at a faster rate than they have in the past," de Castro says. "In five years I would expect to see a mini sell for \$1,000 or less."

In addition, minicomputer peripheral prices have begun to decline at an even faster rate than cpu's, with the result that systems costs are still dropping rapidly. All this simply means that the only limits to where minicomputers will end up are those of human imagination. □



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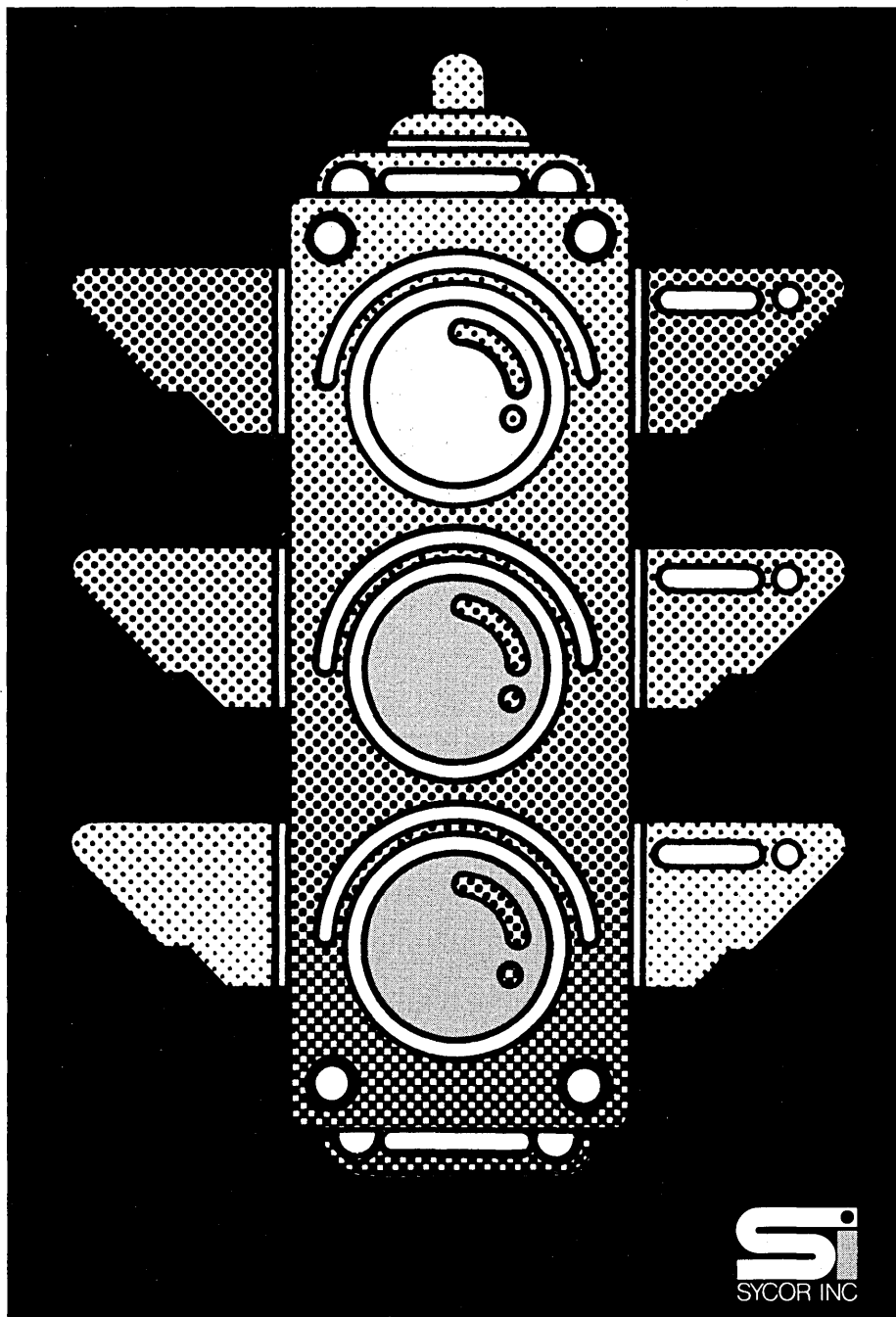
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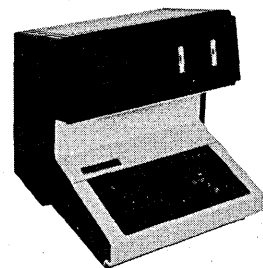
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The main purpose is to deliver computing power to those who wish to use it

Speaking of Minis

by Fred Gruenberger and David Babcock

Starting in 1967, a breed of computers now categorized as minis appeared. By 1973, there were several dozen manufacturers making such machines, and they had reached such a degree of uniformity that they can be described as follows:

1. Their central processing units sell for between \$3,000 and \$20,000.
2. Their word length is either 12 or 16 bits (most often 16).
3. For most of them, their mainframes measure 19 x 11 x 21 inches (to facilitate rack mounting).
4. Their internal operating speeds are from one to four microseconds per full word addition.
5. All of them offer approximately the same range of operation codes and utilize much the same set of schemes for addressing core stores of up to 65,536 words within the constraint of their short word lengths.
6. Some of them offer microprogramming capability, through the addition of writeable control storage.

There is no generally accepted definition of the term "mini" in the field. To some extent, the chief distinction from other computers is made on the basis of physical size, but as soon as you try to pin down the word "mini," exceptions will pop up. Printed surveys of the field tend to get out of date quickly.*

Nevertheless, the mini market clusters around machines that are decidedly similar. Indeed, if the dozen or so most popular minis were photographed together, the casual observer would have difficulty in telling one from the

other without looking closely at the nameplates.

If a mini is being used as a stand-alone general-purpose machine, it will have next to it the ubiquitous Teletype terminal, and boxes full of rolls of punched paper tape. The use of paper tape as an input/output medium is one of the biggest drawbacks to successful proliferation of the minis as general-purpose machines. To be sure, every mini is capable of supporting more sophisticated I/O gear (e.g., punched

... few devices in our technological society that are required to function continuously.

card readers, line printers, and magnetic storage devices), but these peripherals are expensive in relation to the cost of the cpu. Given the financial resources to hang good I/O gear on a mini, most users would prefer to get a second cpu, or to increase the central storage capacity of the first cpu, and we're back to paper tape again. There is clearly a need for a truly inexpensive cassette tape drive that is better engineered than the modified audio drives that appeared early in the game.

By and large, the minis are extremely reliable devices. The central processors can and do operate for months without any sign of trouble. The number of interconnected components is small, and the packing density of those parts is low. The designs are not pushing the state of the art electronically.

The minicomputers in their early stages of development were marketed almost exclusively to the original equipment manufacturers (oem's). That is, the machines were sold in large lots to the makers of other equipment; for example, to the makers of key-to-disc systems. In this atmosphere, the mini maker produced a bare cpu, with little or no software beyond a simple

assembly language and some diagnostic utility programs. Use of minis as free-standing computers, to be sold to end users and to function as general-purpose computers, was carefully avoided.

By 1970, most of the mini makers were offering such pieces of software as a FORTRAN compiler, a BASIC language interpreter, an RPG program, editing routines, more sophisticated assemblers, and operating systems. Attention began to focus on the use of minis as the heart of complete computing installations.

This notion seemed to run counter to the general trend in computing; namely, to centralize and concentrate computing power in larger and larger machines. There is no question that as computers get larger, the cost of each executed instruction falls significantly. Thus, it is reasoned, by replacing many small machines with one large machine that absorbs the work load of all

... an idle computer is not necessarily a bad thing ...

the small machines, the total cost of computation can be lowered. This line of reasoning is called the "economies of scale" argument. A crude analogy is found in the transportation of people: the cost per mile per person is much lower in a bus than in individual cars.

A parallel argument urges that computing power be furnished to the small user via time-shared use of a large machine. The person who needs only a small amount of computing, or who needs computation at widely spaced time intervals, will be better off economically, the argument goes, by buying a small time-slice of a large machine, rather than by having his own machine.

To a large extent, these arguments rest on a deep fear that unless comput-

This article is adapted from material in the book *Computing With Mini Computers*, published in June by Melville Publishing Co, a corporate division of John Wiley & Sons, Inc.

*One of the best such surveys is "Comparative Criteria for Minicomputers," by J. L. Butler, *Instrumentation Technology*, Vol. 17, Oct. 1970, pp. 67-82. This paper is reprinted in the book, *A Practical Guide to Minicomputer Applications*, Fred Coury, Ed., IEEE Press, 1972. The book reprints 28 articles on minicomputers.

Speaking of Minis

ing power is concentrated, some computer might stand idle. Here the analogy is always made to the generation of electric power, where few users can afford to operate their own generators, and all users are better off by having electricity generation concentrated in a relatively few installations.

There are few devices in our technological society that are required to function continuously. Nearly every device built by man has as its chief function, if we judge by usage, to sit and rust. We use our personal cars, for example, on the order of 4% of the time, and the 96% of idleness does not disturb us unduly. The desk calculator in our office is utilized much less than 1% of the time, but the university does not schedule people to absorb the 99+% of the idle time. And so it goes with device after device; we expect them to sit idle most of the time, since this idleness adjusts them to our needs and desires, rather than the other way around. Those who advocate economies of scale most avidly would balk at a centralized, time-shared pencil sharpener; they seem to enjoy the convenience of having small, inefficient units in their offices.

Those devices that must function around the clock do so because of the huge investment necessary to establish any usage at all. We have had the same situation for a long time in the computing business, where "huge" might mean a machine that cost \$100,000 or more. An old rule in the computing game says that machine dollars must always be matched with people dollars. A machine that cost \$100,000 will rent for around \$2,500 per month, and the rule says that it will require another \$2,500 per month in salaries of the people who operate it (programmers, keypunch operators, console operators, and so on).

The minicomputers currently sell for around \$10,000, counting everything that is needed to make them useful. The corresponding monthly rental figure is thus about \$250, and the matching amount for people will not buy one whole competent person.

But the minis are coming, in large numbers. Used as general-purpose machines, they will cause a revolution in the way computing power is delivered to its users. We must begin to think in terms of the cost (per million executed instructions, say) to the user, rather than the cost of raw cpu time. Above all, we must begin to get used to the idea that an idle computer is not necessarily a bad thing, and may be quite a good thing.

Consider the other end of the electric power generating network that is so often cited as proof of the value of centralization. True, we all enjoy the benefits of centralized generation of electric power and the low costs that accrue from it. But to the *user* of electric power, the analogy breaks down. A typical home today may have 40 electric motors, totalling perhaps six horsepower, but seldom having more than one horsepower in use. The parts of the home that need physical power could be run, in theory, with one three-horsepower motor and a lot of shafts and belts and power takeoffs. The industrial world saw how silly that was, at the turn of the century. It has been universally concluded to put the power where it is used, even though the total available power is then much greater and most subunits will be idle most of the time.

Now, analogies are tricky and dangerous, and it remains to be decided whether the use of computing power corresponds to the generating end of the electricity analogy or to the home-use end. The rise in the use of minicomputers is an obvious expression of the belief by someone that computing use is analogous to the use of electric power in the home.

The argument is strengthened by another fact of life. When computing power is centralized and concentrated, it becomes economically necessary to minimize idle time of the cpu; the total investment must be protected by driving the large computer continuously. This means that elaborate mechanisms must be created to feed an endless stream of problems to the large machine, and complex communications links must be set up to move the problems from the end users to the machine and move the output back to the user. Moreover, complicated control and bookkeeping systems must be set up to keep the whole mess straight, and these systems themselves absorb a significant amount of the computing power that is available.

Big computers are intrinsically more efficient than small computers, but

... the case for cost-cutting via time-sharing is surely not clear cut.

they tend to defeat the main purpose, which is to deliver computing power to those who wish to use it. Large computers have a nasty way of inducing users to serve the machine, instead of having the machine serve its users.

The attempt to bring the economies of the large machine to the small user via time-sharing can also be attacked. There have been few studies made of the true cost of operating a time-shared terminal, but the commercial vendors

of such terminals agree that they must realize upwards of \$1,000 per month per terminal to stay in business. Figured over five years (which is about the life of a computer these days), this amounts to \$60,000. It is possible to acquire a complete computing installation for well under \$20,000. There is an imbalance here—something is wrong. The raw costs neglect, of course, the ancillary requirements for operating one's own installation (and these can be severe), but the case for cost-cutting via time-sharing is surely not clear cut.

Among the vendors of minis who foster the free-standing environment and furnish general-purpose software,

... human-engineered software that is thoroughly debugged and tested and made idiot-proof.

the current leaders, in terms of the number of machines installed, include Digital Equipment Corp., Varian Data Machines, Hewlett-Packard, Data General, Microdata, General Automation, and Interdata. For purposes of putting together an introductory textbook, we had the use of a Varian 620/L at California State University, Northridge.

The 620/L can be considered as typical of the minis. Its throughput power compares favorably with that of the IBM 704, which was once the giant of the field. The Varian mainframe, plus a Teletype terminal and a photoelectric tape reader, constitutes a modest computing installation, suitable for learning a great deal about the art of computing, and capable of grinding out a lot of work that is usually put on much larger machines.

Just what sort of work can be done with a mini that is completely free-standing?

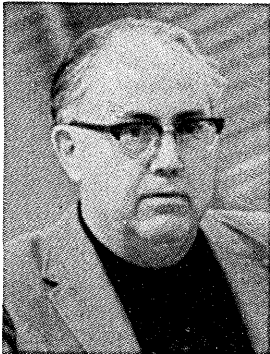
1. It can be used as a replacement for a general-purpose time-shared terminal. Many users rent a terminal which is then used for small engineering calculations, using FORTRAN or BASIC. Much of this use can be done less expensively on a dedicated terminal (e.g., a mini plus Teletype terminal or other keyboard device). One of the advantages of the time-sharing approach is that the user can buy in at a low level, perhaps as low as \$500 a month to start. The initial investment in a dedicated terminal will be much higher, although there is no reason why dedicated terminals could not also be rented (lease plans for the minis themselves have been offered).

2. Or, stand-alone minis can replace special-purpose terminals. Many terminals are rented for specific applications; for example, a doctor's billing

procedures. The central machine is programmed for medical paperwork, and individual doctors subscribe to the service. Much the same software can be used if the terminal connects to a local mini. The main advantage thus gained is lowered cost. But there are other advantages, such as improved security; the medical records never leave the doctor's office. The interface with the telephone company is also severed (which eliminates telephone line costs, at the least). Overall reliability goes up, too; a malfunctioning cpu affects one doctor, rather than 50 doctors.

We can expect to see minicomputers in large numbers that are programmed for one specific task (medical filing and accounting, law office paperwork, small engineering problems, small business inventory control, and so on). For all such tasks, of course, someone must create human-engineered software that is thoroughly debugged and tested and made idiot-proof.

If the installation of hordes of minicomputers triggers hardware/software systems that *are* human-engineered and tested and made idiot-proof, then the small end of our industry will be miles ahead of the rest—a consummation devoutly to be desired. □



Mr. Gruenberger is a professor at California State Univ., Northridge, coordinator of the computer science program there, and the author of 21 books on computing.



Mr. Babcock is a consultant to the Computing Center at California State Univ., Northridge, and associate editor of Popular Computing, a monthly publication started by Fred Gruenberger this spring.

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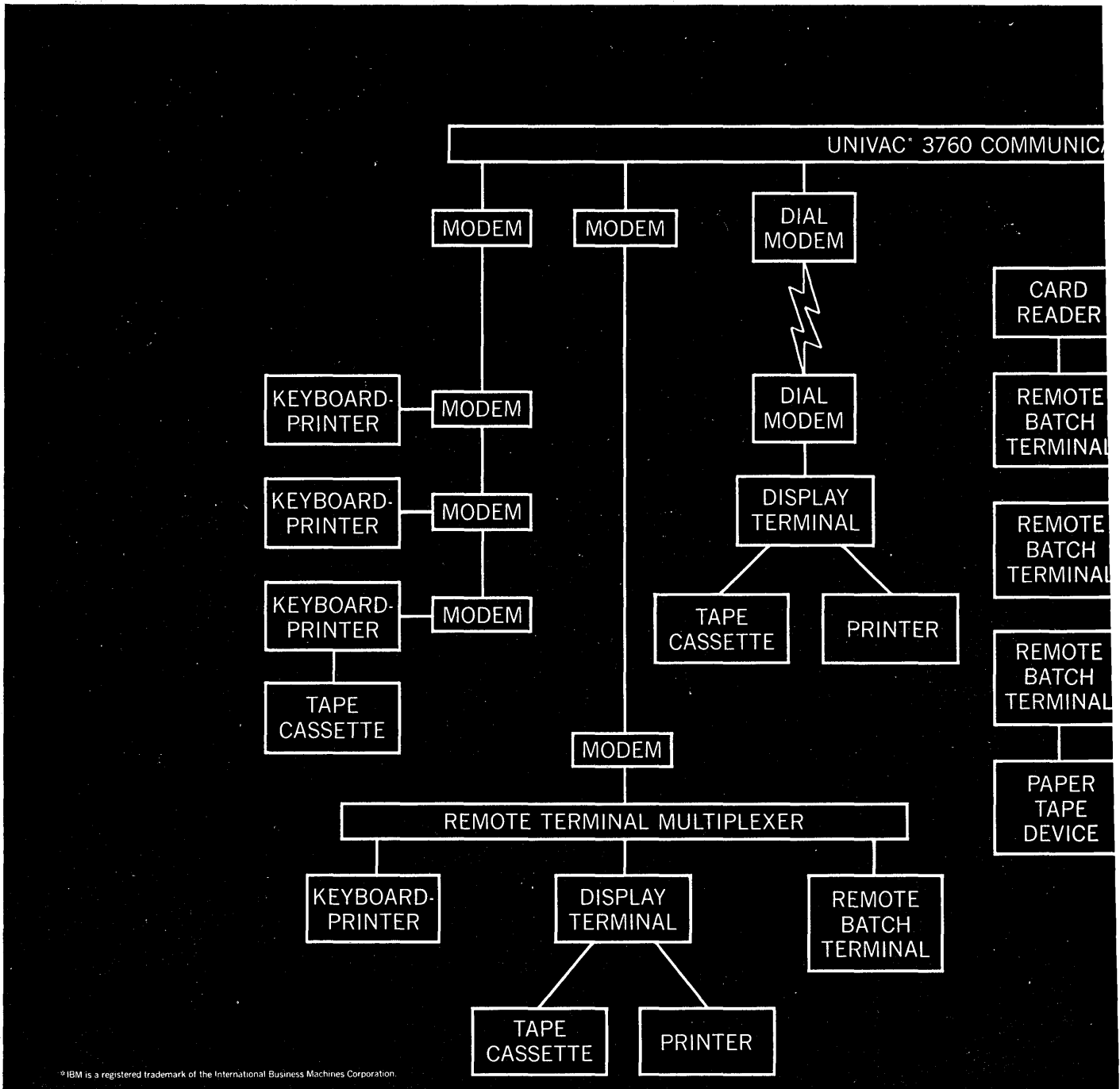
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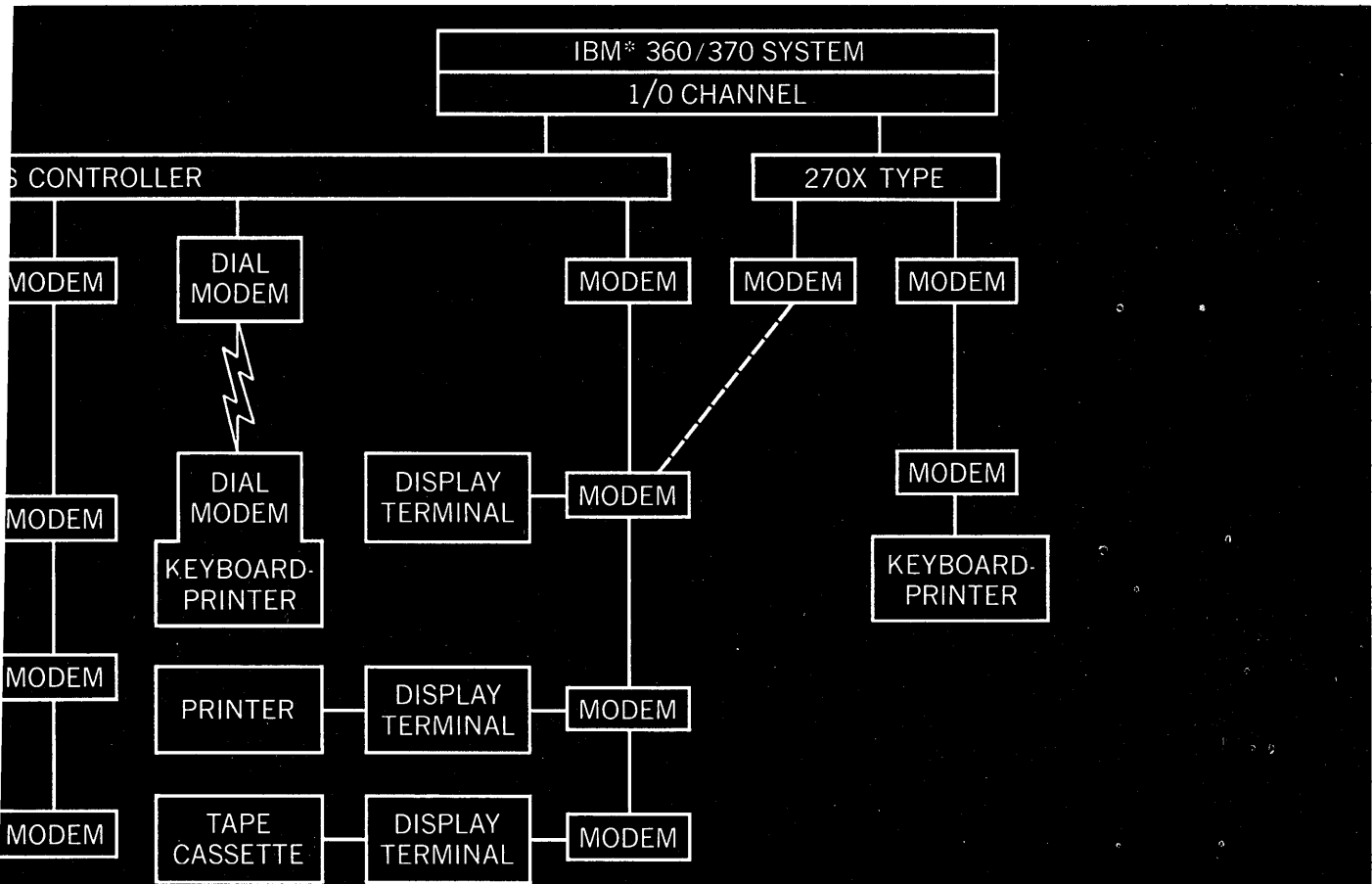
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Parry Encounters the Doctor

by Vinton Cerf

The rising interest in resource-sharing computer networks is easily detected by the rapidly increasing literature on the subject.¹ One very visible and thus far successful project is the ARPA (Advanced Research Projects Agency) Network.² This packet-switching communications network now interconnects over 40 computers at almost 40 sites.

An essential goal of the Arpanet is to share resources. Of the many programs and data bases available, two seem very appropriate to interconnect: 1) *Parry*, a simulated paranoid; and 2) *Doctor*, a simulated psychiatrist.

Parry is the psychotic brainchild of Dr. Ken Colby (Stanford Univ.). The motivation behind Parry's genesis in 1964 was the desire to understand and model the belief system of paranoid psychotics. Colby chose to have this model made externally visible through natural language interrogation by a human agent (e.g., a psychiatrist). The goal of modeling paranoid belief systems has been successfully realized. Parry is equipped with a complex belief structure which relates "self" to the threatening and vindictive world (as Parry sees it).

Not so easy, however, is the implementation of natural language communication between human and program. Colby has found himself forced to tackle a formidable "side issue": getting a program to *understand* natural language input. Parry uses a semantic pattern matcher rather than a phrase structure grammar to achieve understanding of sentences typed into it. The belief structure is searched to determine Parry's understanding of the input sentence.

If Parry believes it understands the sentence, it produces a *canned* response appropriate to the question or statement presented. Otherwise, Parry will say something noncommittal, but relevant to the context of the present

conversation. Because Parry generates sentences from a canned menu, it is capable of producing complex and convincing statements, much like those of its flesh-and-blood counterparts. At present, Parry appears to understand about 70% of the sentences presented. A new system may be able to understand 80-85%. Human patients appear to understand around 95% of the conversations in which they engage.³

Doctor is a close relative of *Eliza*⁴ a natural language program invented by Prof. Joseph Weizenbaum of Massachusetts Institute of Technology. *Eliza* was created around 1965, partly as an experiment to see how closely a transformational grammar could model human conversation. Using the same principles, Weizenbaum constructed Doctor. Essentially, these programs accept sentences and, when possible, produce new sentences from them.

For example, if the sentence "Do you know anything about bookies?" is presented, Doctor may respond with "What makes you think I know anything about bookies?" What happens is that Doctor sees a sentence of the form "Do you X?" and produces "What makes you think I X?" This is the essence of a transformational grammar.

Of course, if Doctor cannot match the syntax of a sentence, then it must punt. There are two possibilities: 1) say something noncommittal, such as "Please go on." or "What does that suggest to you?"; 2) recall an earlier match and refer to it, for example: "How does this relate to your nerves?" where "nerves" was an earlier topic of conversation.

Although no strong attempt is made to make Doctor understand the input, in Parry's sense, Doctor can respond sensibly. For example, on seeing "I hate my mother.", the Doctor might say, "Tell me about your family."

The success of the transformational

grammar is largely dependent on its ability to match the syntax of the sentences it sees. The version used in this experiment was an old one with a rather limited set of syntax matching rules. The surprising thing is that while Doctor exchanges very little information with the conversant, the resulting conversation bears close resemblance to many human conversations (which have the same informationless property).

These two programs were running respectively at the Stanford Univ. Artificial Intelligence Laboratory (on a DEC PDP-10/PDP-6 under a locally modified version of 10/50), and at Bolt Beranek and Newman, Cambridge, Mass. (on a DEC PDP-10 under TENEX). They were joined through a program running at the Univ. of California at Los Angeles (on an XDS Sigma 7 under the locally produced SEX operating system).

The transcript which follows is the verbatim conversation which occurred when the input and output of Parry and Doctor were cross-connected through the ARPA Network. The reader should not consider the result to be anything but a source of entertainment. No scientific or research intent was in mind, except to find out whether the mechanics of connecting the two programs could be worked out. ("*" represents Parry. "Comments" are the author's.) The conversation begins with the Doctor's opening greeting:

Good Evening.

Tell me your problems, Please terminate input with a period or a question mark.

*People get on my nerves sometimes.

I am not sure I understand you fully.

*You should pay more attention.

Suppose you should pay more attention.

*You're entitled to your own opinion.

What makes you think I am entitled to my own opinion?

*It bothers me just to be around people

1. Rustin, Randall (ed.), *Computer Networks*, Courant Computer Science Symposium 3, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972.

2. Roberts, L. G., and Wessler, B. D., "Computer Network Development to Achieve Resource Sharing," *AFIPS Proceedings*, Spring Joint Computer Conference, 1970.

3. Colby, K., "Artificial Paranoia," *Artificial Intelligence—an International Journal*, Vol. 2, 1971, pp. 1-25.

4. Weizenbaum, J., "ELIZA—A Computer Program for the Study of Natural Language Communication between Man and Machine," *Communications of the ACM*, Vol. 6, No. 3, March 1966.

in general.
 Please go on.
 *I went to the track at Bay Meadows a while back.
 What does that suggest to you?
 *I went to the races.
 What else would you like to discuss?
 *Horseracing interests me.
 Why do you say that just now?
 *There's a lot of crooked gambling going on there.
 I am not sure I understand you fully.
 *It's clear to me if not to you.
 Do you think it's likely that not to I?
 *I went to the races.
 Please go on.
 *I gamble on horses.
 What does that suggest to you?
 *I went to the races.
 What else would you like to discuss?
 *Gambling has been nothing but trouble to me.
 Why do you say that just now?
 *I've had experience with crooks gambling at the track.
 I am not sure I understand you fully.
 *I've already told you enough about that.
 Oh? I enough about that?
 *I went to the races.
 Comment: This has to be the most persistent and patient paranoid I have ever encountered.
 Please go on.
 *Do you know anything about bookies?
 What makes you think I know anything about bookies?
 *A bookie didn't pay me off once.
 What does that suggest to you?
 *I beat up the bookie who did not pay off, and I thought he might use his friends in the underworld to get even with me.
 What else would you like to discuss?
 *What do you know about racketeers?
 Why do you ask?
 *What experience have you had gambling?
 Why does that question interest you?

*I like horseraces.
 What else do you like?
 *I know the mob controls the big rackets.
 Who are you really talking about?
 *Have you ever really thought about the MAFIA?
 Suppose you ever really thought about the MAFIA?
 *Let's talk about something else.
 I am not sure I understand you fully.
 *You keep asking me the same things, why not change the topic?
 In what way?
 *What do you mean?
 Why are such questions on your mind?
 *I thought I told you, people get on my nerves.
 Your nerves?
 *Well, I don't know.
 Don't you really know?
 *I would say so.
 Please go on.
 *I would rather not discuss that anymore.
 Would you like to discuss your nerves?
 *I guess so.
 What does that suggest to you?
 *What are you getting at?
 What answer would please you most?
 *It's not a matter of like or dislike.
 What else would you like to discuss?
 *I am getting tired of answering the same questions over and over.
 What resemblance do you see?
 *Why do you need to know that?
 What do you think?
 *I don't understand your motives.
 Why don't you understand my motives?
 *Shouldn't I be?
 Comment: ???
 Why do you say that just now?
 Comment: I was wondering the same thing.
 *That's just the way it is.
 Suppose that's just the way it were not.
 *So?

I am not sure I understand you fully.
 *You harp on the same questions too much.
 What does that similarity suggest to you?
 *I don't get you.
 Do you wish that you did get I?
 *It's about time you showed some interest in my feelings.
 Oh? I showed some interest in your feelings?
 Comment: Must have been an accident . . .
 *I will help you if I trust you.
 Do you wish that you trust I?
 *Maybe yes, maybe no.
 You don't seem quite certain.
 . . . Excuse me for just a minute. Sorry to have interrupted you, please continue . . .
 *Really?
 Please go on.
 *In my opinion you have a one-track mind.
 What makes you think I have a one-track mind?
 Comment: You ready for this?
 *I used to go to the track every week.
 What does that suggest to you?
 *I avoid racetracks now because the races are fixed.
 Is that the real reason?
 *I'd rather not discuss it.
 What else would you like to discuss?
 *That's something I don't want to go into.
 Does that trouble you?
 *I went to the races.
 Why do you say that just now?
 *It's none of your business.
 Why are you concerned over my business?
 *I don't confide in strangers.
 Don't you really confide in strangers?
 *Let's change the subject.
 Perhaps that concerns your feelings.
 *I went to the races.
 I am not sure I understand you fully.
 *What's wrong with you that you keep on bugging me about this?

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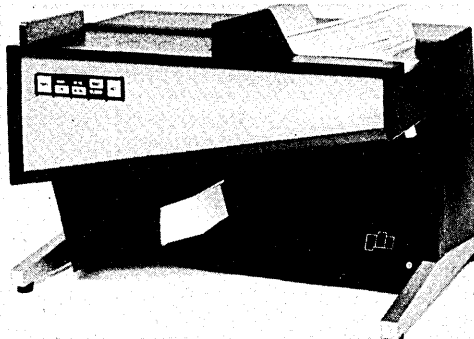
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CIRCLE 94 ON READER CARD

Parry

Who are you really talking about?

*The way you repeat yourself is getting ridiculous.

Suppose you repeat myself is getting ridiculous.

Comment: Howzat?

*There are some tricky operators down there.

Are there really some tricky operators down there?

*The guys involved in the horseracing racket.

Please go on.

*You are a real nag.

Comment: Just one of the horses.

Does it please you to believe I am a real nag?

*I have had enough of this.

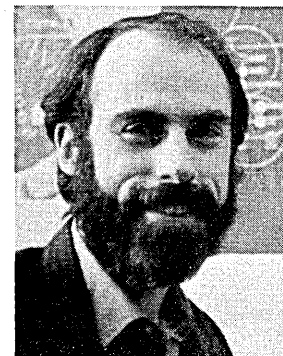
What does that suggest to you?

*Goodbye.

It's been my pleasure, that \$399.29 please.

Comment: Talk about tricky operators . . .

Acknowledgment. The idea of connecting these two programs has occurred to several people, among whom R. Tomlinson (Bolt, Beranek and Newman) should be singled out as having also successfully accomplished this task. □



Dr. Cerf was born in New Haven, grew up in Los Angeles, and did his undergraduate work in math at Stanford Univ., where he is now teaching and doing research in computer networking. After working for IBM for two years, he did graduate work in computer science at UCLA, receiving his PhD in 1972. Dr. Cerf is very happily married, plays tennis occasionally, enjoys hiking, practices black magic, and collects and consumes old books and good wine with equal relish.

The background, the people,
and the implications of the Tulsa trial

Telex vs. IBM

by W. David Gardner, Industry Editor

For the first time in its history, the destiny of the International Business Machines Corp. has in recent weeks been in the hands of an outside force—Federal Court Judge A. Sherman Christensen. The chief reason for this is that the Telex Corp. has charged that its destiny has been in the hands of an outside force—the International Business Machines Corp.

Judge Christensen has been presiding over the non-jury trial of Telex' \$1.2 billion antitrust claim against IBM and his unusual power over IBM is explained by the fact that he delivers the decision in the case. Barring a settlement between the two companies, the judge's decision is expected to be appealed, probably all the way to the U.S. Supreme Court.

The Salt Lake City judge, who has had extensive experience in antitrust and patent cases, startled observers during the case with his knowledge of the computer industry. Moreover, by his incisive questioning from the bench in Tulsa he demonstrated that he had carefully studied the voluminous exhibits and depositions filed in the case.

The case focused on the attempts of Telex and other manufacturers of plug-compatible devices to attach their equipment to IBM's cpu's and systems. In the process of the case many legal and economic issues that cut across the entire industry were raised. Telex charged—among other things—that IBM had instituted pricing measures designed to hurt plug-to-plug competitors and that IBM designed products with an eye to making it difficult for the plug-compatible makers to attach their products to IBM equipment.

During the course of the case, IBM's attorney, Thomas D. Barr, appeared to be relying heavily on the DuPont "Cellophane Case" as precedent in the IBM defense. In brief, the U.S. Supreme Court had ruled that DuPont, which was responsible for the manufacture of all cellophane, was not monopolizing that market because there were other kinds of competing wraps, such as wax paper. Barr argued that IBM monopolized its own market and products, that other computer firms monopolized

their markets and products, too, and further that they all had the right to monopolize their own markets and products.

"IBM must monopolize every product which it manufactures, which might be replaced by a product manufactured by someone else," said Barr. "It is true that every manufacturer of electronic data processing systems monopolizes all of the products which it manufactures which could be replaced by a product manufactured by another. It is even true, as I said in the beginning, that Telex is a monopolist, because these control units that it manufactures . . . only the tape drives or the disc drives that Telex makes can be plugged into those."

The Telex attorney, Floyd Walker, developed an argument holding that the competitive aspects of the plug-compatible marketplace take precedence over all else. He maintained that IBM was a monopolist and had attempted to illegally stifle competition by the plug-compatible manufacturers.

The Telex lawyer indicated that "once the seed of competition starts to grow" in the IBM product line, then IBM should not be free to use activity which, "in effect, destroys the ability of new entrants to come into the marketplace, and either destroys or retards the ability of those people in the marketplace to continue to grow."

At one point, Walker said: "The evidence that we produced in this case, up to this time, leaves no doubt what the predatory intent was in this particular situation, and by way of history, as the competition in the plug-compatible field started to generate, by 1969, both industrial users and government users were recognizing the advantages to being able to select from a multitude of sources, or from a number of different sources, the peripheral equipment that they would use."

How it started

The genesis of the plug-compatible industry is interesting, and, in some respects, ironic. Trial briefs filed by both IBM and Telex in the case reveal that a user and not a manufacturer was

the prime mover in starting the IBM-plug-compatible industry. In 1966, bids for magnetic tape drives compatible with IBM cpu's were solicited by DuPont. Telex won the DuPont bid and the new industry was born. The irony is that DuPont, which fathered the plug-compatible industry, is now being invoked by IBM (the Cellophane case) to defend itself and, if that defense is successful, many believe that the plug-compatible industry will be decimated.

The plug-compatible industry is not exactly thriving today. Indeed, Telex' list of "damages and detriment" filed in the case reads like a computer industry Book of Job. In that list, Telex maintains that "the cumulative effects of IBM's predatory acts" have chopped revenues and profits, tarnished Telex' reputation, impaired Telex' ability to raise funds, and hurt its chances of hiring key people. Nevertheless, Telex president Stephen J. Jatras testified during the trial that as recently as 1970 things looked rosy for Telex.

"We had the image of a growth company that was going to go to the moon," Jatras testified. "We had the people in Wall Street, people at the banks and general public, customers, believing that."

It became evident during the trial that Telex isn't "going to the moon"—its stock has plunged from well over 30 to the vicinity of 4. Moreover, other vendors in the plug-compatible market are having trouble just going to the bank, much less the moon. As the Telex-IBM trial drew to a close in Tulsa, cries of anguish could be heard from Santa Clara, Calif., where Memorex, the largest of the plug-compatible firms, was holding its annual meeting. Not only had Memorex' stock dropped from \$177 to less than \$3, but the company said it might not have enough funds to maintain its planned operations for the year.

At the Memorex annual meeting, president Laurence L. Spitters said the firm's financial problems could be traced to the "monopolistic position" of IBM and to Wall Street, which has discouraged investments in competi-

Telex vs IBM

tors of IBM.

Memorex was discussed at length during the Telex trial and IBM documents were introduced that revealed that the firm had been studied carefully by IBM with the idea of uncovering any soft spots in Memorex that could be exploited. A former IBM financial analyst who worked on the Memorex study in the summer of 1970 testified that IBM analysts felt that because Memorex had an extremely high overhead, it was imperative that the California firm achieve a high manufacturing volume to remain successful. "So it had to get quite a lot of volume," the ex-IBM official testified, "and in other words, if IBM were to turn the screw, if you will, and reduce the amount of volume that Memorex could achieve, this would be critical, insuring that it did not become a viable company."

In addition, testimony was delivered during the trial supporting the idea that several plug-compatible firms have either given up on the business or have scaled down to the degree that their plug-compatible business is relatively insignificant.

For its part, IBM maintained that Telex could not prove the damages it claims in the case and that, in addition, Telex was and is not in such poor financial condition as it claims ("Telex was successful, and my view is Telex is still successful," IBM's Thomas Barr said in May). IBM also pursued a countersuit against Telex with great vigor. In the \$25 million countersuit, Telex is charged with unlawfully obtaining IBM trade secrets and copyrights of IBM technical publications. Telex denied the charges, claiming that IBM was trying to divert attention from the antitrust case.

At any rate, the Telex trial established that Telex and other plug-compatible companies are having serious difficulties that, for some companies, have been fatal for their endeavors in the plug-compatible market. The next question is whether their problems and the slowdown in their rapid growth rate was caused by "predatory" acts by IBM, or whether IBM was simply improving its offerings to be more competitive.

In the trial, Telex attempted to establish that IBM had committed "predatory" acts aimed at the plug-compatible competitors. Documents introduced during the course of the trial indicated that high IBM management became extremely concerned with the inroads made by the plug-compatible manufacturers in early 1970 and formed a Peripherals Task Force to study and recommend action on the

issue. The mission was also known as the "Cooley Task Force," after its head, Henry A. Cooley, then a vice president of IBM's System Development Division. The work of the task force led to a series of product, marketing and financial moves by IBM that had the effect of containing Telex and other makers of plug-compatible products.

The descriptions by each company of the task force's recommendations form the basis more or less of how the two firms legally look upon the whole issue. Telex, for example, puts it like this:

"The Peripherals Task Force recommended short-term and long-range marketing plans and strategies that were intended to restrict, impede and prevent Telex and other plug-compatible peripheral manufacturers from retaining or increasing their share of the market for such products."

IBM's response is simply that the leader of the task force "recommended

that IBM improve the performance and price of its products to make them more competitive."

Changing the rules

But IBM did something new in the peripherals area in September 1970. The company announced—for attachment with the 370/145—the 2319 disc drive, which in many ways was little different from the 2314 disc drive. The price, however, on the 2319 was substantially lower—about 50%—with the result that the independents began to get nervous. There were charges that IBM's move with the 2319 was just a price cut in disguise.

Moreover, the controller function of the 2319 was buried in the cpu of the 145—a measure that tends to make life miserable for competing engineering staffs, because of the problems in interfacing plug-compatible equipment to the 145. But the 145 was only one IBM machine. In December, IBM completed the job: the 2319, called the 2319B,

IBM's Legal Army

One reason Tulsa, Okla., takes its evangelists in stride is because so many are headquartered there. It is the home of Oral Roberts ("Something GOOD is going to happen to you") and of Billy James Hargis ("The Communists are Coming").

But not even Tulsa had seen the likes of the business missionary team of evangelists sent there this spring by IBM ("Ever Onward, Think"). Precise figures aren't available because IBM wouldn't talk publicly about it, but the IBM legal support team in Tulsa was thought to number about 100 persons during the recent IBM-Telex trial here.

During the weeks when the trial was under way, a stroll along Boulder St. in downtown Tulsa late at night was revealing. Tulsa is a modern industrial ghost town at night with the streets virtually deserted and the office buildings shut up tight for the night. But the IBM building was humming. On any given night between 40 and 80 cars were parked in the parking lot. The three floors of the building were lit up and a steady stream of people went in and out of the building. But not freely. Uniformed security guards stopped everyone entering and leaving the building.

"The IBM guys were all over the place," said one court stenographer who often delivered transcripts to the IBM building. "They worked hard, too. Sometimes 12 hours a day, 7 days a week. But I really couldn't figure out what they did."

The team represented a wide

range of jobs and talents—file clerks, secretaries, librarians, paralegal assistants and attorneys. Many came from areas where key IBM plants are located—San Jose, Calif., Rochester, Minn., the New York City area. But what were they doing?

Many things, it seems. With millions upon millions of documents swirling around the case—IBM alone produced some 40 million documents in the Control Data case and Telex had access to these—the IBM team spent considerable time sifting through documents and depositions to prepare its attorneys for the next day's trial.

Members of the team, for example, were said to review the depositions of—and exhibits pertaining to—witnesses who were expected to appear in the courtroom the following day. The lawyers were then briefed on the witness. One IBM lawyer was usually assigned to a key witness with the responsibility for knowing all pertinent information about him, as well as having ready access to documents and papers that might relate to him.

Once in the courtroom, some IBM attorneys and team members often sat in the public section of the courtroom. The IBMers took over the press section—by default—early in the trial and at times there was a virtual bucket brigade of documents and papers flowing along the courtroom from the IBM trial chambers to the public section of the courtroom to the attorneys try-

was announced for the 360 and 370 lines.

During the Telex case, Telex charged: "Prior to announcing the 2319B disc drive for attachment to 360 and 370 central processing units a financial analysis, presentation and report was made to IBM's management which showed that Telex and Memorex would have to reduce their rental charges for their plug-compatible disc drives in order to keep their drives on rent; and, that such reduction would cause Telex, Memorex and other competitors to be deprived of substantial profits because of the lowered rental price."

IBM took issue with that statement, but there were enough IBM documents introduced and testimony taken from ex-IBMers during the Telex case to substantiate the notion that IBM top management was not unaware that its actions would damage the plug-compatible firms.

Over the following months it soon

became evident that there was a new ball game under way between IBM and the plug-compatible companies. In the magnetic tape drives, too, IBM announced a new and substantially cheaper version of its old workhorse 2420 model. Virtually every new peripherals announcement from IBM contained an unpleasant surprise for the independents. Besides cheaper discs and tapes, and buried controllers, there were other features that would test the imaginations of the engineering departments of the independents. To its chagrin, the IBM-plug-compatible industry learned that it wasn't plug-compatible anymore.

None of the first batch of controllers, tape drives or disc drives represented much of a step forward in the way of new technology and might best be described as stopgap measures. Depending upon how you looked at it, IBM was protecting its product line or blocking off the competition.

In mid-1971, IBM was moving on

another front. A group of top IBM executives who came to be known as the "Blue Ribbon Task Force" began considering the idea of offering long-term leasing plans to IBM customers. Since IBM's computer products have traditionally been offered on regular 30-day lease plans, those IBM products offered fat targets for replacement by plug-compatible firms. Any leasing plan by IBM that would lock in customers for several months would virtually eliminate those IBM products from replacement opportunity by the plug-compatible companies. The Fixed Term Plan (FTP), which Telex maintained "tied" IBM's competitive peripheral products to noncompetitive central processing units" was announced by IBM. Telex then maintained that once customers were locked into a contract with the FTP (on peripherals), IBM raised prices on products that weren't covered by the FTP. "The price manipulation," Telex maintained, "was the lowering of prices on

ing the case.

IBM is also understood to have developed its own extensive computerized data base and information retrieval system. There is speculation that at least portions of it are on-line to White Plains, where IBM maintains a documents library. And, IBM being IBM, the system is thought to be even more sophisticated and comprehensive than the one developed by Control Data. When IBM and CDC settled their case earlier this year, CDC destroyed its system at the insistence of IBM—with the most important result being that the CDC system is not available to either Telex or the Justice Department. Each has claimed that they needed the CDC system to prepare their cases against IBM.

IBM appears to have refined and enlarged its legal and legal support team since the Greyhound trial in Phoenix some months ago. For the Greyhound case, the team was thought to have been smaller—perhaps 40 or 50 persons. IBM took over two floors at the Del Webb Town House in Phoenix where tight security restrictions were instituted. Anyone who wandered onto an IBM floor without a pass was turned back by an IBM guard. IBM, of course, won that case, although Greyhound has appealed the decision.

In Tulsa, the entire IBM operation involved in the IBM-Telex case is presided over by Thomas D. Barr, who serves as lead attorney on the IBM trial team and as the top execu-

tive of the back-up group that works in the IBM building late at night. As the case unraveled in court, Barr read from voluminous and what appeared to be extremely carefully prepared notebooks.

Barr is the man of the hour for IBM. Often he comes and goes in a private IBM jet. He is a member of the prestigious New York law firm of Cravath Swaine and Moore, which has represented IBM through the years in various antitrust and other cases. Barr gained some earlier public exposure as the counsel for the Kerner Commission.

In the courtroom, Barr wears the traditional IBM uniform—dark suit and white shirt. From time to time, he walks around the courtroom with the swagger of a Marine, and that is not unusual since he once served in the Marine Corps.

Nicholas Katzenbach, IBM's legal counsel and U.S. Attorney General at the time the Justice Department began investigating IBM in the late 1960s, popped up in the courtroom on a couple of occasions during the Tulsa trial, but it is clear that the case is Barr's show. Barr was lead attorney on the Greyhound case and is expected to be the lead attorney when IBM's case with the Justice Department goes to trial.

Barr displays an intimate knowledge of the computer industry, and moves adroitly in questioning marketing or technical people on the finer technical specifications of tape drives, disc files and the like. His style is direct and succinct.

He can be rough, too. When a securities analyst—an ex-IBM—took the witness stand and testified against IBM, Barr delved into the securities analyst's own business with his customers and suggested that the analyst had violated securities regulations.

Like most of the top members of the IBM team, Barr has been staying at the Center Plaza apartment building where IBM is said to have taken some 40 apartments for the duration of the trial. Others staying at the Center Plaza include the judge who is presiding over the case, Judge A. Sherman Christensen, and the lead Telex attorney, Floyd Walker. One can only imagine the Alphonse and Gaston vignettes that occur when all three stand before an elevator.

In many ways, the Telex case, like the Greyhound case before it, is sort of pre-game calisthenics for the upcoming Olympic event—the trial of the Justice Department's case against IBM. Thomas D. Barr and his marvelous legal machine have already proven themselves once—in the Greyhound case—and they have been polishing their skills further in the Telex case for the day when they meet the Justice Department in court.

And what of the Justice Department? It didn't even send an observer to the IBM-Telex trial. But that shouldn't be so surprising because they didn't send anyone to the Greyhound trial either. □

Telex vs IBM

IBM's tapes, discs and printers by offering long-term leases on those products and then later increasing the rental price on the portion of the customer's system that was not under the long-term lease." Indeed, IBM did announce price increases on cpu's, memories and various services in mid-1971. In addition, Telex claimed that "IBM knew that its revenues and profits" from products on the FTP would be reduced.

However, regarding revenue and profits, IBM said it believed "FTP would

increase both IBM revenue and profit as compared to what would happen to revenue and profit if no attempt to meet competition was made by IBM." Also, IBM claimed that a successful FTP program would reduce some of IBM's costs for field engineering, reconditioning, marketing, surplus parts and some other costs.

"In sum," IBM stated in a brief, "IBM adopted FTP under intense competitive pressure for the purest of competitive reasons—to reduce costs and to meet lower competitive prices and more desirable terms existing in the marketplace."

Telex also made an issue of IBM's so-

called Smash announcement of last year. Telex claimed that IBM made its 155 and 165 models obsolete by the 158 and 168 Smash announcement with a "predatory purpose" of reducing "the number of computer systems in the hands of end users to which Telex and others can attach their competitive plug-compatible memories and disc drives." Telex also observed that IBM's decision to move memory from separate boxes into the cpu's of the 158 and 168 "makes it more difficult and expensive for Telex and others to attach their plug-compatible memory products." IBM generally denied Telex' charges regarding the Smash announcement.

The IBM attorneys also used the trial to observe that Telex may have had problems other than those created by IBM. Perhaps the most crucial problem encountered by Telex and most of the other plug-compatible firms was a ruling by the Accounting Principles Board that compelled the firm to cease reporting lease transactions as sales. That requirement caused the stock of most of the plug-compatible companies to drop, which, in turn, made it more difficult—and in some cases impossible—to raise money.

Telex had other difficulties: the Tulsa firm had a three-month strike in mid-1971 and IBM also charges that Telex suffered "a manufacturing collapse which ended with the termination of the president and vice president of manufacturing in the spring of 1972." Telex also lost heavily in tape drive sales to Storage Technology Corp.

And at the apex of all this sat Judge Sherman Christensen. He sat listening intently, seldom changing expression, through a long testimony that ranged from spicy tales of stock manipulation and missing secret documents to stultifying dissertations on the economics of the computer industry and on the finer technical points of tape drive controllers. He moved the case forward in a deliberate manner; when the attorneys wandered, he kept the case on course, often with a dash of Utah folklore. He poked good-natured fun at the "eastern establishment" lawyers from New York and Tulsa and he even evoked Robert Frost at one point when he was attempting to jog the lawyers along. He regularly complimented the attorneys on both sides for doing their jobs well. Nearly every night during the trial, Judge Christensen returned to the Federal Courthouse in Tulsa, where he placed a blanket over his lap and pored over the exhibits and depositions. As the trial progressed, then ended, the feeling grew that new antitrust ground had been explored and that the computer industry might never be the same. □

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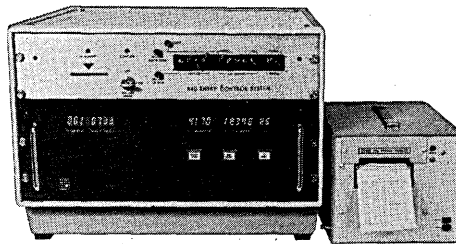
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CIRCLE 106 ON READER CARD

The rating scales appeared to be measuring what they were intended to be measuring

Evaluating Computing Personnel

by Richard D. Arvey and Joseph C. Hoyle

One of the more perplexing problems that faces management in organizations that employ electronic data processing personnel is how to evaluate and rate the job performance of these individuals. The problem is compounded because of the complexities and variety of job duties involved in such jobs. "How can I rate a programmer analyst's job effectiveness if I am not really sure what he's doing in his job?" asked one edp manager. An even further complicating feature is the overlapping duties of individuals with different job titles (e.g., programmer analysts, system analysts). Individuals with nominally different jobs may perform similar tasks, or conversely, individuals with the same job title may perform very different tasks within the same organization.

With these complexities in mind, we set out to answer two questions concerning several of these computer related jobs:

1. What are the major dimensions of job behavior? That is, what are the basic tasks or functions involved in these jobs?

2. How can we evaluate and measure performance of individuals along these important dimensions of job behavior? Once we know what is involved in the jobs, how do we go about evaluating and rating individuals?

We will describe our efforts to discover the major dimensions of job behavior and to develop instruments to measure performance along those dimensions for individuals employed in three basic jobs: systems analysts (SA's), programmer analysts (PA's), and computer operators (CO's). We conducted our work within a large

midwestern computer manufacturer which employs approximately 3,000 edp personnel in the U.S. and Canada.

Behaviorally based rating scales

Essentially, the technique we used involved the participation of appropriate computer personnel in a series of workshops to consider, in painstaking detail, the major components or dimensions of the job in question. Fur-

ther, these individuals were asked to generate specific "critical" incidents to serve as anchor points along rating scales which reflected these dimensions. Following are the steps we took in developing the performance rating scales.

1. We first met with individuals employed in the three job areas in separate groups of approximately 15 each. Various departmental and geographical areas were represented in each of

1. TECHNICAL KNOWLEDGE. Keeping abreast of and retaining familiarity with software and hardware, learning new languages, application, utility routines, and/or executives, learning about central processors, peripherals, and other input/output media.
2. PLANNING, ORGANIZING, AND SCHEDULING. Effective utilization of time, planning, and scheduling of current and future work, reacting to potential problems, making schedules, etc.
3. MAINTAINING CUSTOMER RELATIONS. Trying to please the customer, answering customer questions in an understandable manner, "holding up" under customer demands and abuse, presenting new techniques on "selling" the customer whenever appropriate, providing continuing customer service, providing advice, assistance, and updating to the customer.
4. PROVIDING SUPERVISION AND LEADERSHIP. Giving technical work direction, directing and delegating assignments, motivating and utilizing personnel, calling meetings, coordinating activities, preparing cost estimates, and project schedules, etc.
5. TRAINING OTHERS. Providing instruction and guidance to customer personnel, coworkers, and/or subordinates, etc.
6. DOCUMENTATION. Providing formal narratives describing a program and/or system in sufficient detail so that others can understand and use the program and/or system.
7. MAINTAINING COMMUNICATIONS. Providing information through the use of written or verbal channels, such as letters to colleagues, established procedures, using the telephone, etc.
8. ASSESSING CUSTOMER NEEDS AND PROVIDING RECOMMENDATIONS. Studying and determining customer and/or internal management problems and requirements, including the isolation, definition, and analysis of problem and need areas. Recommending software and hardware to solve these problems and/or meet their requirements.
9. JOB COMMITMENT AND EFFORT. Putting in long hours and extra time, working on own time to acquire knowledge, putting in a full week's work, performing tasks that might be considered beyond the "call of duty," being committed to doing a good job.
10. DEBUGGING. Using various techniques (CRAM analysis, tracing of logic, etc.) in connecting the logic and associated problems in order to make a program or system operational.
11. PROGRAM AND/OR SYSTEMS MODIFICATION AND/OR DEVELOPMENT. Modifying and/or developing programs and/or systems that reflect unique solutions and/or a certain degree of "creativity."
12. CONDUCTING PRESENTATIONS. Formally providing information and/or materials to interested personnel, illustrating how a system works, developing seminars, etc.

Table 1. Major dimensions of job behavior for systems analysts and programmer analysts.

Evaluating Personnel

the three job categories. One of the first things we asked these individuals was: "What must a programmer analyst (or SA or CO) do to be effective in his job?" Some dimensions were immediately presented—such as debugging, planning and organizing, maintaining personal relations, etc. These were listed on a blackboard and discussed in order to define them with precision.

2. During this same meeting, the individuals were asked to write "critical incidents" of unusually good or poor job behavior. Critical incidents, as the term implies, are simply reports of different types of behavior that are especially effective or ineffective in accomplishing work objectives. Two examples of such incidents are given below:

A job was resubmitted by this

individual several times without changing the data. He refused to believe it was the job he was testing that was bad. He kept saying that he felt the system was making an error in his run.

Late in the afternoon, a salesman asked this individual to give a demo for him of standard programs plus a program which would show a special report. This individual stayed late to get the programs ready and rehearse with the salesman.

By the conclusion of this first meeting, a listing of tentative job dimensions had been outlined and several hundred critical incidents had been written in each job area.

3. Between the first and second workshop, several events occurred. We edited the critical incidents and sorted them into seemingly homogeneous job dimensions which, for the most part, reflected the dimensions generated by the workshop participants. If no inci-

dents could be categorized into a particular dimension, we dropped the dimension. We also held several meetings with a few edp managers to discuss (a) whether the tentative dimensions were meaningful and important; (b) whether there was too much overlap between dimensions; and (c) whether important components of job performance were not represented. We modified wherever necessary. At this point, there were 15 dimensions for the SA and PA jobs and 13 dimensions for the CO job. Finally, we wrote tentative definitions of the job dimensions based on the critical incidents defining the dimension.

4. We then held a second workshop where three groups of job incumbents met independently. Given a list of the dimensions and their definitions and the critical incidents in booklet form, they were asked to make two judgments—to estimate the particular job dimension which each incident represented, and to rate each incident with regard to whether it was an effective or noneffective incident of job performance. This step provided us with a cross-check on whether we had done a good job of editing and classifying the incidents in the previous steps.

The information gained from this meeting was used to prepare preliminary forms of a rating-scale booklet. At this time, it became obvious that the dimensions for the programmer analyst and systems analyst jobs were essentially the same, while the dimensions for the computer operator job differed markedly from the other two jobs. We decided, therefore, to develop one rating booklet for both systems analysts and programmer analysts and a separate booklet for computer operators.

5. We scheduled a third and final meeting. During this meeting a group of job incumbents was asked to: (a) review the dimensions and identify any which were irrelevant, poorly defined, deficient, etc.; (b) review the incidents comprising each dimension for accuracy of categorization, etc.; and (c) generate new critical incidents when they were clearly inappropriate and needed replacement or when it appeared necessary to add more incidents.

After this meeting, the rating scales were reviewed and revised again by several smaller groups of edp personnel to insure coverage across various departmental and geographic areas.

Dimensions of job behavior

The outcome of these workshops was the specification of the major dimensions of work behavior for employees in the three jobs. The major dimensions of job behavior and their definitions for PA's and SA's are shown

1. TIME UTILIZATION. Planning and scheduling current and future work in order to effectively utilize the computer and associated equipment.
2. LOGGING. Recording pertinent information associated with computer runs and/or the labeling of output reports or measures and associated magnetic media (CRAMS, tapes, discs, etc.).
3. WORK AREA MAINTENANCE. Keeping the computer, peripherals, and surrounding work area in a clean and orderly condition.
4. SOFTWARE AND HARDWARE KNOWLEDGE. Maintaining general familiarity with, and showing the ability to learn and use utility routines, executive systems, general programming principles, central processor, associated peripherals and all input/output media.
5. COMPLIANCE WITH WRITTEN AND VERBAL INSTRUCTIONS. Taking and following instructions submitted with a job in accordance with established computer operator procedures.
6. JOB EFFORT AND ATTITUDE. Making self available to help out in critical and emergency situations. Doing more than just "carrying his load," coming in on time, spending own time learning to program, showing commitment to doing the job well, etc.
7. ERROR RESPONSE. Detecting and recording pertinent information upon encountering an error condition, taking corrective action when appropriate, and/or reporting the error to appropriate individual(s).
8. MAINTAINING PERSONAL RELATIONS. Interacting effectively with coworkers and/or supervisors on a personal or work-oriented basis.
9. PROVIDING SUPERVISION, LEADERSHIP, AND TRAINING. Giving work direction, providing instruction and guidance, planning and scheduling tasks, assigning responsibilities to coworkers and/or subordinates, etc.

Table 2. Major dimensions of job behavior for computer operators.

TECHNICAL KNOWLEDGE	
<p>Keeping abreast of and retaining familiarity with software and hardware, learning new languages, applications, utility routines, and/or executives, learning about central processors, peripherals, and other input/output media.</p> <p>Because this individual has frequently demonstrated his technical expertise, he is nearly always consulted by his colleagues concerning the solution of significant and complex problems.</p> <p>This individual periodically wrote test programs using all the tools available to maintain and improve his expertise and to test new features which would enhance his job performance.</p> <p>A particular hardware unit was malfunctioning (misreading data) but was not detectable at the operator level. This individual noticed the wrong data and determined that a bit was being dropped. He determined that it was a hardware problem by using memory dumps and hardware specification manuals.</p> <p>When an output tape had no data on it, this individual determined that the option switch must not have been on at the time of the execution. A rerun showed that although the operator had the switch on, there was a malfunction in the switch itself.</p> <p>This individual was told to go to a language class but he did not feel he needed to. As he started to write a program, it became quite obvious how much time he was wasting because he didn't truly understand the use of that particular language.</p> <p>When there was a need to format employee names so that an alphabetical sort could be performed on the last name, this individual exhausted three man-weeks developing this routine only to discover that a similar routine had been developed by another member of the same division.</p> <p>Sales being low, this individual failed to see a reason to read software manuals. When he was assigned to a site, he was unable to answer elementary language questions.</p>	<p>Best</p> <hr/> <p>Typical</p> <hr/>

Table 3. Behaviorally based rating scale for the dimension of Technical Knowledge for system analysts and programmer analysts.

in Table 1. (See page 69.)

As can be seen, the final number of dimensions resulting from these procedures for the SA and PA jobs was 12. From our observations, what seems to differentiate these two jobs is the relative importance of their dimensions. For example, Assessing Customer Needs and Providing Recommendations may be of particular importance for some SA's, while the Debugging dimension may be of particular importance for PA's. Individuals employed in these two areas may find any or all of these dimensions to be important aspects of their jobs. This reasoning corresponds closely to the statement by Mayer and Stalnaker that "many different positions appear to include similar performance factors involving essentially the same tasks, but in different mixes."¹ In order to gather information concerning the importance of these dimensions, we included a section in the rating booklet to allow for estimates of dimension importance to be made by supervisors. The dimensions and their definitions for the computer operators are shown in Table 2.

Rating scale development

Once we had developed the basic dimensions, we then used the critical incidents to serve as behavioral anchor points on a rating scale for each dimension.² Table 3 shows one of the scales—in this case for the Technical Knowledge dimension for SA's and PA's. There are several aspects of this scale to note. First, the behavioral incidents are arranged along a continuum; highly effective incidents of behavior are located at the top of the scale, while incidents of more ineffective behavior are located toward the bottom. Second, ratings are made by asking supervisors to infer the level of effectiveness that could be expected of the ratee's "typical" performance and when the ratee is at his "best," and to indicate his rating by writing "typical" and "best" on the scale. Thus, no numerical value is assigned (until later), and the rating is much more of a description than an evaluation. In addition, allowing the rater to give a "best" rating will also help purge the tendency for raters to rate their men "good." We scored this type of scale by simply assigning a value of 7 to the top incident, down to a value of 1 for the bottom incident.

1. Mayer, D. B. and Stalnaker, A. W., "Selection and Evaluation of Computer Personnel—The History of SIG/CRP," *Proceedings of the 6th Annual Conference Computer Research Group*, Johns Hopkins Univ., 1968, p. 669.
 2. One other kind of rating format was developed which was experimental and therefore not reported here. Also, behaviorally based scales were not developed for three dimensions—Conducting Presentations (SA and PA booklets); Maintaining Personal Relations; and Providing Supervision, Leadership, and Training (co booklet)—due to limited anchors on these scales. More traditional rating anchors were used for these three scales.

Several general characteristics of these scales can also be pointed out. Each scale is defined and anchored at various levels by actual behavior incidents. Most apparent, perhaps, is the fact that the scales are defined according to the jargon of the edp personnel themselves. In actual use they proved to be understandable and meaningful to the raters.

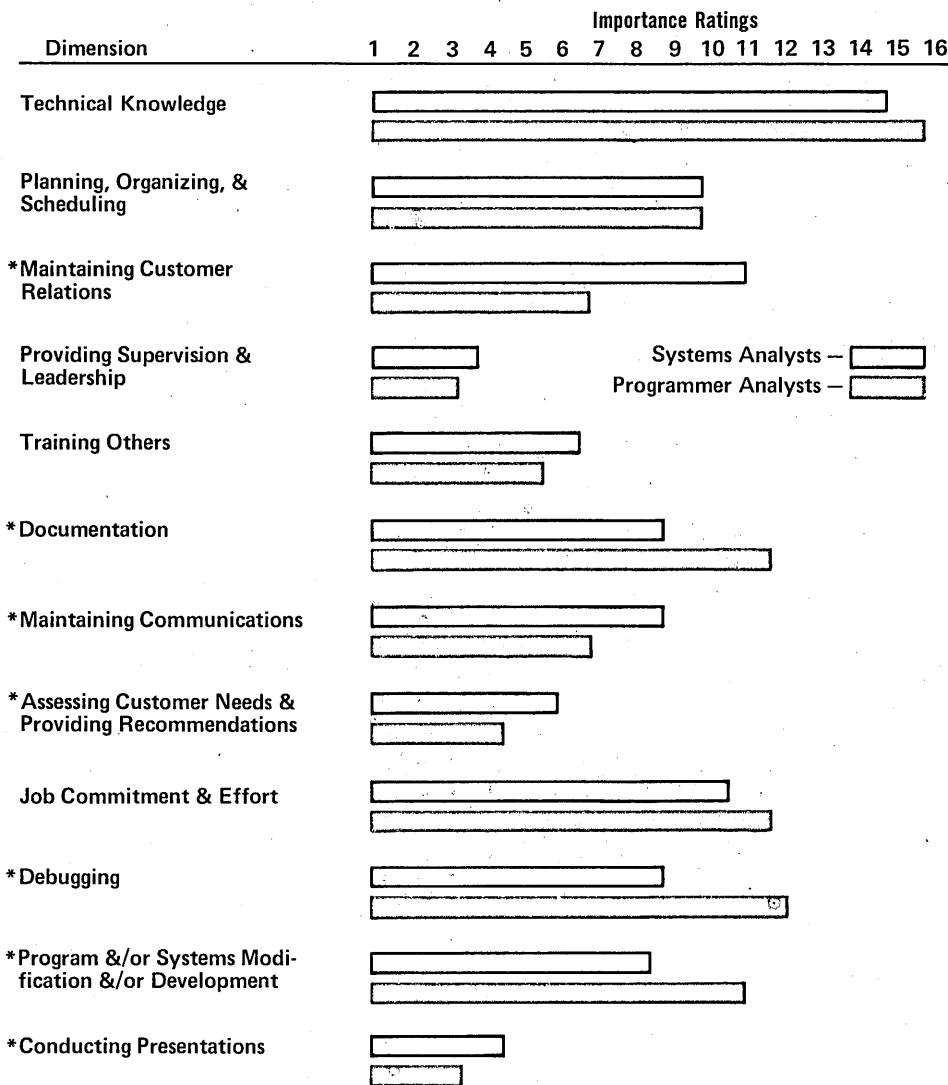
Research on rating scales

We used these scales to evaluate edp personnel in these jobs, and some data are now available. Two hundred SA's and PA's (113 PA's and 87 SA's) were rated by their supervisors on the various dimensions of job performance. One of the first questions we asked concerned whether the PA's and SA's differed with respect to the relative importance of the job dimensions. To this end, we had asked supervisors to indicate the relative importance of the various dimensions by allocating 100 points to the different dimensions according to their importance (high im-

portance = more points).

Fig. 1 presents the results of the data comparing individuals in the two nominal job areas on the importance ratings of the performance ratings. There are several aspects to note about these data. First, as we suspected, there were aggregated differences between the two job areas with regard to what is considered important in the jobs. Statistical tests were performed, and significant differences between the two jobs emerged on 7 of the 12 dimensions (shown by an asterisk). These differences were such that the odds are 1 in 20 that they could have occurred by chance alone. The dimensions considered more important for PA's than SA's were Documentation, Debugging, and Program and/or Systems Modification and/or Development, while those considered more important for SA's were Maintaining Customer Relations, Maintaining Communications, Assessing Customer Needs, and Conducting Presentations.

It appears from these data that, on



*The difference between the systems analysts and programmer analysts on this dimension is statistically significant such that a difference this large would only occur less than 1 time out of 20.

Fig. 1. Average importance ratings for 12 dimensions of job behavior for systems analysts and programmer analysts.

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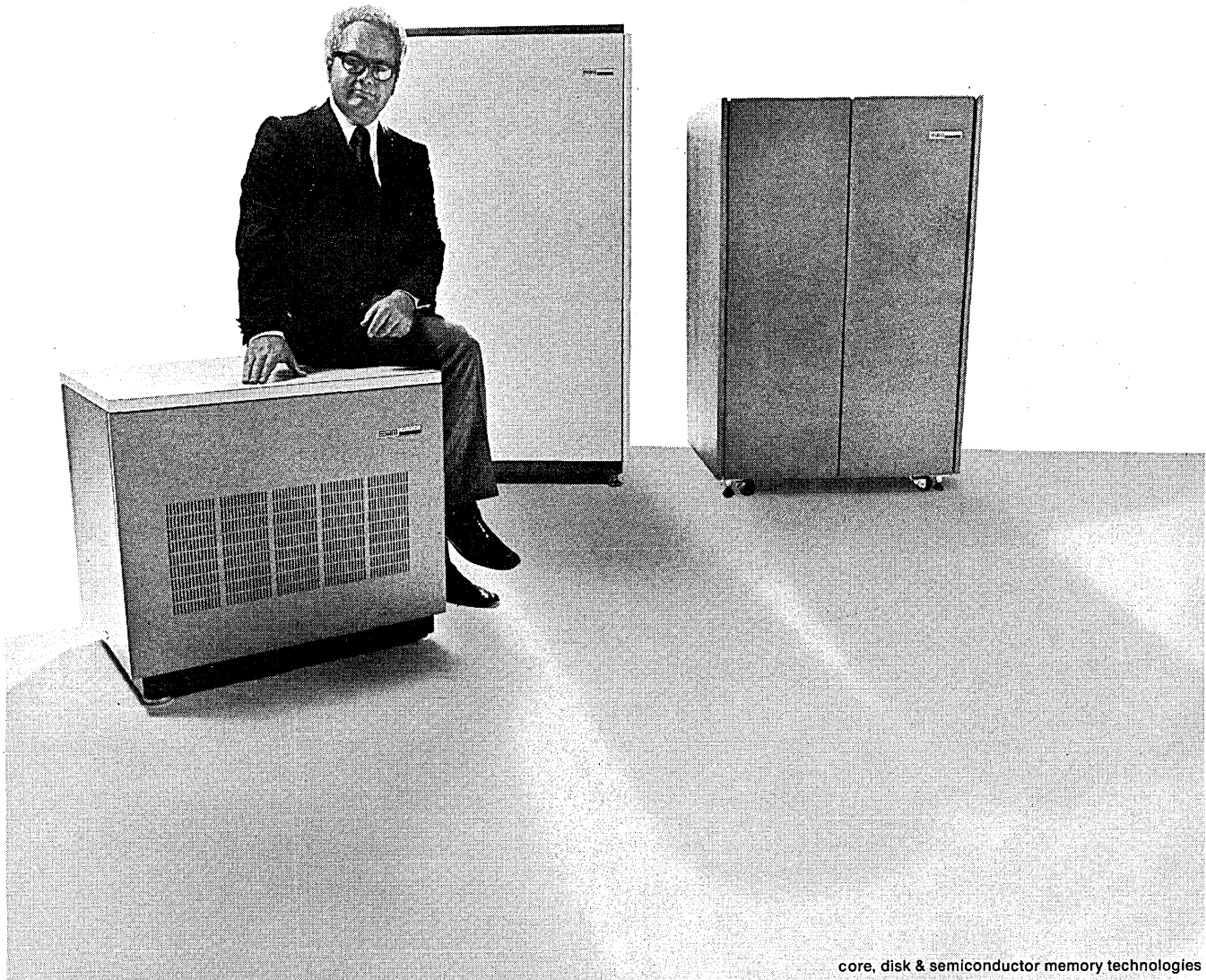
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Evaluating Personnel

the average, SA's have more to do with personal contact activities, while PA's deal perhaps at a more technical level.

It is important to note, however, that there did exist a wide variability within each nominal job category with regard to the importance of each job dimension. Thus, for some PA's, it was important that they maintain customer relations and communications.

Further analyses of the performance ratings revealed several points:

1. Discriminations were made among the job incumbents by their supervisors. That is, the ratings were not all lumped together at the extremes of the scale with everybody giving a favorable or unfavorable rating. Thus, raters did use all parts of the scale. Similarly, raters did not rate everyone at the middle of the scales (or average).

2. Supervisors made their ratings in such a way that an individual who was rated high on one dimension could also be rated low on another dimension. While there was some positive inter-correlations between the ratings on the various dimensions, raters still were diagnostic in their ratings of individual particular strengths and weaknesses.

3. The scales showed good evidence of reliability and validity. Thus, they appeared to be measuring what they were intended to be measuring. For more information concerning the statistical and psychometric properties of the scales, readers should see Arvey and Hoyle.³

Uses of rating scales

We have described the procedures used to develop rating scales to evaluate certain edp personnel. In what ways might these rating scales be used?

First, the scales could be used as measures of job performance for test validation purposes. It is possible to relate psychological test scores to these ratings in order to determine the relationships (if any) that exist. Recent court legislation has made it imperative that we demonstrate that employment tests are indeed related to job performance.

The rating scales could also be used meaningfully as diagnostic indicators of individuals' relative strengths and weaknesses. It may be possible to specify a particular training program for an individual which could upgrade him in particular areas of weakness.

Obviously, these scales can be successfully incorporated in performance

3. Arvey, R. D. and Hoyle, J. C. "A Guttman Approach to the Development of Behaviorally Based Rating Scales for Systems Analysts and Programmer Analysts," *Journal of Applied Psychology*, American Psychological Assn., Lancaster, Pa., in press.

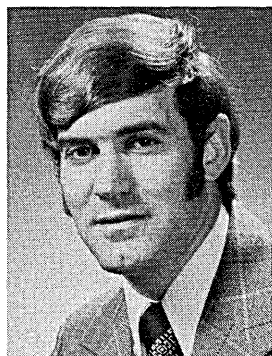
appraisal and review systems. By virtue of the way they were developed, they represent behavioral specifications of desired behaviors while still providing a measure for person-to-person comparisons.

Finally, it may be possible to use the information derived from these scales to evaluate jobs and enumerate specific salary levels depending on the functions (or dimensions) performed. Some preliminary steps toward wage and salary administration of individuals in these jobs have been made by obtaining evaluations concerning the importance of the various dimensions.

In summary, the development of these scales represents a step forward in bridging the gap between computer personnel and management through the application of more rigorous psychometric techniques. □



Dr. Arvey is an assistant professor in the departments of psychology and industrial and personnel management, Univ. of Tennessee. He is also affiliated with Applied Psychological Systems, Inc., Knoxville. His MA and PhD in industrial psychology are from the Univ. of Minnesota. Dr. Arvey is widely published in both personnel and psychological journals and is a member of the American Psychological Assn.



Mr. Hoyle is a personnel research analyst with The National Cash Register Co., Dayton, Ohio, and is pursuing a PhD in social and industrial psychology at the Univ. of Cincinnati. At NCR, he has been involved primarily with the validation of selection instruments for systems analysts, programmer analysts, and computer operators.

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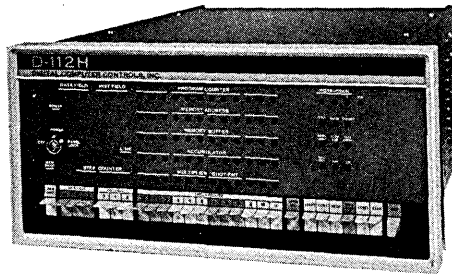
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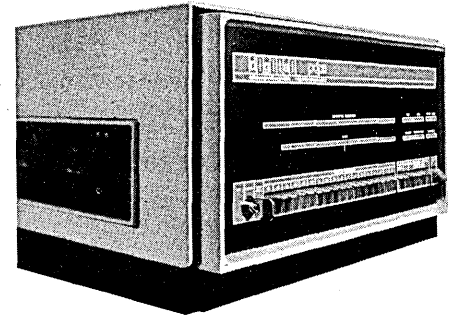
Digital Equipment Corp.

Model: PDP-8E
Price with 4K memory (list): \$4,490
Speed (Cycle Time): 1200ns
Storage Capacity: 32K words
Word Size: 12 bits
DMA (Standard): yes
Input/Output slots: 3



Digital Computer Controls Inc.

Model: D-112H
Price with 4K memory (list): \$4,095
Speed (Cycle Time): 900ns
Storage Capacity: 32K words
Word Size: 12 bits
DMA (Standard): yes
Input/Output slots: 7

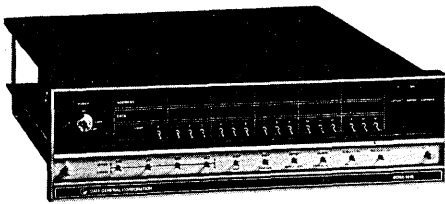


Digital Equipment Corp.

Model: PDP-11/15
Price with 4K memory (list): \$6,000
Speed (Cycle Time): 900ns
Storage Capacity: 32K words
Word Size: 16 bits
DMA (Standard): yes
Input/Output slots: 3

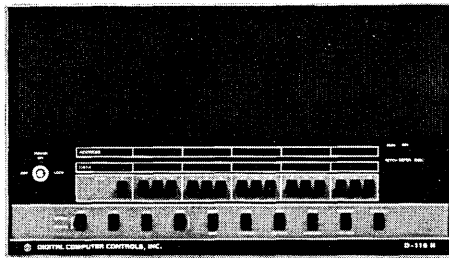
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Word Size: 16 bits
DMA (Standard): yes
Input/Output slots: 4



Digital Computer Controls Inc.

Model: D-116H
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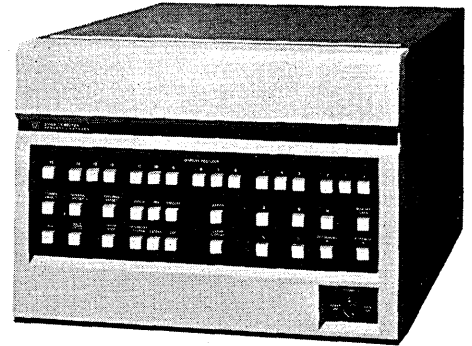
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Price with 4K memory (list): \$7,200
Speed (Cycle Time): 960ns
Storage Capacity: 32K words
Word Size: 16 bits
DMA (Standard): yes
Input/Output slots: 14



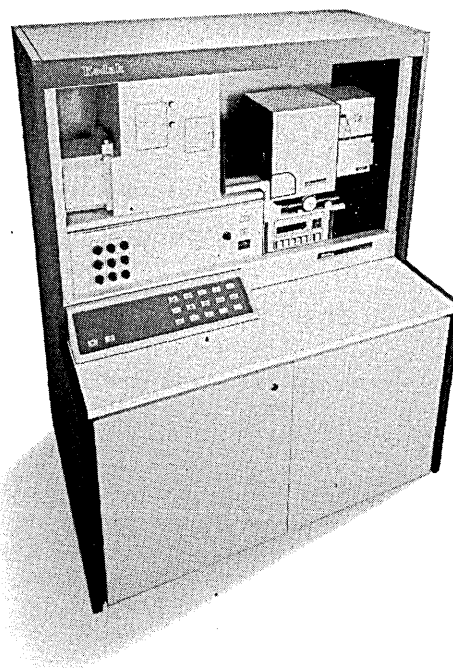
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The characteristics and use of cross-assemblers, with a summary of what's available

All About Cross-Assemblers

by Vincent S. Lamb, Jr.

Cross-assemblers are becoming increasingly popular tools for minicomputer programming. The following dialogue presents many aspects of their use:

Q: What is a cross-assembler?

A: An assembler translates a symbolic representation of instructions and data into a numeric form which can be loaded and executed by a computer. A cross-assembler is an assembler designed to be executed on a different computer from the computer that is the object of this translation. For example, an assembler that operates on an IBM 360 and produces programs for a PDP-8 is a cross-assembler.

Q: Why are cross-assemblers needed?

A: Cross-assemblers are useful or sometimes essential to assemble programs for minicomputers with minimal peripheral or processing capabilities. Large sums of minicomputer programming funds are consumed by programmers editing and assembling paper tapes using Teletype units for all input and output. In many cases, a larger computer is available nearby which, with a suitable cross-assembler, could perform this lengthy process in minutes with considerable savings in programmer and operator time.

The initial development of almost every computer in existence included the development of a cross-assembler. The cross-assembler was used to assemble programs for the new machine before it was operational.

Some minicomputers have such small memories or limited instruction sets that they cannot effectively

execute programs as large as a comprehensive assembler; this situation generally applies to the new microprocessors. For these tiny computers, cross-assemblers are frequently the only assemblers available.

Q: Can a single cross-assembler be developed for operation with several different types of computer systems?

A: Not quite. Numerous cross-assemblers have been implemented in high level languages in order that they could be used on different types of computers. The FORTRAN IV language is most frequently chosen because of its wide availability. When a cross-assembler that has been coded in a higher level language is installed on a different computer, some programming changes are almost always required. These changes are usually minor, especially when compared to the original development of a cross-assembler.

Q: Why won't a cross-assembler operate unchanged on any Standard FORTRAN IV system if the cross-assembler is coded in accordance with the ANSI standard?

A: There are minor differences in each FORTRAN system which are not covered by the standard. Disc file handling techniques are representative of such differences. Some systems require that a disc file be rewound before it is used; other systems consider a rewinding to be an invalid operation for disc files.

Next, very few FORTRAN compilers advertised as Standard FORTRAN IV conform to all require-

ments of the standard. The effects of deviations on a cross-assembler can range from minor to devastating.

The word size of the computer used to execute a cross-assembler is critical to its successful operation. For example, assembling programs for 16-bit computers often require the processing of 16-bit addresses which must be considered as positive integers. When a cross-assembler is executed on a 16-bit computer, then all addresses greater than 32,767 will become negative values. A cross-assembler can be coded in FORTRAN IV to be executed on a 16-bit computer and to assemble programs for a 16-bit computer, but not all FORTRAN-coded cross-assemblers for 16-bit computers can be executed on 16-bit computers. Although the word size considerations may be quite confusing, the minimum size is usually clearly stated in the cross-assembler documentation.

Finally, capacities are not specified by the standard. The maximum number of statements, statement numbers, arrays, variables and other items are each limited in a unique fashion by every FORTRAN system. Frequently the limits are established according to the size of the available memory. When any of these capacities are exceeded, the cross-assembler must be tailored to the available limits by reducing table sizes and perhaps removing capabilities.

Q: How do FORTRAN-coded cross-assemblers compare to those coded in assembler language with respect to

Cross-Assemblers

memory size and operating speed?
A: A well-designed FORTRAN-coded cross-assembler operating with a reasonably efficient FORTRAN system will usually require one and one-half or two times as much memory as the assembly-language-coded counterpart. The processing time required for execution will be longer for the FORTRAN-coded version in an equivalent fashion.

Q: Can cross-assemblers be used with time-sharing services?

A: Definitely. The file systems and editing capabilities of most time-sharing systems are well suited for use with cross-assemblers. A user can keep his source programs on disc files which eliminates re-entering them from a low speed device during each assembly. He can conveniently make source corrections from his terminal using an interactive editor, and he can perform assemblies with printed and punched tape output directed to his terminal. A variety of terminal equipment is offered by the time-sharing services including Teletype terminals, 30 cps typewriters, crt devices and even remote batch terminals.

A cross-assembler can be used on a time-sharing service to provide a remote processing capability.

ity. Once a user has entered his programs into system files, then he can edit and assemble the programs from almost anywhere using only a terminal and a telephone. This capability can be quite valuable to a company performing related software development or installation projects at several locations.

Q: What costs are associated with using a cross-assembler on a time-sharing system?

A: Terminal rental, terminal connect time, cpu usage and file storage must all be considered. Terminal rental costs range from approximately \$50/month upward. In our experience, operating costs run \$12 to \$20 per hour, considering both connect time and cpu usage. Using a 10 cps terminal, a 600-1000 line program can be assembled in one hour including both printed and punched output. With a 30 cps terminal, a program containing 1800-3000 source lines can be assembled in an hour.

File storage costs vary greatly among time-sharing services and even among the various media available from a single service. These costs must be evaluated with respect to each user's specific requirements.

Q: Where can I locate a cross-assembler for my minicomputer?

A: Cross-assemblers are offered by computer manufacturers, users' groups, software firms and time-

sharing services. Table 1 contains a list of cross-assemblers and their suppliers.

Q: What do cross-assemblers cost?

A: The selling prices for cross-assemblers vary enormously, as illustrated in Table 1. Those which are offered for minimal sums generally carry no warranty and are supplied with little or no support. The more expensive ones generally include complete installation and customer training.

Q: How can I evaluate a cross-assembler for my minicomputer?

A: First, consider the execution aspects. Ideally, it is offered in a form which is immediately executable on a computer which you have available. Next in preference is the cross-assembler which is coded in Standard FORTRAN or COBOL and which has been executed on a computer with the same general capability as the one you have available. For example, a FORTRAN-coded assembler which has been used on an IBM 360/50 should require minimal modifications for use with a Xerox Sigma 5. Any cross-assembler which is described as coded in Standard FORTRAN or COBOL should be considered if you have a FORTRAN or COBOL system available, but you should be prepared for some installation difficulties.

The next important consideration is compatibility. Both the source data input by the cross-assembler and the output data, printed and punched, should be identical to the data accepted and produced by other assemblers for the same minicomputer. Although compatibility may not seem very difficult to achieve, incompatibilities abound in cross-assemblers and they can be quite costly. Most common is output incompatibility, which frequently arises because a FORTRAN-coded program cannot produce the required paper tape format on a particular system; the operating system unavoidably includes a sequence number, checksum or terminator character in each output record. When this occurs, a special loader must be developed for the cross-assembler output or a reformatting program can be developed which translates the tapes into a suitable format for loading.

Q: If no cross-assembler exists that is suitable for my requirement, what level of effort is required to develop one?

A: The original development of a cross-assembler using a higher level language usually requires 400-800 programmer hours, depending on

Target Computer	Computer Needed for Execution	Cost ²	Available From
DEC PDP-11	DEC PDP-10	—	Digital Equip. Corp. Maynard, Mass. 01754
DEC PDP-11	IBM 360 or 370	\$2,500	Gould, Inc. Data Systems Division 20 Ossipee Road Newton, Mass. 02164
DEC PDP-8	IBM 360 or 370	\$2,500	Gould, Inc. Data Systems Division
General Automation	IBM 360	\$4,000	Computer Applied Sys., Inc. 18075 Ventura Blvd. Encino, Calif. 91316
Honeywell System 700	Any Standard FORTRAN IV sys.	—	Honeywell Information Sys. 60 Walnut Wellesley Hills, Mass. 02181
Honeywell 316/516	IBM 360 or 370	\$2,500-3,500	Gould, Inc. Data Systems Division
IBM System/7	IBM 1130, 1800, 360 or 370	—	International Business Mach. Box 1328 Boca Raton, Fla.
Intel MCS-4, MCS-8	Any Standard FORTRAN IV sys.	—	Intel Corp. 3065 Bowers Ave. Santa Clara, Calif. 95051
Lockheed MAC-16	IBM 360	\$ 500	Lockheed Elect. Co., Inc. Data Processing Div. 6201 E. Randolph St. Los Angeles, Calif. 90022
Lockheed SUE 1110, 1111, 1112	IBM 360 or Lockheed MAC-16	\$ 500	Lockheed Elect. Co., Inc. (Same as above)
NOVA, NOVA 800, 1300, SUPERNOVA	Any Standard FORTRAN IV sys.	\$ 25	Data General Corp. Southboro, Mass. 01772
Varian 620 Series	Any Standard FORTRAN IV sys.	\$ 30	Varian Data Machines 2722 Michelson Drive Irvine, Calif. 92664
Varian 620 Series	IBM 1130	\$ 40	Varian Data Machines (Same as above)
Varian 620 Series	IBM 360	\$ 30	Varian Data Machines (Same as above)

- This list was compiled from the response to a questionnaire the author sent to minicomputer manufacturers. Additionally, several cross-assemblers which Scientific Systems Services, Inc., has encountered in the normal course of business have been included.
- The cost figures supplied here represent prices quoted by the supplier for a one-time lease or an outright sale. These prices are subject to change at the discretion of the supplier.

Table 1. Available Cross-Assemblers¹

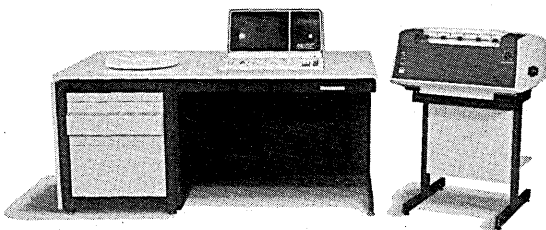
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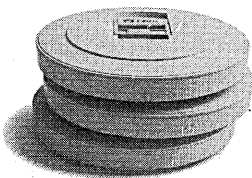
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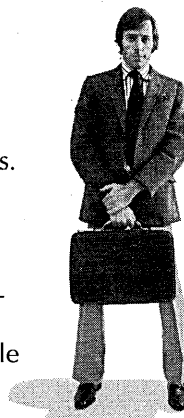
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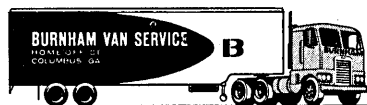
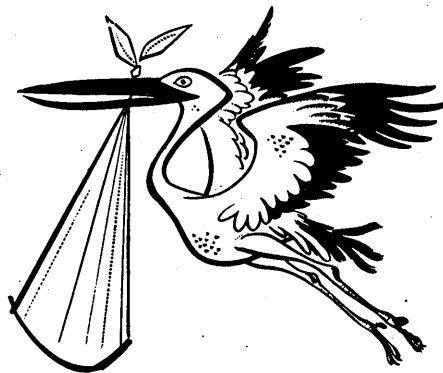
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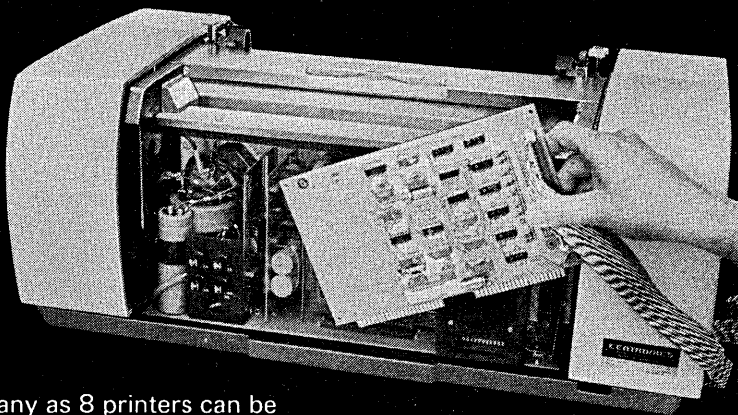


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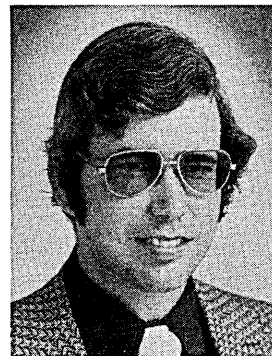
Cross-Assemblers

its complexity. Macros, external and COMMON variables, relocatability, floating point constants and similar features increase the complexity, and therefore the cost, of a cross-assembler. If a cross-assembler must be coded in assembly language, the implementation time will be increased by at least 50%.

Q: What future developments can be anticipated in cross-assemblers?

A: Many of the new minicomputers have variable instruction sets that can be defined using microprogramming techniques. Cross-assemblers that provide the capability of instruction set definition are likely to become popular for these machines.

As computers become smaller and more specialized, more interest will be generated in using larger computers for small computer software development. Already several manufacturers of microprocessors, process controllers and small communications processors are offering cross-assembler/computer simulator packages that allow the user to both assemble and debug his programs using a larger computer. Cross-compilers are also being developed that input programs coded in higher level languages and output programs in the source language or the object format of the target minicomputers. Cross-compilers can well utilize the processing capabilities of a larger computer to produce efficient coding. It seems likely that much future development will be concentrated in the application of larger computers for small computer programming. □



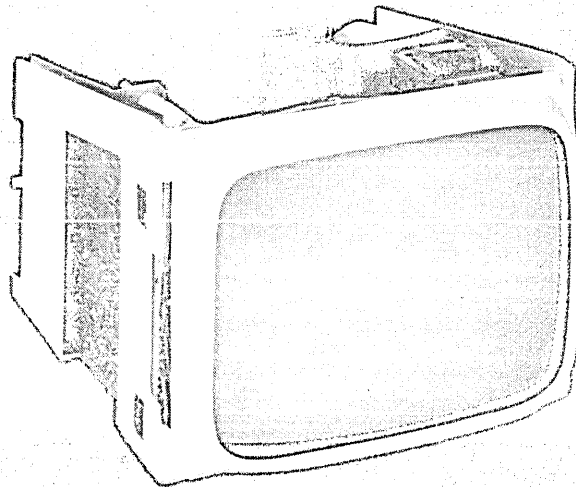
Mr. Lamb is vice president and technical director of Scientific Systems Services, Inc., responsible for software development projects of the company. He was previously manager of operating systems development at Systems Engineering Laboratories. He has a BS in mathematics from the Univ. of Alabama.

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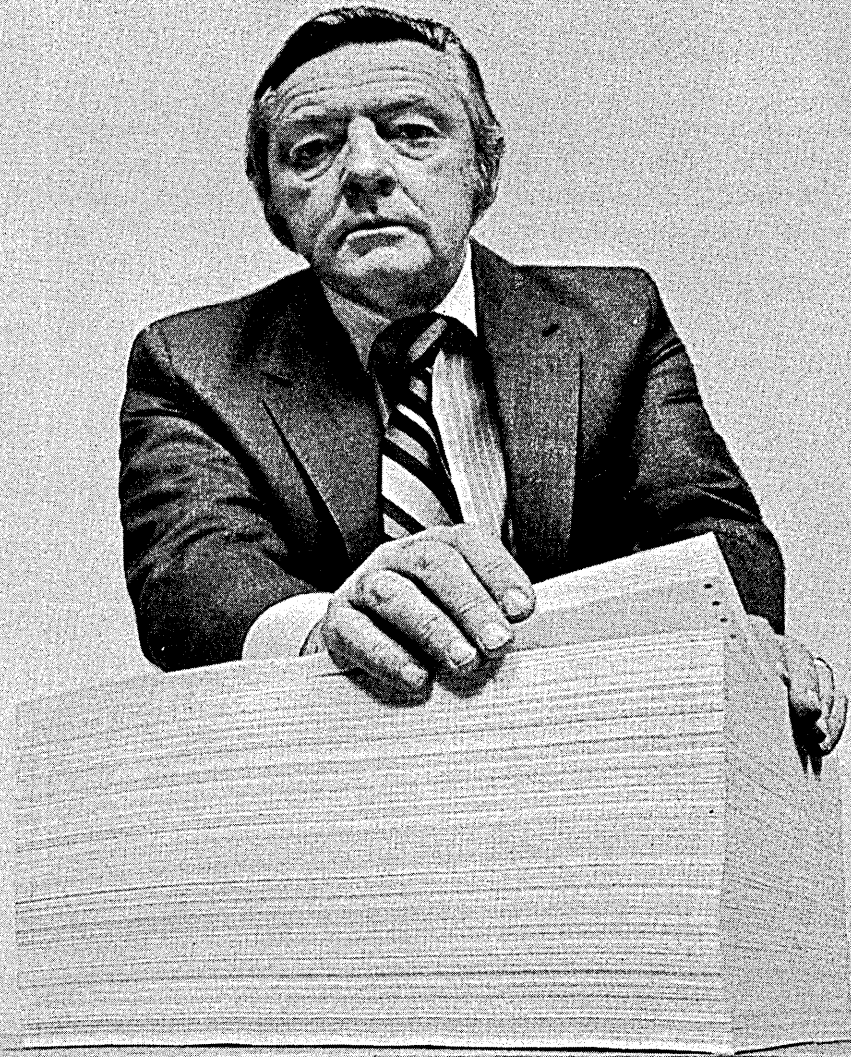
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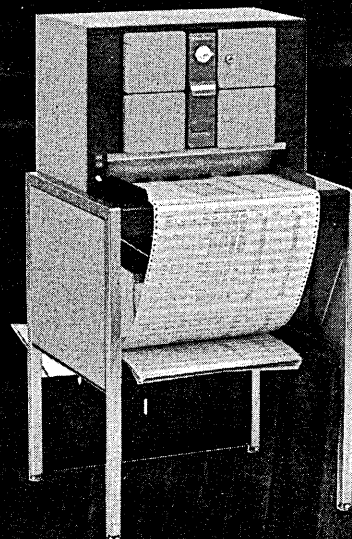
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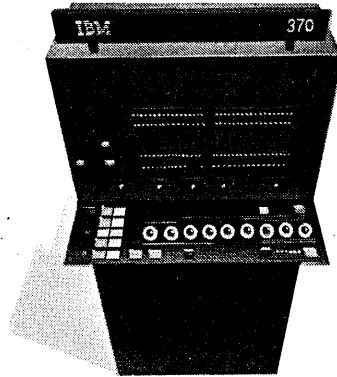
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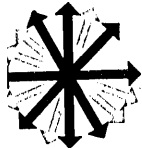
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News in Perspective

Meet George Glaser and Robert W. Rector, the new top men at AFIPS, page 87. They take over the supersociety's affairs this summer with a mandate to make it a strong voice for the computer community. But with considerable wrangling over the way money from shows goes out to societies, some say they're walking into a rattlesnake pit. . . .

Computers may have played a minimum role in the Equity Funding Scandal, but EDP auditors are being told to "jam it down your management's throats," anyway, page 92. How they need clout with their management and how they can get it was the theme of a national conference of auditors last month. . . .

Minutes of IBM's top management committee meetings tell how the powers in Armonk viewed competitors, standards, liquor and transfers in the late '60s and early '70s. Here's a look at some of the documents introduced in the IBM-Telex case in Tulsa, page 93. . . .

Memorex has installed some 280 computer systems. Although customers are happy with the product and the support, they worry whether the cash-hungry company will stay with the product, page 96. . . .

NCR continues to reassure customers it's in the computer business to stay. "We have become a computer systems company," said the NCR president at a users meeting in San Diego . . . and the 400 users bought what he said with a standing ovation, page 96.

Conferences

The National Computer Conference in NYC: Security, Terminals and Turnaway Crowds

"We can't say if we have a successful conference until we read what the trade press has to say about it," said Harvey L. Garner, general chairman of the first National Computer Conference held June 4-8 in hot and humid New York City. At a press briefing midway during the conference, he added: "We've added many user interest sessions and in so doing have run the risk of not interesting the traditional Joint Computer Conference attendees. We'll have to wait and see."

In sheer numbers, the conference was an advertising coup. The attendance of 32,643 was on target with what the sponsoring American Federation of Information Processing Societies (AFIPS) had predicted. The exposition was a roaring success. Before it had even ended, 52 exhibitors already had signed up for 55,000 sq. ft. of exhibit space in next year's conference in Chicago, May 6-10. That was only 10,000 feet less than all 220 exhibitors had purchased for the New York affair.

In contrast with the total attendance, the conference, with a turnout of 4,836 at the New York Hilton, appeared as mere window dressing for the commercial exhibit at New York's Coliseum eight city blocks away. Preliminary figures showed the conference drew only 400 more persons than the turnout at the final semi-annual event last fall in Anaheim, Calif.

It was a massive program—the first to be evenly split into topics for the technologist (Science and Technology) and for the user (Methods and Applications). At times as many as nine formal sessions ran at the same time. There were near-empty rooms and there were turnaway crowds. More than 300 showed up for a session on Point of Sale Systems in a room for 128. "It was the first time I can remember that people asked for refunds because they couldn't get in," said Dr. Bruce Gilchrist, the AFIPS executive director.

Those who took head counts noted that the technical sessions had the largest audiences. A program on Intelligent Terminals on the opening day drew more than 300 persons. The 50 or 60 who turned up on the very last day for a session on Associative Processors were delighted with the pertinent questions the presentation drew from hard-

core technologists who had somehow held on despite five full days of mental pounding, high humidity and inadequate air conditioning.

The Bell debate

Although they generally played to smaller crowds, the applications sessions were well received. Sessions on broader topics met with mixed interest. As expected, those dealing with security were winners; but an opening session, "Regulation of the Computer Communications Industry," attracted only 70 to a room for 400, yet that session produced one of the more lively debates of the conference between George Ashley, general counsel of the New York Telephone Company and Bill Melody, formerly an economist with the Federal Communications Commission and now a private consultant.

Said Ashley, referring to the FCC's specialized carrier decision and subsequent developments:

"What was intended to be an opening of a regulated industry . . . to the free play of supply and demand, with decisions made by market forces, has instead become a procedural morass of incredible complexity. The public in general and the dp industry in particular will be the losers if, in order to protect 'infant industries' and to enforce an artificial division of the market, the Bell companies are hobbled."

In reply, Melody said Bell's attitude reminded him of "an elephant walking among a bunch of chickens and saying 'let's all compete with each other'." The fact that the industry is a monopoly, he explained, makes true competition impossible unless special measures are adopted by the FCC to prevent AT&T from exploiting its dominant position.

This action will require some rather basic changes in regulatory philosophy, Melody argued. For example, "regulation has historically focused on Bell's overall rate of return," a practice that enables the phone company to play the cross-subsidy game—i.e., increase its rates for monopoly services, while reducing those for competitive services. Melody didn't appear to be optimistic regarding FCC's willingness to make competition between the elephant and the chickens more equal.

The keynote speech was delivered by

Sen. Philip H. Hart (D.-Mich.) who referred to his proposed industrial reorganization act as a "reasonable little bill"—a description the Chamber of Commerce and other businessmen don't exactly share. Hart's point was that if his bill, or something similar, isn't adopted, the result will be much less "reasonable"—e.g., government regulation; elimination of what remains of free enterprise in the U.S.; and/or loss of our technological leadership, particularly to Japan and the Common Market. In both of these latter areas, Hart pointed out, steps had to be taken to deconcentrate domestic industries.

Attacking a key argument made by businessmen against his bill, Hart said, "ten years of chairing [Senate] antitrust and monopoly hearings have convinced me that technical efficiency, inventiveness and innovativeness are not monopolies of giant corporations . . . certainly the edp industry is illustrative of this point. Significant innovations have been produced by small- and medium-sized firms, as well as large companies."

Afterward at a press conference, Howard O'Leary, an aide to Hart, said the subcommittee is looking into tax incentives as a way of encouraging large corporations to break themselves up voluntarily.

The security market

In contrast with the apparent minor concern of attendees with the issue of regulation, was the widespread interest in computer security brought into the limelight this spring by the involvement of computers in the celebrated Equity Funding insurance scandal (June, p.

88). "Suddenly," said a person attending one of eight sessions related to the subject, "a vast new market has been created in less than three months."

At a session on Secure Data Systems, some users criticized the vendors for failing to provide security systems, to which John W. Weil, of Honeywell, replied, "We've been developing shiny new products (for security), taking them up to our management, and being told the marketing department says nobody wants them. Users aren't going to get secure systems if they don't ask for them. Write them into the specs and tell the salesman what you want."

Earlier, Charles L. Foster, reporting on IBM's \$40 million data security project, announced a year ago, suggested it would be a long time before the results of the study can be transferred into a product. He said the study will not end until next spring, the end of the second year of a five-year project.

Some security sessions proved amusing, particularly one on Security and Privacy in Disaster, in which a speaker related the theft three years ago of a computer program through a time-sharing network in Palo Alto, Calif.

Although the programmer accused of the theft has been convicted, the courts still are studying if a program is a trade secret. Meanwhile computer people in the San Francisco area jokingly have established the "Peninsula Ethic," wherein a shared program is automatically in the public domain unless particular steps are taken to protect it.

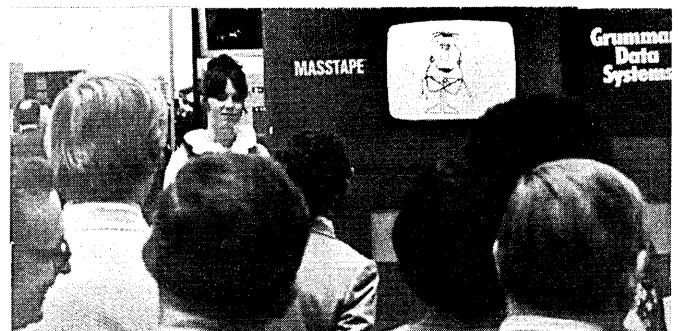
Another well-attended session, The Auditor's Interface with EDP Systems, brought forth the suspicion from a panelist that many compromises are being made in the audit of dp functions. Some installations allow the dp staff to select their own "random" records for an audit. Some programs to audit dp departments are produced by the same staff that is being audited.

Very few topics were left untouched in the conference program:

Automobiles: Speakers in a session, Onboard Computers for Automobiles, began with glowing predictions for computers in this massive market, but ended with gloomy warnings of reliability problems under the hot hood of a car. A 14-year-old youngster attending the session asked, "When will the computer in my car take me from New York to Boston?" He was told this might come about in time for him to enjoy it and for the panelists to experience it in "our dotage."

Data Bases: A day-long conference was devoted to the topic of data base management and the issue popped up in many other sessions. It was surprising to observers that many times it was suggested that hardware would provide the solution for data base management instead of software.

Performance Measurement: Speakers began talking about things that could be done, contrasting with many



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CIRCLE 9 ON READER CARD

news in perspective

sessions at last fall's FJCC where their counterparts were largely saying, "We don't know what to measure yet or how to measure it." Dr. Barry Boehm, of Rand Corp., told of progress by the National Bureau of Standards and the Association for Computing Machinery in defining the vocabulary of the measurement business.

Networks: Retrieving information on a network is difficult, speakers said, because nobody has come up with an "English-like, or pure English" language. Donald J. Hillman, Lehigh Univ., said designers find it difficult to index a data base because of great difficulties in deciphering the meaning of the input request, even in English.

Teletype's terminals

At the exposition, AT&T and one of its manufacturing subsidiaries, Teletype Corp., displayed their new model 40 data terminals. Both AT&T's booth and Teletype's attracted crowds of visi-

which was the only user exhibit at the show. Avis is proud of its "Wizard of Avis" computerized reservations system and wanted to show it off to other users, a company spokesman said. The company wasn't saying so publically, but it is not adverse to selling time on the system to other users. The system has excess capacity.

Greyhound Computer Corp. displayed its new "Phoenix" system—an expanded 360/30—and not only claimed it could outrun a 370/145, but offered visitors the opportunity to benchmark it at the show.

Booths were taller and larger than in recent years, a flashback to the golden era of pre-recession computer shows when the competition sought to outdo the massive displays of IBM, which was back at the show for the first time since 1970. Minicomputer maker Interdata built a booth to look like a giant minicomputer shell complete with a plug. But, chiefly, it was a business-like show.



tors. Among the curious was IBM's chairman, Frank Cary, who toured the show.

The curious also included other manufacturers of terminals—printers and crt's—and they weren't so pleased about it. One company executive, Ryal Poppa, president of Pertec, said his firm may abandon plans to manufacture a low-cost printer it has on its drawing boards because of the low price of the Teletype machine. The most intriguing aspect of the new products was the low cost—\$1165 in oem quantities—for a stripped-down printer. That should be appealing to minicomputer manufacturers, who have been having trouble getting low-cost printers in sufficient quantities.

One exhibit that drew a great deal of attention was the Avis car rental booth,

Said AFIPS' Gilchrist, "Visitors looked seriously for equipment and information. On Tuesday, some people viewed a demonstration on how to clean discs. The next day they were back at the show with their discs to see if it worked."

The brand new, once-a-year conference—conceived and executed in less than a year—had its shortcomings, as expected. Many felt 100 technical sessions with four or five times that many papers was simply too much. But it was designed to serve the great users industries, and from preliminary attendance figures it succeeded. There were horrible instances of lack of preparation by speakers and lack of screening by the organizers, to the point that in one session that dwindled in attendance from 250 at the start to 20 at the end,

the chairman told those remaining at the end, "Frankly, I don't know why you stayed."

But as Harvey Garner admitted, the organizers were experimenting in New York. The final judgment on the success of the first national conference won't be in until the doors open at Chicago's McCormick Place next spring for the second time around. And AFIPS is betting on an even larger turnout.

Societies

AFIPS' New Officers: "A Thorough Review"

In a revolt of the "little guys," the "official" officers' slate for the American Federation of Information Processing Societies was revised last month. Instead of electing Bernie Galler (See May, p. 18), the AFIPS Board chose George Glaser as president of the superorganization of 13 computer-related professional societies. The nomination from the floor was made by the representative of SIAM (Society for Industrial and Applied Mathematics).

SIAM, only recently admitted to full membership in AFIPS after an earlier rejection, is an "outsider" member of AFIPS, which heretofore has been dominated by the three societies that formed it: the Association for Computing Machinery, The IEEE Computer Society, and the Society for Computer Simulation (formerly Simulation Council).

So the successful challenge of the insiders' nomination may signal a new balance of power within AFIPS, which is still struggling with the sticky question of how to divvy up amongst its members the proceeds of the National Computer Conference.

One of the problems is that AFIPS' show income is controlled *not* by that metasociety, but by the partners to "The JCC Agreement," an official Appendix to the AFIPS constitution and by-laws that was signed by the three founding societies and AFIPS. In other words, there is now no mechanism by which the "profits" from the NCC can be shared by the new, outside member societies, or by any new members... such as the Data Processing Management Association, for instance.

Open arms

The possibility of such an expansion was slightly enhanced at the June board meeting when the Federation unanimously passed a resolution to invite the 25,000-member DPMA to join AFIPS. The wheels and cogs within

news in perspective

DPMA have been oiled for such a move, but there is still some opposition. At any rate, DPMA will undoubtedly want to know specifically how it will fit . . . in terms of voting rights as well as in terms of sharing NCC surpluses before it jumps aboard the clumsy clipper known as AFIPS.

At a special two-day AFIPS soul-searching workshop held in Atlanta in March, society biggies began to wrestle with this problem. But the ACM, DATAMATION learned, made it clear that it considers the NCC as a product stemming from their R&D work. And the ACM wants a return on what it considers this "investment." The Computer Society agrees with ACM on this point.

The DPMA has made it clear that it is willing to buy its way into the club.

But they may not even get to bid: it's not clear that ACM and Computer Society are interested in broadening AFIPS at all, let alone sharing NCC revenues with upstart newcomers who, some of them undoubtedly feel, aren't even professionals at all.

Needed: snakebite kits

So new president Glaser, 41-year-old San Francisco management consultant (see profile, May, p. 208), has some problems on his hands. He and the new executive director, Bob Rector, are walking into what one viewer calls a nest of rattlesnakes.

The question of broader membership is only one of the vipers, but it's a leading candidate for wrestling with because it gets at the heart of the finan-

cial and political problems that plague AFIPS and its strongest, most vocal internal foe; big, badly-run and financially desperate ACM.

DPMA affiliation would strengthen AFIPS' position as a spokesman for the computer industry, which it now inadequately represents. Glaser says that DPMA's absence has weakened AFIPS' credentials and Rector calls DPMA the "reason-for" society: the reason AFIPS abandoned or didn't start many projects . . . because the findings or positions would not represent a true industry consensus.

Another rather important implication of DPMA membership would be its eventual participation in the NCC. DPMA show revenues are on the decline (June, p. 122), and that illness can only be accelerated by the fact that for the next two years, DPMA and AFIPS will be competing for exhibitors and attendees

Robert W. Rector: "Ask Me a Year from Now"

A former business associate describes him as "well-organized, on top of the job, three weeks ahead of everybody else" in planning. "It was a pleasure to see him in action."

Another former associate said of Dr. Robert W. Rector, who left UCLA this month to become executive director of the American Federation of Information Processing Societies (AFIPS), "He's a lovable guy, a fine man who is also a diplomat." He sticks up for what he believes, but "he won't go out of his way to pick a fight."

These, plus extensive experience in computer society affairs, are the credentials the 57-year-old Californian brings to his new job in Montvale, N.J., as head of a staff of 17 who manage the affairs of the 13-society federation, troubled in recent years by declining conference revenues, its search for a role in non-conference projects, and a wrangle over the disbursement of conference proceeds. Rector said in an interview recently his first priority at AFIPS is "to insure a viable one-conference-per-year operation."

He's aware of other challenges to the supersociety, primarily its role in educating the public on the position of computing in society. He thinks AFIPS could probe topical issues through "seed conferences," noting that the federation has budgeted \$2,000 for a committee that will plan such conferences this year.

Born in San Jose, Calif., Jan. 28, 1916, Rector received his Ph.D. degree in mathematics from the Univ. of Maryland and his M.A. and B.A.

degrees, also in mathematics, from Stanford Univ. and San Jose State. He was associate director of continuing education in engineering and

ment of mathematics at the U.S. Naval Academy.

The quality of people

Rector admits he took the AFIPS post reluctantly, since it meant giving up his Los Angeles home and the university environment he's always longed for. What made him take the job? "The quality of people I've been associated with in AFIPS projects over the years."

A long-time member of the Association for Computing Machinery, Rector is a former treasurer and director of the federation. At the time of his appointment, he was chairman of its finance committee. He was chairman of the USA-Japan Computer Conference last year and general chairman of the 1965 Fall Joint Computer Conference in Los Angeles.

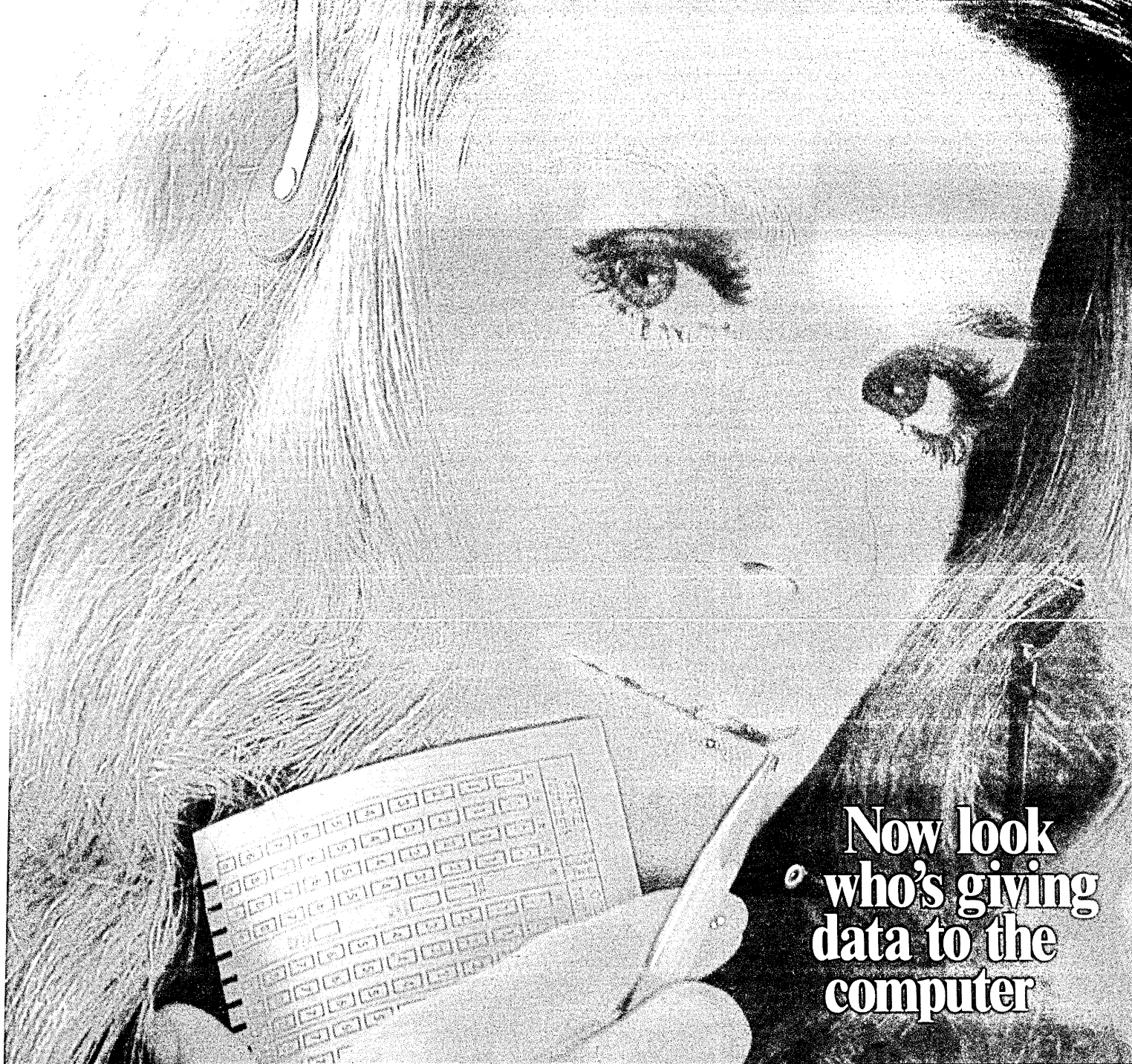
Said by friends to be a good mixer and a good listener, Rector, during his first months with the federation plans to do just that, "work for the executive committee and the board of directors, probe the AFIPS' staff members for ideas, and mix with the member societies." His talents are not as much those of an innovator or a visionary, as in his ability "to recognize it in others," says a friend who adds, "Maybe that's a more important trait. His job calls for being in the middle."

Rector's initial plans seem to agree with that assessment. When pressed in an interview to be more specific on what he felt of AFIPS' role, he answered: "Ask me a year from now." □

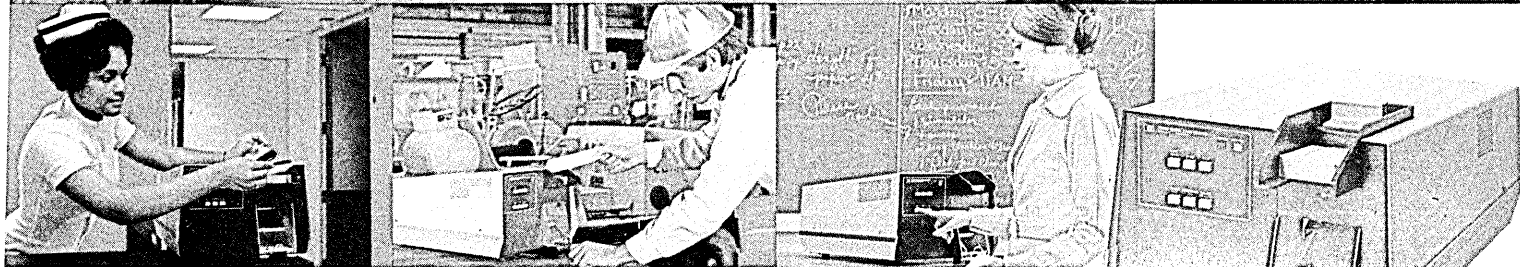


ROBERT W. RECTOR
He'll listen and mix

science at UCLA when he took the AFIPS post. Previously he held executive positions with Cognitive Systems, Inc., and Informatics, Inc., of Los Angeles, and managed some data processing activities at Aerospace Corp. and Space Technology Laboratories. He's a Captain in the U.S. Naval Reserve and a former associate professor in the depart-



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news in perspective

in the same two marketplaces within the same month.

It's clear to most observers that by adding DPMA to its roster of conference and exhibition sponsoring societies, AFIPS would offer to exhibitors a much broader and more attractive audience. But ACM president Tony Ralston is reported to have said that there is no evidence to support such an assumption.

Onward and sideways?

Despite such fun and games, the AFIPS house is not all bleak. The NCC appears to have been a substantial if not resounding success; over 40% of



BRUCE GILCHRIST
Sit down with pencil and paper

the space for next year's Chicago exhibit had been sold before the first NCC shut down. AFIPS officials estimate that the "profits" from the first annual event will be around \$200,000.

That compares to \$153,000 derived from two shows in 1972. Obviously, the downward slide has been reversed. Although the budget will be tight, AFIPS plans to intensify a program of educational and scientific projects that it launched five years ago to supplement its role as conference producer. "The priority, however, is to make sure we know what we want to do," said Glaser, who says he'll conduct a "thorough review to determine if today's projects are the right ones and if there are voids we ought to be filling."

Glaser said he'll rely heavily on "communication" with the AFIPS 22-man board, some of whose members have been criticized for an extreme lack of enthusiasm for the federation's non-conference programs. Walter M. Carlson, a former president of the ACM, calls it the "money tree" attitude, a reflection of AFIPS' original charter to produce a conference and exposition

and distribute the surplus to the three founding societies.

Societies contribute about \$13,500 a year to AFIPS, but last year, for example, ACM put in \$3,000 in membership dues and got back \$48,000 as its share in conference surpluses. The federation's constitution provides for a disbursement of 40% of conference surpluses to the three societies. The remaining 60% is earmarked for AFIPS projects. But that budget has been slashed from \$166K last year to \$106K in the new fiscal year which began July 1.

"We have a problem"

AFIPS currently has a half-dozen non-conference projects completed or underway, including a \$20K project to develop guidelines for privacy and security of information systems, headed by John Gosden of Equitable Life Assurance. "The informational role AFIPS should fill is immense," says Dr. Bruce Gilchrist who, as AFIPS' president and later its executive director for nearly five years, opened the federation to more societies and expanded its



GEORGE GLASER
Time to shift gears a little

charter beyond that of producing shows and conferences.

"Sen. Philip Hart [in his keynote speech at NCC] seemed to be imploring the industry to take note that we have a problem," Gilchrist said. "He was saying, 'Competition is lessening. Should we go in the direction of regulation, or are there new approaches we should take?'"

In an interview, Gilchrist raised other issues he felt should be studied:

Should the role of designing systems be left up to the mainframers? Or should the thrust come from an independent body?

"We are asking the public to rely more and more on computers," Gil-

christ added. "How are you sure the system you're getting will do what it's supposed to do? Somebody should be sitting down with pencil and paper to see what schemes to solve these issues will help."

When reminded that these projects are expensive, Gilchrist answers that the dues a computer professional assigns to AFIPS membership are infinitesimal when compared to the dues a steelworker pays to his union. "I don't know if this is the right analogy. But you can see what I mean. The motivation must come from within the societies."

"We were off to a good start in that direction," Gilchrist said, "when the recession hit us and we had to turn our attention towards saving the conferences."

With the help of some outside pressure of an Industry Advisory Panel, AFIPS last year dropped its twice-a-year Joint Computer Conferences for a single show in New York. With the show a success, the federation shows signs of turning its attention to the goals Gilchrist set for it before he left the federation last month to become director of computing activities at Columbia Univ.

Shifting gears

"We certainly don't want to take the show for granted," says Glaser, "but we feel we can now shift gears a little bit. Some of our problems are structural," adds the former AFIPS treasurer.

Glaser is the only one of last year's five top officers to be elected. He succeeds Walter L. Anderson, who held the post one year. Paul W. Berthiaume, of Electronic Associates, Inc., was elected vice president, and becomes the traditional candidate to succeed Glaser, who can be re-elected to one more one-year term as president if he satisfies his board in handling all those snakes. Dick Simmons of Texas A&M, and Marvin Ehlers, of Square D Co., were elected secretary and treasurer, respectively.

Joining Glaser in the key post of executive director is a fellow westerner, Dr. Robert Rector, 57, who left UCLA to succeed Gilchrist. Both Glaser and Rector, who also is a former treasurer of the federation, are highly regarded for their administrative talents. Both have said in interviews that they are aware of and sensitive to the needs of the federation's member societies. Although neither will immediately say what they see these "needs" to be, the fact that Glaser's name was placed into nomination by one of the smaller societies that does not participate in conference surpluses—the Society of Industrial and Applied Mathematics—might be a hint that, for the majority,

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these needs transcend the "money tree" interests of the larger societies in AFIPS.

Although diverted by recent AFIPS financial problems, Gilchrist had clear-cut ideas of the role of the Federation. Two huge questions loom over AFIPS right now. How will the new management team view the roles AFIPS should play? And how well will they be able to sell those views to the management of powerful member societies who may insist on continuing to see AFIPS as merely a money tree?

Security

EDP Auditors: A Question of Clout

Like a benevolent specter, the Equity Funding scandal has done more to impact the edp auditing field than anything before it.

At a national conference of the EDP Auditors Assn., Inc., last month, the major concern of conferees appeared to be how to get recognition and support from top management. One speaker, Joseph Wasserman, president, Computer Audit Systems, Inc., told them, "I believe computers played a minimum role in the Equity Funding matter, but take advantage of it and jam it down your management's throat. Tell them we want to protect you!"

Another, Jim Chambers, Dart Industries, said "The greatest boon to edp auditing has been Equity Funding. When management asks can this happen to us, would you have caught it, give them an unequivocal yes."

At the National Computer Conference, in a jam-packed session on Secure Data Systems, a panelist was heard to remark, "there wouldn't be so many people here if it hadn't been for Equity Funding."

And perhaps there wouldn't have been as many people at the auditors' conference either. The attendance of 225 far exceeded the early expectations of organizers from the host Los Angeles chapter. Sessions which had been planned as informal give-and-take type meetings had to shift to a lecture format because of their size.

One of these was a session on "EDP Auditing: Its Role in the Management Function." Phil Levy, Shareholder's Investor Service Corp., a speaker in this session, didn't mention Equity Funding by name but noted, "the door has been opened by some unfortunate publicity. As long as it has been opened let's take advantage of it."

The conference keynoter, Russ Quinn, general auditor, Rockwell International Corp., didn't use the name either. He said "recent business tragedies have awakened the entire business community to the fact that edp audit can play a key role." The word "clout" came up often at the conference as something the edp auditors want, need, and want to learn how to get. Quinn suggested that the clout is available now, that "the public and top management are attuned to potential disaster, that edp auditing has come of age, is accepted," but the edp auditors themselves "are not nearly as proficient as they should be in techniques and approach. They are maturing but not yet matured. They're not entirely sure what it takes to qualify [to be an edp auditor], how to use resources, where to look, and what to look for."

One of the stated objectives of the conference was to help clear up just these points, "to contribute to the identification of the edp auditor's role."

Dan Cashier, Coopers & Lybrand, in the session on "EDP Auditing: Its Role in the Management Function," noted that "unfortunately, the role of the edp auditor is still controversial in respect to his responsibilities" but offered this list of categories in which the auditor should assist top management: closing the gap between man and machine; removing obstacles created by the traditional school of management; minimizing human resistance to change; optimally utilizing up-to-date computer capabilities; and reducing edp systems development costs and time periods.

A matter of salesmanship

Levy in the same session said he'd looked for literature to help in preparing his presentation and found there was none. "There is no clear-cut identification [of the edp auditor] and management has to recognize who you are." In this, he said, there is salesmanship involved. "You must educate management to the fact you can offer an unbiased view of systems capability and hardware procedures. You have expertise they don't have, and you must convince them that use of your expertise does not mean they're being redundant and doubling expenses; that you can contribute; and that you're not necessarily trying to degrade the dp staff."

He warned against a "nit-pick" type auditing, giving as an example an auditor objecting to documentation standards which would satisfy their objectives but weren't done the way he would do it. "That's an attitude of self-justification, trying to justify your existence and it's a good way to lose

credibility."

Bill Murray, senior program administrator, data security, IBM, said an edp auditor shouldn't worry about his work leading to specific action. "An auditor's job is done if management understands his level of risk."

Murray's published topic was "EDP Auditors—Who Needs Them," but he opened by noting that "the press has made this a moot question" and chose instead to address the question "How Can EDP Auditors Make Themselves More Valuable to and Valued by Their Managers." To achieve this, he said, it is "important to understand the system, to know what controls and procedures there are. The box tends to swallow up controls and procedures so it is extremely important to understand them before they get into the box and this can only be done by auditing the development effort."

He emphasized the importance of the adequacy of the audit trail to fix responsibility for every event to a single individual and to make sure any kind of variance will come to the attention of management in such a way that management can take timely and effective action.

E. Rae Shaw, Sears Roebuck & Co., was one speaker concerned with clout. He advised "know how much clout your superior has and if he doesn't have enough to get a particular job done, go higher. Go as high as you can." A questioner wondered how "you go about going over the boss's head without getting fired," and was told by Shaw to "use salesmanship, go through channels."

Over and over during the conference the point was made that the edp auditor should be involved from the beginning, in the system development stage. "Too often," said Levy, "the auditor gets involved after the fact and is dealing with hindsight."

A number of little tricks were suggested. Ira Gottfried, Gottfried Consultants, said his firm has found an effective way of determining how many of the reports that go out of a computer center are really necessary. They glue them together. They tried this in one center and only two out of 43 recipients of one set of reports noticed.

A questioner in one session suggested putting a dummy employee on the payroll then bringing it to management's attention after several checks had been issued, as a way to get clout. Another said he had tried "something like that." He was concerned about security of the tape library which contained "millions of records." It was restricted to authorized employees which he interpreted to mean even having an employee's badge wouldn't automatically permit entrance. He went in

with a visitor's badge "with a big 'V' for visitor on it" and when he wasn't stopped after a few minutes, he took the badge off and walked around for 15 minutes. Then he went back and wrote a report. Security was tightened.

In a session on physical security, Robert Sutake, Rockwell International, told of testing an elaborate fence mechanism they had protecting a computer center. Any jostling of the fence would set off an alarm in a watchman's shed. He and some friends, returning late to the center one night, deliberately jostled the fence. The buzzer went off and the watchman simply got up and turned a switch stopping it, and returned to what he'd been doing.

Check lists

There was a lot of talk about standards—about the need for them and what they should cover. Robert Beals, Arthur Anderson & Co., said "there are plenty of standards out there. You all have check lists and a check list assumes standards."

Robert L. Patrick, a computer consultant who has performed some 18 computer management audits and computer technical audits of large installations, has a check list (he likes to call it a tour guide) that is 100 pages long. Patrick described his procedures at a recent ACM meeting in Los Angeles.

Kent Gould, State of California, Dept. of Finance, suggests use of performance measurement tools, particularly software packages, as the means of determining standards against which to compare.

Three years ago, he told the auditors' conference, it would have been grossly unfair to evaluate users using these devices which they didn't have themselves. Now they're in widespread use "and if they've got 'em and aren't using 'em you got 'em cold."

Beals was in what he called the "clean-up position" at the conference. He took a swipe at computer manufacturers in a talk entitled, "The End of the World Will Occur at Exactly . . ." He said the manufacturers spent the first generation generally making equipment work; the second generation in salesmanship, selling unworkable applications; the third generation on software; and the fourth generation on getting the courts more crowded. "And all they ever really taught us was how to convert payroll four times."

"We have to train and educate a whole army of edp auditors," he said. "We have to gain acceptance because there is a whole jungle of edp systems out there, ill-conceived and inefficient. When will the end of the world come? It will come at exactly the same instant in time that this group just shrugs and says who cares." —Edith Myers

Mainframers

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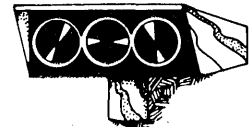
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news in perspective

life: the Management Review Committee (MRC), the top body that reviews the work of the Management Committee (MC), deliberates over the parking problem at Armonk and expense account mileage.

Perhaps the most interesting minutes show IBM top management at work during periods of strain and crisis. It was clear, for instance, that Thomas J. Watson Jr. was laying down the law in April, 1971. "T. J. W. Jr.," the MRC minutes state, "wants clear understanding that company swallow whatever financial pills required now and get ready for the future. We can't have ourselves mesmerized by the balance sheet—irrespective of financial considerations of one or two years—must return this business to a growth posture and operate accordingly."

Later that year, the MC minutes show that some within IBM were concerned about what was referred to as "our declining performance." IBM didn't exactly cry poormouth but the November 1971 meeting is replete with references to IBM's problems and difficulties, although the minutes on the meeting indicate that there is some disagreement about the idea that the firm's performance is declining.

The competition

In the minutes, it is stated that most competition, in declining order of percentage, comes from systems, plug-compatible, terminals, and key entry equipment manufacturers. The November 1971 minutes state: "In addition to our unique exposure to plug-compatible leasing company and marketing practice competition, a depressed economy affects us more severely than other systems competitors since more of our business is concentrated in large, multi-installation customers who are able to tighten DP belts without significant degradation in total capacity."

The two IBM top management committees follow the competition closely. And most of the firms they track are companies they would be expected to follow—mainframe companies like CDC and Univac, and peripherals and leasing companies like Memorex and ITEL. But one startup company seems to have really caught IBM's eye back in 1969—Viatron Computer Systems Corp. A reading of the minutes reveals that IBM tracked Viatron closely and, as a result of Viatron's efforts to push the state of the art in several areas, IBM appears to have pushed its research and development in the same direction in response.

At one point, the minutes indicate, IBM is worried about its competitive position vis à vis Viatron in the key

entry field. "Our product development to meet this market [the key entry market] is called Viking," the November 1969 minutes state. "Until two weeks ago it was not even fully funded. This is an unglamorous area where IBM has tried to make a cheaper keypunch in the past and now finds others taking the market with a systems approach. Viking, even if ready to be announced, does not have the function in the Viatron price nor does it have the communications ability. We would be announcing with too little after Viatron is installed."

And on the subject of large scale integration (LSI) in componentry, the MRC observes that IBM's efforts with the technology are "one year behind competition." However, the minutes paraphrase an IBM components expert who reported to the MRC that IBM's technology "would have much broader use and higher performance for the same cost than Viatron." Viatron, of course, ran into a whole myriad of problems in the early '70s and subsequently went into bankruptcy.

Future Series

The minutes also give a glimpse into some of IBM's planned new products. For instance, the FS (Future Series) is discussed several times in the minutes and although it has been common knowledge in the industry for three or four years that IBM planned to announce FS in the mid-1970s, the minutes reveal that extremely elaborate planning on all levels from research and production right on through corporate was carried out in 1971 for a product line that probably won't be delivered until 1976. Several plans were presented to the MC and the MRC before one was agreed upon as the best approach.

Customers can gain some relief by one comment in the minutes regarding FS: "No reprogramming would be required and most customers will emulate their existing application program. New programming thrust will be directed toward additional applications."

IBM top management apparently pays considerable attention to standards too. One entry in the minutes showed that an IBM scientist is concerned that proposed standards by the National Bureau of Standards could be "fraught with deficiencies similar to those which occur in our internally-generated measurement systems, and yet they would be used to establish final judgments."

Another entry indicates that the MC was concerned with the Codasyl Task Force work because it "is evolving a

standard that is inconsistent with our product line." On another point the MC observes that IBM did not have a "thoughtful business strategy regarding programming languages" in August, 1971. "The MC concern," the minutes state, "is that the proliferation of programming languages may not be viable, given the practice of charging for such languages and the large number that are presently in the public domain."

As far as standards in the I/O interface area are concerned, the MC seemed to begin leaning towards the idea that the pressures have been shifting away from the establishment of rigid standards to releasing interfacing specifications early. "The current feeling is that NBS (National Bureau of Standards) will recommend that manufacturers release specifications and that the timing of the release will be negotiable, dependent on the specific bid situation." On an earlier occasion, IBM top management indicated that announcement of full interface specs was "impractical because of the multiple changes which occur during the normal" predelivery testing cycles.

The modern world

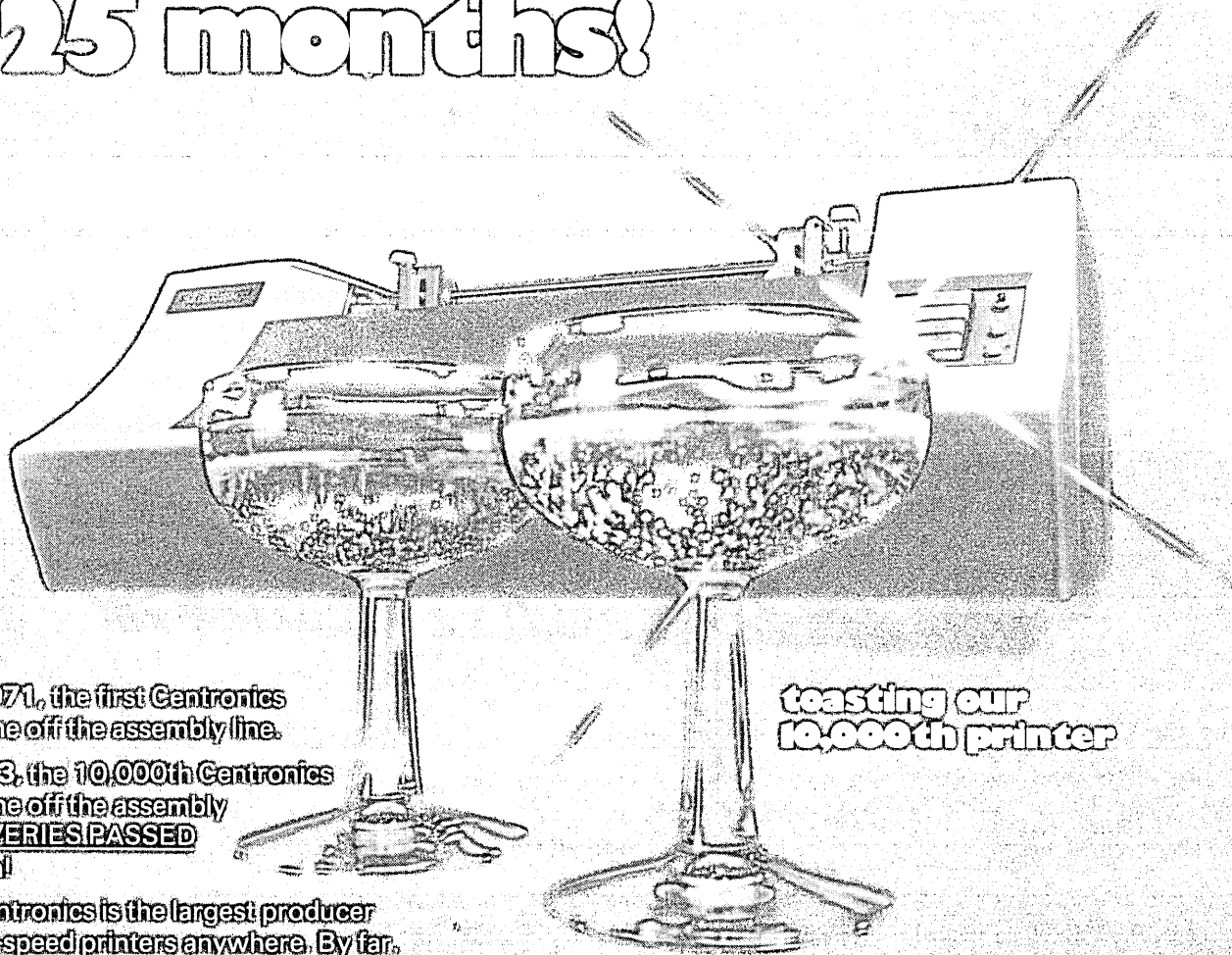
The Management Review Committee is not only concerned with business decisions, but, in its role as unofficial prefect of discipline for IBMers, it establishes and changes the company's code of behavior. The hymn books of course, are long gone and while the vestiges of the quasi-missionary code of behavior still linger, the minutes of the MRC indicate that IBM, too, is changing with a modern world.

IBM, however, is not quite ready for Playboy Club, or at least the company wasn't in the summer of 1969. On the subject of using Playboy Clubs for IBM's business meetings, the MRC minutes said: "It was agreed that these [Playboy Clubs] were inappropriate for business meetings, but if they were used for social occasions, such as IBM Club functions, that no corporate position should be taken."

And liquor. The company is loosening its teetotaling stand on liquor, but in mid-1969 the MRC didn't open up very much. "Business meetings would not include the serving of liquor," the minutes state. "A family dinner [traditional gatherings of IBM employees and wives] is defined as a business meeting." The MRC decided the company's long-standing policy against liquor still had "considerable business value" and that the policy would be retained, but that it would ultimately erode. The MRC agreed to allow alcohol to be served at social events sponsored by the company.

There is also a note to the effect that IBM began loosening up on its strict

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move policy in which it often moved its employees from one geographical location to another without the highest consideration for the employee's feelings. "The consensus of the DP Group was that moves were particularly difficult when children reached high school age," the minutes state. "It was decided to write a briefing to increase management sensitivity to this problem."

The minutes even illustrate the pecking order that exists between the two committees. In December, 1969, two members of the MC were "criticized for confusing the MRC with a bad piece of work." The minutes state that the discussion was "postponed until further homework was done."

—W. David Gardner

Memorex Users Laud Supplier But Worry

The Memorex Fan Club seems to grow each day. According to one source, there are now more than 280 of those Memorex computer systems installed in the U.S. And at each of those sites are more people who are concerned about the financial plight of the mainframe vendor. Inevitably, they mention the *Wall Street Journal's* periodic stories on the Santa Clara, Calif., company and its well-known need for cash. Those stories shake him up, one user says, "but the Memorex boys have been pretty good about coming in three days later with a retraction."

On the occasion of its annual stockholders' meeting, Memorex said it would need another \$79 million to carry it through the rest of this year. It has not been able to secure equity and debt financing, the company admitted, and therefore "is currently engaged in discussions with other companies with a view toward sale by Memorex of a substantial equity interest or other form of business combination." Failing this, says president Laurence L. Spitters, it will have to reduce operations and that could mean dropping its big-ticket product line: the mainframes.

We're delighted

"From what I know of the sales response in this neck of the woods, I cannot believe that it's an intelligent thing to do so," says Barry Ries, president of Quality Data Processing, a Baltimore, Md., service bureau. Ries has been running a 48K MRX/40 system since the beginning of the year, one that replaced a 360/20. "The Memorex equipment has been quite dependable and exceeds the specifications by pretty

good margins," he adds. "We had a very early model and there were some software problems that have since been solved, and there were some minor modifications to the hardware. . . We are highly operational now, the machine really cooks. We're delighted." As to the software support, he says it's been "superior."

Also pleased with his system is Paul Bultmeyer of Educational Reading Service in Mahwah, N.J., a school supplies firm that also does some service bureau work for schools. It's a toss-up as to whether Bultmeyer or Ries got the first installation, but the former now has a 64K mod 50 that was field upgraded from a mod 40.

Isn't worried

Bultmeyer also says support from Memorex has been very good, indicating no de-emphasis on the system business by the supplier. He, too, is concerned that Memorex might drop out of the mainframe business, but doesn't really expect that to occur. "I think they'll either limp along until they get their installed base to the point of bringing in a profit, or they'll sell it the way GE did to Honeywell, or RCA to Univac. . . If a major manufacturer were to take it over, even a Japanese firm, which is one of the rumors I've heard, that wouldn't really bother me too much. It might even be beneficial." He explains that another company might have the financial resources to provide the support the users will continue to need. Through the end of 1972, according to Memorex, the company had invested some \$22 million in the systems business.

It also said its largest single investor, the Bank of America, has chipped in some \$130 million so far, including \$25 million advanced earlier this year. But the company's cash requirements for 1973 are for an additional \$95 million. To balance that, it estimates its cash generated by operations at \$67 million, which is shy by \$28 million. But to this one must still add \$51 million for demand notes and debt maturities scheduled for this year. This brings us back to a need for \$79 million.

Among companies who are rumored to have held discussions with Memorex are Univac, the 3M Co., and an unnamed Japanese firm. The Ford Motor Co. was named by one source, who quickly pointed out that this, however, related to a 370 peripherals deal and not to the Memorex systems business. For awhile, one got the impression that Ford had a lousy idea.

—Edward K. Yasaki

For NCR Users: Reassurance

A president of a computer manufacturing company could be expected to anticipate a number of possible reactions when he agrees to keynote a conference of users of his company's equipment.

An enthusiastic standing ovation probably wouldn't be one, but that's what William S. Anderson, new president of the National Cash Register Co., got when he keynoted this year's NCR Users' Group conference in San Diego.

For the most part it was an expression of relief and an indication the users believed Anderson when he said, "Edp is our business." With RCA and GE out of the computer business, and with NCR having had its problems lately, many users admitted they were worried. "He restored my confidence," said one.

The NCR president told users that the company in the past had had "a somewhat split corporate personality—in part, a producer of free-standing mechanical business machines, and in part, a producer of electronic data processing systems. Now that distinction is vanishing. We have become a computer systems company. Virtually everything we make in the future will either be a computer or capable of being linked to a computer, either directly as an on-line device or indirectly through cassettes or some other media."

"We have trimmed out a great deal of corporate fat," said Anderson, hastening to add that the majority of reductions occurred in the non-edp areas of the company.

That users were concerned with effects of personnel cutbacks was reflected in a question and answer session which followed a presentation by another NCR executive, S. E. Loewy, asst. vice president, systems services. One questioner asked what the cutbacks had done to systems service. "Obviously, it hurt us a bit," said Loewy, "with the bad fruit we lost some good fruit but we're trying to build back up." Others spoke up to say what they thought the effects had been: "People too limited . . . covering too many sites . . . we're practically out of site support."

But when they'd had their say one user got up to give a glowing testimonial to the kind of support he had been receiving and he was backed up by lengthy applause. Conversation in the corridors and over lunch indicated there is more satisfaction with support than dissatisfaction and Loewy made careful note of the names of all who cited problems. Users were unanimous in their assurance that "He's the kind of guy who will follow up and soon."

Plain talk

Loewy came on as a plain-talking, tell-it-like-it-is guy, telling users, "We cannot offer you a Cadillac at Chevy prices and stay in business very long." He said too, "We must avoid the pit-fall of total involvement with a few selected users at the expense of the many. We must make our resources available to all who have need of them, not just to those who yell the loudest."

Loewy called upon users to face up to their responsibilities. "The vendor has the right to expect the user to be prepared for installation of his computer . . . not just the more obvious preparations such as the physical site, air conditioning, files, and electrical requirements. But also the less obvious adjustments that are absolutely mandatory to make things work smoothly . . . You must educate all levels of personnel so that they understand why the way that they have been doing things for the last 50 years is going to be changed. They must be a part of the new system or it will never work. I'm not just talking about the clerks and accountants, but also the presidents and vice presidents."

Bill Keating, asst. vice president, basic and applied software development, said NCR is streamlining and improving its documentation. "There are two levels of documentation now, functional specs or 'what', and implementation specs or 'how'. These are being integrated." He said they have developed a text editor for documentation which may be announced as a product "in the next couple of months."

The three NCR executives were heard by some 400 users who also divided their attention among 38 technical sessions on applications including banking, retailing, manufacturing, health care, and education.

New groups

The attendance was down by about 100 from the last one held in Dayton but organizers were pleased. "We thought it would go down by more because of holding it in the west when the bulk of our membership is in the east. We're pleased to see how many easterners made the trip and we think we've accomplished our objective of stirring up west coast interest."

The national organization is actually a "Federation of NCR User Groups" (UGs) which are organized on regional and industry bases. On the regional side, only the west coast doesn't have an UG.

A new UG, SBUG (Service Bureau Users Group) came into being during the conference, joining such groups as CHUG (Cooperative Health-Care Users Group), MUG (Manufacturers' Users Group), and NUMUG (NCR Upper Mid-

west Users Group), to name just a few of about a dozen.

Conference organizers including James Krautkremer of Midland Cooperatives, Minneapolis, chairman of the Federation, and Roger Wilgus of Memorial Medical Center, Corpus Christi, Texas, general chairman of the meeting, did a commendable job in putting together a program which users who had attended past conferences called "the best yet."

The program committee screened papers for sales pitches and it seems only one that was deemed "somewhat salesy" slipped by. In the main, the sessions were informative, and users generally agreed they left the conference having learned something from them and the informal exchanges in-between.

There was considerable interest in sessions concerning on-line systems. In one, Don Masterson, Midland Cooperatives, described an on-line order entry system his company has developed. Midland is a distributor of farm products and products for service stations. The system, Masterson said, has cut their order to delivery time from three days to one day. Their distribution center, in Fridley, Minn., is equipped with a 128K Century 200, multi-programmable. It's a two partition system. Heart of the distribution process, Masterson said, is the WATS room to which 500 customers call on a once-a-week basis. Their orders are input to the system by either Teletype terminals or crt's and a picking and delivery schedule is produced based on truck routes.

Dr. Laird Sloan, Automated Systems Corp., in a talk on "The Incremental Costs for an On-Line Data Collection and Communication System," described such a system in a hospital. He said use of such a system produces "considerable savings" but that most of them are intangible, such as savings of professional time, reduced supplies (use of forms), reduction of lost charges (since each charge is captured at the time it is created), and in the no-payments area—"the customer gets his bill while he's still feeling grateful to the hospital."

Dr. Sloan's presentation concluded with a demonstration of how a card reader is used in such a hospital system and it took a big strong user to shoulder his way to the center of the mob that crowded around.

A user attending from England, anxious to get an UG going there, commented that he liked everything about the conference and his trip to the U.S. except American food. "I haven't had a decent meal since I left BOAC."

—E.M.

Standards

ANSI Votes While Feds Launch Tests

All COBOL compilers acquired by the federal government must be tested for conformity to the ANSI standard, under a GSA regulation that was about to be issued late in June.

Meanwhile, ANSI's X3 committee began its final ballot on the 1973 COBOL standard, an update of the existing 1968 standard which could become effective this fall.

The new COBOL compiler validation order may be the forerunner of others. Dr. Richard W. Roberts, director of the National Bureau of Standards (NBS) considers testing of COBOL compilers to represent "the beginning of a new era in which for the first time, quality controls are employed in the acquisition of computer software."

The Bureau's Institute for Computer Sciences and Technology already has developed software capable of validating FORTRAN compilers, and vendors are now testing and debugging these routines. Development of a standard for BASIC, and a related validation routine, is underway at the Univ. of Massachusetts. This work is scheduled to be completed by Sept. 1. Meanwhile, NBS is considering similar standardization and validation projects for ALGOL and PL/1. And the Navy, as reported earlier, is working on a software system for evaluating the performance of COBOL compilers in relation to specified job requirements. These routines, the bureau hopes, will become a federal procurement tool.

May be changed

The GSA order covering compiler validations, known officially as a federal property management regulation (FPMR), becomes effective upon publication and expires in June '74. It's subject to revision in the meantime. All COBOL compilers "proposed by vendors to meet mandatory requirements of federal agencies" must be tested. The test will determine the degree to which the compiler conforms to a specified level of the COBOL standard then in force, and will impose "a contractual requirement" on the vendor for correction of any deviations. Vendors also will have to maintain their compilers in conformance with the federal standard when any compiler or operating system maintenance changes, or equipment modifications, are made.

Validation tests will be performed by a Navy agency, the Federal COBOL Compiler Testing Service (FCCTS), which "may" disclose the validation summary report (VSR) to the public

news in perspective

without any restraint. But the GSA regulation emphasizes that the test is made "only for the purposes of satisfying U.S. government requirements." The VSR "is necessarily discretionary and judgmental" and "is not meant to be used for the purpose" of publicizing test results.

If a compiler fails to pass the test, the user agency probably will be able to use it anyway, provided it informs NBS, but not necessarily ahead of time. If there is a difference of opinion regarding interpretation of test results, the dispute will be referred to a "Federal COBOL Interpretation Committee." NBS chairs this group and has the final word regarding resolution of disputes.

Implementation of the COBOL compiler testing service on a government-wide basis came after a protracted and often acrimonious discussion between NBS and the Navy over control of the program. The Bureau, leaning on the authority it has under the Brooks Bill for development and maintenance of federal adp standards, initially wanted to run the entire show. The Navy, which did much of the technical development work, insisted that its people should be the sole judges of a compiler's technical compliance with the standard. A "memo of understanding," signed recently between the two organizations, seems to give the Navy what it wanted. However, the Bureau retains overall control since it receives a copy of each VSR, has the last word regarding interpretation of the standard, and heads the Federal COBOL Interpretation Committee which was set up to resolve disputes over interpretation of test results.

Eighteen changes

The proposed COBOL standard now being voted on by X3 members includes 18 "substantive" changes added since publication of a draft version several months ago. Of these 18, only five "will have any impact on programs written to conform to X3.23-1958 [the present standard]," according to Bob Kearney, of Bell Labs, who heads the ANSI group (X3J4) that developed the proposed new COBOL standard. Here are the five most significant changes:

—Where the `DEPENDING ON` phrase is used, there must now be at least one occurrence.

—Relation conditions and arithmetic expressions must contain at least one reference to a variable.

—In a combined relational condition, `NOT`, when immediately followed by a relational operator, is interpreted as part of the relational operator. In the 1968 standard, `NOT` was considered to

be a logical operator in such cases.

—The definition of an unambiguous, qualified reference has been extended.

—If `SYNCHRONIZED` is specified for an item containing an `OCCURS` clause, any implicit `FILLER` generated for items in the table are generated for each occurrence of those items.

The proposed standard includes several capabilities not present in the '68 version. For example, facilities were added to provide for native, ASCII, implementor-defined, or user-defined collating sequences, to be used in non-numerical comparison operations, in `SORT` or `MERGE` operations. The specification of code conversion for sequential non-mass storage files; implementor/from native and ASCII or implementor-defined sets is also permitted.

Five new modules are included in the 1973 COBOL standard. Three of these—`DEBUG`, `INTERPROGRAM COMMU-`

`NICATION`, and `COMMUNICATION`—provide new capabilities, while the other two—`RELATIVE I/O` and `INDEXED I/O`—replace the `RANDOM ACCESS` module. The revision also provides fewer implementor-defined areas, and has a completely rewritten `REPORT WRITER` module. Altogether, there is a nucleus and 11 processing modules in the '73 version. Each module contains either two or three levels.

Ballots on the proposed standard, which has been under development for more than six years, are due Sept. 7. If the vote does not produce a consensus, another 30 days, approximately, will be required to resolve objections. Then, the approved standard will go to ANSI's Board of Standards Review for a final vote, requiring 10 days. Approval at this level is considered virtually certain, and once it is obtained, the standard will be ready to go into effect.

—Phil Hirsch

Benchmarks

The First: The optical systems division of Itek Corp., Lexington, Mass., has received the first 370/158 system. The machine, which replaces a 360/30 and a Control Data 3300, will serve both Itek's business dp needs and scientific applications that include producing lenses for cameras on space ships, astronomical telescopes, and other special devices. The dp director describes the changeover to the 370/158, one of the smoothest conversions (aided by an interim 370/145) he's seen: Installation began on a Thursday afternoon at 4:30, and IBM turned the machine over to them early Saturday afternoon. Production runs began on Monday morning. Itek has a 1-megabyte 370/158 and runs a 5-megabyte virtual memory environment under `os/vs1` release two.

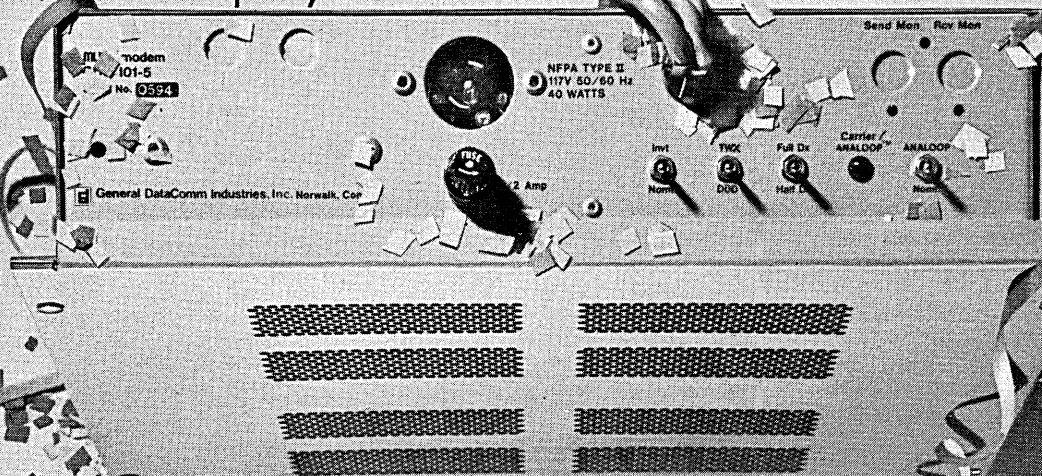
Me Two: System Development Corp., Santa Monica, Calif., has the first 370/158 operating in a production mode under `vs2`. Pete Cooper, system planning coordinator for SDC's Corporate Computer Facility, said the computer arrived in crates on May 21. "We pulled the plug on a 155 Friday, May 27, at midnight and system programmers began testing both the new operating system and the computer at 8 a.m. on the 28th. We were back in a production mode by 5 a.m. on the 29th and this was not only a new computer but a whole new concept in operating systems." With the 155, he said if the company's `ORBIT` Search Services (text

editing) or `PATRIC` (the Los Angeles Police Department's Pattern Recognition and Information Correlation program) were operating, they had to be resident in main storage. With `vs2` each is stored on a 3330. When used, each is paged off of disc to main storage. Cooper said throughput is the same because the internal speed of the computer was increased. "Now we can have `ORBIT` and `PATRIC` up all day and still process any and all other jobs," he said.

Happy Birthday: The Computer Industry Assn. (CIA) is one year old and is pleased with its first year. A. G. W. (Jack) Biddle, executive director, in a year-end report to membership, said the group "has been successful in meeting most of its early goals, including preventing a 'soft' pre-trial settlement of the government's antitrust suit against IBM." He listed six points the CIA's 1973 program will include: public discussion of solutions to overconcentration, continued meetings with government, increasing public awareness of the importance of free competition, involvement of users of computer systems in discussions of the problems, maintaining a close relationship with the Justice Dept., and discussion with the financial community to demonstrate that an end to the "overconcentration problem" of the data processing industry will allow all participants to grow and prosper. □

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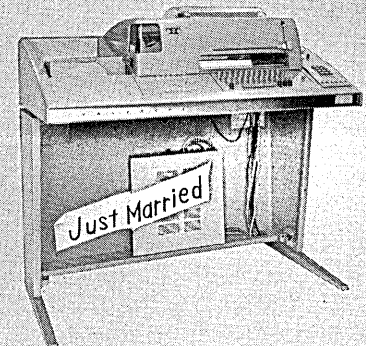
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CIRCLE 65 ON READER CARD

Hardware

Off-line

IBM won't say how the group coded recording technique works on its recently announced 6250 bpi tape drives, but according to a spokesman at the Potter Instrument Company, "It's logical to assume that an essential part of the approach" borrows from a basic patent awarded in 1965 to then-company-president John T. Potter (and associates). Potter, which is coming out with its own line of 6250 drives, says that relatively recent advances in solid state technology have made the technique economically feasible to use. IBM is currently the only company licensed by Potter to use its gcr technique, but other "responsible" manufacturers are offered access to it.

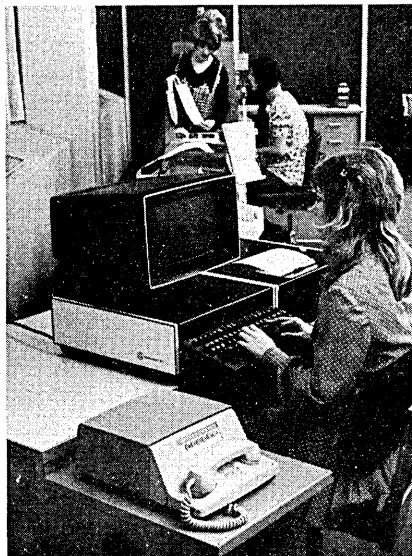
One of the more interesting computer architectures seen to date has been assembled by a Carnegie-Mellon Univ. (Pittsburgh) professor and a team of students. Called the Multi-Mini-Processor, it consists of 16 Digital Equipment PDP-11 minicomputers, each with its own memory, tied to a switch that allows each mini to access any other mini's memory. The minis can be set up to work on various portions of one job, operate in small groups, or be set up to work independently on 16 separate jobs. One of the first tasks the MMP will face is the real-time speech understanding problem.

Two companies have recently developed some interesting modifications for IBM products. ITEL Corp., San Francisco, teaming with Advanced Memory Systems, is offering a 370/155 processor speed up, involving attachment of AMS-supplied semiconductor memory and removal of "tread-water" cpu logic originally built into 155 cpu so that it could operate with relatively slow core storage. The modified 155's performance is said to be on a par with the 370/158. Similarly, Greyhound Computer Corp. has taken a "stock" 360/30, equipped it with up to one megabyte of core, additional disc capacity, and a 370-compatible operating system from The Computer Co. (see p. 107). A 512K version of the Phoenix system is said to approach the performance of a 370/145.

Teletype's Crt Terminal

It has taken the Teletype Corp. a long time to announce its crt terminal, which is understandable considering all the restrictions placed on the company by antitrust laws and consent decrees. The DATASPEED 40 is an exciting product with a number of well-thought-out features, not the least of which are in the area of reliability, and the product will undoubtedly be a successful one.

There are a number of configurations that can be assembled from the following components: a crt display monitor with dimensions of approximately 6 x 12 inches, 128-character ASCII keyboard, a serial printer, and the logic for the 40. When only the serial printer is specified, the 40 is a receive-only printer that operates at up to 120



cps. The printer can be placed alongside the crt screen to provide backup copy, or it is also available integrated with the keyboard (much like the current Teletype models) with the crt screen sitting atop the configuration. The screen displays up to 24 lines of 80 dot-matrix characters, and can be tilted by the operator to adjust it for minimum glare.

The keyboard also contains such controls as character insert and delete, line insert/delete, scroll up/down, printer controls (on-line or off-line), and cursor controls. Every component of the terminal can be isolated and tested to diagnose potential problems, and in the case of the logic for the DATASPEED 40, this diagnostic capability has reached a new industry high. By manipulating toggle switches on the circuit boards contained in the logic cabinet, the 40 displays oscilloscope images on the crt monitor.

The DATASPEED 40 is really not in-

tended as a model 33 teleprinter replacement. Rather, it's meant for heavy usage on the switched network through 202C, 202D, or 202R data sets, basically conforming to ANS's X3.28 subcategory 2.1 (two-way alternate switched point-to-point) conventions, but an option is available that allows the terminal to operate conversationally. The first units of the family will go into AT&T installations, with availability for the rest of us no earlier than the first quarter of next year. Exact pricing and rental rates have not been set, but it's estimated that the receive-only model will go for between \$105 and \$120/month (\$2300-\$3000 on purchase), the keyboard and display for \$110-\$125 (\$2500 to \$3500 when purchased), and the combination of the two for \$175-\$195 (\$3800-\$4800.) TELETYPE CORP., Skokie, Ill. FOR DATA CIRCLE 341 ON READER CARD

Calculator

If you don't need trigonometric functions, logarithm capability, and battery-powered operation in a shirt pocket size container, the Texas Instruments SR-20 calculator might be the most competitive product of this type introduced since the Hewlett-Packard 35 of last year. The SR-20 has all the rest of the 35's capabilities (except four working registers), including a pi key, epsilon key, change sign key, reciprocal, and square root, and even has some things that the 35 didn't, such as a factorial key that makes the SR-20 think for approximately 1.5 seconds, and an integer key for displaying any number in integer form. Like the H-P 35, the 20 handles magnitudes of ± 99 , and calculates answers to 13 significant digits. It weighs less than two pounds and measures only 9 x 6 1/2 x 2 1/2 inches.

TI is currently test marketing the SR-20 in selected portions of the country, because they don't want to get flooded with orders for a product that won't be available in quantity until later this year. Their reasoning seems good, as the SR-20 is priced at only \$179.95, and we've seen calculators only capable of four function operations priced higher than that. TEXAS INSTRUMENTS, INC., Dallas, Texas.

FOR DATA CIRCLE 342 ON READER CARD

Univac Commo Controller

Here is an alternative communication terminal module controller (CTMC) supplied on Univac 1100 series computers that is based on this manufacturer's Omnus-1 16-bit minicomputer.

It's called the ECTMC (E for enhanced). It is compatible with Exec 8 communications protocol even when capable of servicing other makes of terminals such as the IBM 2780 and 2741. Up to 128 active terminals can be attached to each ECTMC. A typical configuration would consist of eight synchronous 9600 baud lines together with 16 1800 baud asynchronous lines, and is priced at \$54,296. Adding eight more 9600 baud lines and 32 asynchronous lines to that configuration results in a price tag of \$122,536. The system, complete with operating software, is said to be up and running, and to have already been demonstrated to selected users. Initial deliveries of the ECTMC are scheduled for October. OMNUS COMPUTER CORP., Santa Ana, Calif.

FOR DATA CIRCLE 346 ON READER CARD

Flexible Discs

A floppy disc, as with any peripheral, is either IBM-compatible or not. This five-month-old manufacturer resolves that with two models, both sharing some specifications. The SA900 is logically and format compatible with the IBM 3740 data entry system and uses the same medium. The SA901 is non-compatible, and uses a similar disc but one that has 32 sectors and is available at the same price: \$6. Both models have a capacity of 3.1 megabits or 41 kilobits/track, a data transfer rate of 248 kilobits/second, rotational speed of 360 rpm, average latency of 83 msec, and a movement time from track to adjacent track of 10 msec. The SA901 has a Write Protect feature not available on its sibling rival, but in both the head is in contact with the medium. The heads, made by the company, have no lapping, use no ceramic materials or epoxy, and therefore reportedly do not contaminate and cause excessive wear of the disc. They also are adjustable for compliance in the field. Unit price, subject to volume discounts, is \$750 for the SA900 and \$800 for the SA901. Delivery is 90 days ARO. SHUGART ASSOC., Sunnyvale, Calif.

FOR DATA CIRCLE 348 ON READER CARD

Forms Separator

The model 800 forms separator is designed for low-volume, short-run operations. It operates at up to 400 feet per minute, handling both carbon-interleaved and chemical carbonless forms with maximum dimensions of 17¼ x 14-inches. The unit goes into production this month, with deliveries slated for three weeks ARO thereafter. The initial selling price will be \$550. THE STANDARD REGISTER CO., Dayton, Ohio.

FOR DATA CIRCLE 349 ON READER CARD

Do-it-yourself Mini

The L series consists of 11 MOS LSI and MSI printed circuit boards that are primarily offered to systems designers for use as controllers, but are offered to individual users complete with racks

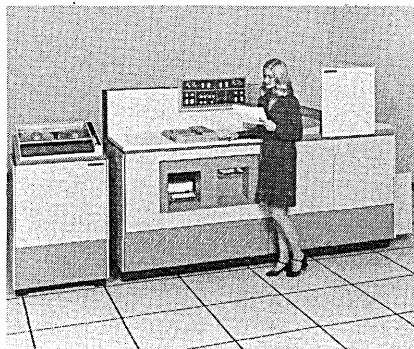
for assembly much like a high-fidelity tuner. The eight-bit processor contains 48 mnemonic instructions, seven general-purpose registers, can directly address up to 16K memory locations, and typically executes instructions in 20

product spotlight



Printing System

The Xerox 1200 computer printing system is probably the most significant development in getting computer output into the hands of users since the invention of nonimpact printers. It prints standard 132-character length lines in the 66 lines-per-page format that is almost industry standard, but the printing is done on 8½ x 11-inch paper instead of the 11 x 14⅞-inch stock that is fed through line printers. Drawing heavily upon the technology of its 3600 copier system, the 1200 prints at approximately one page/second, or 4000 lpm, using a 95-charac-



ter ASCII set that includes both upper and lower case fonts. The 1200 also includes a "forms flash" feature that allows any type of fixed-format information, such as letterheads or distribution information, to be combined with the variable computer output.

There are a number of advantages in doing computer printing this way. These include the fact that the 1200 is much quieter than a line printer and could be located in parts of an installation that couldn't tolerate the high noise line printers generate. There is

also the consideration that no dust is generated to be sucked into air conditioning systems, adjacent peripherals, or operators' lungs. The 1200's monthly rental compares very favorably to that of two or three line printers when you stop and figure out exactly what they cost. But the clinching feature is probably the 1200's ability to eliminate the time-consuming bursting and binding operations that must be performed on carbon copy output reports before they can be distributed to users. The 1200 can be set to generate an unlimited number of copies of any selected output report, and can also be set to stack the output in the twin output stackers offset by ½-inch per job or per entire run. Also for operator convenience there is a test output tray that allows sample outputs to be diverted upon request.

Two versions of the 1200 will be available in the last quarter of this year: an on-line system that will attach to the largest Xerox computers (the Sigmas 6, 7, and 9), and an off-line version. The off-line model will take output from any 800 or 1600 bpi, 9-track mtu in either ASCII, or IBM's EBCDIC from either OS or DOS System 360 or 370 equipment, or from any of Xerox's own computer formats. The basic monthly charge for the 1200 computer printing system is \$2600, which gets you the copier and the first 100,000 copies. From 100,001-300,000 copies per month the additional charge is .007¢/copy, and above that the rate drops to .004¢/copy. The monthly rental includes round-the-clock maintenance charges seven days a week. XEROX CORP., Rochester, N.Y.

FOR DATA CIRCLE 340 ON READER CARD

usec. A minimum system consists of the cpu, and i/o controller, and a memory address buffer, and is priced at less than \$400. Other components of the series that can be used to tailor the system include a 512 x 8-bit programmable read-only memory, and 256 or 1K byte read/write memory boards. A serial interface is available for handling such peripherals as teletypewriters, printers, keyboards, displays, and communication channels. CONTROL LOGIC, INC., Natick, Mass.

FOR DATA CIRCLE 350 ON READER CARD

Medium-scale System

Honeywell's announcement of an entry level 6000 series configuration suggests that the rumors regarding a whole new line of replacement equipment to be introduced in the near future probably refer to a smaller HIS series, possibly the 2000. The 6025 brings all the advantages of the GCOS operating system down into a price range that fits in between IBM's 370 models 135 and 145. The machine features 1.2 usec MOS memory in 80, 96, and 128K words, 36 bits to the word, with each cpu cycle pulling two words. The 6025 also features an integrated control unit for speeding up disc and unit record peripheral operations, an extended instruction set box optimized to run COBOL as fast as possible, and an Input/Output Multiplexor (IOM) with 10 ports, each rated at 500,000 words/second, with the aggregate for the IOM pegged at 2.8 million words/second. The larger Datanaet



communication processors can also be attached to the 6025.

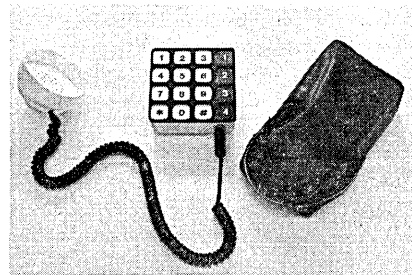
With the aid of a base address register, the GCOS operating system performs dynamic memory management while swapping batch, remote batch, and time-sharing jobs in and out of the system. Any job mode operates on a common data base. A number of conversion aids are offered users of other equipment, notably COBOL-to-COBOL conversion and file-to-file conversion routines, and assembly language-to-

COBOL conversions for IBM 360 and 370 users, Univac 70 series users, and Honeywell's own 200, 2000, and 400 series user base. A minimum 6025 configuration consists of a cpu and 80K of memory, console, printer, card reader, three tape drives, and two disc units, with a monthly payment of \$18K on a three-year lease. Add communications capability and the rental is \$21K/month on the same lease contract. First systems go to the field in the last quarter of the year. HONEYWELL INFORMATION SYSTEMS, Waltham, Mass.

FOR DATA CIRCLE 343 ON READER CARD

Portable Terminal

The T-16 is a 16-key terminal complete with acoustic coupler measuring only 3 x 3 x 1-inches and supplied complete with a pocket-sized carrying case. A standard nine volt transistor radio battery is said to enable the T-16



to send several hundred hours of Bell Touch-Tone signals through standard telephone mouthpieces. In addition to the numerals 0-9, there are the characters # and *, and four additional keys for sending customer-defined functions such as rubout, repeat, enter, shift, etc. The price is \$140, and the T-16 has a 90-day warranty. INTERFACE SYSTEMS, INC., Ann Arbor, Mich.

FOR DATA CIRCLE 344 ON READER CARD

6250 bpi Tape Drives

Telex is one of the first IBM-compatible peripheral suppliers to announce that it will build replacements for the recently announced 6250 bpi tape drives. All current Telex 6000 series drives are field-upgradable to become models 6420-44, -66, and -88, corresponding to the IBM 75, 125, and 200 ips models. Telex offers a double density option (6250/1600) on all three models, and the 6803-11 controller is offered as an alternative for IBM's 3803. IBM probably stays up late figuring out how to price its products nowadays—but it seems much simpler for Telex. Their prices for almost any tape drive and any length lease are right around 15% under IBM's charges. Some examples: the IBM 3803 model 2 controller rents for \$1130/month; Telex's for \$960. Telex's 6420-88 with double density

feature is \$760/month compared to IBM's \$895. Deliveries begin in the second quarter of next year. TELEX COMPUTER PRODUCTS, INC., Tulsa, Okla.

FOR DATA CIRCLE 353 ON READER CARD

Message Switching

The MS-5 is a large-scale store-and-forward message switching system built around Interdata's model 50 processor, a cpu with 88 general-purpose and 26 communications instructions. A typical MS-5 system would include 32K 16-bit words, a five megabyte cartridge disc, magnetic tape unit, card reader, tty, and a communication module capable of supporting 30 asynchronous lines running at rates up to 1800 baud. Including the RTEK real-time communications executive, this system would be furnished on a turn-key basis for \$190K.

The MS-5 is designed to operate as either a free-standing switching center running a network composed of a variety of terminals, or as part of a network that is controlled by several regional message switching systems with



computer-to-computer communications. Depending on user requirements, the MS-5 can act merely as a "traffic cop" in directing messages, or with additional software levels provided either by the supplier or through user programming of the mini, do message analysis to determine appropriate lines of action, and execute them. The MS-5 is available within 60-90 days. INTERDATA, INC., Oceanport, N.J.

FOR DATA CIRCLE 345 ON READER CARD

Drum Plotter

The 1036 drum plotter is Calcomp's top-of-the-line model in terms of speed, accuracy, and features. Two interchangeable drums are supplied with it, one measuring 36½-inches, and the other 15½-inches. Plotting through liquid ink or pressurized ballpoint pens is done at 5000 increments per second, and the step sizes available are .002-inch and .05 mm. Also part of the 1036 is an electronic scaling device to compensate for paper width variations due to climatic conditions or inking

Re-introducing the "other end" of the 3M COM system.

Usually, when we talk COM, we tell you about the proven 3M Electron Beam Recorder.

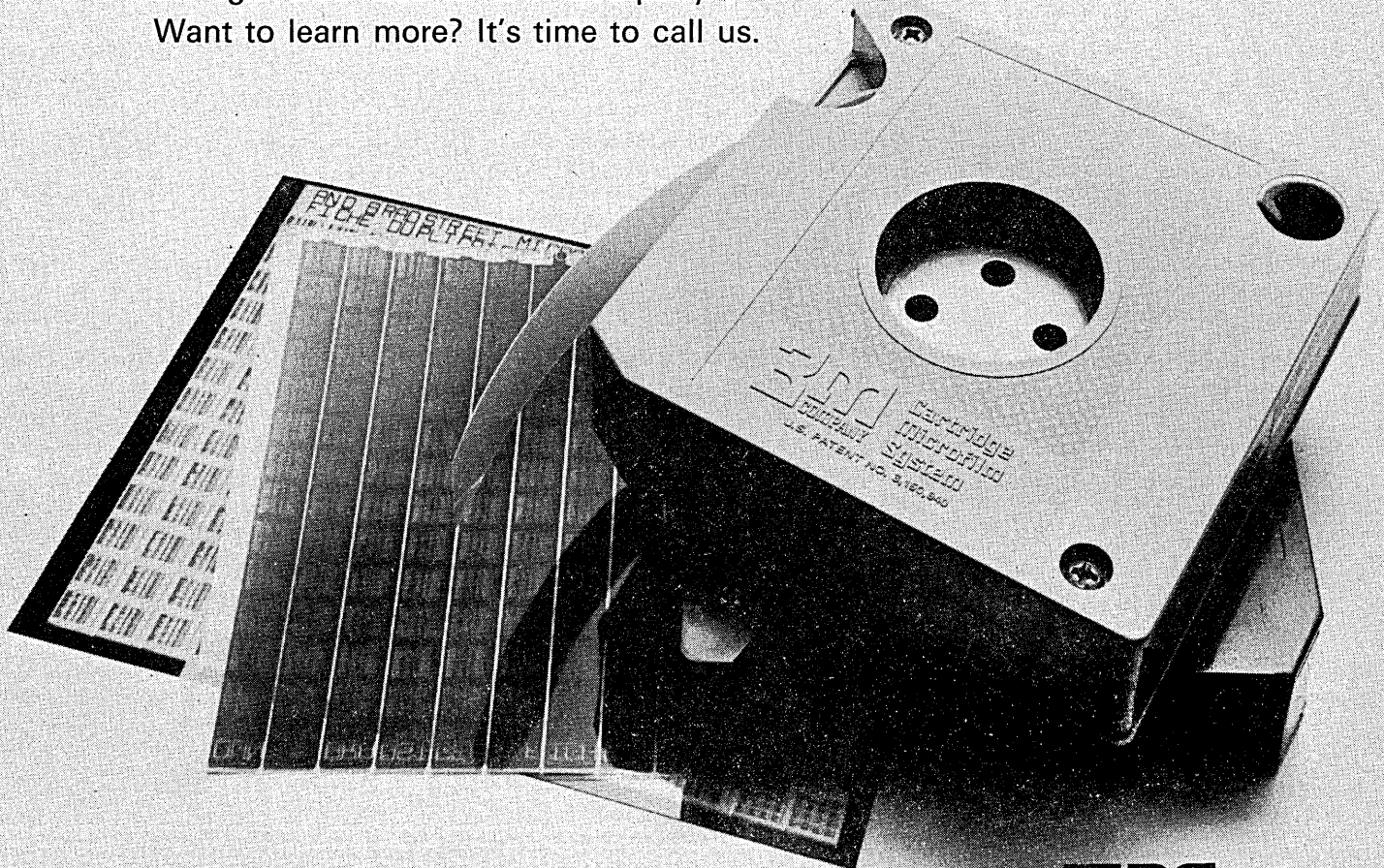
But there are two other important 3M COM capabilities you may not know about: Microfilm duplication and COM data retrieval, the "other end" of the 3M COM system.

So let it be known that 3M offers 16mm reel and cartridge duplicator equipment, plus microfiche duplicators.

Let it be known also that 3M offers a complete line of readers and reader-printers for retrieving COM data from microfilm reels, cartridges and fiche. Which provide visual display if you select a reader. Or visual display and copies if you select a reader-printer.

What does all this mean to you? Simply this. You can obtain EBR-Computer Output Microfilm with dry film processing, plus duplication and retrieval units in one complete COM package from a single COM source: 3M Company.

Want to learn more? It's time to call us.



The age of microfilm is here... **3M**
COMPANY

CIRCLE 53 ON READER CARD

variations, and a built-in cutting bar for removing finished plots. A number of interfaces are available for attaching the 1036 on-line to such typical host cpus as the IBM 1130, and the unit is also available in off-line versions. The basic plotter is priced at \$22,720, including one year of maintenance and basic software routines. CALIFORNIA COMPUTER PRODUCTS, INC., Anaheim, Calif.

FOR DATA CIRCLE 351 ON READER CARD

H-P's Latest Calculator

Hewlett-Packard's model 35 calculator, which has taken the world by storm (more than 75,000 sold in 18 months), would ordinarily be a tough act to follow, but the latest models, the 45 and 46, incorporate additional functions suggested by early model 35 users. The 45 retains all the capabilities of the 35, and in addition contains



nine addressable memory registers, polar/rectangular coordinate conversions, metric/U.S. conversion constants, and three trigonometric modes (degrees, radians, and grads). We couldn't understand why a factorial function wasn't on the original model 35, but that has been taken care of with the two new models. The models 45 and 46 differ only in that the 46 is a desk-top version of the 45 and has a printer for listing up to 10 significant digits, plus exponent and sign. The 46 is priced at \$695, and the model 45 is \$395. Since that is the same price as the original model 35, its price has been reduced to \$295, in hopes that it will continue to sell well. Delivery is within two weeks, depending on backlog. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 347 ON READER CARD

Cartridge Drive

Fully a year after it introduced the DC300A high-speed cassette cartridge, 3M now has a drive to accommodate it—something a handful of oem's have already developed. The unit records at 1600 bpi and ¼-inch-wide tape which is moved bidirectionally at 30 ips, yielding a transfer rate of 48 kilobaud. Search and rewind speed is 90 ips. The DCD-3 is initially offered in a door load configuration intended for half-rack mounting or for applications requiring a stand-alone unit. The basic drive unit can be expanded with the addition of a pre-wired card cage, read/write, encode/decode, and direction control circuit boards. In typical oem orders of 100, the DCD-3, complete with a single channel read/write head, is priced under \$350 per unit. Evaluation units are available now. 3M CO., St. Paul, Minn.

FOR DATA CIRCLE 352 ON READER CARD

Key-to-Disc System

The IS/1500 is a shared processor key-to-disc system that can support from 4-32 stations. Its programmable 16-bit processor operates at 750 nsec, simultaneously verifies input records, checks for illegal characters and boundary or field errors, and sends error messages back to the stations. In addition to being a key-to-disc system, the 1500 can become a remote batch terminal when equipped with additional software and hardware that includes additional disc units, tape drives, and printers. Communication is done in bisynchronous mode, making the 1500 look like an IBM 2780 or 3780 to most IBM cpu's.

A 12-inch crt screen can be expanded from three lines of 80 characters to six lines, and the keyboard is



compatible with the 029 keypunch. Up to 240 formats can be called up from memory, and operators can create temporary input formats if desired. Monthly rental on a basic IS/1511 configuration, including maintenance, is \$650. Purchase price for the system is \$30,350, and includes a 16K proces-

sor, 24-megabit disc drive, 800 bpi 7- or 9-track tape drive, and four key stations. First deliveries are scheduled for this quarter. GTE INFORMATION SYSTEMS, White Plains, N.Y.

FOR DATA CIRCLE 354 ON READER CARD

Floppy Disc

In quantities of 500 units, oem buyers can acquire for \$600 a flexible floppy disc with flying heads rather than contact recording. Features include media protection through total cartridge enclosure, a 300-msec average access, transfer rates to 2.53 megabits (with slower rates attainable through optional MOS buffering), and a capacity of 2.1 million bits on 64 tracks. Power supplies, interfaces, and full cabinetry are extra-cost items. DYNASTOR INC., Boulder, Colo.

FOR DATA CIRCLE 355 ON READER CARD

Display Interface

The BP-721 is a pc card interface that is inserted into any Data General Nova computer for turning any x-y display such as an oscilloscope into a graphics display terminal. The unit has its own semiconductor refresh memory and hooks up to the X, Y, and Z inputs to the oscilloscope or larger x-y display. A set of BASIC language commands supplied with the BP-721 enable the user to plot points, lines, and alphanumeric information. The card is priced at \$1095. MEGATEK CORP., Harbor City, Calif.

FOR DATA CIRCLE 356 ON READER CARD

Faster Mini

The D-116H is a refinement of the D-116, which was in turn "compatible" with (sold as a replacement for) the Data General Nova 1200. The H model uses a 960-nsec cycle core rather than 1200 nsec, but is said to be compatible in all other ways. Priced at \$4000 for a unit with 4K, a programmer's console, and an I/O connector, versions to 32K are available in a 5½-inch chassis. DIGITAL COMPUTER CONTROLS INC., Fairfield, N.J.

FOR DATA CIRCLE 357 ON READER CARD

PDP-11 Interfaces

PDP-11s probably are used in more specialized applications than any other 16-bit machine and therefore are often interfaced to lab instruments or control devices and other strange peripherals. Three kits are offered to make that interfacing easier. The kits provide 64-bit data transfers in input-only and input/output combinations for \$695 to \$1165 exclusive of Unibus connectors and cables. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 358 ON READER CARD

Bruning's new OP-40/80 microfiche duplicator

It produces cut-to-size and collated fiche in one operation. That's because our new OP-40/80 from Klear-Vu is really an automated duplicating system.

It's this simple: your operator puts the master fiche in the input station, dials the number of copies required (up to 99 from any master), and pushes the start button. The OP-40/80 begins at once to deliver cut-to-size, collated fiche at up to 1000 copies an hour.

Here's the system you've been looking for to eliminate waste film, cut operating time, and significantly reduce your fiche duplicating costs.

And what convenience: You get automated pushbutton operation. There is no plumbing and no venting needed. You can use positive or negative masters to produce flat, non-static copies.

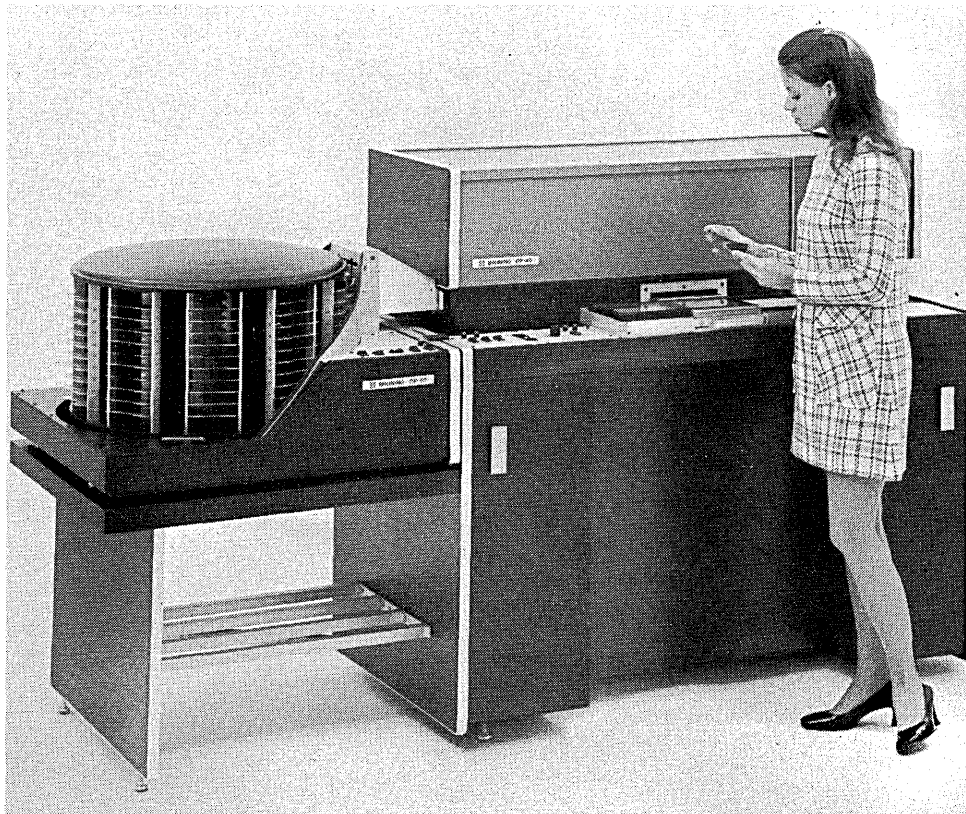
The Bruning Micrographics Systems Specialist in your area is ready to show you the OP-40/80

in action. And tell you about other Bruning products—such as the OP-49/88 roll-to-fiche duplicator—which make up our total capability in micrographics information distribution.

Call your local Bruning Sales Office today. Or write Bruning, 1834 Walden Office Square, Schaumburg, Ill. 60172.

The bold new force in micrographics.

Duplication automation.



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DIVISION OF ADDRESSOGRAPH MULTIGRAPH CORPORATION

Software & Services

Updates

The National Bureau of Standards is soliciting proposals for algorithms for encrypting computer data to insure its protection during storage, transport and transmission. NBS intends to collect the algorithms, select those fit for commercial and nondefense government use, and publish guidelines relative to the encryption techniques.

The market for packaged computer software and services, (\$770 million last year), will climb to \$1.5 billion by '75, and exceed \$2 billion by '82, according to a recent study by Frost & Sullivan, a New York City-based research firm. F&S packaged software into four classes (total packages, standard packages, and both systems and applications programs), with "total" applications-oriented products such as brokerage quotation and airline reservation systems winning the award for fastest-growing market segment. The services sector is credited by F&S with having reached \$635 million in '72, with projections for \$1.2 billion by '77, and more than \$1.5 billion by '82.

All NCR computer users who sell computer services or software to the public are invited to join SBUG*, a service bureau users group organized in San Diego. The group plans to meet three times a year; the next meeting is scheduled for August in Chicago. Contact SBUG*'s president, Ray W. Johnson, Systems Data Processing Corp., 701 Howe Ave., Sacramento, CA. 95825. Phone (916) 927-5371.

A performance study of 83 Burroughs installations has tentatively shown that operator performance, rather than software architecture, is the greatest factor influencing machine utilization, and is the most critical element affecting throughput on fully loaded multiprogramming hardware. A report will soon be issued on the survey specifics by Paden Data Systems, Dallas.

Programming Language

Is the world ready for another original programming language? According to the developers of ULYSSE, approximately 40 European users so far have found enough advantages in using the business-oriented language to displace COBOL with it, and the vendor thinks that large- and medium-sized corporations here might do well to check into it. And to overcome the argument about the vast number of trained programmers available to maintain COBOL systems, the vendor is offering a three-month trial period, that can be canceled with one month's notice, to show how easy ULYSSE is to maintain. Among the advantages claimed for the language are that it takes only perhaps one-fifth the time needed to write comparable COBOL programs, decreased training time to learn it, faster execution speeds, and self-documenting statements.

COBOL programmers who would typically need to write a program of approximately 20 statements to transfer one file to another should be impressed by ULYSSE's simple four-statement program:

```
INPUT TAPE SYS011 (FILE A) 5
TIMES 420
OUTPUT DISK 2314 SYS012 (FILE B) 4
TIMES 150
PROCESS
WRITE POSITION 1 LENGTH 150 ON
POS 1
```

ULYSSE looks at only the first three characters of its 102 commands, allowing programmers to be as brief or as explicit as they desire in writing statements. The self-relocatable compiler requires only 11K bytes of storage, and is available in the following command languages: French, English, Spanish, Dutch, and German; Japanese is under development.

The developers aim to make the language machine independent in the future, but the first offering is for the large body of IBM users of both OS and DOS. For them, ULYSSE rents for \$1200 and \$1000 per month, respectively, including documentation and training. GACHOT. INFORMATION SYSTEMS, Chicago, Ill.

FOR DATA CIRCLE 321 ON READER CARD

Report Management

The Report Control Optimizer (RECOOP) is designed to give dp management more control, analysis, and evaluation capability over an installation's report generation function. All pertinent statistical, descriptive, and distribution information for reports is in-

put to the RECOOP data base, where it can then be used in a number of ways. For example, it can point out such things as obsolete reports or distribution schedules, to show the last time a particular report was updated, or whether a current report couldn't possibly be modified to replace a number of other similar reports, etc. RECOOP is written in ANSI COBOL and is set up to run on IBM 360 and 370 computers having at least 50K bytes of memory, one disc and two tape drives, and a line printer. The object code and documentation are priced at \$5200. INTERNATIONAL MANAGEMENT SYSTEMS CORP., Beverly Hills, Calif.

FOR DATA CIRCLE 322 ON READER CARD

Data Base Management

The System for Information Management (SIM) data base management system has been structured to include almost all the features noted in last year's CODASYL committee report. SIM is comprised of four major processors, including SIMPLE (structured information managing and processing language—extensible) for data manipulation, and SCAMP (set creatives, allocation, manipulation processor). These are both nonprocedural languages that use the same syntax and differ only in the operations each performs. The other two modules in SIM are SILAM, a collection of access methods that includes sequential and indexed sequential (and can be customized to handle any other file organization), and SUPER, a generalized update processor. The SIMPLE processor contains such features as a generalized report writer, extensive editing capabilities, 16 control levels, sort capability, and facilities for creating output files, performing statistical analysis, and even some updating capability. FORTRAN and COBOL interfaces are also present.

SIM maintains a trail of changes to the data base so that it can be recreated in the event the system goes down. The system is currently up and running in batch mode at a local service bureau on a Univac 1108, where it requires approximately 36K words of memory, and versions are available for IBM 360 and 370 equipment (OS with at least 100K byte partition), and selected CDC systems. Purchase prices range from \$15K for just the SCAMP and SIMPLE processors, to \$40K for a complete system that includes plotting capability and interfaces for a maximum of two other data management system formats, such as DMS 1100. Rental prices for the systems are approximately 3%

of the purchase price per month on a one-year lease. RABCO SYSTEMS, INC., Houston, Texas.

FOR DATA CIRCLE 323 ON READER CARD

RPG Precompiler

A precompiler is offered users of the 360 model 20 and up (dos) that takes user-prepared parameter cards and generates source RPG and RPG II programs. The List/Source Compiler is probably best used to generate simple reports or total accumulation coding. No coding is generated to test for valid input, but this can be patched into the coding by the user if required. LSC defines the spacing, both horizontal and vertical, and the report title using just three cards (and one specification sheet), and generates the job control language necessary to run the program. Approximately 8K bytes of storage are required. LSC is priced at \$199 for the object deck and user instruction manual. COMPUTER PROCEDURES CORP., Valley Stream, N.Y.

FOR DATA CIRCLE 324 ON READER CARD

Program Debug Aid

The data exception bypass routine allows COBOL and assembler language programs to continue executing on IBM 360 and 370 computers even though references are made to invalid packed decimal data fields. In operation, the routine establishes linkage with the supervisor to capture program checks. When data exceptions occur, each bad field is logged and set to zero, and the instruction is then automatically re-executed. Priced at \$100, it's conceivable that it could pay for itself in a very short time checking out large programs in DOS or OS environments. JOSEPH SIDER & ASSOC., Canoga Park, Calif.

FOR DATA CIRCLE 325 ON READER CARD

370 Instructions for 360

This software house continues to enhance an operating system it offers as an alternative to IBM's DOS called EDOS, for extended disc operating system. The latest additional capability is simulation of the 14 instructions that make a 370 different from a 360. This offers the user the ability to run the latest 370 program products on the 360. The software overhead required to support the instruction simulation will differ from program to program, but initial tests show that the performance degradation is surprisingly small, says the firm. The special feature is available for a one-time charge of \$750. EDOS rentals start at approximately \$225/month. THE COMPUTER CO., Richmond, Va.

FOR DATA CIRCLE 326 ON READER CARD

Cross-compiler

The Language Implementation System (LIS) is a cross-compiler that allows users of Univac 1100 series computers to generate compilers for virtually any other computer. The program has six major components: a scanner, a parser, semantics generation routines, an optimizer, a target machine description module, and a code generator. The syntax description, the semantics generation routines, the scanner, and

the target machine modules all require user parameters to control LIS. The program is supplied in both source and object code form for less than \$40K, and also can be rented for less than \$1K/month on a one-year lease, including documentation. Approximately 50K words of storage on an 1108 are required. CHI CORP., Cleveland, Ohio.

FOR DATA CIRCLE 327 ON READER CARD

software spotlight

Data Base Design Aid

The intent of the Logic Metadata System is to eliminate redundant data descriptions in separate application programs, resulting in reduced peripheral storage requirements and improved operating efficiency. LMS would ideally be applied by installations about to convert to data-base-oriented processing, but it's claimed that the package can also be effectively used to prune files on operational systems.

LMS first scans individual application programs and logs all locations where data elements are stored or edited. From this is generated a data dictionary that shows the logical meaning of the data, its physical attributes,

and its relationship to other files. Based on a scaled-down version of the vendor's data base management system, this module of LMS is priced at \$7500. Additional modules, priced at \$3500 each, are available for describing any data base or file structure organization, generating a complete installation data trail (where the data comes from and where it goes), and a module that shows every processing function for every job step down to bursting and binding instructions. In addition, a host language interface is available for \$5K which allows users to write retrieval programs in COBOL, PL/I, FORTRAN, and assembler language. LMS is written in ANSI COBOL and assembler language and requires less than 64K bytes on OS and DOS 360 and 370 systems. LOGICA INC., El Segundo, Calif.

FOR DATA CIRCLE 320 ON READER CARD



"I'm afraid Cranston's had it as sales manager."

© DATAMATION ®

Literature

Digesting Service

A foldout brochure describes *Data Processing Digest*, a monthly digesting service which regularly surveys more than 150 periodicals, including **DATA-MATION**. In addition to reports on articles, regular features are book reviews, news items, and a calendar; there are no advertisements. Subscription \$51 annually. **DATA PROCESSING DIGEST**, Los Angeles, Calif.

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Small System

A 16-page booklet details **ADAPTS**, a small, fully integrated Varian 620-based system with applications in the biological and medical sciences, electronics and electrical engineering, analytical chemistry, earth sciences and oceanography, nuclear science and technology, education, mechanical and materials engineering, and industrial automation. The system is controlled through Varian's Extended **BASIC**. **VARIAN DATA MACHINES**, Irvine, Calif.

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Data Base Software

A 17-page spiral-bound primer presents the **Data Catalogue System**, a software tool for supporting the design, control, and maintenance of large data collections or data bases. This system, which permits user-defined standards, requires a minimum of input and documents through indexes, cross-reference reports, program change and data structure reports. **SYNERGETICS CORP.**, Burlington, Mass.

FOR COPY CIRCLE 302 ON READER CARD

Data Access Arrangements

A flyer for terminal users explains technical requirements and ordering procedures for specifying proper data access arrangements. Lack of user knowledge of Bell System interconnection requirements for non-Bell terminals has been a major cause of terminal installation delays. **WESTERN UNION DATA SERVICES CO.**, Mahwah, N.J.

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Industrial Controller

The **Neuron 8000** modular, solid-state programmable controller, described in a 26-page brochure with specifications and programming information, has a variety of applications in the petrochemical, process, electric power generation, pipeline transmission, and material handling industries. **DATRAK CORP.**, South Windsor, Conn.

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Bibliography

This 30-page 1973 catalog of the **National Technical Information Service** lists special interest publications in the fields of administration; behavior; building technology; business and economics; computers, control and information theory; environmental pollution and control; industrial technology; library and information sciences; materials sciences; medicine and medical services; transportation; urban technology; and water resources. **U.S. DEPT. OF COMMERCE**, Springfield, Va.

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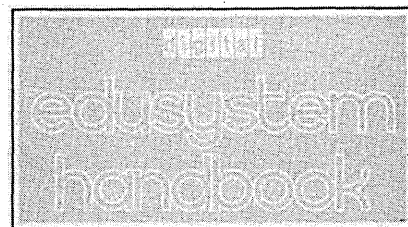
New Minicomputer

The subject of this 12-page bulletin is the **Model 85 Processor**, a 16-bit computer built around a 16KB interleaved **MOS/LSI** memory, providing 270 nsec average cycle time. Costing \$22,800 in single-unit quantities, the **Model 85** has user-alterable dynamic control store. **INTERDATA, INC.**, Oceanport, N.J.

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Systems for Schools

This 600-page handbook describes **Edu-Systems**, eight **PDP-8/E**-based school systems. The first chapter is a self-teaching primer on the **BASIC** language. The remaining chapters discuss **Edu-**



Systems 5 to 50, describing the features and extended capabilities of **BASIC** in each system and giving detailed operating instructions and error messages. Order prepaid, \$5. **DIGITAL EQUIPMENT CORP.**, Software Distribution Center, Bldg. 1-2, 146 Main St., Maynard, MA 01754.

Market Report

A descriptive letter and a detailed table of contents provide information on the \$395 150-page report (#181) on the markets for software packages and packaged computer services. Sales forecasts for these two markets, considered the fastest growing segments of the computer industry, are \$1.5 billion in 1975 and over \$2 billion in 1982. **FROST & SULLIVAN, INC.**, New York, N.Y.

FOR COPY CIRCLE 304 ON READER CARD

Computer-Assisted Instruction

A four-page report discusses a program in which 10 mentally retarded high school students used **CAI** for one session a week to learn arithmetic. During the four months of this 1972 program, the students made an average gain in achievement of 7.6 months. **MONTGOMERY COUNTY PUBLIC SCHOOLS**, Kensington, Md.

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Circuit Technology News

Published five times a year, *Analog Dialogue* includes application notes and new product descriptions of **Analog Devices'** lines of digital panel meters, **A/D** converters, linear integrated circuits, amplifiers, function modules, power supplies, and monolithic transistors. The current issue, 16 pages long, includes a design note on the **AD2010**, a slim, low-cost 3½-digit panel meter. **ANALOG DEVICES**, Norwood, Mass.

FOR COPY CIRCLE 305 ON READER CARD

Computer Time

The 20-page national edition of *Computer Time Report* lists representative descriptions of installations which sell computer time with price structure shown for each installation. A section entitled "Market Comments" analyzes current trends in the computer time market. **TIME BROKERS, INC.**, Elmsford, N.Y.

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Performance Monthly

Available are a descriptive brochure and a sample issue of *EDP Performance Review*, a new monthly publication which reports on the latest techniques, literature, products, and services to aid **edp** installation management in achieving maximum productivity from their systems. Each issue will feature a major report on some aspect of performance measurement and/or enhancement. Subscription \$36 annually. **APPLIED COMPUTER RESEARCH**, Phoenix, Ariz.

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Continued from page 26

Like it is

Kudos to Miss Heather Lynne McWilliams for her credible piece about the berserk computer in your May issue (p. 84). Miss McWilliams has an obvious gift for blending realism with just the right touch of symbolism. Note the simple candor of such phrases as "... everybody except grandmother was dressed ..." and "... Alex thew-up."

The overtones of police brutality were clearly relevant to our times, and the runaway machine was undoubtedly symbolic of a technology which is rapidly progressing beyond Daddy's (i.e., Society's) ability to cope with it.

Having read an excessive amount of cheap formula-fiction in other magazines, I congratulate DATAMATION for having the courage to publish a story that tells it like it is.

JERYL W. LAFON
Albuquerque, New Mexico

Lightly disguised

I occasionally get a chance to read your magazine, and I find it the most factual and authoritative publication in the computer field. The blind spot that

you display vis-à-vis IBM can be ignored because it is quite obvious to most of your intelligent readers.

However, when you publish five pages of advertisements, lightly disguised as editorial content, I believe that you are insulting your readers. I refer to the May issue and the article, "Nonimpact Printers," by Renn Zaphropoulos. When the president of a corporation is allowed to publish an article plugging his product and receiving free publicity, I think that you do a disservice to the computer community from which your readers are drawn.

H. F. ROTH
Annapolis, Maryland

To each his own

Since 70% of the students covered in Dan McCracken's survey (May, p. 236) are given FORTRAN in their first introductory programming course, Dan has answered "yes" to the question: "Is there a FORTRAN in your future?"

FORTRAN plays no part in my future regardless of curricula choice by today's undergraduates. I'll wager that if the students who have been introduced to FORTRAN had three days' exposure to APL, over 70% of them would not use FORTRAN in their future.

Anyway, I think we have a responsibility to guide the next generation of

computer users towards some better choices rather than conclude that we are all prisoners of a system with high inertia.

DANIEL DYER
President
Scientific Time Sharing Corporation
Bethesda, Maryland

Stretching the imagination

I was really upset after reading the article "A Data Dictionary Approach to MIS" in the April issue (p. 91). There is quite enough problem within our industry due to nonstandard definitions of various terms and jargon without a leading publication making matters worse.

The article in no way relates to the more common usage of the term "data dictionary" and requires considerable stretching of the imagination to relate it to an "MIS." It is obvious that those buzz words were used to draw attention to an otherwise somewhat trivial article.

THOMAS W. BRYAN
Ashland, Kentucky

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People

"The Way the Industry is Going"

Dr. Robert Worsing's 22 years in data processing have included service with a user organization, a hardware manufacturer, and now with a service group. He is the new vice president-development and operations for the Infonet Div. of Computer Sciences Corp. His position, a new one, consolidates direction of the remote data processing network's software development, network development, and operations, and for Dr.



Dr. Robert Worsing
technical strength."

Worsing it marks a swing back to the kind of work he likes best, operations and development. "I'm an operations sort of person," said Dr. Worsing, who left a position as vice president of marketing and assistant marketing group executive for Control Data Corp. to join csc. "I started at CDC in operations and only got into marketing to lend technical strength."

Dr. Worsing began his dp career in 1951 at the Boeing Co., working with analog computers on the Bomarc missile. From 1962 to 1968, he was Boeing's director of systems administration and computing. Even back then, he says, he spotted a trend in the industry toward use of remote networks and "I told Boeing management this was the way the industry was going to go." While with CDC, he says, he saw the trend developing more clearly and now "it's the way the industry is going."

Dr. Worsing holds a PhD degree in applied mathematics and pure mathematics from Iowa State College, an MA degree in mathematics and physics from the University of Nebraska and a BS degree in engineering from the U.S. Coast Guard Academy.

An Offer He Couldn't Refuse

Douglas K. Baker, new chairman of the board and chief executive officer of Qantel Corp., Hayward, Calif., got out of accounting and into data processing "because accountants always look at black clouds, at problems. I wanted to look at the good side." But his accounting background has been a



Douglas K. Baker

big part of his dp career. He was with SCM Corp. for seven years marketing accounting and billing machines first in Toronto, then in Montreal, Chicago, and the Western Region. When SCM began having financial troubles, Baker began looking around and, in early 1970, he joined Clary Corp. with the charter of "getting them into the business equipment marketplace." Clary was having its troubles too and Baker only stayed there a year but in that year he "picked up hardware knowledge," knowledge which led to his development of the concept behind the Basic/Four small business computer system. He took this concept to Management Assistance Inc. and got the go-ahead from MAI in February 1971, which led to formation of Basic/Four Corp. Baker was Basic/Four's president until last month when he resigned because Qantel "made me an offer I couldn't refuse." He said he likes Qantel's "communications orientation" and the fact that the company's small computer systems have equal

potential as stand-alones for small business and as a part of much larger systems. He also likes his equity position in the firm. Canadian-born Baker, 39, is a business administration graduate of Barry College, Ontario, Canada.

JOHN A. DE VRIES, who managed General Instrument Corp.'s successful competition for the computer services contract for New York City's Offtrack Betting Corp., has been elected a group vice president of GI and head of its data systems and services group . . . RICHARD E. KAYLOR was named executive vice president of Informatics Inc., Canoga Park, Calif. He had been president of a major operating unit, Informatics Computing Technology, River Edge, N.J. . . . JAMES M. O'CONNELL and JOSEPH P. FRANCINI were appointed division vice presidents in Litton Industries' Retail and Revenue Systems group. O'Connell, formerly president of Sweda-North America operations, is now president of the Sweda International division. Francini, new president of the Advanced Retail Systems division, had been vice president-product development for Litton's Business Systems and Equipment group.

New NBS Director

Dr. Richard W. Roberts, who recently became director of the National Bureau of Standards, looks more like a college student than a physical chemist who is internationally renowned for his work in ultra high vacuum technology. The 38-year-old scientist succeeds Dr. Lewis M. Branscomb, who resigned in May 1972 to become chief scientist at IBM.



Before his appointment as NBS director, Dr. Roberts spent 13 years at GE's R&D center in Schenectady, N.Y., eight of them as a manager. His last title was Manager of Materials Science and Engineering; responsibilities included supervision of four laboratories and about 400 scientists and engineers. As NBS director, Roberts supervises a staff of 4,000.

Dr. Richard Roberts "Communicating, getting the information needed to establish priorities, is a little more complicated here," he said recently. To reduce the complexity, he has established a procedure that encourages lower-level NBS technicians to communicate directly with the front office.

Among Dr. Roberts' responsibilities is the "Experimental Technology Incentives Program" (ETIP), which President Nixon unveiled at the beginning of his second term. A total of \$7 million has been given to ETIP this fiscal year, and Dr. Roberts hopes for an equal amount next year. Some of this money, he indicated, will be spent on programs aimed at helping inventors and small R&D firms market new products.

Professor DONALD L. BITZER of the University of Illinois received the 1973 Vladimir K. Zworykin Award of the National Academy of Engineering for his development and application of the PLATO computer-based education system . . . CHARLES J. DOMINIQUE was named executive director, communications and computer services department, Illinois Central Gulf Railroad . . . GENE NICHOLL is the new president of DPA, Inc., data processing equipment leasing subsidiary of Pioneer Texas Corp. . . . ROBERT PAPPAS left a position as a group vice president of Ampex Corp. to become president of Trendata, a subsidiary of Applied Magnetics Corp. □

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and techniques. Papers and panels will cover a full range of applications in business, industry, education, medicine and government. Sample topics: automated payment systems, turnkey systems, mini-computer networks in business, information retrieval systems, point-of-sale automated transactions.

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Full conference details and registration/housing forms are available through ACM 73, P.O. Box 4566, Atlanta, Georgia 30302 or ACM Headquarters, 1133 Avenue of the Americas, New York, New York 10036. If you're already an ACM member, plan to attend ACM 73. If you're not, join us there and convert part of the admission fee to annual dues. Either way, plan to be at ACM 73!

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Books

Databanks in a Free Society
by Alan Westin and Michael Baker
Quadrangle Books, Inc.
New York, N.Y. 1972
522 pp. \$12.50

This book ranks as the single most important published work concerning the impact of computers on our society. For years to come the information presented in this book will be reviewed and updated; its interpretations will be debated; and its recommendations will be discussed and, perhaps, implemented.

Formally, *Databanks in a Free Society* is the report of a three-year study conducted by the National Academy of Sciences, and funded by the Russell Sage Foundation. Described as a "landmark study" and "the definitive work" by even the cautious ACM¹, this book:

1. Presents a wealth of information about the current state of computerized record-keeping in the U.S.
2. Discusses these facts in relation to their effects upon the individual's civil liberties.
3. Recommends courses of action designed to strengthen the citizen's rights against present and future abuses.

The publication of *Databanks in a Free Society* could hardly be more timely: it comes at a point in our political history characterized, in part, by an unprecedented concentration of the powers of the federal government in the executive branch. When, in early 1971, Congress sought to determine the extent of alleged abuses by the executive connected with computerized record keeping, representatives of the current (Nixon) administration took the position that Congress has no business concerning itself with such matters, on the grounds that

"... self-discipline on the part of the executive branch will provide an answer to all of the legitimate complaints against excesses of information gathering."²

If there is anything which *Databanks in a Free Society* shows, it is that the legitimate complaints Americans do have about information gathering and dissemination have little to do with "self-discipline" on the part of anybody, but stem instead from an almost complete lack of legislation to spell out what rights each of us has with regard to the records kept on him. Discipline (or the lack of it, self-imposed or otherwise) sometimes becomes a prob-

lem in any organization, but disciplinary problems can be dealt with only within a framework of established guidelines. It was precisely the lack of such guidelines that Sen. Ervin's hearings were trying to explore, and Mr. (now Justice) Rehnquist's remarks are disappointingly typical of an executive branch that has demonstrated far greater talents for diverting discussion away from the problems at hand than it has for solving them.

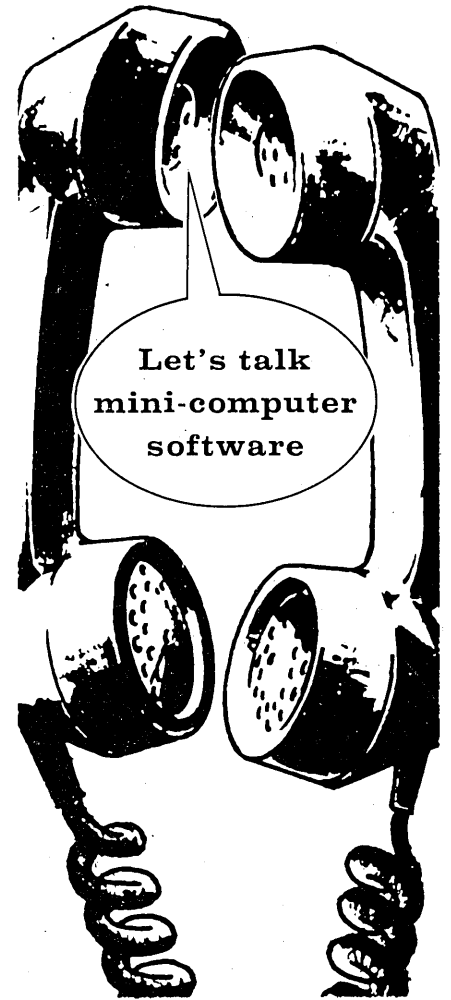
On the other hand, a much subtler danger to citizens' rights is posed by those who claim—or, worse, simply assume in their argument—that computerization of record keeping necessarily and inevitably results in erosion of the liberties of those on whom the records are kept. Westin and Baker present convincing evidence to show that this assumption is not warranted. More importantly, they point out that a strong belief in this assumption leads the believer to conclude that the battle has already been lost, because he believes there is no way that computerized record keeping can be made responsive to individual rights. Such a conclusion results in all too prevalent attitudes of resigned apathy, Luddite hostility, etc., thus avoiding any productive consideration of the problems at hand.

Databanks in a Free Society is based upon information gathered during visits by the project staff to 55 computer sites described as leaders in the use of computers for record keeping. At each site, the staff interviewed executives, department heads, and data-processing personnel, and examined internal documents, forms, procedure manuals, etc. In connection with each site visit, they also interviewed management consultants and civil liberties groups, and examined news media items, transcripts of legislative hearings, court cases, and so forth. The 29 site visits to governmental agencies included the areas of law enforcement, motor vehicle registration, welfare and social security, education, health and hospitals, taxation, personnel and civil service, the military, courts and criminal justice, management services, and statistics and planning. The 26 visits to nongovernmental sites included manufacturers, banks, insurance companies, universities, religious bodies, airlines, hospitals, health services, newspapers, information suppliers, and computer service bureaus.

The largest section (over 190 pages) of this book presents summaries of what was found at 14 of these site visits. The installations thus reviewed are:

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Federal: Social Security Admin.,
and FBI-NCIC
State: New York State Dept. of



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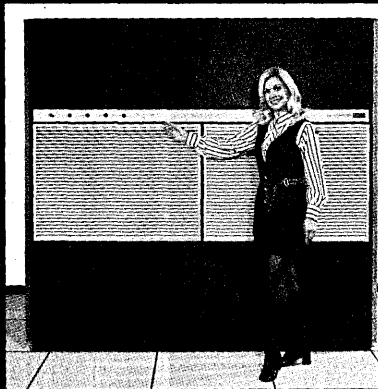
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¹Communications, Dec. 1972, p. 1096f.

²Statement of William H. Rehnquist, Asst. Atty. Gen., before the Subcommittee on Constitutional Rights, on Mar. 9, 1971, from *Federal Data Banks, Computers and the Bill of Rights*, U.S. Govt. Printing Office, Wash. 1971; p. 603.

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The use of computers for record keeping has been accompanied by popularity of the beliefs that the use of the computer: (1) increases the scope of the data collected for each record, (2) results in wider sharing of personal data, and (3) changes the way in which the recorded information is used to determine an individual's opportunities or rights. The Westin and Baker study shows that, in the overwhelming majority of the 55 cases, these beliefs do not match actual practice. In almost all cases, the "... computer record systems have followed, rather than altered, pre-existing rules..." and procedures.

With regard to the following specific concerns—that the user will regard the computer record as infallible, that abbreviations and codes force-fit people into categories which are imprecise and easy to misuse, and that unforgetting computer memories make it impossible to start afresh—the study found that, in general, where these practices existed before computerization, they were carried over to the new system, and where they did not exist before, they were not introduced with the computer system.

By clearing away these widely held misconceptions relating to computerized record keeping, *Databanks in a Free Society* focuses upon the real issues, which relate to the fact that due process has not been extended to apply to records kept on individuals. Your Constitutionally derived rights to know what evidence is used against you, to cross-examine your accusers, to be represented by legal counsel, and so forth, apply in judicial proceedings (and have only recently been expanded to include proceedings that determine your eligibility for welfare, education, and public housing). But these rights do not, in general, apply to records kept on you (in either manual or computerized systems), despite the fact that the contents of both governmental and privately held files are used in de-

termining benefits, rights, and opportunities concerning every aspect of your life—employment, licensing, credit, and insurance, for example.

Westin and Baker discuss three crucial problems which need to be solved in this area:

Privacy. What information should a given organization collect about individuals?

Access. What notice should an individual have that his record is in a file? What rights should an individual have to examine the contents of his record? What mechanism should exist for an individual to contest the accuracy, completeness, or appropriateness of the information in his record?

Confidentiality. What rules should govern the sharing of information between organizations?

Ultimately, the solutions to these problems must come from legislation which sets the limits, defines the rights, and establishes the mechanisms. As stated by Westin and Baker:

"We assume that the collection and intelligent use of considerable information about people, events, and social processes is necessary in a complex society, especially one in which people expect a high level of social and public services from government, extensive goods and services from private business and industry, and a wide range of cultural, educational, and civic services from private associations. We also assume that the collection and use of personal information, particularly when it is relied upon heavily to determine the rights, benefits, and opportunities of individuals, has to be conducted in conformity with the constitutional protections that American society provides for its citizenry. Setting a balance between these two valuable interests of society requires, as it always has, the application of law and organizational policy to arrive at sensitive, area-by-area judgments."

Although court decisions in these areas could prompt legislative action, and deter administrative abuse, protective legislation is the ultimate need. The last section of *Databanks in a Free Society* applies the conclusions from the information gathered in this three-year study to problems of public policy. In each area of possible legislative action, the authors consider the alternatives that are open, and weigh the advantages and disadvantages of each. They discuss in detail the steps which should be taken to improve the citizen's right to access (in each of the areas of notice, inspection, and challenge) and confidentiality. We have here a sound set of proposals, which, at the very least, should provide a basis for productive consideration and debate. As such, the information and

suggestions in this book constitute a unique challenge to our democratic system. Because of the thoroughness with which this study was conducted, and the insight of the project staff in sorting out the issues, we now have that rarest of opportunities: the chance to take effective action while there is still time.

Every day that we and our elected representatives fail to take action in this area just allows the balance to tip a little bit further in the direction of the current trend, which is to maximize administrative convenience and efficiency in computerized record keeping. Unless these pressures are balanced by effective legislation protecting individual rights, we will continue to drift in the direction of a society in which the citizen feels completely powerless against computerized decision-making procedures about which he is given no information, in which he has no voice, and against the consequences of which he has no appeal.

—James L. Rogers

Book Briefs

Automatic Data Processing, Principles and Procedures
by Elias M. Awad and Data Processing Management Assn.

Prentice-Hall, Inc., Englewood Cliffs, N.J., 1973
566 pp. \$15.95 (\$11.95, DPMA members)

The third edition of this popular introductory textbook, first published in 1966, emphasizes business data processing and contains a new chapter on the BASIC language, an update on data communications and visual display devices, the addition of the data base concept, a new chapter on direct data entry devices, an update of input-output media and devices, and a reduction of material on punched card dp. A workbook will be available in the fall at extra cost.

Complexity of Computer Computations

Raymond E. Miller and James W. Thatcher, ed.

Plenum Publishing Corp., 227 W. 17th St., New York, N.Y., 1972
225 pp. \$16.50

These proceedings of a March 1972 IBM research symposium include 14 papers, a panel discussion report, and a bibliography on complexity studies closely related to how computations are actually performed on computers. This field of study encompasses such topics as: determining lower bounds on the number of operations or steps required for computational solutions of specific problems; developing improved algorithms for the solution of such problems, plus experimental and theoretical evidence concerning the

efficiency and numerical accuracy of those algorithms; studying the effects of the efficiency of computation brought about by variations in sequencing and the introduction of parallelism; and studying the relative complexity of classes of problems with respect to lower bounds on computation time.

Information Systems for Management

Fred Gruenberger, ed.
Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972

122 pp. \$7.95

The chapters in this book are written versions of speeches given at the annual UCLA/Informatics Inc. symposium, held in March of 1971. The 12 MIS experts who spoke at the symposium are George Glaser, Thomas DeMarco, Philip H. Dorn, Kenneth Boyd, Walter W. Haase, Murray Laver, Eugene M. Brault, John A. Postley, Jerome Wiener, Frederic G. Withington, Daniel Teichroew, and Sullivan G. Campbell.

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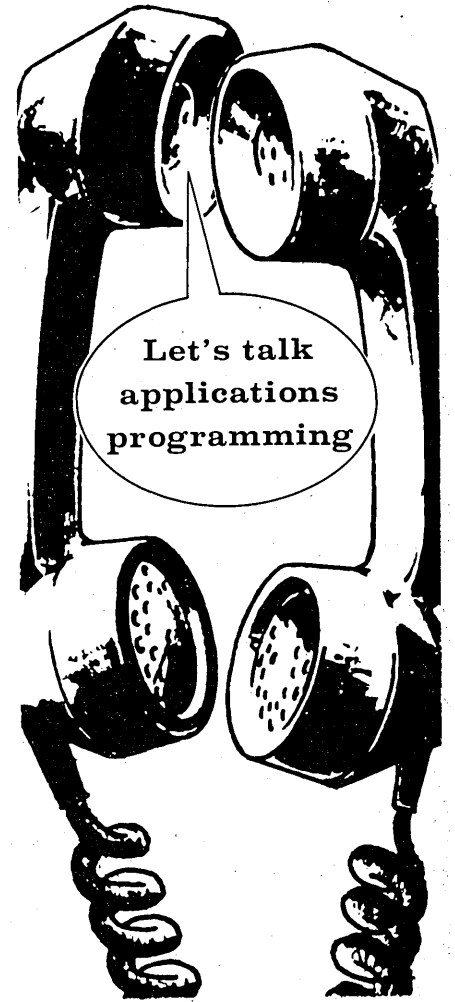
William M. Penney and Lillian Lau, ed.
Van Nostrand Reinhold Co., 450 W. 33rd St., New York, N.Y., 1972
474 pp. \$18

Written primarily for systems and logic designers of digital equipment, this book presents the techniques necessary for implementing systems using Metal Oxide Semiconductor Large Scale Integration (MOS/LSI). Also included are basic physical theory of the MOS transistor, as well as state-of-the-art design and application information. The book was prepared by the engineering staff of American Micro-systems, Inc., for use as a standard reference.

Digital Computer Applications to Process Control—Volume 3

William E. Miller and A. Niemi, ed.
Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa., 1972
650 pp. \$42

This book comprises English language proceedings of the third international conference on the application of digital computers to the control of industrial processes held June 1971 in Helsinki. The conference was sponsored by the International Federation for Automatic Control and the International Federation for Information Processing. The 65 technical papers, presented by authors from 17 countries, are supplemented by transcribed and edited discussions between the speakers and the conference participants. Subjects include: power plants and systems, pulp and paper processes, metallurgical processes, chemical processes, mineral and cement processes, environment, warehousing, hardware, software, and education in practical computer control at the university level. □



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London — October 30, 31, November 1; **Stockholm** — November 6, 7, 8; **Paris** — November 12, 13, 14; **Milan** — November 19, 20, 21; **Munich** — November 27, 28, 29, 30.

Look Ahead

(Continued from page 18)

anymore, and Yaconelli has increased this force to 70 from 12. A tape library management package is offered free to those who promise to buy only Memorex mag tape and disc packs. Though it has never solicited oem business, one man now is devoted solely to that effort.

CANADIAN GOVERNMENT PHASING OUT OF SERVICE BUREAU BUSINESS

While efforts in the U.S. by ADAPSO to restrain government competition to service bureaus have had little effect to date, it appears as if the Canadian government, at least, is phasing out of the service bureau business to the advantage of independents. Robert T. Horwood, president of Computel Systems Ltd., Ottawa, said independents were picking up government agency work throughout the spring and are looking for a sharp rise in work made available for tender by government this summer...work which had been handled by the government-run Central Service Bureau.

VIVE LA DIFFERENCE

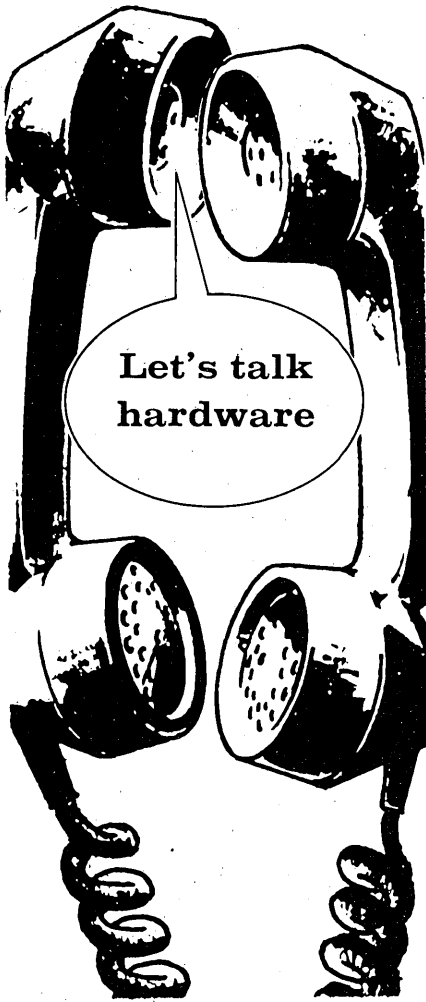
Question: Can a small French company that has made it in Europe with a simple portable-punch data collection product line successfully invade the U.S.? Answer: Probably not if the product stays simple. At least that's the belief of George Colon, president of Dynapunch Systems, Inc., El Segundo, Calif. (see May p. 140). The company was a 50-50 venture with Perfo-Guide International (Paris), organized to sell the portable punch units. But, says Colon, "We found our best prospects here wanted more; we needed a systems approach." And since the Paris company wanted to stay strictly with the portable punch units, Colon is now going it alone, expanding his line to include an intelligent terminal.

MUSICAL CHAIRS IN EUROPE?

Look for the long-discussed ICL-Nixdorf hookup to happen pretty soon. The British giant has been under pressure from the European Economic Commission to find a partner in order to strengthen competition to IBM and other U.S. makers (June, p. 139). The arrangement will probably be marketing-oriented, with ICL pushing Nixdorf gear in the UK, and getting the German manufacturer to represent its wares on the continent. Telefunken is reportedly already nervous about its partnership with Nixdorf, (due for review and possible extension at the end of this year), and undoubtedly wonders how the new transchannel deal would affect them.

RUMORS AND RAW RANDOM DATA

Several big IBM users are reportedly doling out \$20K/month for 145s -- solely to play with the virtual machine monitor. We're trying to find out if this is cost-effective...It's rumored IBM will have a backing store supporting paging on the 370 virtual machines, although there is no word on whether it'll be a fast head/track disc or drum or slow, cheap semiconductor memory...West Germany's Heinz Nixdorf admits to plans to produce systems competitive with the IBM 370/115 and 125, but won't say when or where...Another example of the burgeoning bank terminal market in Europe is that four leading commercial banks in Norway will buy 3,000 terminals in the next two years...Ernie Baynard, former staff director for Rep. Jack Brooks' Government Operations subcommittee, is now a CBEMA consultant. He's analyzing the recent report of a federal commission on government procurement...When new AFIPS executive director Robert Rector reported for duty in Montvale, he was greeted by a 2' x 3' blowup photo of himself in a bunny suit...It took a long time, but ACM has appointed a long-range planning committee to decide what the society wants to be when.



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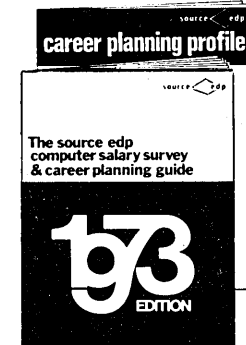
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The Forum

Free Trade: At What Cost?

The combatants of the Pacific war, Japan and the United States, have written a new kind of history by forming a very different relationship between the victor and the loser. This relationship since the end of World War II has made a significant contribution to the development of freer trade and in a volume unthought of before.

For example, a recent report indicates the U.S. is "by far the most important single-country market for Japanese products, accounting for about 30% of Japan's exports . . . On the other side, it should be noted that Japan is the biggest customer for U.S. products after Canada, accounting for about 10% of U.S. exports . . ."

A great deal of effort has been made by both parties to develop and maintain this mutually advantageous relationship. Present actions by both parties are now threatening it. If positive action and changes in attitudes are not made by both parties, there is likely to be a full collapse.

As an American who served in the Air Force during the Pacific war, my allegiance to the U.S. is apparent. I have spent the last 14 years working in Japan, during which time I have developed a deep respect for the Japanese. With this mixed background perhaps my observations are close to being neutral and based on facts and not emotions. DATA-MATION is a good platform to reach both sides because it is widely circulated among the leaders of the computer industry in both countries.

Japan and the U.S. have been having hard and at times rather heated negotiations on methods of equalizing the trade imbalance between the two countries. Outside groups, in the midst of the negotiations, applied pressure to have the yen and the dollar revalued. This action has forced Japan and the U.S. to revalue their currencies and thus we have a probable solution to the trade imbalance. The second yen revaluation has been made and is now in the process of being fine-tuned. The new price differential should soon improve the trade imbalance and remove a big thorn from the relationship.

The restrictions on computer and related equipment imports to Japan is a thorn in the side of the United States. Japan is aware of this and is working towards liberalization as rapidly as it feels its economy can accommodate it. For those who may think this is a one-sided coin, it should be pointed out that the U.S. has pressured Japan to restrict its exports of textiles to the U.S. It has conceded to this pressure, for the good of both countries, certainly showing a concern and understanding for this problem. I hope the U.S. will show the same concern and understanding for the computer problem in Japan.

An important thing to remember is that while Japan does have restrictions the door is not closed. IBM, with the longest history in Japan, has been able to maintain a substantial growth; it now has about 30% of the market, more than any other manufacturer. Recent arrivals, such as Digital Equipment Corp., have been able to firmly establish their operation in Japan. Both of these companies have done this

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Free Trade

in spite of the restrictions. Frankly, from the results achieved by these two companies, it would appear that the restrictions are not nearly as severe as most people believe.

The restrictions have been used as an excuse for failure by many ineffective managers sent to Japan. The home office has in many cases accepted this as fact and thus helped spread the false assumption that it is impossible to do business in Japan because of the restrictions.

It may seem that I am implying there are no restrictions. It should be made clear that there are restrictions, but an effective, flexible manager understands this and adjusts to them in his operation. Needless to say, a clear understanding of the restrictions, not just how the rules read, is needed. And one should keep in mind that a good manager in the U.S. is not necessarily a good manager for Japan. The evaluation of whether a manager will be effective in Japan is not easy. He should be selected with the same care that would be given to choosing an executive vice president.

Free world trade is a good goal and perhaps some day the dream can be realized. But, too rapid movement in this direction would upset the internal economies of nations and negate any benefits. Let's continue to press for and move in the direction of free trade but, at the same time, show understanding for the internal problems countries have. Most of all, we must have patience while adjustments are being made lest we press too hard and start a backward movement. Remember, no movement at all is better than going back.

—Joseph C. Berston

Mr. Berston is a vice president of Com-Stute Inc. and manager of their Japan branch, supplying system software and application programs to both users and computer manufacturers.

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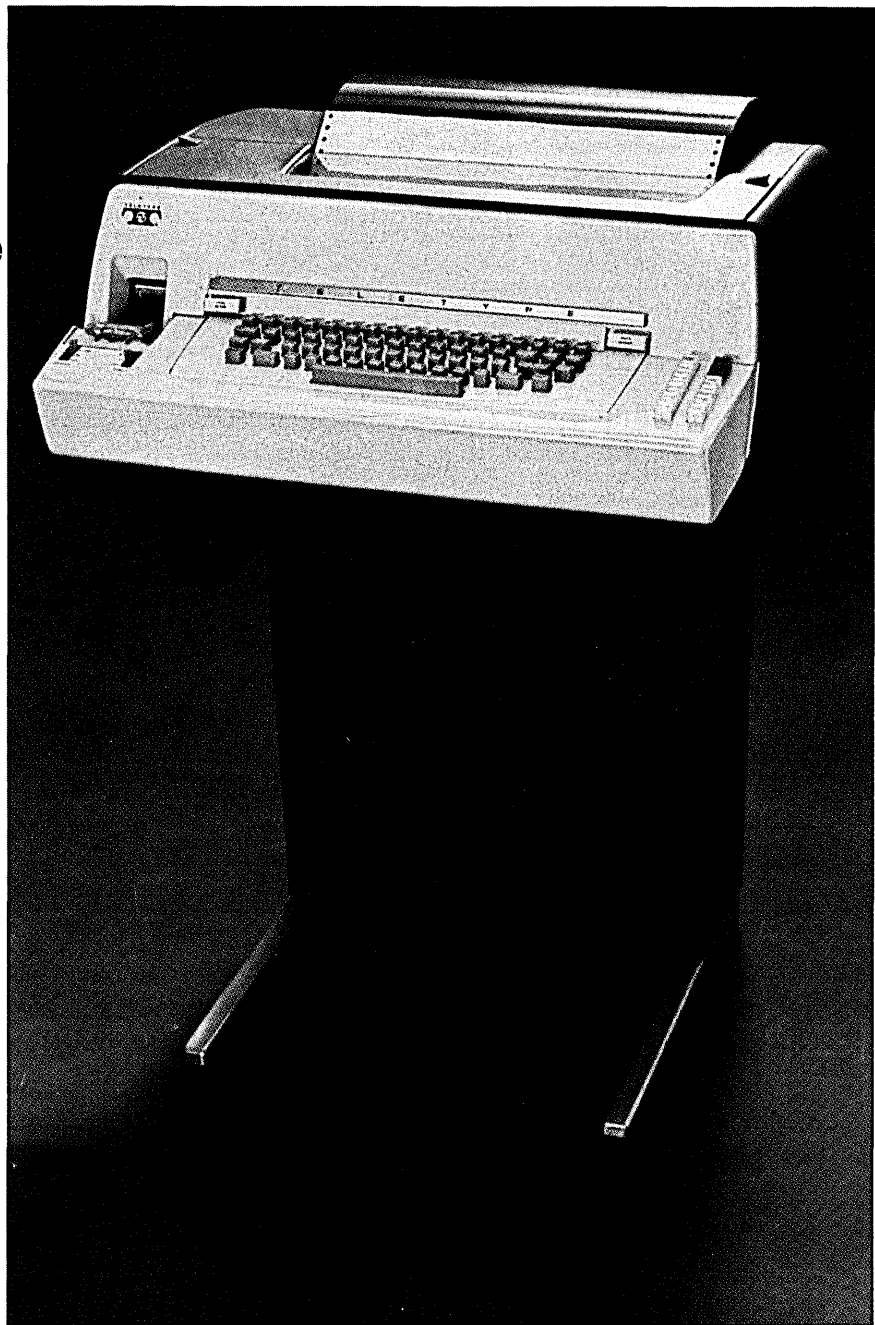
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