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AT&T'S MCGILL
RESPONDS**

**ALSO:
THE TOP DATACOM
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FOR LEMONS**

**POINTING FINGERS
AT TOUCH SENSING
TERMINALS**

New From Kennedy
 Model 6450
 High Density
 Cartridge
 Tape System

Low cost, flexible and reliable backup—that's Kennedy's
 Model 6450 cartridge tape drive and Model 650 embedded
 Formatter—combined in one compact package—Model
 6450. Model 6450 is loaded with features, such as:

- Low power consumption—the system requires only 4.5
 and 4.2 watts for operation.

- Self-diagnostic capability—allows you to check the system
 (rewinds) before you start a backup operation.

- 6400 BPI recording density—yields up to 17 Mbytes of
 unformatted data capacity on a 450 ft. cartridge.

- Infrared tape position detection—virtually eliminates
 substitution error rate in tape position sensing
 errors.

- Online self test—The 6450 system performs online self
 test before your backup operation begins.

These are only a fraction of the features that make Model
 6450 the most advanced 1/4" tape cartridge available. All
 these features, combined with Kennedy experience and
 reliability guarantee it.

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Subsidiary, Magnetics & Electronics Inc.

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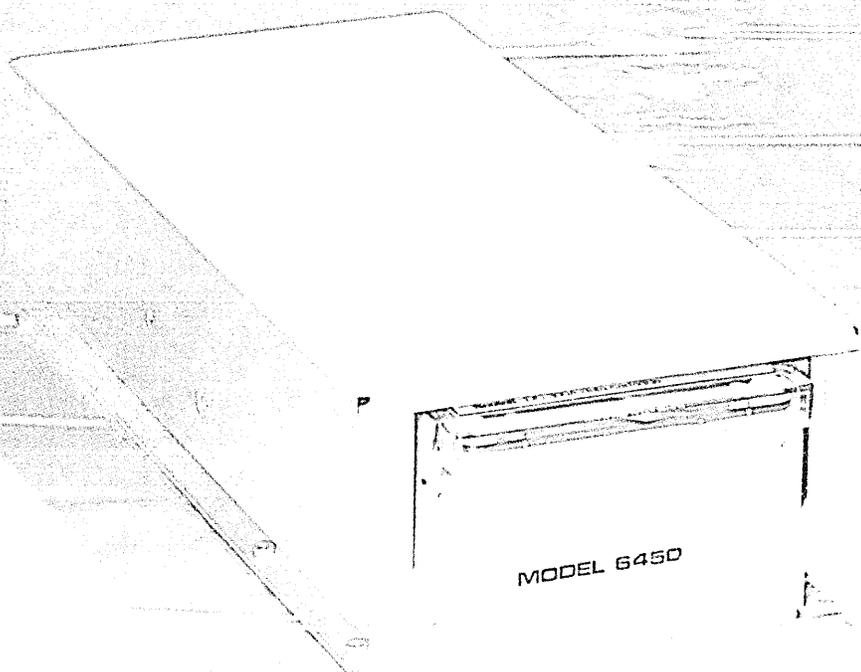
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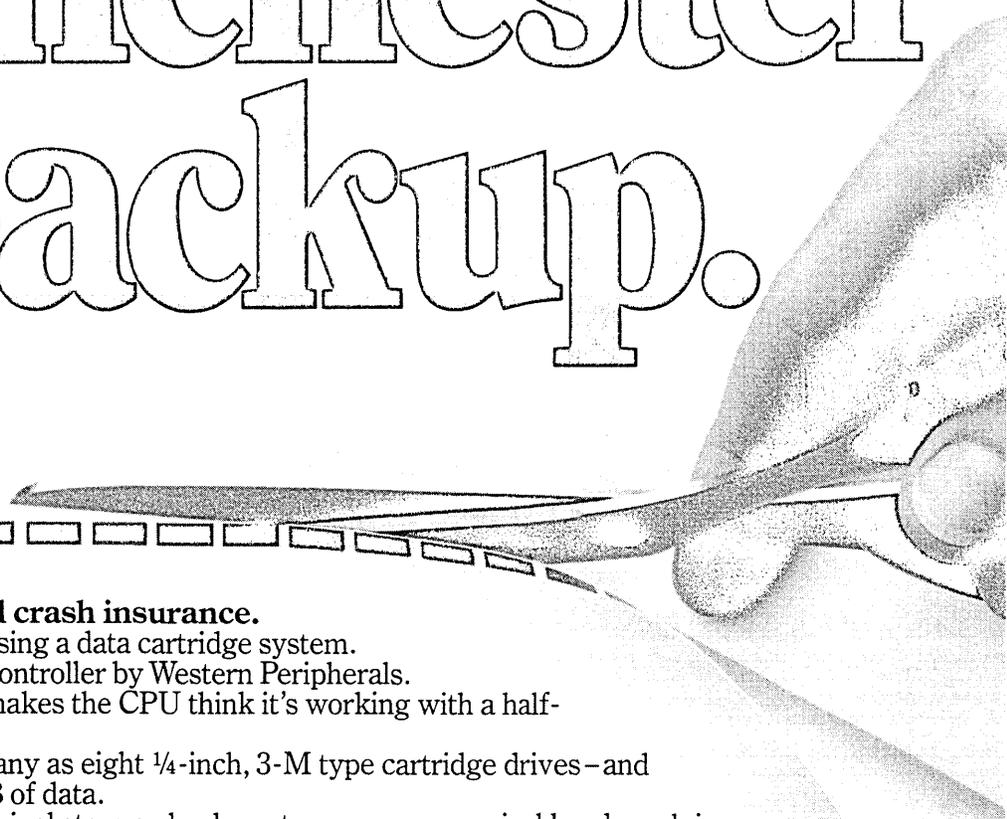
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How to cut the cost of Winchester backup.



Low cost head crash insurance.

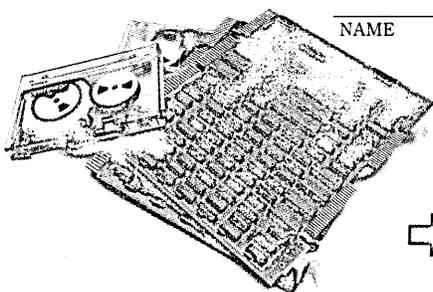
Save up to 50% by using a data cartridge system.
With a transparent controller by Western Peripherals.

The controller makes the CPU think it's working with a half-inch tape drive.

Piggyback as many as eight 1/4-inch, 3-M type cartridge drives—and dump nearly 140MB of data.

For low cost archival storage, backup storage or economical head crash insurance, count on data cartridge systems—with controllers from Western Peripherals.

Yes! Please send complete information about low cost mass storage.



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TITLE _____

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STATE _____

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CPU Type: DEC LSI-11* PDP-11* Data General NOVA/Eclipse**

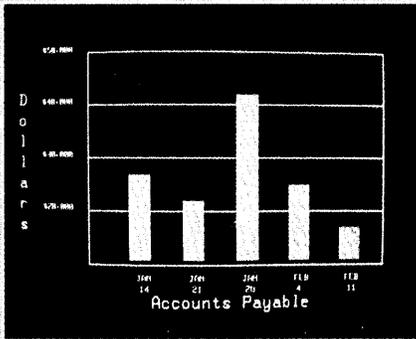


western peripherals

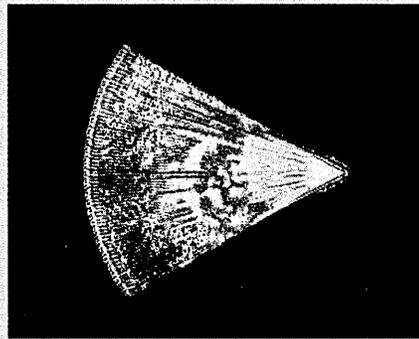
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14321 Myford Road
Tustin, CA 92680 (714) 730-6250

*Trade name of Digital Equipment Corporation.** Trade name of Data General Corporation.

CIRCLE 2 ON READER CARD



Management Information Display



Ultrasonic heart sector scan



High-resolution display with alphanumerics

Get the professional color display that has BASIC/FORTRAN simplicity

LOW-PRICED, TOO

Here's a color display that has everything: professional-level resolution, enormous color range, easy software, NTSC conformance, and low price.

Basically, this new Cromemco Model SDI* is a two-board interface that plugs into any Cromemco computer.

The SDI then maps computer display memory content onto a convenient color monitor to give high-quality, high-resolution displays (756 H x 482 V pixels).

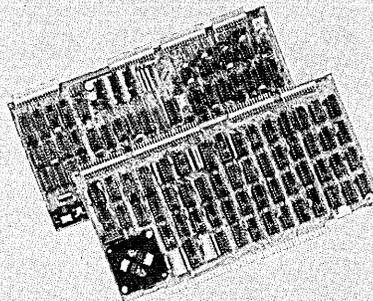
When we say the SDI results in a high-quality professional display, we mean **you can't get higher resolution than this system offers in an NTSC-conforming display.**

The resolution surpasses that of a color TV picture.

BASIC/FORTRAN programming

Besides its high resolution and low price, the new SDI lets you control with optional Cromemco software packages that use simple BASIC- and FORTRAN-like commands.

Pick any of 16 colors (from a 4096-color palette) with instructions like DEFCLR (c, R, G, B). Or obtain a circle of specified size, location, and color with XCIRC (x, y, r, c).



Model SDI High-Resolution Color Graphics Interface

HIGH RESOLUTION

The SDI's high resolution gives a professional-quality display that strictly meets NTSC requirements. You get 756 pixels on every visible line of the NTSC standard display of 482 image lines. Vertical line spacing is 1 pixel.

To achieve the high-quality display, a separate output signal is produced for each of the three component colors (red, green, blue). This yields a sharper image than is possible using an NTSC-composite video signal and color TV set. Full image quality is readily realized with our high-quality RGB Monitor or any conventional red/green/blue monitor common in TV work.



Model SDI plugs into Z-2H 11-megabyte hard disk computer or any Cromemco computer

DISPLAY MEMORY

Along with the SDI we also offer an optional fast and novel **two-port** memory that gives independent high-speed access to the computer memory. The two-port memory stores one full display, permitting fast computer operation even during display.

CONTACT YOUR REP NOW

The Model SDI has been used in scientific work, engineering, business, TV, color graphics, and other areas. It's a good example of how Cromemco keeps computers in the field up to date, since it turns any Cromemco computer into an up-to-date color display computer.

The SDI has still more features that you should be informed about. So contact your Cromemco representative now and see all that the SDI will do for you.

*U.S. Pat. No. 4121283



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i n c o r p o r a t e d

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CIRCLE 3 ON READER CARD

DATA⁸⁰MATION

AUGUST 1980/\$4.00 U.S.A.
VOLUME 26/NUMBER 8
This issue, 163, 915 copies

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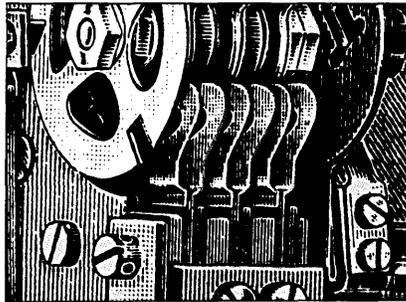
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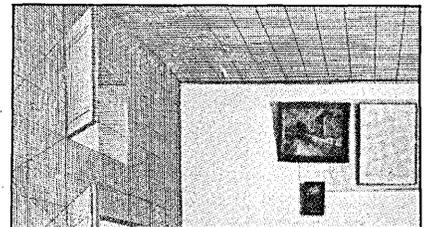
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COVER ILLUSTRATION BY KATHY JEFFERS;
PHOTOGRAPH BY MARTY UMANS.



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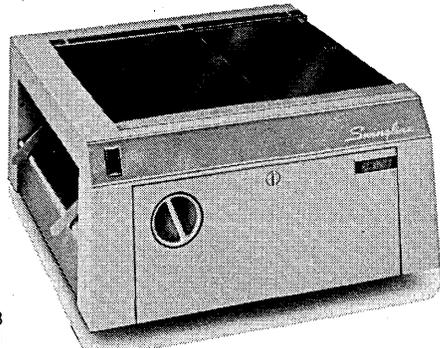
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CIRCLE 4 ON READER CARD

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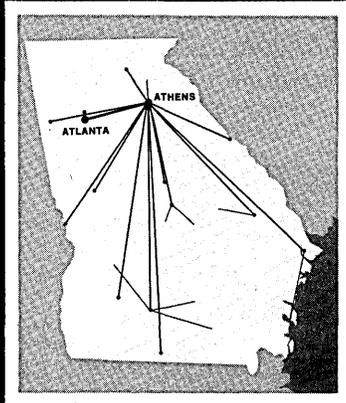
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Georgia's USCN Network ...



...is also a Tran Network.

Georgia's University System Computer Network was established to provide a cost effective path from any terminal on one of the university system's 33 campuses to any computer.

Encompassing over 2,500 miles of leased telephone lines — plus dial up facilities — it concurrently supports synchronous and asynchronous traffic

statewide, and mixed packet and time division switching at up to 50,000 bits/-second between its main nodes in Athens and Atlanta.

USCN's developer, Tran, now has more international experience in the construction of digital data networks than any other communications company in the world.

tran TELECOMMUNICATIONS CORPORATION

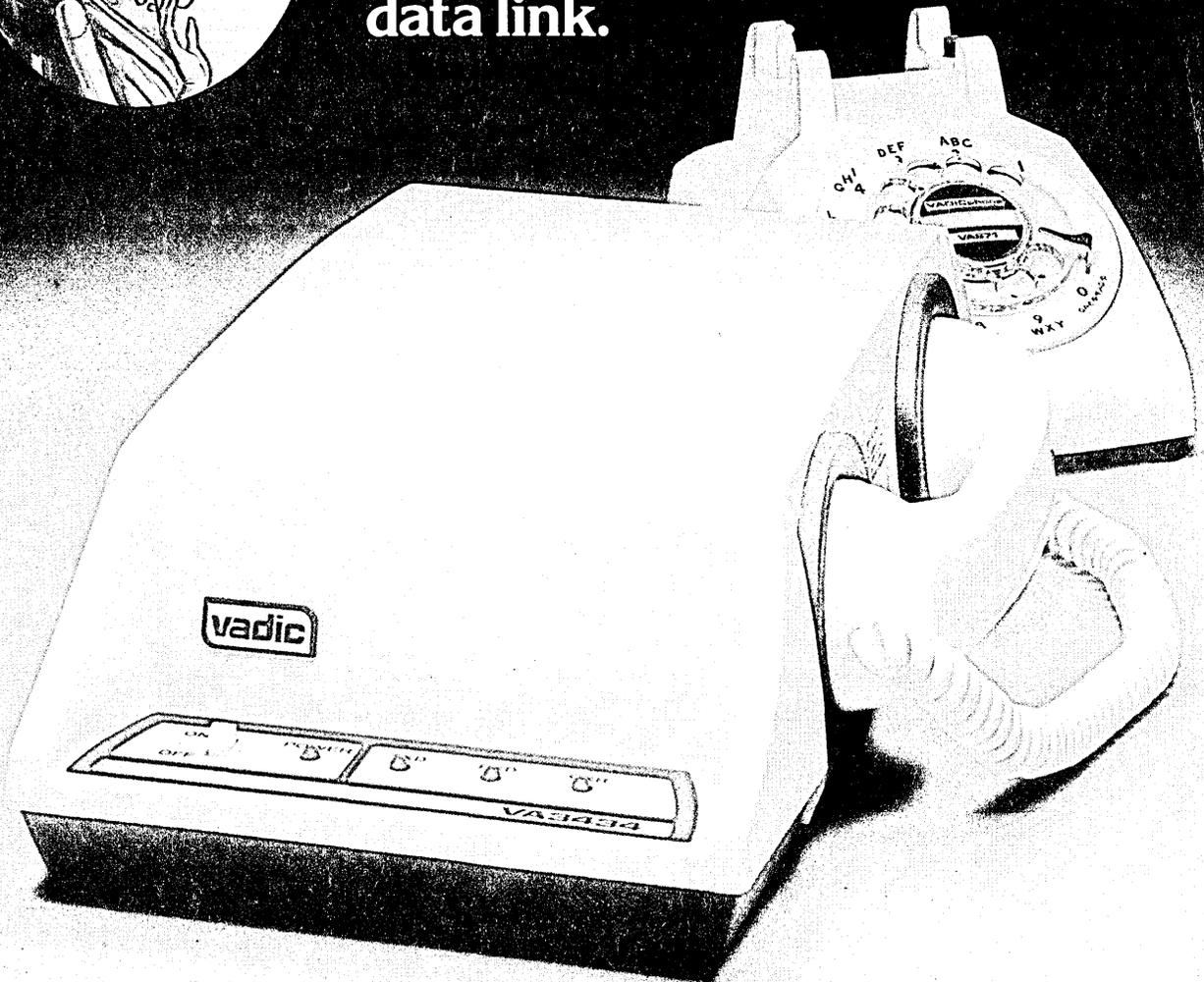
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CIRCLE 5 ON READER CARD



Dear Ma:

With Racal-Vadic's VA3434 acoustic coupler, every telephone becomes a 1200 bps full duplex data link.



Racal-Vadic is in full production on an acoustic coupler that operates at 1200 bits per second, full duplex. Thousands are already installed and operational.

This is great news for remote terminal users who will no longer have to settle for 300 bps acoustic operation. Now, merely by replacing your present coupler with the VA3434, you can step up to 1200 bps full duplex, using the same 103 type protocol, yet retaining the portability that only an acoustic coupler provides. And since data flows 4 times faster, phone charges may be less, too.

More good news. The VA3434 is compatible with Racal-Vadic's VA3400 Series, including the VA3467 computer site triple modem.

Where can you obtain the VA3434? Easy. Just phone the nearest Racal-Vadic stocking rep. They're listed below.

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The Electronics Group

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CIRCLE 6 ON READER CARD

"Tektronix' IGL software the first day. Its modularity current and future

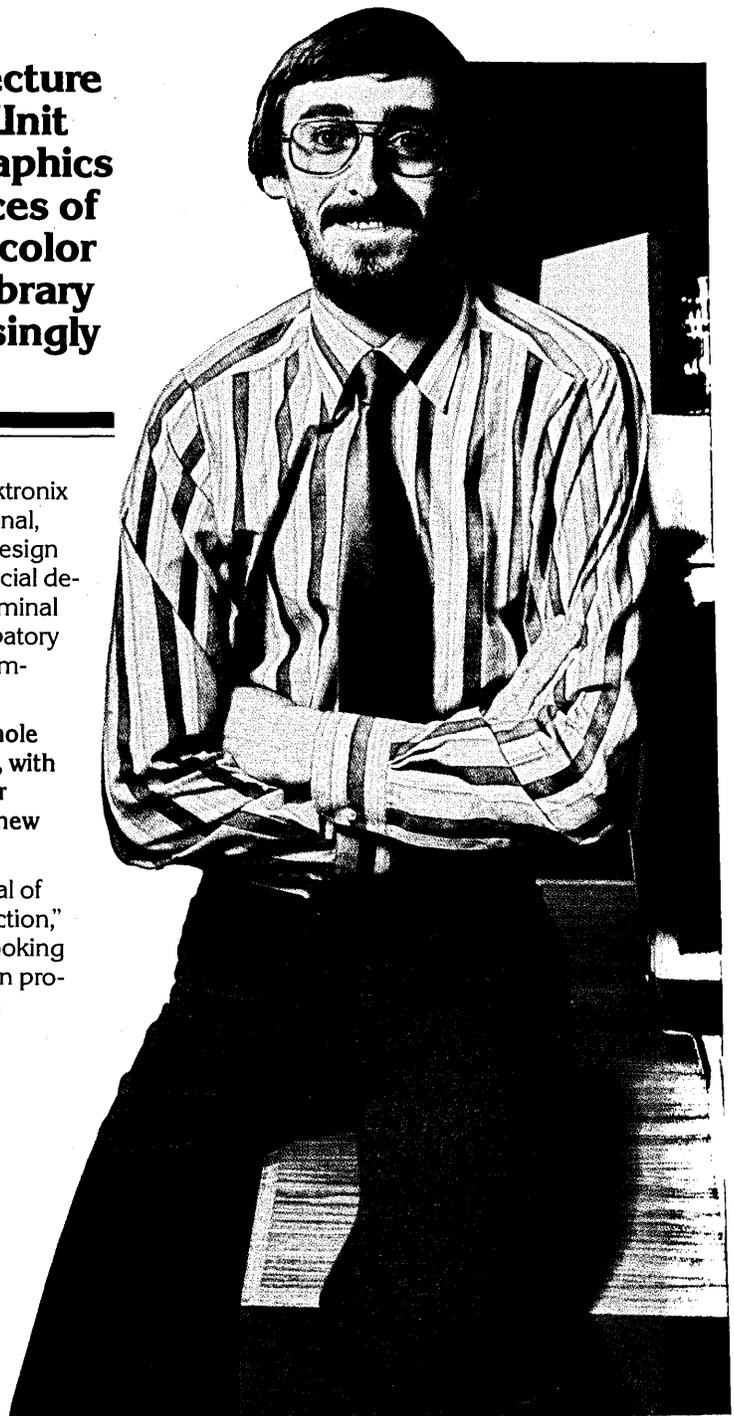
Strathclyde University's Architecture and Building Aids Computer Unit (ABACUS) uses computer graphics to instantly appraise the consequences of building design decisions. Tektronix color graphics and Interactive Graphics Library (IGL) software are playing an increasingly crucial role.

Bill Gardner
Research Fellow, Archi-
tecture and Building
Aids Computer Unit,
Strathclyde University,
Glasgow, Scotland

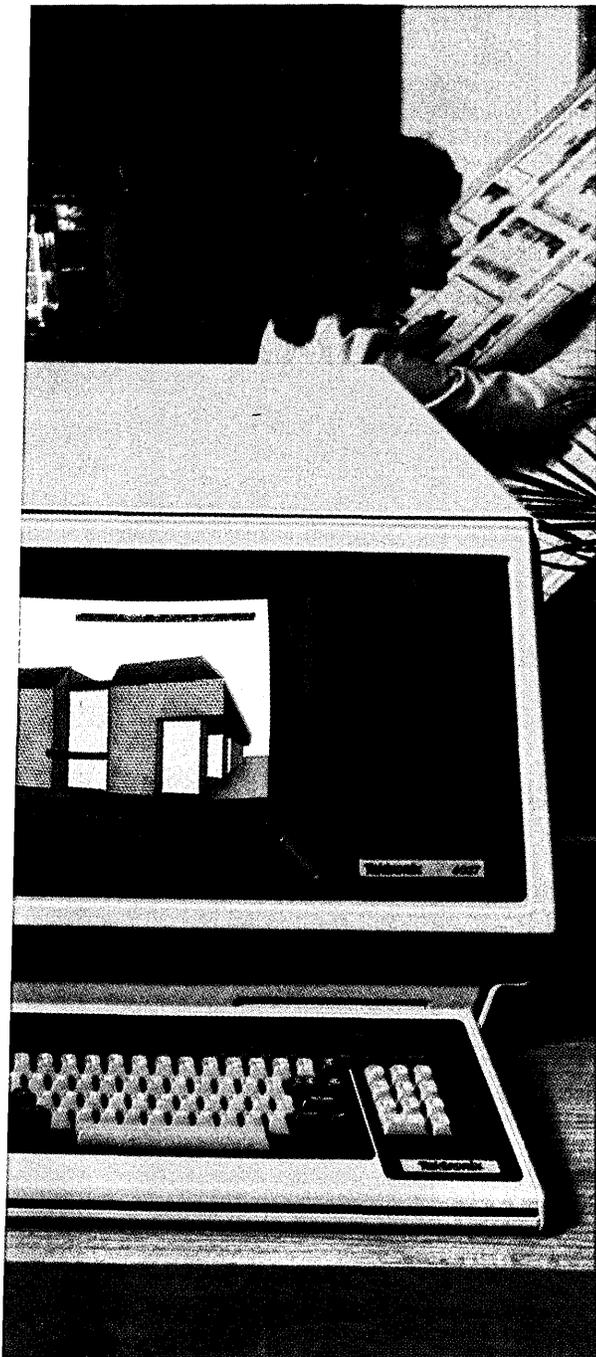
For ten years, ABACUS has utilized Tektronix graphics in displaying spatial, functional, environmental and economic effects of design alternatives. Their research has led to special design packages for school, hospital, air terminal and housing projects — including participatory programs in which the building users themselves help develop layout strategies.

Now ABACUS has literally added whole new dimensions to its pioneering efforts, with the adoption of the Tektronix 4027 Color Graphics Terminal and segments of the new Tektronix Plot 10 IGL.

"We've only begun to tap the potential of colour in improving man-machine interaction," says Research Fellow Bill Gardner. "By hooking IGL's 3-D option into our energy prediction programs, for example, we can indicate such factors as heat loss or available sunlight for an entire building or cluster of buildings — not by numbers, but by colour gradations."



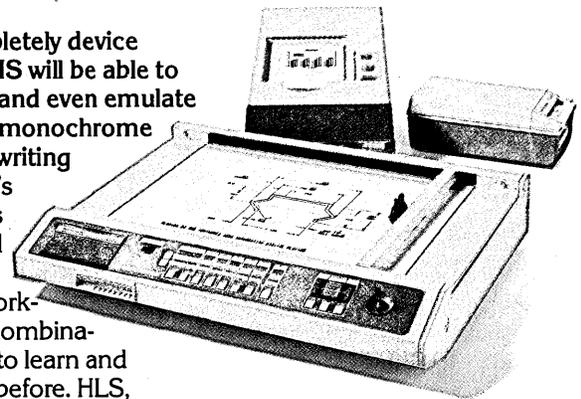
was up and running an keep it running on all our leverages.”



Because IGL is completely device independent, ABACUS will be able to add new equipment, and even emulate color graphics on its monochrome terminals, without rewriting code. In addition, IGL's easy-to-read manuals and highly-acclaimed HLS color selection system have made working with shades and combinations of colors easier to learn and remember than ever before. HLS, too, will be a permanent point of reference no matter how the technology evolves.

“Simple yet powerful capabilities like these,” says Gardner, “will let architects graphically design and integrate everything from carpets to working conditions, while keeping a firm grasp on capital and running costs.”

As the world's graphics leader, Tektronix can integrate the hardware, software and on-going support that lets you see where you're going and what you're doing. Whatever the job. Whatever your need for speed, ease and accuracy. For more information call, toll-free, 1-800-547-1512. In Oregon, call 644-9051 collect.

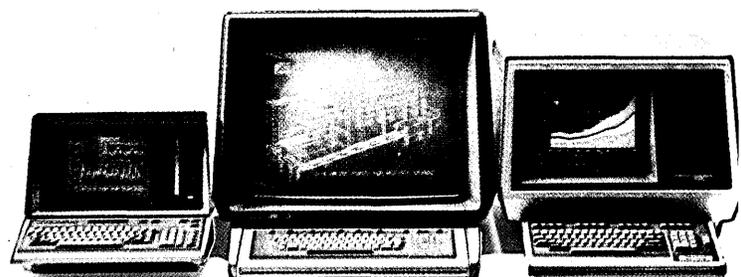


IGL lets you modularly add device drivers for a range of terminals, plotters and peripheral equipment.

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CIRCLE 8 ON READER CARD

Twenty Years Ago/Ten Years Ago

LOOKING BACK

JULY/AUGUST 1960

General Electric made its first move toward the general purpose computer field with the announcement of the GE-225. The move was expected for some time, especially considering the approximate \$12 million annual IBM rentals GE was carrying. The 225 was introduced as a medium-priced machine for both scientific and business applications. Delivery time was 18 months. DATAMATION noted the machine offered "nothing revolutionary," except its price—between \$125,000 and \$400,000. The price range was considered "quite a computing bargain."

Remington Rand's Iliion, N.Y., plant was turning out one solid-state system (SS 80s and 90s) per day to fill the 250-plus orders placed. In addition, rumors were circulating that a new business system was due for announcement shortly.

Also in August 1960, Texas Instruments and IBM signed an agreement providing continued exchange of technical information on transistors and diodes. The agreement was expanded from an original version to include TI circuits for at least another three years. The pact gave each company the right to exchange its technology with other organizations. A "procurement commitment" was signed by both companies, specifying IBM had the freedom to buy or manufacture its remaining transistor requirements. There was no limit set on the amount TI could sell to other customers.

The new "phrase of the month" came from Burroughs. The term "data processing" would become obsolete, and "item processing" would take its place.

AUGUST 1970

"Down but not out, Pete Harris has trimmed ADPAC Corp., San Francisco software house, to about a dozen people," stated DATAMATION in 1970. "They're hustling, they're ugly, they know everything," said Harris, ADPAC president, of the remaining dirty dozen. Earlier that year, Harris had turned his sales offices over to independent

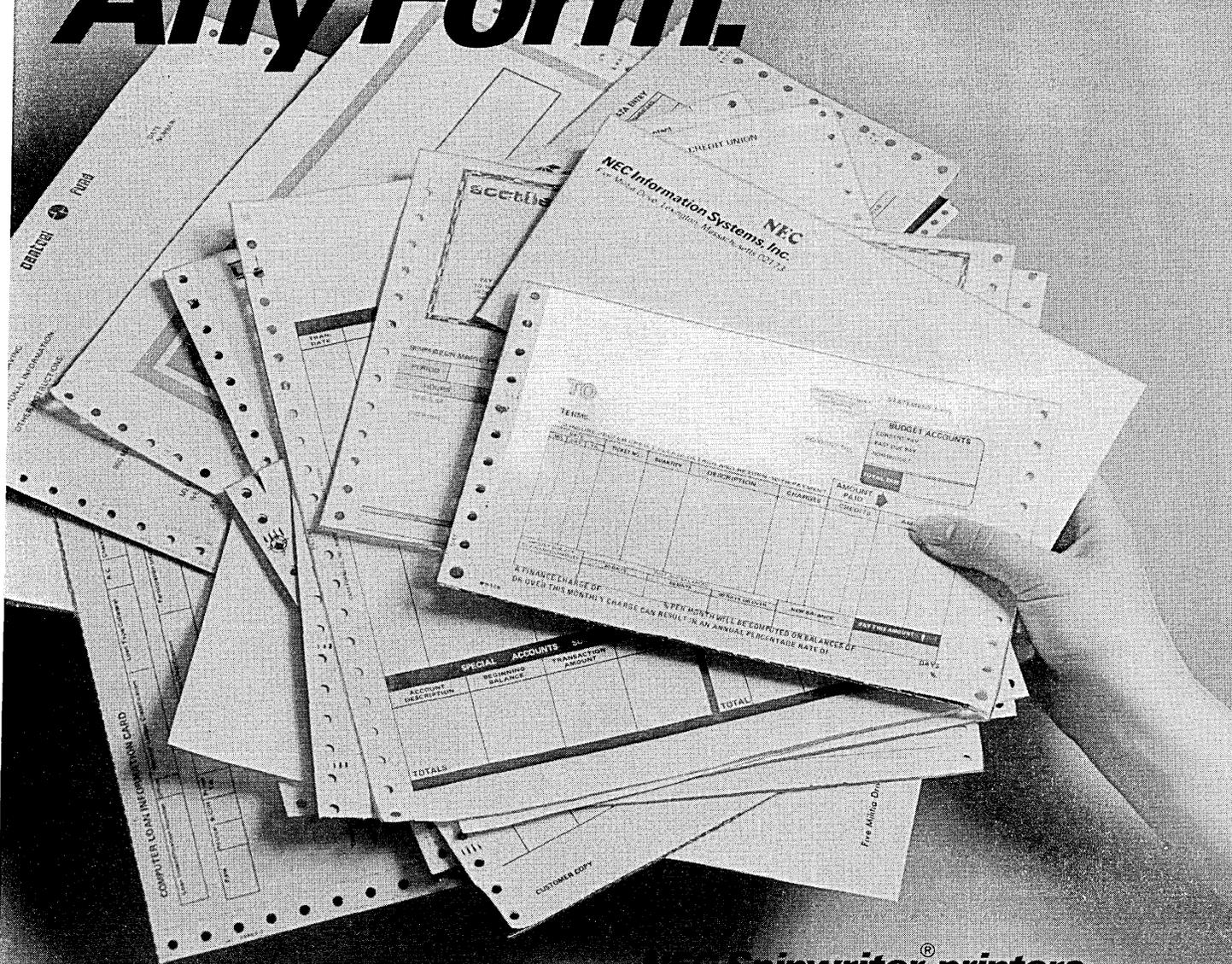
distributors, but had to close down the Los Angeles office. Harris's famous claim, "ADPAC will bury COBOL," just wasn't happening. ADPAC, a commercial language introduced and supported by one company, couldn't "bury" the industry-wide approved COBOL. The next logical step for ADPAC was to join COBOL, and that's exactly what Harris did. He began marketing plans for Polypac, a package that translated ADPAC into subject languages. The first one produced ANSI COBOL, and other versions were planned for microcomputers. Polypac answered a question asked often of Harris: "What do we do when you guys go out of business?" His reply: "You're not going to sell a language unless it's got a bail-out."

Since 1970, ADPAC's downward trend has reversed. There are now 35 ADPAC employees working in sales and technical offices in San Francisco, Los Angeles, Seattle, and Portland, serving a base of approximately 100 customers. Clients such as Georgia Pacific, New York Telephone, and HEW in Washington have been ADPAC users for up to 12 years; Georgia Pacific runs several thousand ADPAC programs. Five years ago ADPAC began selling "price-fixed contract programming," running first in ADPAC and then translated into COBOL through Polypac. More recently, the company developed SS/80, a design tool that cuts software costs by automatically documenting programs written in COBOL and ADPAC. The new system, introduced at this year's NCC, uses structured programming to handle user programs as data and produces complete graphics and narrative texts to document source programs.

The general feeling at ADPAC is positive; finances are good, and the products are ready. New marketing plans are scheduled for this year to reintroduce the product and expand public awareness of it. ADPAC is living harmoniously with COBOL these days, and as Harris said, "I'd like to change the words 'bury COBOL' to 'marry COBOL.'"

—Deborah Sojka

Pick A Form. Any Form.



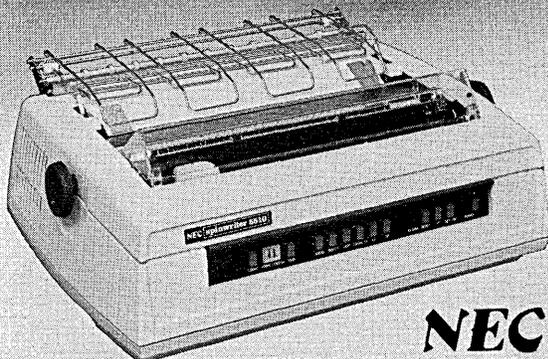
NEC Spinwriter[®] printers make it simple.

Forms handlers reduce the labor content of using printers. The more forms you handle automatically, the more labor and aggravation you save.

NEC Spinwriter printers have ten forms handling options, twice as many as other printers. All are NEC-quality to deliver superior reliability. Almost all are operator interchangeable without special tools. Several perform functions no other forms handler can match—such as bidirectional paper movement, first and last-line printing, and ultra-fast cartridge changing with forms handlers in place.

Add these labor-saving options to the Spinwriter printer's speed—up to 55 CPS, 128-character print elements, multiple language fonts and numerous ease-of-use features, and you get the most productive character printer available anywhere. The NEC Spinwriter printer. For information, call your nearest NEC sales office.

NEC. Going after the perfect printer.



NEC

NEC Information Systems, Inc.

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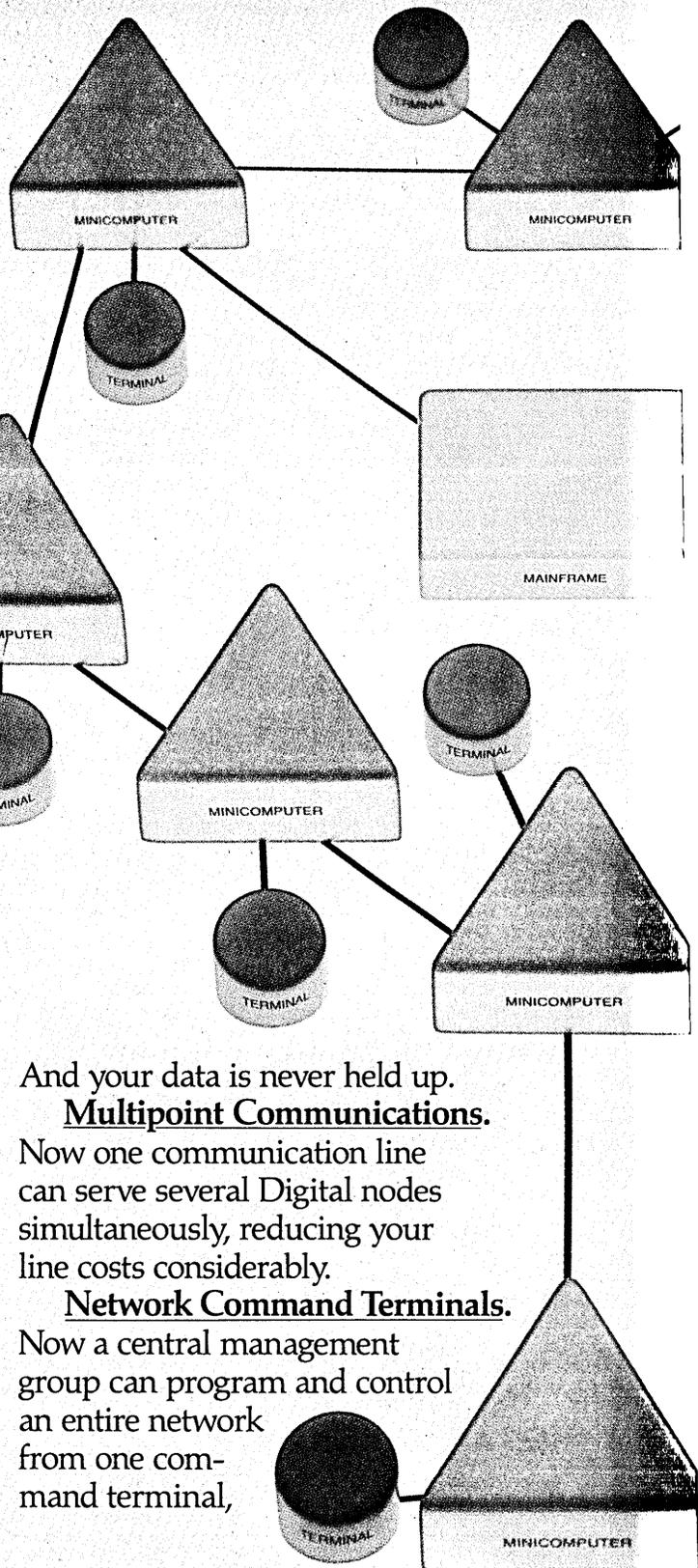
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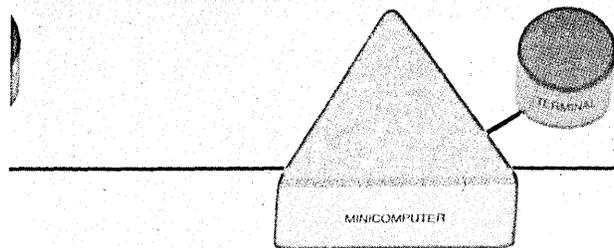
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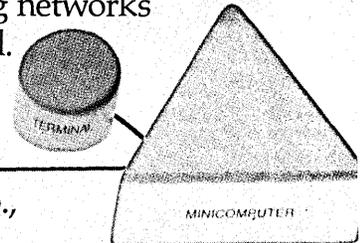
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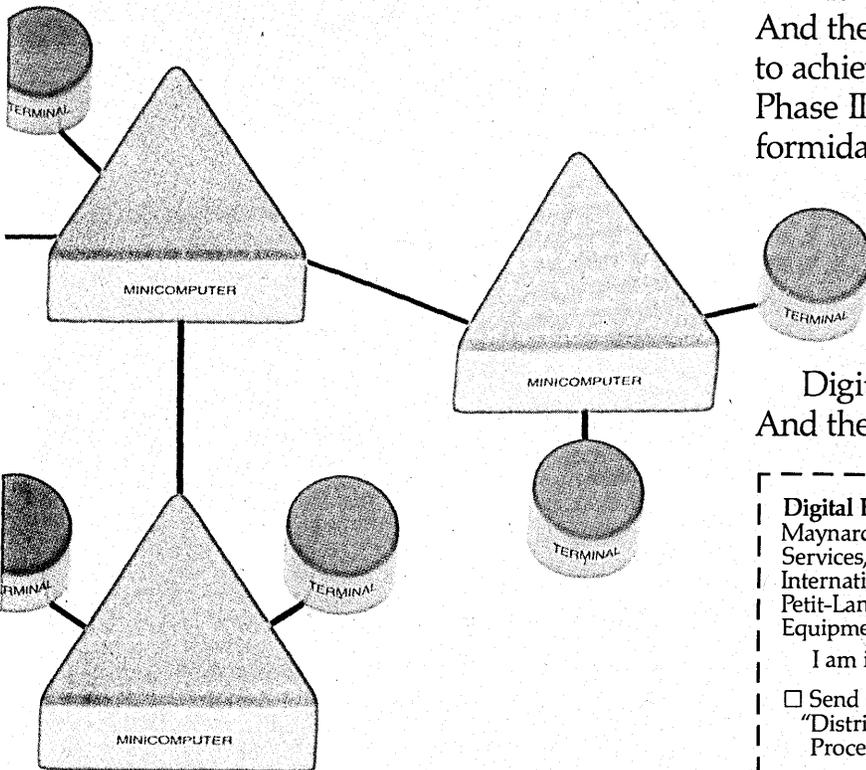


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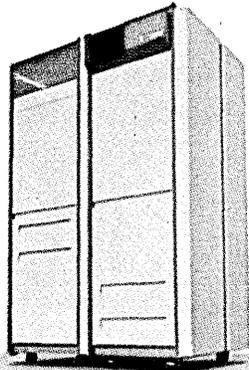
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CIRCLE 20 ON READER CARD

LOOK AHEAD

NEW FROM
HONEYWELL

Word has it that Honeywell will announce a new network architecture this fall -- the first from a major vendor to conform to the International Standard Organization's (ISO) open system architecture. The Honeywell design reportedly will conform to all seven levels of the ISO standards and is expected to encompass the entire HIS product line -- from minis to mainframe monsters.

BIG BOOST
FOR CA'S SYFA

Look for Computer Automation's Commercial Systems Div. to make a fall announcement of a new SyFa network processing system that will support 48 terminals with a throughput improvement of up to 300%. The basic SyFa system, which has been in production since 1976, supports up to 32 terminals. The improved performance is reportedly the result of a new cpu and the addition of cache memory, among other features.

FORMAN TO
THE FORE

Jumping into applications-oriented vertical markets, Formation is expected to introduce next month an MRP system to run on the Formation 4000, the 370 software-compatible mini the New Jersey firm announced last May. Targeted for manufacturing concerns with sales between \$10 million and \$30 million, the totally on-line system will offer such features as master scheduling, capacity resource planning, inventory accounting, and even a simulation capability. Called Forman, the mini/MRP package deal is expected to cost between \$120,000 and \$150,000.

NASA PURSUES
SUPERCOMPUTER

A special-purpose supercomputer with a sustained speed of a billion floating point operations per second still appears possible for the 1986 time period, says a spokesman for NASA's Ames Research Center. The computing engine, designed to simulate a wind tunnel and show the effects of air flowing across the surface of an aircraft or some part of it (DATAMATION, March 1977), is still in a preliminary design study phase. But the user community is calling for the incorporation of 40 millions words of individually addressable main memory, plus 200 million words of block-addressable main memory.

CSC PULLS
ALL STOPS

Control Data Corp. is rumored to be getting ready to enter the streaming tape drive market via a licensing agreement with Tandberg Data, Oslo, Norway. The streaming (no stops) concepts was

LOOK AHEAD

XTEN COUNTERS NEGATIVISM

created by IBM with the introduction of its 8809 drive.

Despite reports that the Xerox XTEN network is in trouble, company officials remain optimistic. One source reported that cellular radio concepts to be used for local distribution are being tested in five cities, but no tests are currently under way with satellites, the other major part of the XTEN proposal. Asked why there had been virtually no rebuttals to recent negative reports, the source said, "Bad press can't hurt us until we have something to sell."

PCM PLOT THICKENS

IPL Systems Inc., the Massachusetts PCM vendor supplying CDC and Olivetti, is negotiating with established systems houses, offering iron for proprietary software applications -- and seeking markets that evade the IBM challenge.

SIEMENS MAPS OUT U.S. STRATEGY

Sources say Siemens is quietly making plans to introduce the new members of its 7.500 series mainframes to the U.S. market. Rumor has it that the company will begin by installing the machines at its own three U.S. plants, and then offer them to its largest German customers for installation at their U.S. subsidiaries. Full-scale U.S. marketing would then begin around 1982. European sources suggest Siemen's U.S. marketing would be a threat to the Univac VS/9 customer base. Like VS/9, Siemen's VS 2000 operating system has been developed from RCA's VMOS, but Siemens has developed it much further, adding such features as multiple virtual storage.

AMERICA'S LOSS, EUROPE'S GAIN

The U.S. recession will help European manufacturers hit by component shortages, say Hewlett-Packard sources in Geneva. The slow-down in the States will allow U.S. suppliers to divert output to Europe, they claim. Cii-HB sources say the company will take the remainder of this year to recover from component shortages which led to its first quarter fall in revenues. ("IBM bought all the components," said Cii-HB president Jean-Pierre Brulé.) And ITT's German offshoot, Standard Elektrik Lorenz, is still waiting up to 70 weeks for the "more exotic" LSI circuits, it says.

JUMPING ON THE WP BANDWAGON

Two companies are planning to introduce word processing products in the management workstation mode to challenge Axxa, the former Lexar system of Citibank fame. Three Rivers Computing, a Pittsburgh computer graphics company, is readying

(continued on page 49)



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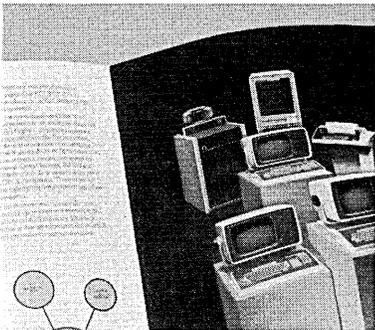
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Find out about our new DG/DBMS and ECLIPSE Data Systems. Send for our brochure: RESULTS.

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CALENDAR

AUGUST

1980 Joint Automatic Control Conference, August 12-15, San Francisco.

Theme sessions include adaptive control, direct digital control with small computers, and energy. Contact Dr. H. Austin Spang, III, GE Research and Development Center, Bldg. 5, Room 207, Schenectady, NY 12345.

First Annual National Conference on Artificial Intelligence, August 18-21, Palo Alto, Calif.

Sponsored by the American Association for Artificial Intelligence, a newly formed group, the conference will be held in conjunction with an Artificial Intelligence Trade Fair at Stanford. Contact Louis G. Robinson, Conference Coordinator, Stanford University, P.O. Box 3036, Stanford, CA 94305.

SEPTEMBER

Workshop for International Marketing Decision-Makers, September 8-9, Washington, D.C.

Exporting products in the '80s is the theme. Cosponsored by DATAMATION and the U.S. Department of Commerce. Contact Graydon Associates, P.O. Box 566, Red Bank, NJ 07701 (201) 741-2690.

MIMI '80, September 9-10, Montreal, Quebec, Canada

13th International symposium and exhibition on mini and micro-computer applications. Contact Prof. M.H. Hamza, Department of Electrical Engineering, the University of Calgary, Calgary, Alberta, Canada T2N 1N4.

Integrated Systems Expo '80, September 9-11, Washington, D.C.

The National Micrographics Association will feature the development and promotion of the effective uses of micrographics, including interfaces with other information-processing technologies. Contact John Bidwell, NMA, 8719 Colesville Rd., Silver Spring, MD 20910, (301) 587-8202.

Internecon/Semiconductor International Expo, September 11-13, Singapore.

Keyed to the specific needs of engineering, manufacturing, and support personnel of Southeast Asia. Contact Industrial and Scientific Conference Management, Inc., 222 W. Adams St., Chicago, IL 60606, (312) 263-4866.

DPMA Symposium on Office Automation, September 15-17, Chicago.

The Education Foundation of the DPMA announces a one-day series of workshops, followed by two days of general conference. Contact DPMA, 12611 Davan Dr., Silver Spring, MD 20904.

Wescon '80, September 16-18, Anaheim, Calif.

This convention is the largest high technology assembly in the U.S.

Contact Robert Myers, Communications Counsel, Wescon, 999 N. Sepulveda Blvd., El Segundo, CA 90245, (213) 772-2965.

SICOB '80, September 17-26, and Convention Informatique, September 15-19, Paris, France.

These back-to-back exhibitions and conferences cover personal computing to office equipment, and constitute the largest French international show. Contact Pierre Wagner, International Trade Shows in France, 1350 Sixth Ave., New York, NY 10019, (212) 582-4960.

IPAD National Symposium, September 17-19, Denver.

NASA and an Industry Technical Advisory Board (ITAB) to report on progress of the joint industry/government computer-aided design project called IPAD (Integrated Programs for Aerospace-Vehicle Design). Contact IPAD Project Office, Mail Stop 246, NASA Langley Research Center, Hampton, VA 23665, (804) 827-2888.

Federal Computer Conference, September 22-24, Washington.

Cosponsored by DATAMATION. Will address the management of change in the 1980s for federal dp users. Contact Ms. Lynn Green, P.O. Box 368, Wayland, MA 01778, (617) 358-5181.

12th Annual Conference of the Society for Management Information Systems, September 22-25, Philadelphia.

The conference theme will be "MIS Management in the Emerging Information Age" and will examine the challenges facing the MIS Executive. Emphasis will be on the impact of converging technologies on the role of the MIS executive in the 1980s. Contact M. Rippey, the Society for Management Systems Information, 111 East Wacker Dr., Chicago, IL 60601, (312) 644-6610.

OCTOBER

10th International Symposium on Fault-Tolerant Computing, October 1-3, Kyoto, Japan.

The symposium concentrates on Fault-Tolerant Computing, and covers the basic theory and practice. Official language is English. Contact Secretariat of FTCS-10, Department of Applied Mathematics & Physics, Faculty of Engineering, Kyoto Univ., Kyoto, 606, Japan.

IFIP Congress '80, October 6-9, Tokyo, Japan, and October 14-17, Melbourne, Australia.

Challenges of a computer presence is the theme of the Eighth World Computer Congress. Contact AFIPS, 210 Summit Ave., Montvale, NJ 07645.

INFO '80, October 6-9, New York City.

Returning to the New York Coliseum is the Information Management Exposition and Conference. Contact Clapp & Poliak, Inc., 245 Park Ave., New York, NY 10017, (212) 661-8410. *

DP Dialogue

Notes and observations from the IBM Data Processing Division that may prove of interest to DP professionals



Oshkosh Truck custom designs and builds vehicles like this airport crash-fire-rescue truck. Delivery can be as quick as 100 days because CADAM helps produce error-free engineering drawings fast.

CADAM® Means Quick Turnaround for Heavy Trucks

Most of the large all-wheel-drive vehicles made by Oshkosh Truck Corporation are custom engineered. Even those based on standard designs are substantially modified to meet individual customer needs.

But fast delivery of the company's vehicles for construction, crash-fire-rescue, in-transit concrete mixing and similar heavy-duty tasks is vitally important. As Ron Gehrke, manager of engineering administration points out: "Quick turnaround—sometimes in 100 to 190 days—is one of the things the customer is paying for. CADAM has drastically cut both the manhours and the elapsed time required to produce the engineering drawings."

The Computer-Graphics Augmented Design and Manufacturing (CADAM®) system runs on an IBM System/370 Model 135 at the company's Oshkosh, Wisconsin, headquarters. In the fabrication of sheet

metal parts, Gehrke explains, CADAM has eliminated engineering drawings as a source of error.

Often, the metal stock that must be bent into complex curves is a half-inch thick. Today, to calculate the geometry of the flat equivalent of these parts and draft the patterns by which the stock will be cut, Oshkosh Truck uses CADAM.

"Since we installed CADAM, we have yet to see one drawing come back with errors," Gehrke reports. "Because these parts are so complex, we were eating a lot of scrap costs even though we were double-checking. Frequently, we resorted to welding two simpler pieces—which is costly, but cheaper than making scrap."

On the average, he says, there is a four to one saving of manhours on detail drawings. "The saving in elapsed time is even greater, because CADAM lets us add late

shifts. Many designers prefer the late hours, when access to CADAM is easier.

"We see the strongest gains when we are revising a drawing. The designer calls it up on the screen of an IBM 3251 Graphic Display Station and modifies it with a light pen. Once when a customer wanted the fuel tank moved back 12 inches, the designer changed the assembly drawing in five minutes. In general, on engineering changes our manhour gains are 12 to one."

Oshkosh Truck will sometimes "stretch" a vehicle by increasing the frame length, Gehrke notes. Previously, the draftsman changed the dimensions noted on the drawing, without changing the drawing itself. The resulting out-of-scale layout opened the possibility of errors; with CADAM, the line work is as easily stretched as the dimensions.

*CADAM is a registered trademark of the Lockheed Corporation.

Helping Olin Train Its Pool of Talent

"People remember what they learn under the Interactive Instructional System," says Mary DiDonato, manager, development and training for the Chemicals Group of Olin Corporation. "The effectiveness is

in the exercises; the system helps identify weak areas and presents extra drill in those areas."

Olin's Chemicals Group is using the Interactive Instructional System, an IBM

program product, to teach newly hired customer representatives how to enter incoming orders through online computer terminals. Jane Murphy, project training manager, directs this effort.

Customer orders for industrial, agricultural and consumer chemical products are phoned into Olin's Stamford, Connecticut, headquarters. There, customer representatives enter them into an IBM System/370 Model 158AP through online terminals. Running on the same computer, the program presents a simulation of this order entry system on which the students practice.

"This helps to overcome the psychological barrier some people have to the use of computer terminals," Murphy explains. "The result has been to make new people more effective faster.

"Previously, we gave a three-week course of conventional instruction with four to eight people in a class. It was almost a full-time job for two of us," says Murphy. "Besides being terribly time consuming it was exhausting; I don't think we could have continued much longer. The program has reduced that load considerably.

"After some training," Murphy continues, "the student takes a quiz at the terminal. This identifies any weak areas and the program gives extra instruction on those topics. At any time the student can go back to any desired subject. We've also injected some humor into the course materials, which the students enjoy."

"Training takes much less elapsed time," says Ben Graves, manager, interactive instructional systems for the corporation, "because we are able to provide sustained practice that wouldn't be feasible in a conventional training program. The students can spend more hours at the terminal than we could give them in the classroom.

"We use it to train DP people, too," Graves notes. "We have sequences on IBM operating systems, job control language and on TSO. With these courses available in-house, people can take them at any convenient time."

Boris Sichuk, corporate director, development and training, summarizes: "The Interactive Instructional System is an outstanding method for delivering training materials in the Chemicals Group, and we are actively working to expand its use to the other groups."

Algae are cultured in the laboratory to test Olin's HTH swimming pool treatment. To train customer representatives on online order entry, Olin uses IBM's Interactive Instructional System.





These coils of rolled steel are ready for shipment. DL/1 helps Republic Steel keep track of every workpiece that passes through its Warren, Ohio, facilities.

DL/1 Keeps Mill Work Rolling at Republic Steel

At a Republic Steel Corporation plant in Warren, Ohio, an online system using IBM's Data Language/1 (DL/1) tracks each piece of steel from the time it enters as a hot slab until it is shipped as a coil of finished sheet. And the Customer Information Control System/Virtual Storage (CICS/VS) enables plant operators to inquire about the work or enter transactions from computer terminals located in offices or on the plant floor.

"The inquiry capability under DL/1 is very flexible," says Ted Geary, assistant director, business systems group. "We've built operator prompting into the system, and several validity checks: Is this a valid coil number? Is it scheduled for this unit?"

"One measure of success," Paul Wigton, vice president—steel operations, explains, "is the error rate in inventory and customer-order data. Before the system went online, the rate was 3 to 5 percent. Now it's down to 0.5 percent and still improving."

Since it permits information to be accessed in many different ways, DL/1 enables a user to determine the status of any piece of steel by entering a customer name,

order number, or coil identifying number. Or he can ask for a list of pending orders, or work waiting to enter any process unit in the plant, or the day's production for each unit. The DL/1 system replaces all paper documents formerly used to schedule and track workpieces through the mill. And it permits mill routings to be modified or expanded without reprogramming.

"At Warren," Geary notes, "over 20 process units perform finishing operations: rolling, cleaning, annealing and slitting the steel coils, and then treating the surfaces or painting them. DL/1 lets us key each coil to its present and subsequent processing units, showing all interrelations without duplicating any data. We can change the process sequence, add record segments, or make other major changes without reprogramming."

At the plant, the mill scheduler looks at a terminal screen displaying customer orders. By pressing keys, he tells the computer—an IBM System/370 Model 158 at Republic's data center in Niles, Ohio—the sequence in which he wants the orders to be started. In the computer, a stored set of production rules for routing different types

of rolled steel through the mill is applied to his input, to generate an optimum schedule for each process unit.

Then, every time a plant operator starts a strip through rolling, pickling, or other treatment, he makes an entry at a nearby computer terminal. This enables the computer to keep track of each workpiece as it moves through the plant.

"Soon," Wigton adds, "we'll be very close to our goal of zero errors. This will result in greater productivity for us and improved service for our customers."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

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Prime's Office Automation System has word processing, data processing, electronic mail, correspondence management, scheduling, automatic proofreading, language translation, networking capabilities—virtually everything you need—all integrated into a single incredibly efficient system with three major functions.

Word Processing includes a screen editor that displays text as it's entered. Menus that lead the user through the system. Labelled function keys that eliminate the need for heavy user memorization. And storage that will easily handle about a million pages of information.

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And scheduling lets you request a meeting, get confirmation of a specific date and time, then actually schedule the meeting.

Advanced Text Management employs a 60,000 word electronic dictionary. The contents are user-defined, so medical, legal, or industry terminology can easily be added. Spelling is electronically compared with the dictionary for accuracy, and hyphenation is done automatically.

It will also support multi-lingual dictionaries for creating foreign language documents or translating one language to another.

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LETTERS

WHO BELIEVES? I DO!

Robert L. Glass in "Who Believes in Top-Down Design?" (May, p. 293) has two objections to the literal interpretation of the theology of top-down design.

- Wise software developers often use utilities such as SORT or PRINT.
- We often implement components completely, in advance of the rest of the design, in an effort to check their feasibility.

The first objection is weak. Using a utility is not the same thing as implementing, then using one. Glass seems unaware of the "extended machine" concept. Here, the total machine on which a system is installed is the hardware *plus* its operating system utilities. To the top-down COBOL programmer, SORT is a primitive verb, like MOVE.

Top-down design is a way of getting to the extended hardware/software machine level; it does not prohibit the use of any facilities at this level.

Also, while it is true that the developer with his head screwed on tight uses whatever prewritten software is available, the existence of a utility can distort a design if the developer is biased or unaware of the alternatives. The ease of sorting in COBOL often masks the possibility of using direct access rather than sequential access methods; relational data base situations are shoehorned into hierarchical packages; the existence of ISAM has fouled up a number of systems. Top-down design is a way to force the designer to concentrate on logic rather than tools.

Glass's second objection, that it is sometimes necessary to implement in order to check the feasibility of a component, fails to define what sort of feasibility he is talking about. It can't be programmer time feasibility, since actually doing something is a poor way of checking its feasibility. Nor, at least on today's large, fast systems, can Glass be talking about time and space feasibility. Is logical feasibility, viz., computability, being addressed? Noncomputable problems (such as write a program to tell if another program will ever halt) rarely occur in the

real world; most well-defined programs are logically feasible.

In a good top-down design, the feasibility of a module will be evident from its statement of purpose, such as "print total line." If the statement is just too general, it should be unpacked (not by writing code) into subsidiary modules. If the statement is not overly general but the designer is still, in Glass's words, "nervous" about feasibility, there probably is a lack of "functional binding" in the proposed module. The designer should be nervous about "process sales code break," because what happens when the sales code changes is not known. Such a module will probably be "temporarily bound" in that it will contain all actions needed when the sales code changes; it should be replaced by something like the modules "print sales totals," "store new sales code info," and "zero sales total."

Glass recommends "iterative" design. It's often necessary to implement parts which are later changed (although writing system simulators is a useful but neglected method). But too much iteration means that the project is out of control. On your next estimate, try to multiply each man-day figure by an iteration factor and see what your boss says. Iteration can also be bad for morale as programmers write code that is later thrown away. Finally, the user may point to a product of a nonfinal iteration and say "we can live with this." That is the user's right, but the designer's reputation may suffer as bugs surface later.

To sum up, Glass's article is to me a distortion of top-down design. People can get an accurate idea of this method by reading one of the books available, such as Niklaus Wirth's *Systematic Programming* (Prentice-Hall, 1974). COBOL-oriented programmers and managers put off by the extensive use of PASCAL in this book should read *High Level COBOL Programming* by Weinberg, Wright, Kauffmann, and Goetz (Winthrop, 1977).

EDWARD G. NILGES
SEI Information Technology
Chicago, Illinois

AUTOCRITIC

Re: "The Right Books" (May, p. 219), may I also recommend a "doomsday" novel full of computers, robots, ESP, and excitement. It is called *Brainchild* (Manor Books) and is written by J. M. Johnston.

J. M. JOHNSTON
Westminster, Maryland

I enjoyed Mr. Hard's article but his underlying assumptions raise some concern. His nasty sarcasm about "boorish humanities graduates" and his chummy "inner circle" tone are revealing: why so defensive about being literate? What makes him so sure that computer professionals haven't read *Moby Dick*, *War and Peace*, *Finnegan's Wake*? Perhaps even read them for purposes which extend beyond cocktail party conversation?

Mr. Hard seems to assume that the attention span of a computer professional is measured in microseconds. He also seems to think that the relationship between computer professionals and the humanities, especially literature, is that of outsiders laboring under severe inferiority complexes. I have found neither to be true.

DOUG WILHIDE
Colle & McVoy
Minneapolis, Minnesota

CONFERENCE CALL

Re: "Editor's Readout" (May, p. 45), you conclude that it is probably not possible to limit computer conference and trade shows, but you never really addressed why there are so many. I contend that the proliferation is due to the number of willing attendees ready to pony up the going rate. If the buying public became a little more discriminating, all but the best shows would die.

This is where DATAMATION could lend a hand. I recommend a survey of readers to find out how they rank the existing conferences (why they went or why they didn't), and then focus coverage and support on the top four.

Quite frankly, I can't justify going to any conference that has only one or two

LETTERS

topics of interest. I look for the opportunity to hear nationally recognized experts—but I won't fly all over for the rest of my life chasing them on the conference circuit.

PHILLIP W. MORGAN
Salem, Oregon

LONG MEMORY

Re: "News In Perspective" (May, p. 62), we very old-timers remember that the 1403 printer was introduced with the IBM 1401 computer in 1960, not in 1964 with the IBM 360 as Mr. McCusker claims.

DON L. WEIMER
Columbus, Ohio

WELL-TEMPERED PROGRAMMER

Re: "Letters" (April, p. 35),

1. The "universal music language" in A. Caplin's letter on the universality of APL:

a. Can reasonably be said to have taken 500 years to develop (Gregorian chant to Schoenberg) with many various subconflicts such as choice of intonation (of which Bach's Well-Tempered Clavier is only one example) and validity of stylistic devices.

b. Has proven woefully deficient for contemporary musical texts and physical-acoustical developments.

c. Therefore demonstrates that "universality" is a function of arbitrated human agreement.

2. It is not the languages and systems available that are necessarily complex, it is the world's view of computer systems (i.e., user demands which are by nature political and due to user naivete). Hence the real world "system" into which formal systems must fit becomes anomalous, conflicting, and complex.

3. There will always be "chauffeurs" or in sociological terms, shamans, as long as we lack the educational systems. This lack perpetuates keeping users in the dark so that their only response is mytho-religious awe.

4. Such an appeal to the "universality" of any given language smacks of the Tower of Babel metaphor.

5. Programming a computer may be a science but half of the job—analysis of users' needs and the subsequent design—will always remain an art until the user can analyze his own needs.

To paraphrase the previous month's editorial quote of Louis Brandeis: "If you would only realize how difficult life is, things would be so much easier for you."

MICHAEL GARDNER
Programmer
School of Medicine
University of California-Davis
Davis, California

HELLO PROFITABILITY

Re: "The Semiconductor Industry: An Overview" (April, p. 164), the author states that Data General reported reduced

corporate earnings due to the inability to obtain LSI semiconductors, and that "in the fourth quarter of 1979, Data General reported the first loss in its history, primarily due to 16K RAM shortages." Publicly held companies can get understandably testy over such inaccuracies, even though the point Mr. French is making with Data General as example is an accurate one.

Data General reported earnings in fiscal 1979 just over \$49 million, a 24% increase over the \$40 million reported in fiscal 1978. In the fourth period of 1979, the company earned \$13,361,000 during a 16-week period, down slightly from \$14,312,000 earned in the previous year during a 17-week period (a quirk of the calendar every few years).

What Mr. French may be referring to is profitability. Profitability, or the net income (earnings) return on revenues, was down for 1979 and the fourth period over the year ago periods. For 1979, it was 9.8% return on revenues, compared to 10.6% for 1978. For the fourth period, it was 7.8%, compared with 10.6% a year ago. By the way, average net margin of all publicly held computer companies during this period was about 5%. Finally, semiconductor shortages were not the sole cause of this profitability decline, nor even the major cause. It was one among many. Increased prices of the semiconductors that were available during that period were also a factor.

As everything else in this industry, however, last year's problems quickly disappear. Most semiconductors now are both plentiful and reasonably priced. DG's profitability was up to 8.7% last quarter.

J. B. STROUP
Director, Public Affairs
Data General
Westboro, Massachusetts

TAPE SURPRISES

Re: "How To Make Tape Drives Run Faster" (April, p. 228), the article presented good information about blocking that is too often unappreciated. Choosing a block size for an installation is indeed a complex task which is further complicated by buffering considerations. Smaller environments can well benefit by more than one buffer for a file. However, multiprogramming systems issue some surprising results. Double buffering then tends to degenerate performance since, generally, after block I/O one must give up the cpu anyhow. You may find out that rather than double buffer 4K blocks, it is better to single buffer an 8K block. The same amount of buffer memory is required, but once you have hold of a record, twice as much information is moved. Different installations have alternate methods for charging for I/O, which enters yet another parameter for consideration.

HARRISON W. PARSH
McDonnell Douglas Automation Co.
St. Louis, Missouri

A potentially misleading sentence said: "Tape data files with block sizes of over 16,000 probably waste other computer system resources and should be avoided—*unless the tape file is to be archived*" (emphasis added). This comment on "archiving" is ill-advised, even if it only refers to saving a tape in inactive storage, and not permanently preserving it.

For one thing, remember that a read error is for a block; the larger the block, the more records per block, and therefore the more records that will be permanently lost with each read error. Consider what this might mean. With a record size of 80 and a block size of 24,000, one block contains 300 records. If you have a file of only 9,000 records, losing one block can mean losing over 3% of your total data. This may be critical if the file contains data you cannot afford to lose in any amount. The simplest example is a tiny file that contains the index to codes used on many other files. For the security of such data, you might even want to have only 80 character blocks.

There is little incentive for putting large blocks onto archival tapes. You are greatly increasing the risk of loss, while savings in run time are irrelevant for tapes that are rarely read. In addition, a well-thought-out program for disposing of unneeded "archived" tapes would probably save more tape than trying to overpack data onto less tape.

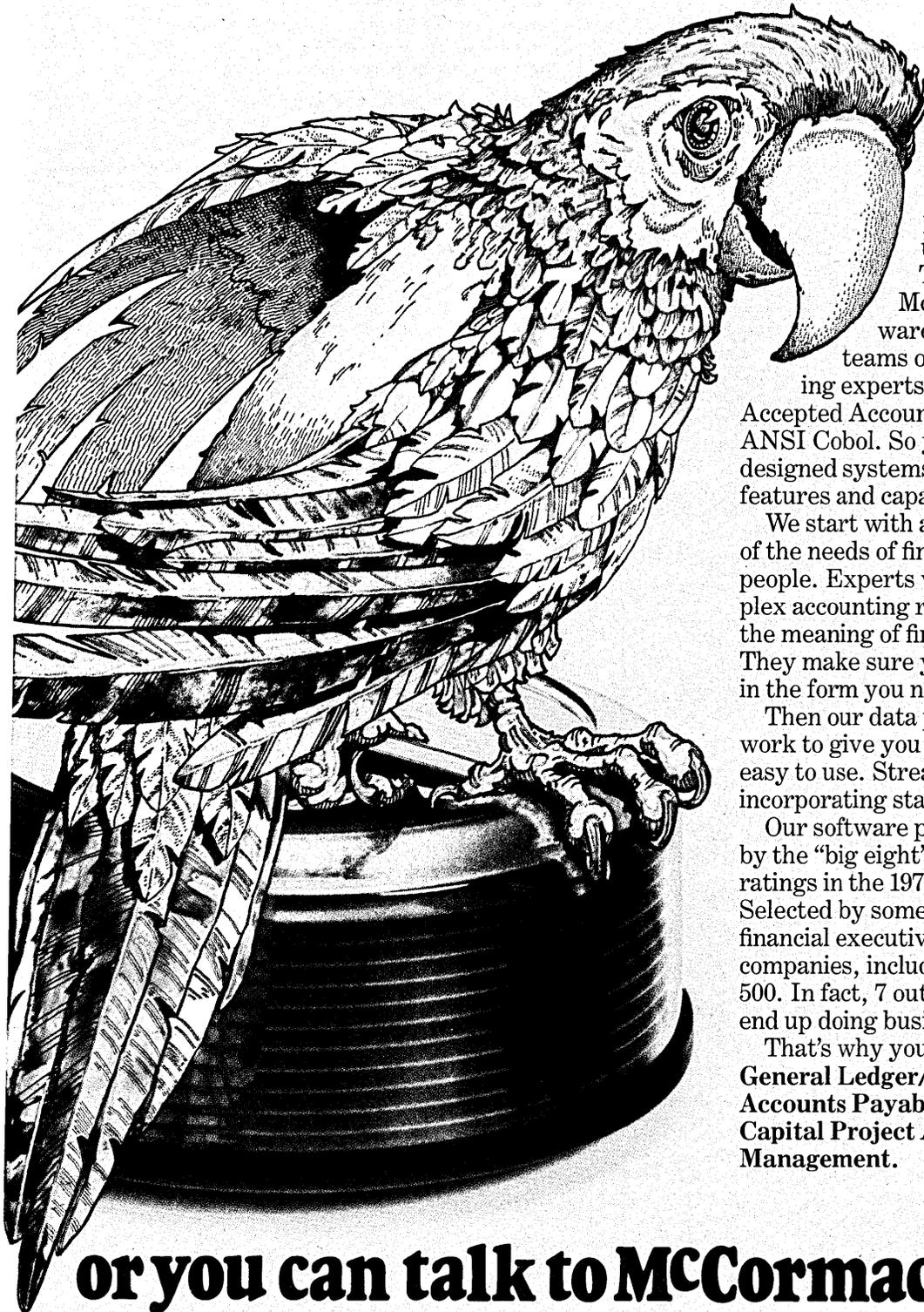
Unfortunately, there is no simple formula for determining the optimum block size for preservation. However, it should be based on the value of the data and the number of records on the file, and not such trivial considerations for inactive files as run speed. In general, we all need to remember that short-term operating efficiency is not the only goal of professionals. We all have a serious responsibility for preserving the integrity of the data in our care.

CHARLES GELLERT
Archivist
Audiovisual Archives Division
General Services Administration
National Archives & Records Service
Washington, D.C.

MORE APPLAUSE

Re: "Communications" (May, p. 64), after discussing the decision and its implications, you purport to reflect initial reactions of "interested parties in the data processing industry" by quoting the president of the Computer and Communications Industry Association. That association represents only a very small and select segment of the dp industry. CBEMA represents large and small dp manufacturers who together make up a substantial portion of this industry, yet we were never contacted for our views. Had we been, we would have told the reporter that although the decision still required study, its overall thrust was positive. We also applaud the separation decision in

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CIRCLE 25 ON READER CARD

LETTERS

principle, though it remains to be seen how it will be interpreted. We would have been prepared to give this much of a reaction immediately after the decision. Admittedly, it is not as dramatic a comment as that of the CCIA, nor as incendiary. Nonetheless, it is a legitimate view worth conveying to your readers.

I hope DATAMATION is not descending to the "squeaky wheel" journalistic syndrome.

JEFFREY T. WOOD
Director of Communications
CBEMA
Washington, D.C.

INFORMATION PLEASE

Re: "DBMS: Developing User Views" (Feb., p. 141), I agree more attention should be paid to the user when developing a data base. Of course, this places the burden on the user to define the contents and utilization of the system. Mr. Holland says, "This process of gathering user views may be performed by using standardized data forms. . . ." I would appreciate a few examples of these forms or information where they could be purchased.

R. D. JOHNSON
Technical Director
Voice Communications and Switching
U.S. Telephone and Telegraph
New York, New York

THE TOWERS THAT BE

Re: "Tribute to Mauchly" (Mar., p. 55), "The New Tower of Babel" (Mar., p. 156), and "Letters" (Mar., p. 39), these articles highlight ideas that are mutually illuminating. Many of your readers likely share the admiration Mauchly expressed for the ascent of man. What structure is more likely to be conjured up in our minds, if we try to envisage an assemblage of 18,000 vacuum tubes, than the Watts Towers on which Bronowski dwelt so lovingly? While sitting at the keyboard of his TRS-80, Mauchly must have felt that he had lived for centuries! How rapidly electronic technology advanced from the remarkable achievement of Mauchly and Eckert to an architecture infinitely more appropriate to its purpose.

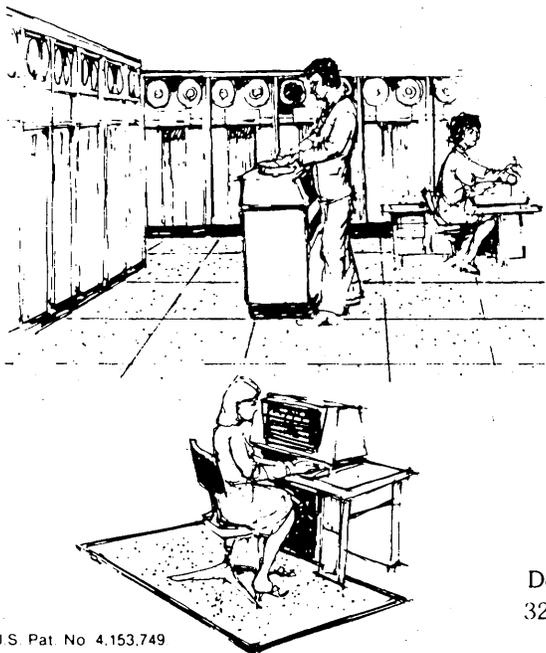
Meanwhile, those who elect to program the machine have scarcely emerged from the ENIAC shop. The 18,000 vacuum tubes could be sunk many times over without a trace in the abyss of vacuous lines of COBOL, FORTRAN, PL/1 that programmers have extruded in their hymenopteran fashion. This scene is depicted vividly by Ehrman, using the most appropriate symbols at his disposal. How very fortunate that hardware is shrinking (from 15,000 to 1 square foot?); the programmers need all of the space they can get for COBOL and JCL. Ehrman has diagnosed incisively the most enervating malady of all time, the plethora of

cumbersome languages in which we have enmeshed the computer and ourselves. However, any hope that his insight might also be a source of revitalizing ideas is quickly dashed by his prescription. It is an ancient one, the hair of the dog, "a subset of plain English."

Nevertheless, sound intuition is the lodestone of good diagnosticians. "There need not be a single language to solve all problems, but one language should be sufficient to solve a large set of problems." Yes, indeed, but one would scarcely guess from Ehrman's paper that the language he appears to seek has been with us for some time. More than likely he has encountered it, but simply failed to recognize it. His prescription clearly indicates that he is looking in the wrong direction. The eye is blind to what the mind does not see.

In his letter, Amort is exasperated with those who choose to remain in the slough that Ehrman described so realistically when there is such an easy way out along the trail blazed by Iverson. Amort is right about APL in much the same sense that Galileo was right in confirming Copernicus, but no religion was ever more set in a wrong-headed direction than data processing is at present. The spirit of Urban VIII is alive and thriving. Amort can scarcely expect that the dp industry is about to heed his sound advice when one of its leading journals is un-

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able to provide his letter with the appropriate font for APL symbols. Moreover, in view of the little enthusiasm Ehrman could muster for any of the "dozen languages" he finds impeding productivity, the labeling of Amort's letter with the faint praise "APL enthusiast" is a telling irony.

The computer languages to which Ehrman refers all share a regrettable characteristic: they are "subsets of plain English." With remarkable ambivalence, he indicates that they constitute both the nightmare from which he would like to awaken and the dream to which he aspires. At best, they provide a painful demonstration of the adverse effects our thinking has suffered through having been imprisoned for most of our lives in a "natural" language. Failure to recognize this point has led to the development of one linguistic monster after another, all of them quite incapable of handling important concepts without bruising, smothering, or completely obliterating them.

Subsets of English so far applied to programming have been more effective in debasing the language from which they were borrowed than in enabling us to use the computer. Natural languages, such as English, fulfill the roles to which they have evolved quite efficiently and even with elegance and grace. Nevertheless, they are too tedious, too redundant, too cumbersome,

too ambiguous, too inefficient to form an appropriate interface between man and machine. Those to whom this is not apparent, upon momentary reflection, should write out the multiplication tables, up to at least 12 times, using no numbers or mathematical symbols, just plain English.

In the preface to *Principia Mathematica*, Whitehead and Russell acknowledged, "The symbolic form of the work has been forced upon us by necessity; without its help we should have been unable to perform the requisite reasoning." It is taking the computer industry a surprisingly long time to recognize the significance of that point. If we wish to align our programming with the essential elegance of the new hardware, then we must proceed via the symbolic route.

E. H. ANTHONY
Associate Professor
Department of Zoology
University of Guelph
Guelph, Ontario, Canada

More important than reducing the multiplicity of languages and syntaxes which Ehrman proposes is to reduce the requirement which generates them. For the big general-purpose multiuser systems to please everyone, they're bound to be loaded with a kaleidoscope of options, control structures, programming rules, etc. But the

big systems don't have to be so general-purpose or multiuser now, with cheap dedicated micros available for software development, and for many applications.

Why not provide the applications programmer with her own TRS-80 or Apple II, with plenty of disk memory and a friendly operating system? For applications where the software product must run in or communicate with a mainframe, then let a software utility do the required conversion or interfacing. And there are still a lot of applications where a good BASIC interpreter is the best development language. When execution speed is critical, let a utility convert debugged BASIC source code into a compilable HOL.

An enormous amount of both programmer and machine time is wasted over repeated compilations of large programs, and misunderstood diagnostic messages. Language consolidation might help some to cut this waste, but greater system dedication to the programmer, and more special-purposeness would be much more effective in making the software development process more efficient.

RICHARD C. VANDERBURGH
Dayton, Ohio

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Mr. Ehrman recommends two changes in the way we view the applications process:

1. We must no longer optimize the use of computer resources at the expense of human resources.

2. We should eliminate artificial languages and replace them with a subset of plain English.

May I suggest a third change:

3. We should stop blindly accepting what IBM dictates regarding the best way of communicating with computers.

If Mr. Ehrman and his programmer would take their parts inventory application and their existing "hierarchically organized, top-down structured programming data flow and HIPO diagrams" over to the VAX-11/780 installation at the Stanford Linear Accelerator Center where they work, they would find a large part of the solution to their language problems.

The programmer there would probably *not* select PL/I, "the most general and flexible high-level language available" (I know—IBM told us that, too). He or she would probably select a language nearly unknown in IBM circles, called ANSIFORTRAN. It allows fully structured top-down coding, long variable names with imbedded underlines (i.e., NUMBER REMAINING), and quite convenient character string manipulation—all in total disregard of the fact that IBM has told us you can't do that with FORTRAN.

The next part of the process is where the witchcraft occurs. If the programmer names the program PARTS, it is compiled in FORTRAN by the bewildering command:

FORTRAN PARTS

Now comes the part where the original programmer needed help from the systems expert next door: the dread Linkage-Editor. The VAX command to do this is a similar tongue twister.

LINK PARTS

From here on it's all downhill. Anyone can master:

RUN PARTS

If you do get in trouble there's the on-line debugger or even the "Help" command. The use of hexadecimal core-dumps for debugging is virtually unknown, and certainly not necessary.

Don't misunderstand—I am not a DEC salesman. It's just that after working with the operating systems of DEC, Data General, Prime, Hewlett-Packard, etc., I cannot understand why professional applications programmers continue to put up with IBM's antiquated, batch/card-oriented, JCL nonsense. Virtually all of Ehrman's horrible examples stem from the use of IBM's 1964 state-of-the-art systems software. I have a vision of the future. In the January 1999 issue of DATAMATION, IBM will announce the new 909X processor (the long-awaited Z series). Its main features are

that it is the size of a shoe box, runs on four penlight batteries, has a cycle time of 4 nanoseconds, and a delivery time of only 47 months. But the best news of all is that it will support OS/360, DOS/VSE, OS/VSI, RJE by DOS/CSE SNA and BSC plus VM/370 RSCS and HRNES IUP with ACF/VTAME, ACF/VTAM/MSNF. Access methods are VSE/VSAM, SAM, ISAM, and BDAM. The system IPO includes IMS/VS, ACF/NCP/VS, ACF/VTAM, and CICS/VS plus 1401/1440/1460 emulation. Now *that's* Babel!

In another article in the same issue, the manager of a major IBM installation will bemoan the fact that programmer productivity has only increased 2% since 1970.

J. MICHAEL STORIE

Director of Computing Services
Mathematical Sciences North West, Inc.
Bellevue, Washington

PLUS ÇA CHANGE

Re: "Source Data" (March, p. 248), it is curious that neither reviewer Phil Dorn nor Richard Sharpe noted the striking similarity in material content of Joan M. Greenbaum's book *In the Name of Efficiency* and Philip Kraft's book *Programmers and Managers*, published only a couple of years before by Springer-Verlag. Kraft pointed out that computer programming was being fragmented in such a way as to keep women and minorities down. Greenbaum does much

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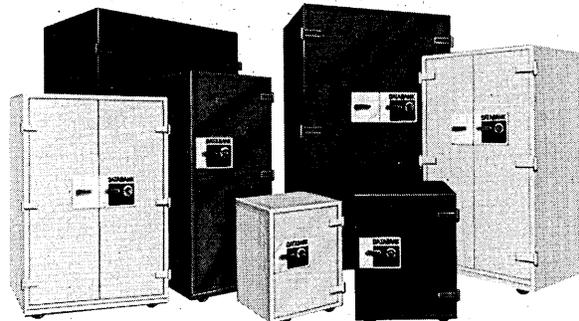
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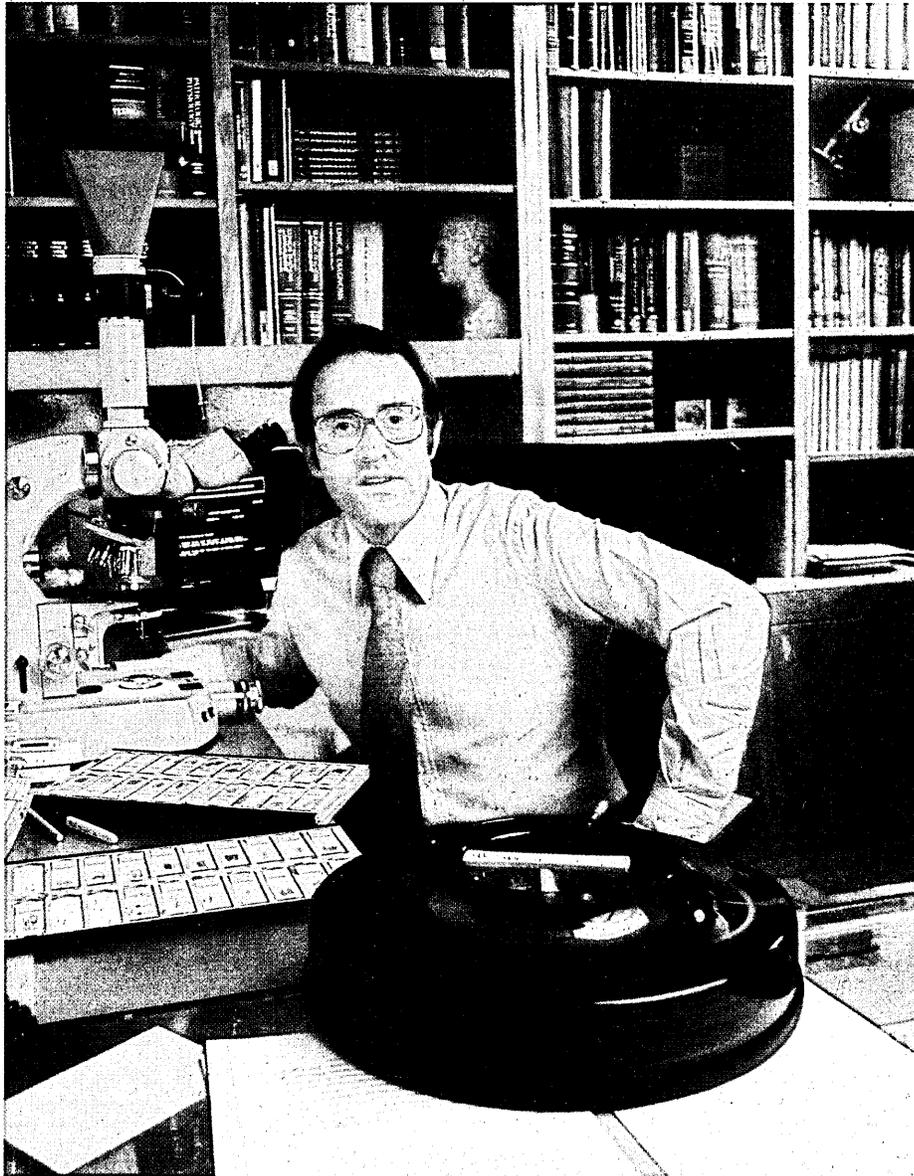


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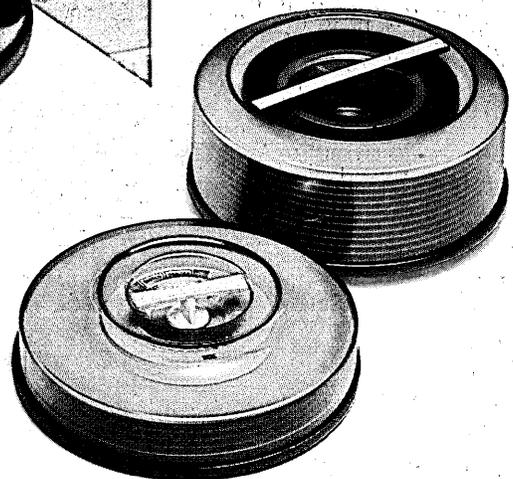
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LETTERS

the same thing, but with a distinctly different viewpoint. The outcome is much the same: the more things change, the more they remain the same!

FRANK WAGNER
Corpus Christi, Texas

Good point. Mr. Sharpe had in fact made the comparison in his review. The following sentence was inadvertently dropped from his manuscript: "In this analysis she draws deeply on the work of Philip Kraft, who, in his Programmers and Managers, the Routinization of Computer Programming in the United States, developed much the same thesis."

—ed.

ESTIMATING COSTS

Re: "Software Manpower Costs: A Model" (March, p. 164), a better understanding of how to estimate system development costs is certainly needed by our industry. Unfortunately, Bob Esterling's article is only of potential use for very small projects since the model proposed is overly

simplistic.

Essentially, the heart of the model is that reducing interruptions (and their duration) increases productivity. Regular-time programmer efficiency drops from 83% to 43% as the number of "typical" programmers on a project increases from one to 10 (the project staff size which minimized development time). Yet, regardless of the project size, overtime is treated as 100% efficient, which ignores physiological effects, other interruptions (e.g., family-related interruptions), increased duration of interruptions (since people and materials are more difficult to obtain at off hours), interruptions from others who are working overtime, etc.

Since overtime should be on a voluntary basis, the financial success and timing of the project would depend on factors outside of direct management control. In fact, if one took the assertion literally that "one person working 60 hours a week can accomplish the same as two people at about three-quarters the cost," then one-third of

the planned time for the project would be on a voluntary basis. The result, I believe, will be a diminished capability to complete projects on time and within cost estimates.

As further evidence of the model's simplicity, note that

- The minimum cost solution for all environments is to have only one person on the project.
- Regardless of environment or project size, the ratio of the optimal staffing for minimizing development time to the optimal staffing for minimal time and cost is 1.5.

Mr. Esterling's conclusions regarding the need to eliminate unnecessary interactions and interruptions are quite right, but the model needs to be extended to match the empirical evidence of the effects of project size, development environment, development techniques, type of system, etc., before it can be applied more widely.

FRED L. FORMAN
American Management Systems, Inc.
Arlington, Virginia

CORRECTION

Due to a printing error, two lines on page 121 of the data com manufacturers chart in the June issue were reversed. The lines should read:

	Test Equipment	Switching	Other	1978 DataCom Revenues \$K	1979 Total Revenues \$K	1979 Income (loss) \$K	Fiscal Year Ends
14. Racal-Vadic, Inc.	0	0	0	12,000	24,500	—	March 31
15. Data Access Systems, Inc.	0	0	85	2,415	28,153	3,415	Aug. 31

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If you use minicomputers and dumb terminals, you probably have a very restrictive system. But those dumb terminals are a bit of a gamble when you connect them to your computer over telephone lines. They have no retransmission error, for example, so any phone line "glitch" makes your CRT's go crazy, and since they cannot be addressed or polled, you need to install an expensive phone line for each one.

The terminals used with mainframe computers don't have the same problems but they cost a lot more, and they need complex software to support the communication protocol they use.

MICOM's data communications products provide a *partial* communication protocol to minicomputer-based dumb terminal configurations *without requiring any changes to existing hardware and software*. We call this unique concept ADLC™ — Add-On Data Link Control. MICOM's ADLC™ products eliminate transmission errors, save computer ports, and allow low-cost dumb terminals to be

clustered, multiplexed and polled on a single telephone line *without special software*.

To complement the ADLC™ products, MICOM offers a range of low-cost data transmission devices, including short-haul local datasets and long-haul modems, all specially designed to meet the asynchronous communication requirements of the minicomputer user. And for the user with multiple minicomputers, or the minicomputer system running short of ports, MICOM's innovative Port Selector provides a unique solution.

Send for complete details today... and if you would like to learn more about the subject of data communications, ask about our *tutorial seminars* designed specially for the minicomputer user. MICOM seminars are offered nationwide throughout the year.

If you're installing remote terminals, whether as an end user, systems house or OEM, don't take a chance. Talk to MICOM, the one-stop shop for all you need, or need to know, in data communications for the minicomputer user.

25c

Are you a minicomputer user gambling with data communications?

Are you losing out to transmission errors and increasing communication costs?

Put your money on MICOM... the winning line in data communications for minicomputer users!

MICOM™ *Minicomputers for Data Communications™*

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 Regional Sales and Service: King of Prussia Business Center • 1001 W. 8th Ave. • King of Prussia, PA 19406 • (215) 837-4155
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CIRCLE 50 ON READER CARD

LETTERS

CRYPTOCOM

Re: "A Modern Aladdin's Lamp" (March, p. 272), as the only second-generation computer person I know, and a supervisor of systems analysts, I have grown up with computers as part of my life. As a confirmed computer hobbyist and a subscriber to over 20 trade and personal computing magazines, I think I have a good perspective on the industry and the phenomenon of computers.

First of all, what is a "computer in the classical sense"? Hollerith cards, key-punches, drum memories, or tubes? What is "programming in the classical sense"? Flowcharts, 80 column forms, machine language or plug wires? By PPL (Personal Programming Language) I assume Ms. Walsh means BASIC. All of you out there who use BASIC for business programs such as payroll, inventory, etc. (classical programs?) raise your hands. I am sure you will be gratified to know that Ms. Walsh does not consider your programming "a disciplined transferable skill." A computer is a computer, period. You can make them of silicon, iron, hydraulic jets, light beams, or paper cups and beans, and the effort to make them do what you want is intellectually the same. I refer you to Turing's work.

As far as a PPL user acting as a "crypto-communicator," I refer you to the article in the same issue, "The New Tower of Babel." I assume Ms. Walsh does not have to use or know IBM JCL. Speak of crypto-communicating! When I wish to load my "frivolously inclined" game programs on any Pet, I type in LOAD "FRIVOLOUS GAME."

No job, execute, data description, or routine statements. I believe that FOR-

TRAN is right up there in the top three languages in number of users. Please list the major differences between a typical FORTRAN and the version of BASIC on my Pet. Concerning the 30 years of "serious disciplined effort" which have produced a "general methodology of programming," does this refer to top-down programming, structured walkthroughs, or chief programmer teams? A look in the trade journals will insure that these methodologies are widely used in the industry, right? Software engineering and software physics are not commonly practiced disciplines. The last I heard was that the argument between programming as an art, and programming as a science was tied in the last of the ninth, going onto extra innings.

Lastly, I hire programmer/analysts. One of the first questions I have incorporated into my interviews is, "Do you have a personal computer?" When people answer yes, I know that they are very interested in computers, programming, and investigating new technology. But most important, they have fun with computers. The kind of work I do requires a great amount of enthusiasm. It does not require a computer science degree (I have not had to write any compilers) and I do not want to be buried in paper, whether it is specifications, functional descriptions, or program logic manuals. I want to get the job done. Give me a person who is goal directed and can wade through all the "methodology." When it comes to a crunch, give me a person who can "crypto-communicate."

CHRIS TORKILDSON

Supervisor, Systems Implementation
NCR Comten, Inc.
St. Paul, Minnesota

ANSWERS TO QUIZ

We've received many letters from readers eager to learn how they scored on the quiz in the May issue (p. 125). The test was to match computer stars with the movies in which they appeared. For people who didn't get the answers at the NCC, here they are.

Computer Stars

1. ALPHA 7
2. COLOSSUS
3. NOVAC
4. M505
5. RITA
6. JOSHUA
7. MOTH
8. ETERNAL TABERNACLE
9. ALFRED
10. ICARUS
11. GUARDIAN
12. COM 9001
13. MU/TH/UR 6000
14. ZERO
15. EMMY
16. ALPHA 60
17. BIOCENRAL COM 2100 Series G
18. HAL
19. MOTHER
20. PROTEUS

Movies

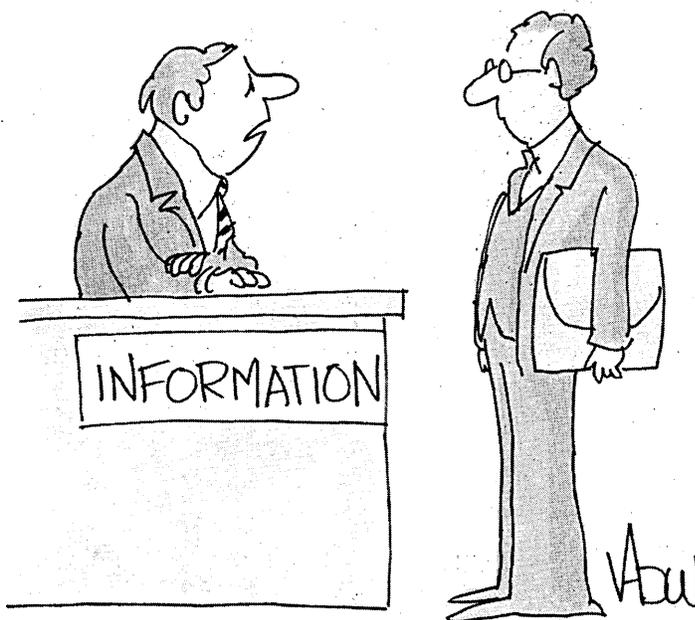
- a. The Forbin Project 2,11
- b. Dr. G and the Girl Bomb 5
- c. Demon Seed 20,6,9
- d. The Phynx 7
- e. Barbarella 1
- f. The Love Clinic 12
- g. The Gladiators 10
- h. Alien 13
- i. Hot Millions 4
- j. Desk Set 15
- k. Rollerball 14
- l. GOG 3
- m. Zardoz 8
- n. 2001 18
- o. Alphaville 16
- p. Sleeper 17
- q. Dark Star 19

CORRECTION

Re: "Look Ahead" (June, p. 63), the reference to Merrill Lynch "Econometrics" is incorrect. First, the firm name is Merrill Lynch Economics Inc.

Second, and most important, Merrill Lynch Economics, Inc. has not "dumped NCSS." In fact, we have just concluded a new agreement that will further enhance the quality of our econometric products. A number of government agencies in Washington are now clients of Merrill Lynch Economics and National CSS. And we are devoting additional sales resources to increase very further our share of that market.

ALLAN W. MACKINNON
Executive Vice President
Merrill Lynch Economics Inc.
New York, New York

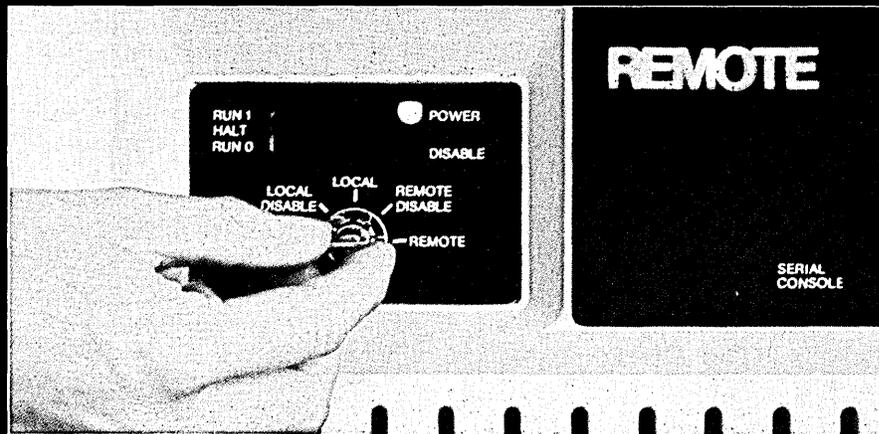


"I don't know. No one ever tells me anything."

©DATAMATION

CARTOON BY CHUCK VADUN

DIGITAL PRESENTS A MAJOR ATTACK ON DOWNTIME.



In "Remote" mode, your computer is linked to our Diagnostic Center in Colorado Springs.

**Day or night, Digital's computer-to-computer Remote Diagnosis
▶▶▶▶▶ goes into action within 15 minutes of your call.◀◀◀◀◀**

At Digital, we know that your tolerance of computer downtime is very low.

So is ours.

That's why we've developed computerized Remote Diagnosis,* the first of its kind.

When a Digital system has a problem, a toll-free phone call and the simple flick of a switch launch a coordinated effort to get that system up and running as soon as possible. Within 15 minutes, our Remote Diagnosis computer in Colorado can run a troubleshooting program on your system via a voice-grade phone link. If we have to send service representatives, we send them prepared. Remote Diagnosis lets them know exactly what's wrong and what they need to fix it before they arrive on the scene.

During off-peak hours, we can run a preventive maintenance program that won't interfere with normal use. Done regularly, Remote Diagnosis

goes beyond troubleshooting. It pinpoints potential problems while they're still merely potential.

We take a lot of pride in the way our computers perform. And we take it very personally when they don't. So we'll keep looking for new ways to serve you better and hold maintenance costs down.

At Digital, the war against computer downtime is never over.

Write: Digital Equipment Corporation, Field Service Marketing Communications, PK3-2/S25, 129 Parker Street, Maynard, MA 01754.

*Available on: VAX-11/780, PDP-11/70, PDP-11/44, DECsystem-10 and DECSYSTEM-20, DEC Datasystem 570 and DEC Datasystem 540.

digital

VAX

Software excellence. Extended.



Digital introduces VAX/VMS™ software, Release II.

Since its introduction, VAX/VMS Performance Software has been setting new standards for excellence.

VAX/VMS was designed from the ground up by hardware and software engineers working together. The result: truly integrated computer software. Featuring highly efficient virtual memory, powerful I/O capabilities, and a basic operating system that's incredibly easy to work with.

Now with VAX/VMS Release II comes another major advance in VAX technology. With several new software capabilities added, and existing features enhanced, you have more ways than ever to use the power of VAX/VMS.

Powerful new languages.

With VAX/VMS Release II, our already remarkable FORTRAN is now a full ANSI 77 implementation and compiles twice as fast as before. We've also added COBOL and BASIC that compile at the rate of two to three thousand lines per minute.

The interactive BASIC gives you performance that approaches FORTRAN.

And COBOL performance on VAX is comparable to mainframe COBOL. Based on the ANSI 74 standard, it offers full support for: nucleus; sequential, relative and indexed I/O; segmentation; interprogram communication; table-handling; library; and sort/merge capabilities.

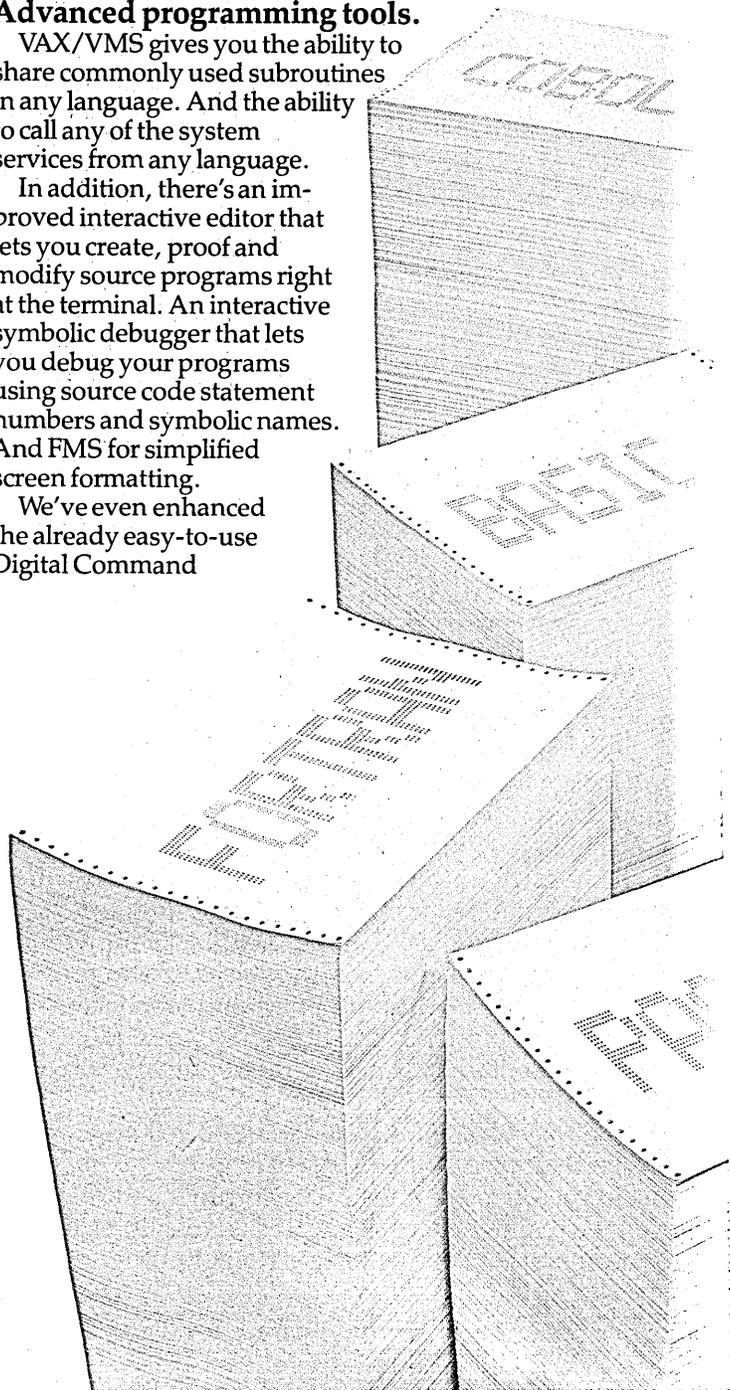
Other VAX languages include PASCAL, BLISS, and CORAL, the British real-time language standard.

But languages are only part of the story. **Advanced programming tools.**

VAX/VMS gives you the ability to share commonly used subroutines in any language. And the ability to call any of the system services from any language.

In addition, there's an improved interactive editor that lets you create, proof and modify source programs right at the terminal. An interactive symbolic debugger that lets you debug your programs using source code statement numbers and symbolic names. And FMS for simplified screen formatting.

We've even enhanced the already easy-to-use Digital Command



Language by providing for user added commands.

Extensive data management.

To help you put all these programming tools to work, VAX/VMS Release II includes a wide range of data management facilities.

RMS, for example, allows you to set up sequential, random or multikey ISAM file structures in any VAX language. And you can use up to 255 keys for each entry.

Then to access RMS files you can use DATA-TRIEVE, a query and report writing utility that's both highly versatile and easy to use.

There's also a new VAX SORT/MERGE utility for easy record formatting.

State-of-the-art communications.

VAX/VMS is more than a powerful system in its own right. It also fits into any network or communications plans you may have.

Using DECnet, you can link VAX into a resource-sharing network with other computers from Digital. This network interface is transparent to programmers, which greatly simplifies your development work.

Then you can use 2780/3780 and MUX200 pro-

ocols to connect VAX to your mainframe system.

In addition, VAX/VMS Release II offers a new Mail utility for interterminal communications, even with a terminal on another CPU through DECnet.

And you can use the new DR780 hardware/software interface, with an unmatched 6Mb/sec throughput, to set up high-speed VAX-to-VAX communications or to support devices like array processors and graphics terminals.

Complete system control.

Best of all, VAX/VMS gives you complete control over system resources.

You can lock part or all of a program into main memory. You can set priorities on 32 different levels—the first 16 for real-time. You can establish disk, memory and processor quotas. You can even control user privileges to the point where it's virtually impossible for a low-level user to interfere with people doing high-level work.

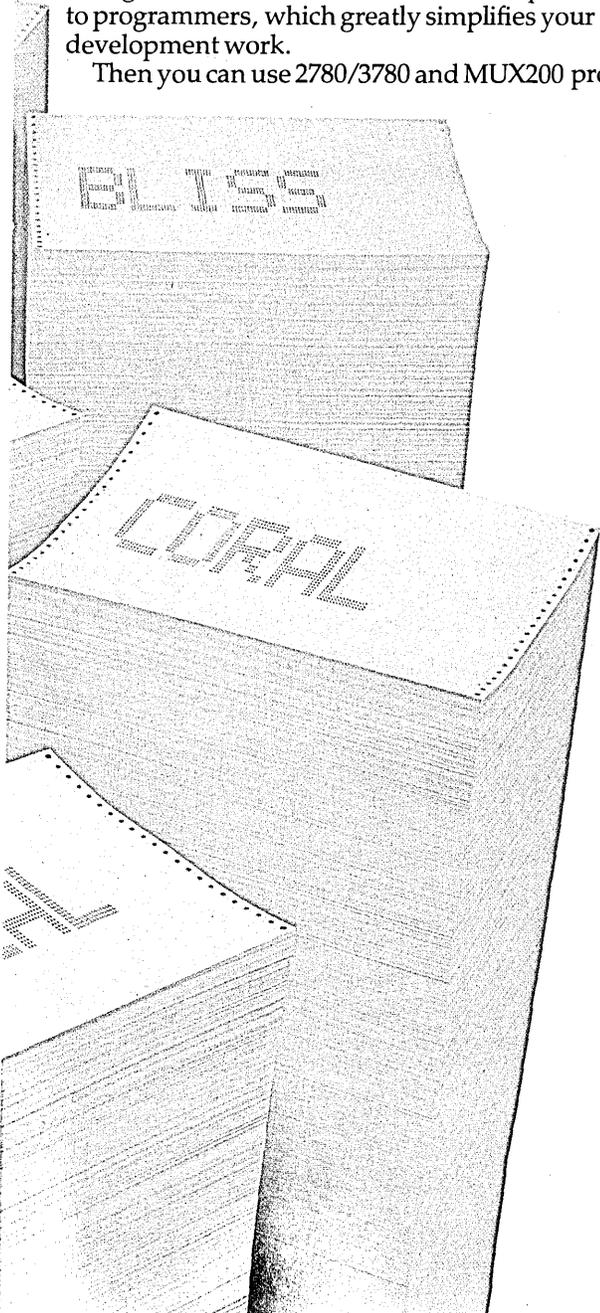
All this control lets you get the best possible performance from VAX/VMS. Regardless of your application or the number of people using the system.

The architecture of the '80s.

VAX/VMS Performance Software is part of a new kind of computer architecture. It combines the large program capacity of mainframes with the interactive access of minicomputers. It's completely integrated with VAX hardware for unprecedented system performance.

And now that Release II is here, all that power becomes available to a lot more people.

Just send the coupon for complete information.



digital VAX II/780

I'd like to know more about the power of VAX/VMS Performance Software.

Please send me your new brochure, "VAX Software: The Measure of Value".

Please have a Sales Representative call.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

My application is _____

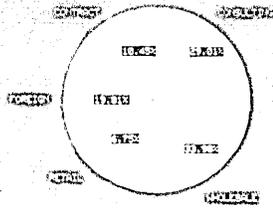
Send to: Digital Equipment Corporation, 146 Main Street, Maynard, MA 01754, Attn: Communication Services, NR-2/2. Tel. (617) 497-6885. Digital Equipment Corporation International, 12 av. des Morgines, 1213 Petit-Lancy, Switzerland. In Canada: Digital Equipment of Canada, Ltd.

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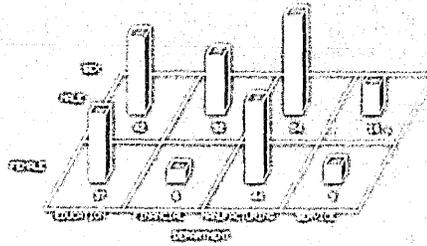
CIRCLE 37 ON READER CARD

digital

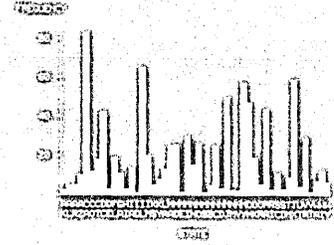
Total Income by Division
1970-1971



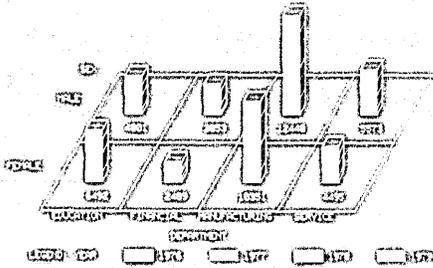
HEALTH PLAN ENROLLMENT
1968-1971



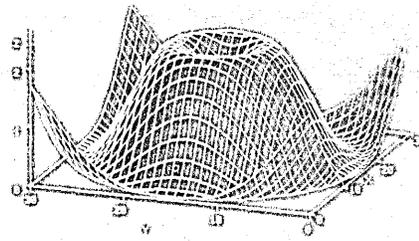
SAS Installations by State
1970



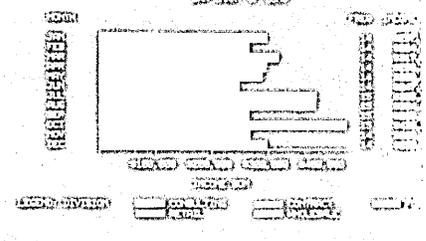
Insurance Benefits Paid



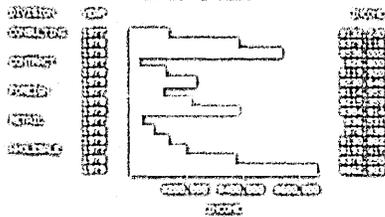
SAS 3-D COLOR GRAPHICS



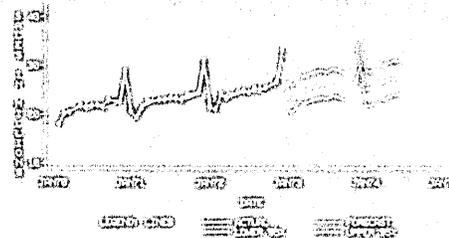
INCOME BY DIVISION



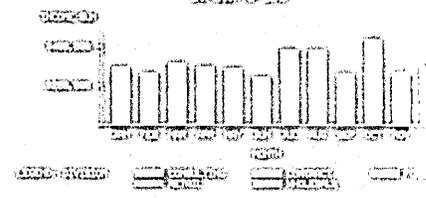
INCOME BY DIVISION
1970-1971



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Designing software to save time is a SAS tradition. And we've packed our years of experience into a new product, SAS/GRAPH.

SAS/GRAPH pioneers a new direction for graphics software.

Old software systems came into being before hardware had much in the way of time-saving features. And because the software had to do most of the work it was designed to be device-independent.

But SAS/GRAPH is device-intelligent. It's designed to use the time-saving features built into most modern hardware.

For example, look at the blue slice of the pie chart above. SAS/GRAPH used one "pie" command to color it. A device-independent system would require hundreds of "move and draw" commands. With SAS/GRAPH you save computer time and drawing time.

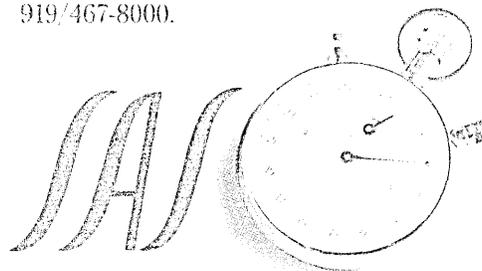
And you'll save user time. Because SAS/GRAPH produces most displays with two or three simple statements.

But best of all SAS/GRAPH is integrated into SAS, so you'll get the benefits of the total SAS system - a system now saving time in report writing, statistical analysis, data management and as a higher-level programming language at more than 1,200 OS, OS/VS and VM/CMS sites.

And you can add SAS (including SAS/GRAPH) to your dp staff for less than half the cost of a new programmer.

Call or write today. We'll provide more information on a very graphic time-saver.

SAS Institute Inc., PO Box 8000, Cary, NC 27511.
919/467-8000.



EDITOR'S READOUT

STIRRING DATACOM STEW

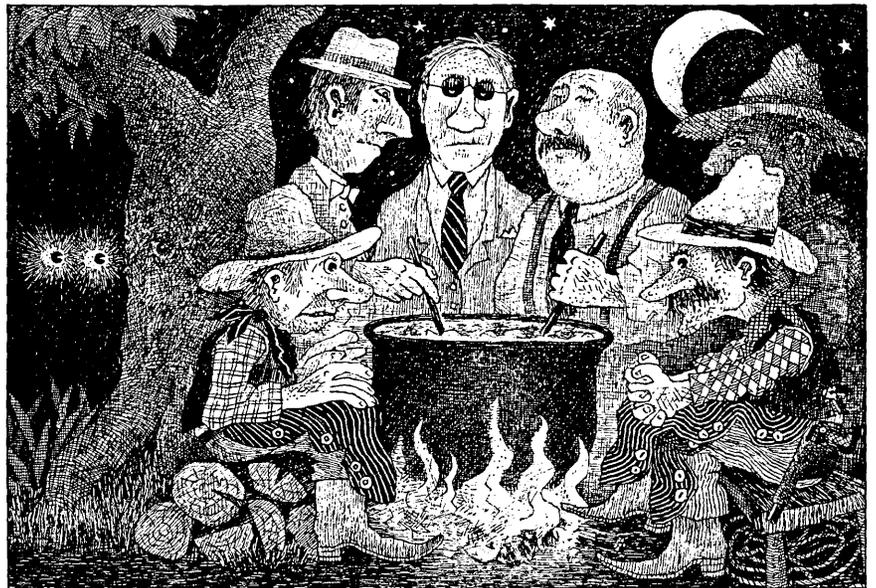
Picture the scene: hunkered around the campfire are an odd assortment of buckaroos wearing pinstriped chaps and wing-tip boots. They're looking hungrily at a large vat of bubbling competitive stew, made up of succulent chunks of unregulated data communications marketplace. Stirring the pot are several congressmen and the FCC. So intent are they on the anticipated meal that they fail to notice they're being watched by scores of eyes, glowing like red coals from the surrounding darkness. Who are these creatures of the night? Read on.

But first, before continuing this rather overdrawn image, let us recommend to you two articles in this issue which shed some light on the FCC's so-called Final Decision in Computer Inquiry II. Naturally these articles show some bias. One is by Archie McGill, the aggressive vice president of business marketing for AT&T; the other is by John Eger, an attorney, a contributing editor to *DATAMATION*, and the former director of the White House Office of Telecommunications Policy.

As they present their respective points of view, both help to clarify some of the knotty problems created by the FCC's bold move. But they also emphasize that we are at the beginnings of a new era in the development of computers and communications and the marketplace for information-based goods and services.

All this sounds very positive. With one stroke the FCC has done away with the tortuous attempts to define the nonexistent—the illusory boundary between data processing and communications. And they have fostered open competition, a move which delights the hearts of all good capitalists everywhere.

In theory all this will benefit you, the user of computers and communications



gear. You will see new and innovative products, you will be wooed and cajoled by the many new vendors fighting for a niche in this new, boisterously competitive environment, and Ma Bell, once cumbersome and glacially slow to change, will become as nimble and innovative as a ballet dancer.

Sounds great. But, as the articles point out, there are problems, and problems mean delay. Any long-range planning that includes these potential goods and services should be done with care.

The delays, which may run into years, have to do with the potentially endless litigation growing out of muddled jurisdictions, power struggles, and disagreements over what maximum separation really is.

For example, there are those who contend that the FCC has abrogated its responsibility as a regulatory agency by the sweeping laissez faire nature of the decision, thereby throwing the burden of policing the marketplace on the courts and Congress. Others disagree. They claim that the FCC has to move swiftly to consolidate its own power. After all, they reason, if the FCC has the power to decide who not to regulate, they also retain the power to decide who shall be regulated.

AT&T of course, would love to have all this fall into the hands of Congress, which would be much more sympathetic, although less able to understand the intricacies of the situation.

How do you keep "Baby Bellephant" from squashing its competitors? How do you insure maximum separation? Do you treat the unregulated spin-offs from Bell, GT&E, and other regulated monopolies differently from private entries into the field? And what do you do with Bell Labs, and what about the Justice Department suit?

The questions are many, the issues are complex, and the outcome is bound to be clouded no matter what Congress, the FCC, or the courts do.

But there is one certainty. One segment of our society will be kept extraordinarily busy by these gyrations, and its members will make potfuls of money.

You'll recall those red eyes glimmering in the dark, hungrily watching that little fireside tableau we painted at the beginning of this essay. Now you know who they are.

The lawyers, of course. After all, when all is said and done, it's not whether you win or lose that counts, it's the size of your fee. *

TANDEM NonStop™ PATHWAY NOW ON-LINE'S AS EASY TO PROGRAM

On-Line Programming—25 to 50% cheaper. User developed on-line applications packages just got a whole lot easier. And better. Not to mention 25 to 50% cheaper. We've eliminated all the time-consuming grief of dealing with terminal handling characteristics for one. And not incidentally, there's even greater protection in data base integrity, too.

PATHWAY has all the programs, procedures and structures you need to get your applications up and running, in NonStop™ operation, in record time. Inexpensively.

Terminal Independent Applications.

By taking the on-line programming task on in component parts rather than attacking it as an all-encompassing, monolithic whole, PATHWAY software makes the transaction processing system job relatively simple, and frees the application programmer from concern over terminal characteristics.

PATHWAY handles four of the critical operations in transaction processing applications as modular, inter-connectable elements: Terminal Interface handles multi-terminal I/O; Field Validation performs

data consistency checks; Data Mapping controls data conversion and formatting; and Transaction Control covers application and transaction flow. Each resource is partitioned, with well-defined interfaces between them. This is the secret to a modular systems' success. It allows optimized utilization of all the resources and permits additional resources to be dovetailed into the system as needed—without rewrite, without redesign and without degrading system performance.

We Speak Your Language. When it's time for the fifth operation—interaction with the data base—a Data Base Application Program can communicate in any of the languages available on the Tandem NonStop™ System: industry standard COBOL, FORTRAN, MUMPS, or our own transaction-oriented language, TAL, all facilitated by Tandem ENSCRIBE to interact with the Data Base management capabilities.

The Things You Can Forget. The PATHWAY Transaction Processing System capabilities include an Interactive Screen Builder which builds the screens interactively at a terminal, independent of the application

program which serves it; a Screen COBOL Pseudo Code Compiler; a Terminal Control

Program to interpret the pseudo code library and

PATHWAY
TERMINAL
INTERFACE

PATHWAY
FIELD
VALIDATION



AS BATCH.

check the flow and content internally; the Applications Monitor which has power to create, track and alter the application run time environment; and finally the Application Monitor Control Language which lets an operator communicate with an active Application Monitor. It's a powerful system, easy to use and inexpensive. With everything you need to get your on-line transaction applications up and running, with all the benefits of a NonStop™ System, in record time.

Dynamic Load Balancing. It comes from taking logical advantage of the multi-processor environment. There is no need for the programmer to consider load balancing with the PATHWAY Transaction Processing System. It's handled automatically; with additional copies of PATHWAY applications started in designated CPUs as needed. And deleted when no longer required. Dynamic load balancing—built into the system's resource management capabilities.

And PATHWAY software also takes full advantage of the unique multi-page storage capabilities built into our new 6520 terminal.

Because terminal mapping translates physical into logical characteristics, programmers can forget about code signal conversions and call on terminals by name. And there's one more major advantage of the PATHWAY Transaction Processing System: one

PATHWAY DATA MAPPING

PATHWAY TRANS- ACTION CONTROL

RECORD IN RECORD OUT DATA BASE SERVICE

For Complete Information. Call or write for a demonstration of our unique capabilities, and for the name and address of your local Tandem sales and service representatives, domestic and international.

The data base and programs in operation can be readily duplicated, hence completely protected from damage or destruction.



system can be used for convenient development, testing and production of application packages.

The Tandem NonStop™ System. Even when it wasn't this easy, it was miles ahead in the on-line world. With immediately available alternatives in all hardware and software elements, the NonStop™ System can go right around any failed element and never skip a beat. Even when a failure occurs in a processor, an I/O Channel, a disc, or a disc controller. Remarkable.

This is the one system in the world which lets you start with only the computing power you need right now and add as your needs grow, in low cost modular elements. From an entry level two processor system, you can go to sixteen processors with thousands of terminals and not lose one cent on your original investment.

Protection From Loss. Because of its unique parallel operation at all critical points, no transaction in process is ever lost or duplicated.

TANDEM

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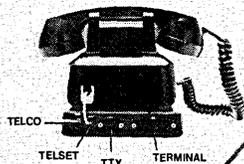
CIRCLE 39 ON READER CARD

Retired!

Universal Data Systems' recent conquest of line-powered modem technology is putting a lot of AC power cords out to pasture. New UDS innovations are leading to more and more modem types which take operating power directly from the telephone line; AC connections are completely eliminated.

Each of these new modems has the same surface area as your telephone handset, and fits directly under that instrument. And, since each is FCC certified for direct connection to the DDD network, hook-up is accomplished in seconds, via three snap-in connectors.

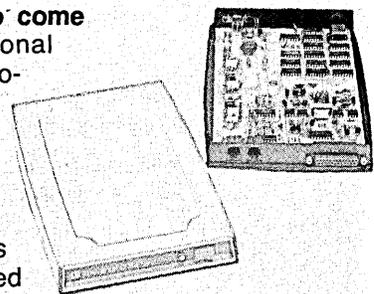
Our first entry in the line-powered sweepstakes was the 103 LP, a \$195 model introduced in January, 1980. It's a 0-300 bps, asynchronous, full-duplex originate-only unit. It includes both RS-232C and current loop (TTY) interfaces.



Next was a 202 LP, announced in May and providing 0-1200 bps, asynchronous, half-duplex communication over the DDD network. It's priced at \$295, complete with an integral RS-232C interface.

Things to come include additional line-powered modems scheduled for August and December of 1980. Others are expected in early '81.

To find out what's happening in line-powered modems, contact the only people who are making it happen. Call your UDS Regional Office or contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Phone 205/837-8100.



"Confidence in Communications"

Universal Data Systems

DISTRICT OFFICES: Summit, NJ, 201/522-0025 • Blue Bell, PA, 215/643-2336 • Atlanta, 404/952-3463 • Chicago, 312/441-7450 • Dallas, 214/385-0426 • Santa Ana, 714/972-4619 • Sunnyvale, 408/738-0433 • Boston, 617/875-8868.

CIRCLE 40 ON READER CARD

Created by Dayner/Hall, Inc., Winter Park, Florida



Member
IDCMA

COMPUTER GRAPHICS— SEEING IS BELIEVING

There is growing recognition that computer graphics is an ideal information medium.

Visual information has a powerful impact. Computer graphics channels this power into a wide range of application areas, turning dry data into dynamic visuals that are easy to access and grasp. It's this dynamic potential that data processing vendors and users alike are anxious to exploit and explore.

Computer graphics capabilities have been around as long as computers, but were originally only tapped for applications that absolutely required visual representation. The first of these, in the late '50s, came out of the military's computer graphics experiments in command and control. By the early '60s, inroads into graphics software had been made. General Motors had launched its Design Augmented by Computer, DAC/1, which fueled GM's present computer-aided design (CAD) effort. The display used in DAC/1 became the 2250 graphics console introduced with the IBM 360 in 1964.

The '60s also saw the aerospace industry pioneering with its design simulation work, which contributed significantly to the evolution of computer graphics. It also laid the groundwork for the development of computer animation, today an exciting field in itself. By the late '60s the CAD field was successfully exploiting computer graphics.

That certainly wasn't true of the rest of the world, which still viewed computer graphics as a complicated and expensive output device. The advent of color graphics didn't help the field's reputation much either. Even today, color graphics is thought of by some as an unnecessary extravagance.

Color graphics was made possible by the rebirth of raster scan systems. The industry had almost given up on the technology a decade ago because of the

The ability of raster scan to provide full color is seen by many as further evidence of the technology's inevitable dominance.

difficulty in accessing adequate memory quickly enough to provide decent resolution at an acceptable price. But then in 1971 Tektronix captured the market with its revolutionary storage



tube. The Tektronix 4010 sold for \$4,000—about one-third the cost of any display available at that time. This widened the market tremendously, and other new displays began to appear.

Meanwhile, Silicon Valley had begun to address the cost and memory problems associated with raster displays. As more and more intelligence was possible in the terminal and at the screen, vendors started to home back in on the technology they had earlier all but dismissed. In the past few years, even the CAD and computer-aided manufacturing (CAM) suppliers have started going the raster route.

The ability of raster scan to provide full color, which no other display medium offers, is seen by many as further evidence of the technology's inevitable dominance. The demand for color is clearly there. It's particularly well-suited for increasingly complex applications, such as integrated circuit design. It's also gaining ground in a whole range of more conventional applications. Major manufacturers, such

as IBM and Digital Equipment Corp., see this market potential and have hurried to unveil color products.

With the proliferation of applications, the distinctions between graphics markets have begun to blur. The consumer market, for example, is now included in assessments of the overall industry, which is currently pegged at over \$2 billion. As in the dp industry, the fastest growing market segment is business. Suppliers of software and services are particularly well placed to take advantage of this business graphics boom.

One of the most exciting new business markets is color slide making. While most graphics devices with special camera attachments can produce color slides, this strategy limits the resolution to that of the crt. Images with no trace of crt scan lines, however, can be created on the latest generation of high resolution slide systems available from such vendors as ISSCO, T-Co. (formerly part of Three Rivers), Xerox, Dicomed, and General Electric's Genigraphics operation.

IN FOCUS

The recent surge in slide making reflects one of the most pervasive business demands—the need for presentation graphics. Despite all the fanfare about computer graphics for management information, the tie between information processing and information presentation is not a simple one. While systems aimed directly at the executive are becoming available, the risk of data base management problems is causing most vendors to tread lightly. Experts in the field stress that graphics systems for decision support require a serious commitment from both dpers and company execs. The plunge, they warn, could entail an investment of \$2 million or more. Nevertheless, there is growing recognition that computer graphics is an ideal information medium—a medium that is likely to play a big part in the latest dp push into distributed processing and the office.

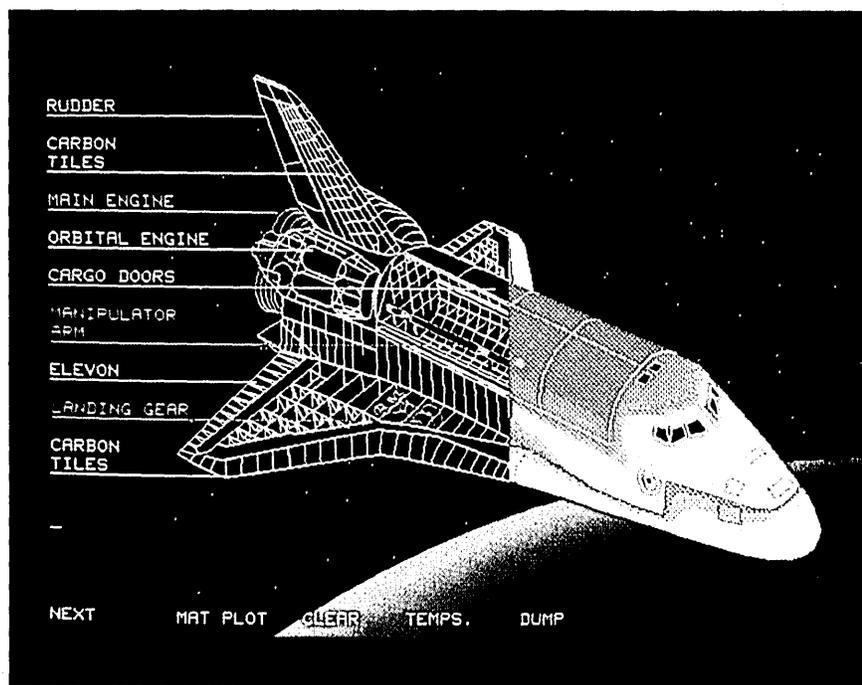
THE MAP IS THE MESSAGE

Maps can provide a wealth of information because they are such a familiar visual medium. They also satisfy a wide range of geographically oriented information needs. In business, for example, they can be used to pinpoint prospects.

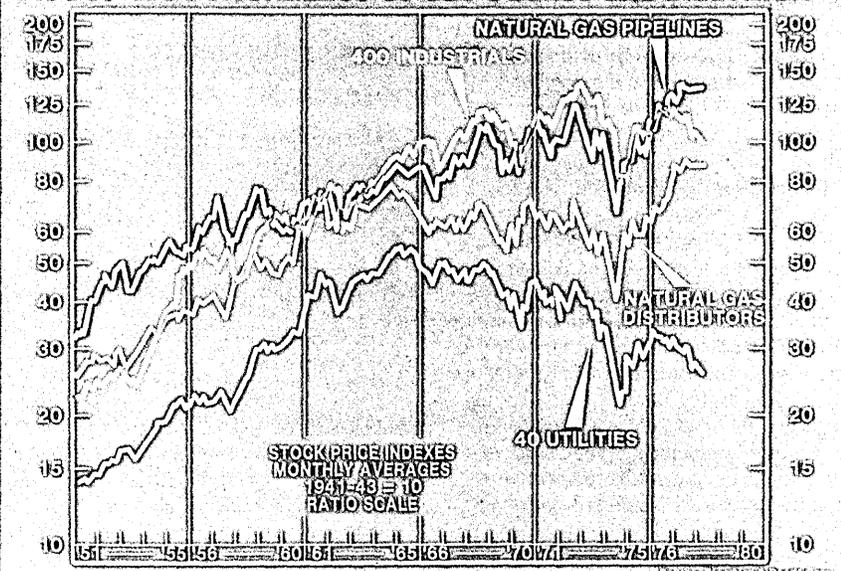
At Harvard's Lab for Computer Graphics and Spatial Analysis they've been researching mapping graphics and cartographic data structures for 15 years. Out of that effort has come Odyssey, a comprehensive software product that gives users the ability to create geographic data bases from statistical information.

The software wizards behind Odyssey have also contributed to the development of an interactive geographic system designed to handle decision-making chores of more than 20 federal agencies. Dubbed the Domestic Information Display System, DIDS was created on the Atmospheric and Oceanographic Information Processing System at NASA's Goddard Space Flight Center. It has recently been successfully transferred to a VAX 11-780 and will soon be implemented on a minicomputer, probably a PDP-11/23.

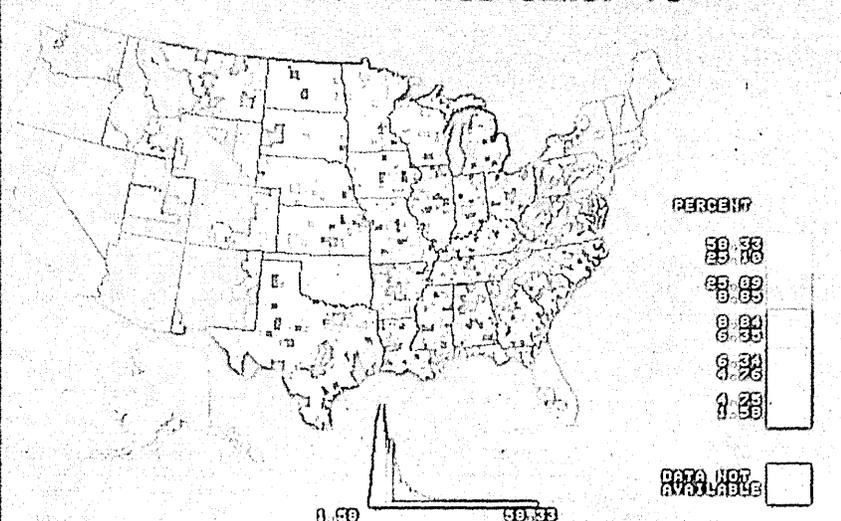
When the system has been refined it will leave its R&D home at NASA Goddard and take up permanent residence at the Department of Commerce. The University of South Carolina is also testing a standalone version that could double as a node in a future DIDS-based federal information network. The setup would enable nationwide access to a central information resource without centralizing the actual data base.

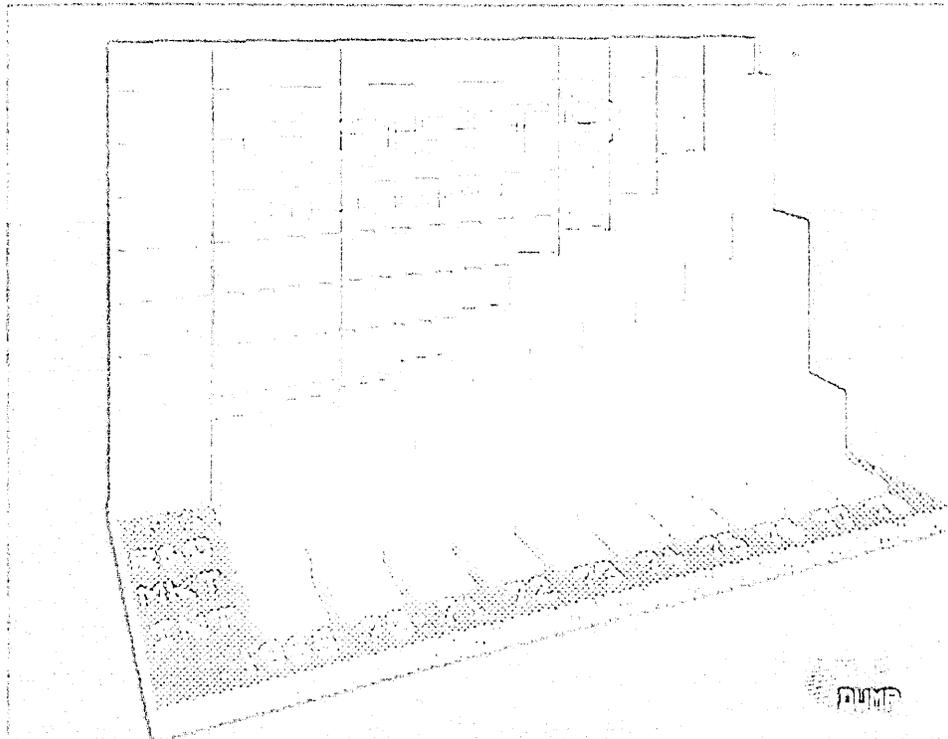
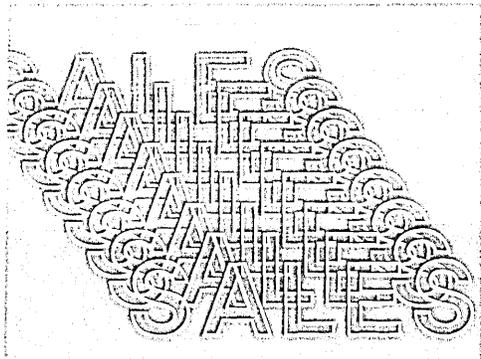
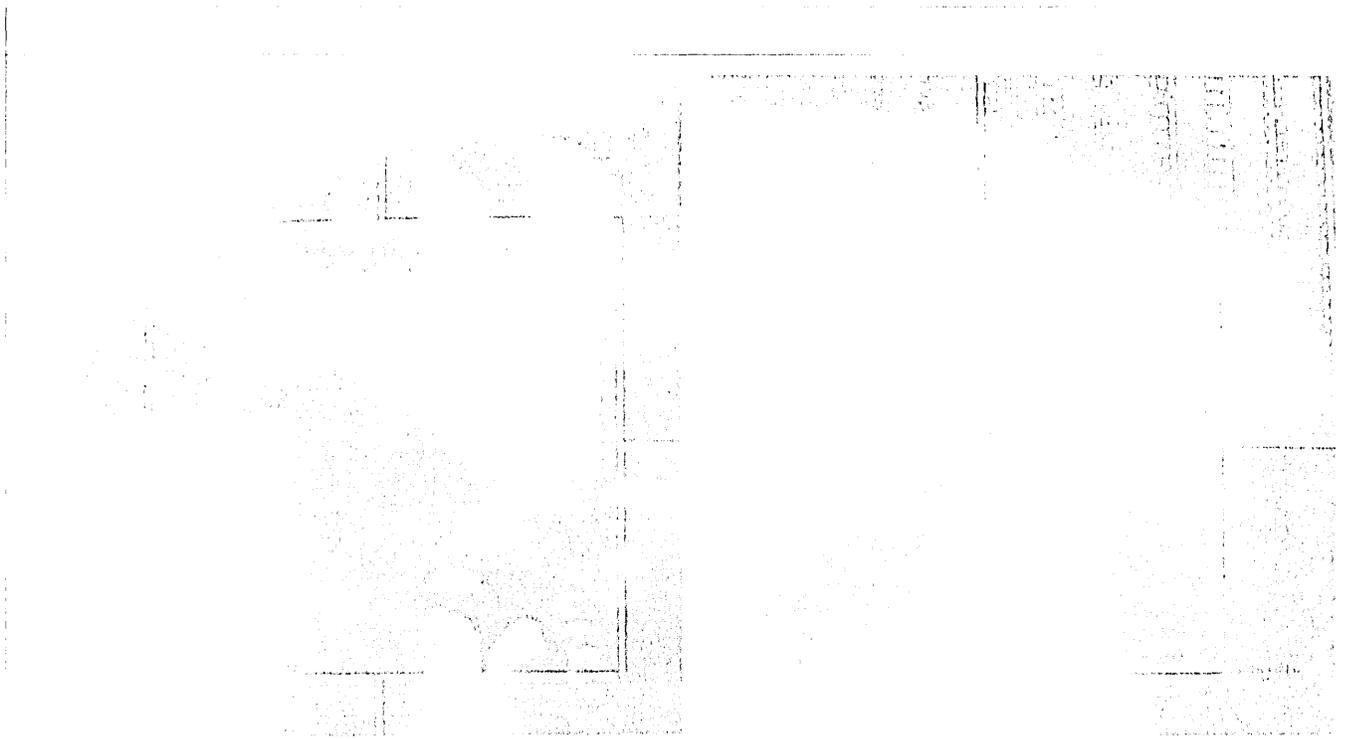


Stock Price Performance of Gas Utilities and Industrials



IMPORT CARS AS % PASS CARS, '76





OPPOSITE PAGE

Top: This diagram of the space shuttle was created on the Hewlett-Packard 45C desktop computer. The colorful illustration on the preceding page was also produced by the HP45C from a scientific display.

Middle: A typical business presentation slide from the NSF (National Science Foundation) 1005 video presentation of the ongoing system.

Bottom: A sample map from DIDS, the Domestic Information Display

System for decision-making jointly developed by NASA and the Census Bureau.

THIS PAGE

Top: A real butterfly was photographed, digitized, and randomly manipulated by an experimental system at MIT's Vision Laboratory as part of a project to build a three-dimensional computer model. The system produced a 3-D plot of the output by means of a high-point plotting or plotter.

Center left: An effect from Shiner, Inc. The high-resolution graphics from I Co.

Bottom left: The graphics created on the Aphas system by an artist with no do experience.

Bottom right: An example of the plotter output from the system at MIT's Vision Laboratory.

IN FOCUS

DAY-TRIP THROUGH ASPEN

MIT's Architecture Machine Group doesn't work on architecture machines. Instead, the group's full-time research efforts are aimed at coming up with the most user-friendly system around; the Spatial Data Management System is for "generals, executives, and six-year-old children," as group head Professor Nicholas Negroponte is fond of saying.

Everything is visual. The "media room" where the system is demonstrated is empty except for an easy chair flanked by two touch-sensitive color monitors. A huge rear-projected color tv screen covers one whole wall. Facing this wall from the chair, a user can access, through cursor or voice command, "data land," the monitor that holds tiny pictures of the system's contents. The other monitor holds the appropriate "key map" to the chosen item.

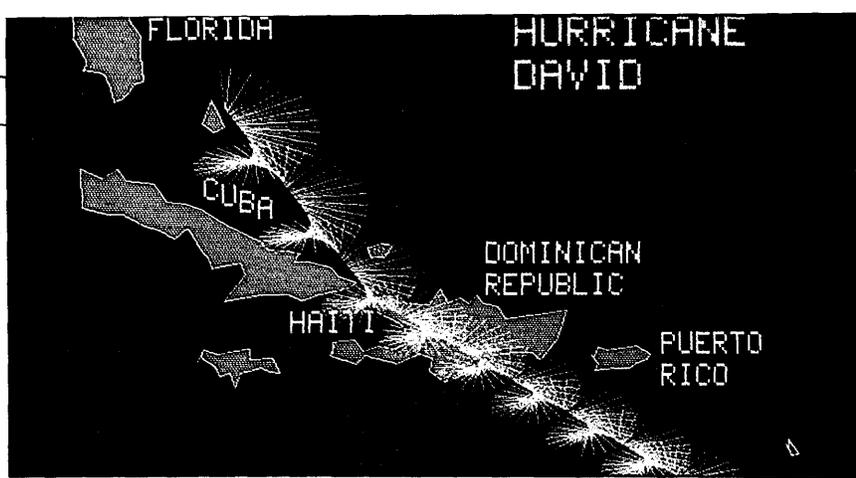
Complex in design, the system is nevertheless very easy to use. If, for example, a user chooses a book, then its table of contents appears on the key map. After the desired chapter is indicated, its front page immediately appears. Then the user can scan the reading matter at leisure, using vertical and horizontal controls. At the end of the page, a gray image sweeps across the screen, creating the illusion that the page is turning.

The user can take a closer look at pictorial information using another fingertip control. The image becomes noticeably clearer with each zoom, by accessing multiple images stored on disk. The system includes three processors and three frame buffer image memories, one for each screen in the media room. It is supported by six Interdata minis linked

For a project called "surrogate travel," the entire town of Aspen was filmed in a sequence of frames and then transferred to videodisk.

by the group's own Magic 6 operating system, said to be similar to Multics.

The experimental system also includes computer-controlled videodisk equipment. For a project called "surrogate travel," the entire town of Aspen was filmed in a sequence of frames and then transferred to videodisk. The surrogate Aspen has been programmed to respond to left or right turn signals entered by touching left or right arrows. You can also stop at any point and touch, for example, a building to call up information about it onto the screen. The finished experiment should enable the user to zoom in on Colorado, cruise through Aspen at a good clip, and take in the sights along the way.



Above: Xiphias tv graphics. The green swirl moves. Below: Mac Perez, KNXT Los Angeles weatherman, instructs a Xiphias designer.

VISIONS OF A VIDEO WORLD

Some of the most eye-opening work in computer graphics these days is being done for the entertainment industry. Computer animation and computer-controlled images, which are used by the special effects houses that brought us the space movie, are also in great demand in the television advertising world. Now a young California company is bringing computer graphics to the tv industry on a more serious basis.

"We are in the information business," declares Xiphias Corp.'s Peter Black, who feels his firm has a lot more to offer the tv industry than visual props. He explains why: "Our primary resource for daily information is tv news, which is very good at covering events. But what about the social trends and economic processes underlying those events? How, for example, do we trace the trail of actions that have led to the failure of the auto industry? These types of questions," he insists, "cannot be answered by a [tv] camera."

Maybe computer graphics is the answer. Black thinks so. "The ability of computer graphics to compress complex statistics, processes, and trends," he maintains, "can be a forceful solution to

the dilemma of tv news."

Another new computer graphics company aimed at tv is doing even more sophisticated pseudo animation. Aurora Imaging Systems, founded by Richard Shoup, formerly of Xerox Palo Alto Research Center, will provide color videographics not only for broadcast tv but for industrial closed circuit applications, such as company presentations and training. "There is a merging and synergy of computer technology and video technology," says Shoup.

Television already uses some digital technology, and is moving rapidly to all-digital storage, processing, and transmission of images. At the same time, many raster scan computer terminals, which are essentially video, are providing NTSC options (NTSC is the tv encoding and decoding standard in the U.S. and Japan). "Long distance broadband communications costs are also coming down, and will easily compete with other media," predicts Shoup, who believes office systems of the future, including intraoffice systems, will be video-based. "Video," he vows, "is surely the dominant medium of the future."

—Sarah Rolph

SYSTEM 132-70

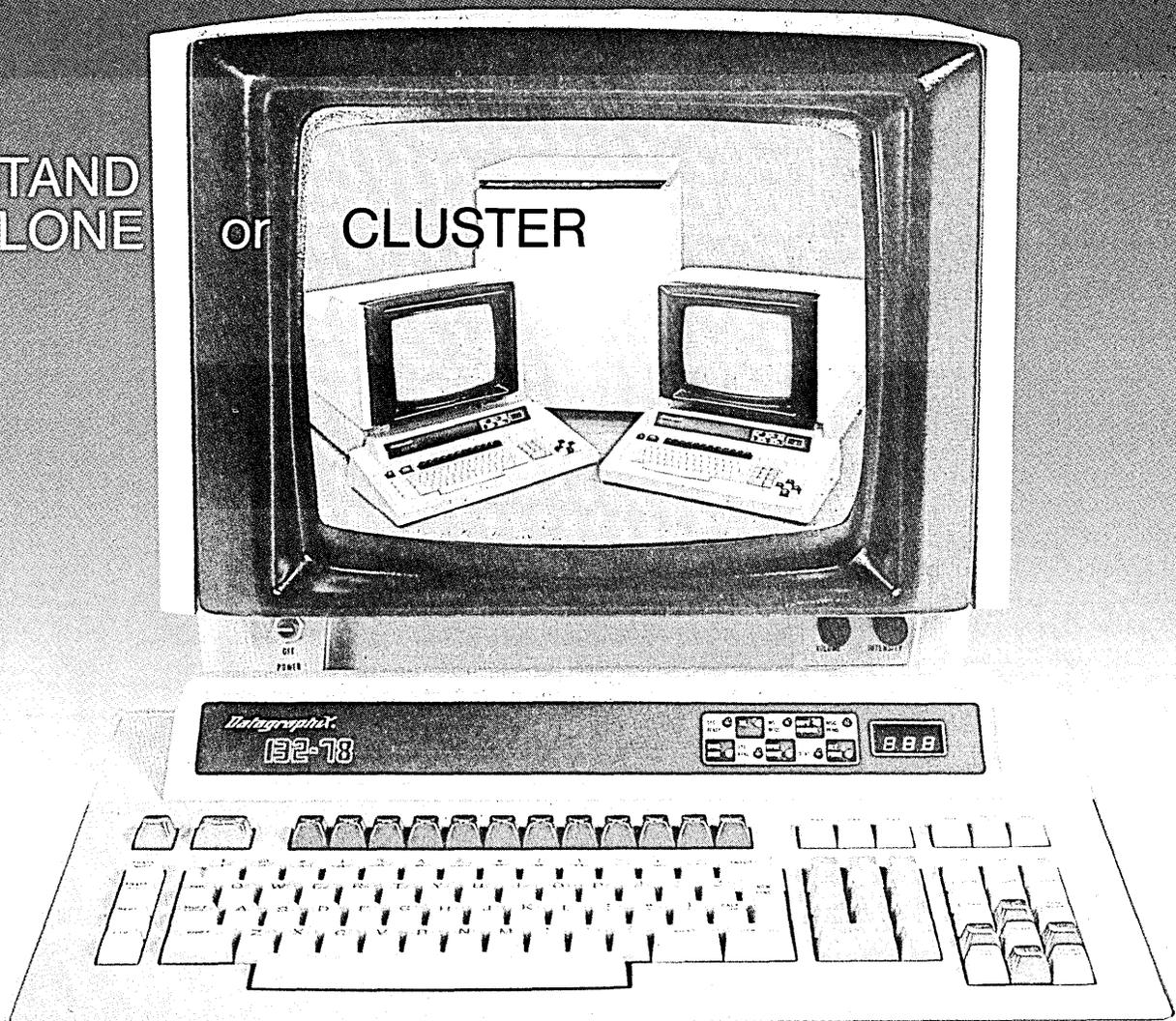
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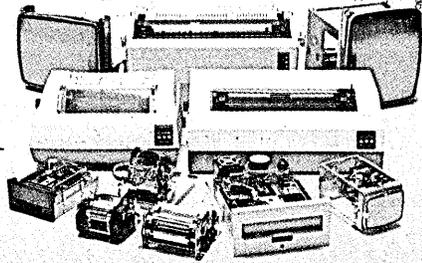
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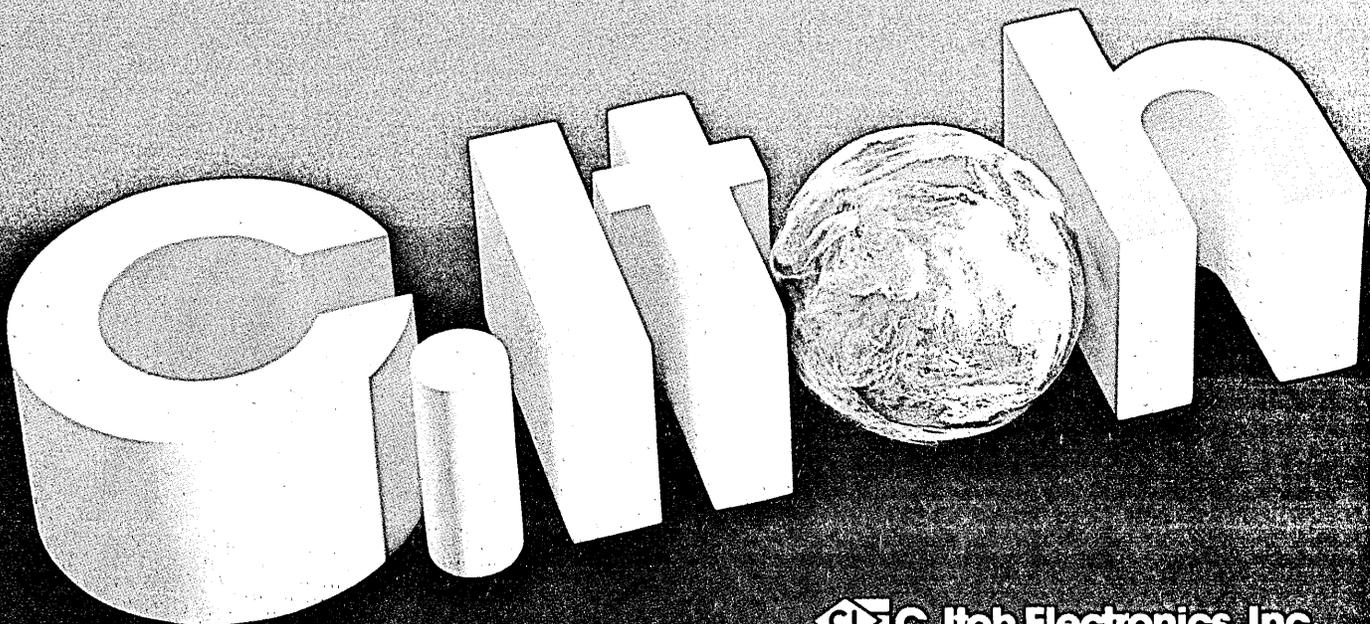
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CIRCLE 62 ON READER CARD

LOOK AHEAD

LIBERATING EUROPEANS

(continued from page 14)
its PERC system. And still in R&D stages is the entry from Zenith Data Systems (formerly Heath). Both products will feature limited graphics capabilities, and both are expected to be priced in the \$20,000 range.

Europeans are moving forward to ensure user independence from vendor datacom protocols. The West German government has followed the French lead in funding national projects to create "open" rather than "closed" networks. By standardizing interfaces and protocols, European nets would evade vendor-based restrictions on data flow. Earlier French efforts pushed IBM and others into offering X.25-compatible systems; the French are now funding open point-of-sale networks.

A TOUCH OF CLASS

A new "executive workstation," an intelligent color graphics display with retractable screen in a sleek wooden desk, will be marketed this fall by Simons Office Systems of New York. Designed by Intelligence Interlink Corp. of N.Y., the micro-based system has a menu-driven touch screen that will create visuals from stored formats.

BPO, FRENCH PTT FIGHT IT OUT

The battle between the British Post Office and the French PTT continues. Under threat of not getting a line to demonstrate Teletel (the French Prestel) at a U.K. show last spring, the French yielded to U.K. demands to be allowed to demonstrate Prestel in France. But the only live installations in Paris at the moment are at the OECD and the British Embassy. And, based on international agreements, neither of these sites is strictly on French territory.

RUMORS AND RAW RANDOM DATA

MCI is not the only company that will benefit from the recent court decision in its suit with AT&T. The law firm of Jenner & Block in Chicago, which represented MCI at the trial, will take home a hefty \$93 million if the verdict is upheld...The opening of Hewlett-Packard's second European software development center signals a big move by the U.S. company towards tailoring software especially for European nations...The new U.K. center follows a German operation that has been running for some time...The Charles Babbage Institute, a nonprofit foundation promoting research on the history of computers, will settle into its permanent home on the Univ. of Minnesota campus next month -- with or without its executive secretary, Paul Armer. Armer was still undecided last month about his own moving plans.

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CIRCLE 43 ON READER CARD

NEWS IN PERSPECTIVE

PERIPHERALS

ONLY THE STRONG SURVIVE

It takes a lot more than stamina to succeed in the plug-compatible peripherals business.

At a time when IBM plug-compatible main-frame manufacturers are growing in number, it has become possible to count on one hand the vendors of IBM look-alike peripheral equipment. For a number of reasons, not the least of which are IBM's actions in the marketplace, competitors have dropped by the wayside, some of them never to be heard from again.

Of the companies that at one time or another were suppliers of IBM plug-compatible tape and disk drives, those that come readily to mind include Ampex, Bryant, Bucode (which was acquired by Mohawk, which continued for a while as a supplier), Calcomp, Information Storage Systems (ISS), Intercomp, Marshall, Peripherals General, Potter, Singer, Telex (which pioneered this market back in the 1960s), Texas Instruments, Tracor, and Varian.

If Telex was the first to sell IBM-compatible tape drives, then Memorex was the first with disk drives. The business peaked in about 1971-72 "with something like 18 to 20 companies supplying disks and tapes," says John Navas, manager of corporate strategic planning at Memorex Corp. He looks around and observes those remaining — Storage Technology, Control Data, and Memorex — and says, "So you could say that by the most generous measure there are only three guys left."

Of course, there have been startups of many disk drive makers in recent years, but they've entered the oem business created by the minicomputer, the small business systems market, word processing, and such. No longer is anyone entering the PCM business, which has become a mature industry where things are much more predictable, where margins are probably not as high, and where "the risks are as high as ever," notes James N. Porter, consultant and author of the annual *Disk / Trend Report*.

The PCM disk drive business is very cyclical, for it is tied to IBM's product announcement and product retirement cycles. Most of these drives have a four to five year active product life; previous key announcements were the 3330 in 1971 and the 3350 in 1975, notes Porter. And that means this year's announcement of the 3380 spells the

imminent end of new shipments of the 3350 by IBM. For the PCMs, it means a foreseeable end to their production of look-alike 3350s before they must begin making their versions of the 3380.

Even that, however, must await IBM's first shipment of a 3380, for the company does not release any detailed specs until that time. The competitor must then acquire a machine, dissect it, see what makes it tick, and then complete its own product development. In the case of the 3380, IBM has scheduled first shipment in the first quarter of 1981. And, says Porter, the PCMs typically take about 18 months after IBM's first shipment to get their first production models into users' hands. This means IBM has an 18-month jump on the PCMs. Until that time, the PCMs must produce and install as many of their 3350s as possible.

"If, and let's underline the if, IBM is successful in ramping up production rapidly on the 3380, it should have a major impact on the installations of 3350s into their 303X systems customer base," explains Porter. Such a user, needing more capacity and able to get early delivery of a 3380 from IBM, would not likely take a 3350-equivalent from a PCM. Further, the user is likely to purchase the 3380, not lease it, because it is early in the product life cycle and that pro-

The PCMs typically take about 18 months after IBM's first shipment to get the first production models out.

vides from four to five years of useful life. On the other hand, if the added capacity is urgently needed and a new 3380 is not available, the user will likely take a PCM's 3350 on a short-term lease while also having a 3380 on order with IBM.

"So life is going to be rather difficult, I think, for the next few years for the plug-compatible disk drive manufacturers," says Porter. But that's the norm for the PCM business. In addition, IBM uses the Count, Key, Data recording format on the new drives and makes them attachable to old mainframes back to the 370/158. This "means that they are seriously going to impact the market that otherwise would have been available in the next few years to PCM 3350s and double-density 3350s," he adds.

Does that mean the demise of the PCM business? Not at all. "I think the overall [plug-compatible] business is fine and is trending higher," says Eugene K. Collins, analyst with Evans & Co. in New York. He, too, notes that the disk business is at the tail end of a major product cycle, so this business for the next 12 to 18 months will be going through a trough in the cyclical pattern. "And in that sense, business is heading downhill." But he doesn't feel that the PCM business, per se, is going downhill.

Trending down also is the IBM add-



IBM'S 3380: For the PCMs, it means a foreseeable end to their production of look-alike 3350s.

on memory systems business. Shipments in the first half of 1980 by independents are thought to have been about the same as in the first six months of 1979, as expressed in megabytes, not dollars. But installations in 1979 were probably about 20% higher than in 1978, says Lee Jensen, marketing vice president for Intersil's Systems Div. in Sunnyvale, Calif. Of course, while megabytes were up, revenues for the suppliers are down. Intersil supplies systems to Storage Technology Corp., Control Data Corp., and Memorex, among others.

This business by independents has lost both charm and profits, thanks to IBM having lowered its price to \$50,000 for an incremental megabyte—down to \$15,000 on its 4300 series processors.

The IBM add-on memory systems business is trending down also.

One supplier, Cambridge Memories Inc., which relies primarily on Japanese producers for its memory chips, has switched to add-in memories for IBM computers where the boards go directly into the backplane of the mainframe, and is selling a megabyte for the 370/158, 168, and the 303X computers for \$25,000. Adds a spokesman for the Massachusetts company, the user also benefits from add-in memory, as distinguished from add-on memory, by saving floor space, power, and air conditioning.

The add-on memory systems business, like the disk drive business, depends on product life cycles. For almost 10 years, it has been riding the coattails of the 370s

and the 303X mainframes. But its future now is tied closely to the long-anticipated H Series processors.

"The memory business as we know it today is, in my opinion, in a downturn," says Jensen. "And it's in a downturn because nobody knows what the H is." But whether the add-on systems business remains a viable one will depend on the new IBM family and the pricing on memory for it.

A major supplier of IBM add-on memories at one time, Memorex has phased out of it in the domestic marketplace, although it continues to support its lease base. The company saw that its suppliers, the semiconductor companies, were increasingly integrating forward and becoming vendors to the end-user community and that that would make it particularly tough on the middleman. "That's probably the most important consideration" in getting out of that business, says Memorex planner Navas. In addition, IBM with its price cuts was becoming more competitive and Memorex "saw the risk associated with the business increasing sharply."

But, says Navas, "I think the tape drive business is definitely viable." The company, he admits, has made no commitment to engineer and manufacture its own units, choosing instead to sell on an oem basis those drives made in Japan by Fujitsu Ltd. He explains that in the early days when a Memorex disk user inquired about tape drives, he was referred to Storage Technology.

But, STC since that time has become a supplier of both tapes and disks, and this led Memorex to feel that it, too, had to be-

come a source for both types of storage devices. Sources outside Memorex have nothing but praise for the quality of the Fujitsu drives, as they also have for the STC drives—the business that got STC started.

Why has there been such a large number of casualties in the PCM business? The major factors, of course, must include the competitive maneuverings of IBM. As one observer says, "IBM will, and properly so, take steps to provide a better market for itself. That's what competition is all about." And that, too, is what all the anti-trust litigation is about, those cases where IBM finds itself the defendant—and where IBM, time after time, has been able to say that it has been vindicated by the courts. But the plaintiffs in these cases have repeatedly said that they were crippled financially, have had to carry enormous financial debts in attempts to carve a niche for themselves, weren't able to make any money, and couldn't raise any money with which to finance their ventures.

In addition, some of the companies just weren't viable, the victims of poor business methods, or a lack of technical or manufacturing skills, or a lousy economy or all three. Plus, there have been business consolidations, where successful independents have been grabbed up by a third party. The acquisition of ISS by Sperry Univac is a prime example. The unsuccessful attempts to merge first Memorex and then STC with Amdahl Corp. also fall into this category.

Why so many casualties in the PCM business?

"It's gotten to be a pretty tough business," says Memorex's Navas, who explains that it no longer is a business that can be conducted from a garage. Disk drives, for example, are now writing at 1,000 tracks per inch and up, linearly at 12,000 bits per inch and up, and lots of precision is required in the mechanical and electronic systems. (In the world of tape drives, Jim Porter reports rumors of an 18-track, half-inch drive.)

What, then, does it take to survive in this business? Uppermost, perhaps, is adequate financial staying power, the ability to pay for the technical (research and development) resources, and to finance the lease base that an uncertain customer base will foist onto you. Second is flexibility ("You gotta be agile," says Navas), the ability to react to technology and market forces, to the moving target that IBM presents. And, of course, you must get well-researched, well-designed, well-made products quickly to market, preferably within those 18 months after IBM's first shipment. And, as if that weren't difficult enough, the PCM must come in below IBM's prices yet earn a profit, hopefully offer the user more than IBM does in the same box, and, alas, it must be compatible.

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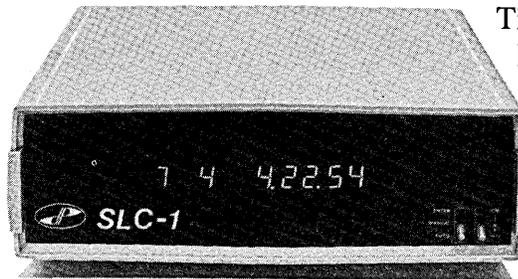
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CIRCLE 44 ON READER CARD

NEWS IN PERSPECTIVE

Looking over these characteristics of the PCM business, one might conjecture about Japanese companies entering the fray. John Navas notes that both Hitachi and Fujitsu have developed a line of disk and tape drives that can be marketed in the U.S. Both vendors have shown an ability to produce quality hardware. And Hitachi through National Advanced Systems and Fujitsu through Memorex have begun supplying peripherals to American users. But Navas observes that both companies operate on a small scale, compared with American companies, and he feels their cost structures are not competitive with those of U.S. firms. Additionally, and perhaps more critically, they lack any sort of distribution structures, the national sales and service facilities required to show American users they really intend to play for keeps.

Porter says essentially the same thing, calling the sales and service capabilities "a prerequisite" to entering the market. He adds, "It's probably not practical without a large expenditure of money to try to set up such a thing—that is, the sales and service capability." It could be done, he says, "but it would clearly be a drain of a lot of money for a few years." They have the products to make the move, explains Porter, "but they don't seem to be ready to go into the spending required to do that in the U.S."

Of course, the consultant adds with a smile, they could always buy a U.S. company. And that brings the conversation back to Memorex and STC. But Porter questions whether STC is for sale, judging by the celerity with which the company backed out of the Amdahl merger. And, he adds, Memorex might find it difficult to maintain its independence if it cannot maintain profitability as a PCM over the next few years. And that is the challenge of the new management there.

—Edward K. Yasaki

LITIGATION

A BIG BLOW TO AT&T

Ma Bell says the MCI verdict will do a great deal of damage to the jury system,

It was Friday the 13th and the verdict came like a thunderclap from the jury. MCI was entitled to a \$600 million damage award be-

cause of the business practices carried on by AT&T which impeded MCI's ability to serve its customers.

AT&T attorneys were confident that Ma Bell would be vindicated. The Bell System's lead attorney, George Saunders, had expressed confidence in the jury's understanding of the complex issues in the case, feeling certain that the verdict would favor AT&T. At about 9:30 p.m., a half-hour before the jury returned its verdict, AT&T press relations began calling members of the press to stand by for what seemed like an obvious outcome. At 10 p.m., the jury filed back in and ruled for MCI. Under antitrust law, the damages were tripled, which meant that the decision awarded MCI a total of \$1.8 billion.

After the verdict, Saunders changed his tune about the jury's competence. He said the finding would do a great deal of damage to the jury system, and he immediately vowed that AT&T would appeal the findings.

The case dealt with complicated regulatory issues from the early 1970s, when MCI was first authorized by the FCC to begin service, up through 1975. A basic question dealt with whether MCI could provide its customers with connections to switched network facilities. AT&T contended that MCI had gone to the FCC with the concept of providing only point-to-point

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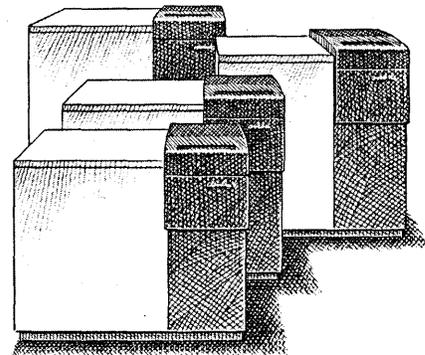
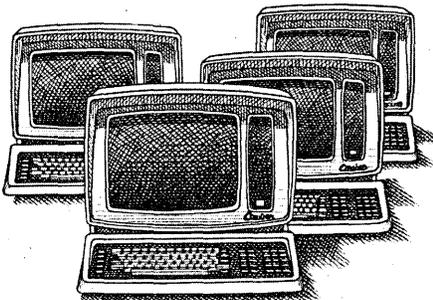
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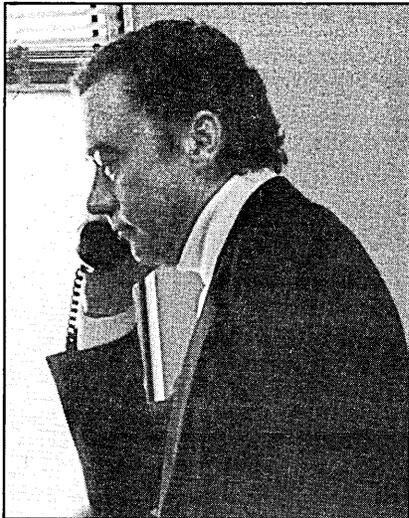
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WILLIAM McGOWAN: "They wanted to make an example of us, and crush us so nobody else would try and compete with them."

service. MCI claimed that the FCC decision in 1970, which paved the way for specialized carriers such as MCI, foresaw the future need to provide switched network connections.

Specifically, the interconnections at issue were foreign exchange (FX) lines and common control switching arrangements

(CCSA), which are specialized facilities for large business users.

Exactly two weeks after the verdict, on June 27, AT&T held a meeting for financial analysts that was closed to the press. An AT&T spokesman said it was not unusual to bar the press from such a meeting for members of the Wall Street community. At the meeting, AT&T distributed copies of a report on the trial that had appeared in the AT&T *Management Report*, a weekly publication distributed to Bell System management.

The report, titled in part "a look back at the changes that fostered uncertainty," took some of the analysts by surprise. It portrayed events in MCI v. AT&T in the way that they had been characterized by AT&T at the trial—and a way rejected by the jury. At least one attendee was concerned about the Bell System motives for distributing the document. One observer suggested that the adverse court ruling had the potential of impeding Bell's ability to raise needed capital on Wall Street, and that the analysts' meeting had been called to reinforce the telephone company's image in the wake of the trial decision.

One of the most crucial events for MCI customers in the stormy MCI/AT&T relationship occurred in August 1974, when 15 MCI customers had about 30 FX and CCSA circuits cut by AT&T. The order to sever these facilities was given by Mark Garling-

house, AT&T chief counsel. Addressing the reason why the customer facilities were cut, the AT&T report said . . . "AT&T found itself in the untenable position of providing these connections in violation of the 'piece out' provisions of its own tariffs, which had the force of law."

The AT&T position that its tariffs had the force of law and could not be modified was challenged by MCI chairman William McGowan. "The Commission couldn't believe it. All they [AT&T] had to do was write a letter to the FCC modifying the provisions of their tariffs," he said.

MCI had earlier gotten a court order requiring AT&T to provide the contested facilities to MCI and its customers. This pro-

Exactly two weeks after the ruling, AT&T invited financial analysts to a private briefing, where a report on its views of the trial was distributed.

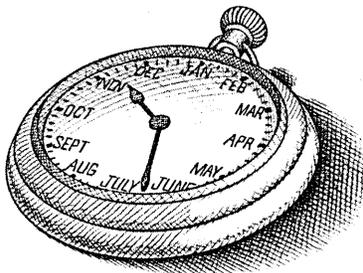
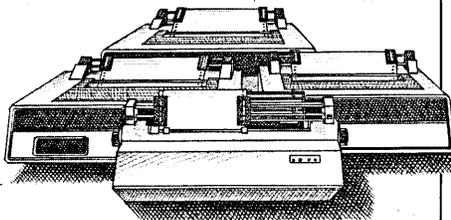
MCI ruling was taken by AT&T to an appeals court, which vacated the ruling just before the service was cut. According to McGowan, AT&T issued the order to its operating companies even though it was reported in the press that the FCC was on the verge of issuing an order obligating AT&T to provide the FX and CCSA lines. The FCC did

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DIGITAL RESEARCH

NEWS IN PERSPECTIVE

order AT&T to provide the contested facilities to MCI about a week after the service was cut.

Explaining the Garlinghouse order to terminate the service, Jay Grossman, AT&T media relations supervisor, said that MCI and its customers had been warned that if the pro-MCI court decision were overturned on appeal, the circuits would be cut. "We had to act that way. We really had no legal choice in that matter. If we didn't take them out we would have been tacitly saying, 'They were entitled to the service.'" When asked if he knew of any other instance where existing service to customers had been cut, Grossman replied that he knew of no other case like the MCI situation.

McGowan was more vocal on this point. He agreed it was highly unusual for customer facilities to be cut and said that in other regulatory/legal proceedings AT&T had never drastically affected users in this

Meanwhile, the AT&T appeal could take years.

manner. "They had plenty of choice. When AT&T claimed it could not provide FX and CCSA under its tariff, Walter Hinchman, [then chief of the FCC's Common Carrier Bureau] said, 'Fine, then change the tariffs.'" "

The implications of the verdict are significant, according to McGowan. He predicts that the Justice Department's suit against AT&T will get a big boost from the MCI outcome. The Justice case will be very close to the MCI suit on the transmission side, McGowan said, although adding he did not know how the government would structure its argument on the equipment side of the case.

The MCI chief raised some concerns about the efforts launched by Bell to push a rewrite of the Communications Act through Congress before the end of the current session. Pointing out that the majority of the legislators do not really understand the issues, McGowan said any attempt by Congress to modify the Justice Department's 1956 Consent Decree with AT&T would adversely affect the government's case against the telephone company. "Bell desperately wants legislation; they think they can steamroll Congress into it in an election year. Congress thinks that simply to deregulate helps competition. That may apply in the airline industry, but in the communications industry, where you have one company with \$50 billion in revenue, and 98% of the business, deregulation is crazy," he contended.

And just how badly has MCI competition hurt AT&T? "This year, Bell is going to increase its revenue in long distance telephone calls by \$3 billion, and we're going to have about a \$100 million increase. So, that's 3% of AT&T's growth," McGowan pointed out. "When they first refused us FX

and CCSA facilities, they were doing \$18 billion per year in revenue, and Bell this year is going to do \$50 billion in revenue."

Then why has AT&T fought MCI so vigorously? "They wanted to make an example of us, and crush us so nobody else would try and compete with them," McGowan said.

Meanwhile, the AT&T appeal could take years. And is it likely Bell will find an appeals court to overturn the verdict in a similar manner that the Telex decision against IBM was later reversed? McGowan doesn't think so. He believes that no court in the land would overturn a finding of this type made by a jury, and adds that the Telex decision was made by a judge without a jury. Industry sources believe that AT&T might gain a modification of the damages, or it might be able to convince another court that the judge made some errors in conducting the trial. But these findings would be considerably less forceful than a full reversal.

MCI is not sitting on its hands waiting for the AT&T check to come in the mail. The company has launched a residential version of its long distance Execunet service at rates 30% to 60% below Bell's.

Another MCI suit is pending against Bell in the District of Columbia federal court. The suit just ended covered the period up to 1975, and McGowan says there are

a few more things he would like to discuss in court with AT&T about the events that took place after 1975.

Undoubtedly attorney Saunders and his staff will take the new suit very seriously. And this time, AT&T press relations may think twice about making advance calls to alert the media before the verdict is actually handed down.

—Ronald A. Frank

COMPANIES

USER REBELLION WORKED

Burroughs' restructuring of its international division is aimed at keeping the customers satisfied.

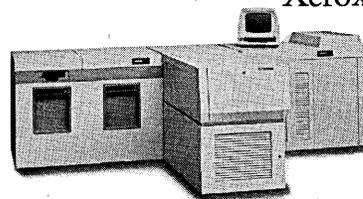
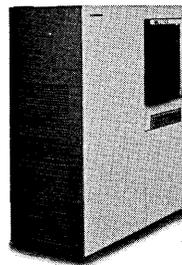
The sound of rebellion in Burroughs' international user base is dying quickly under the weight of new measures from the Detroit mainframer.

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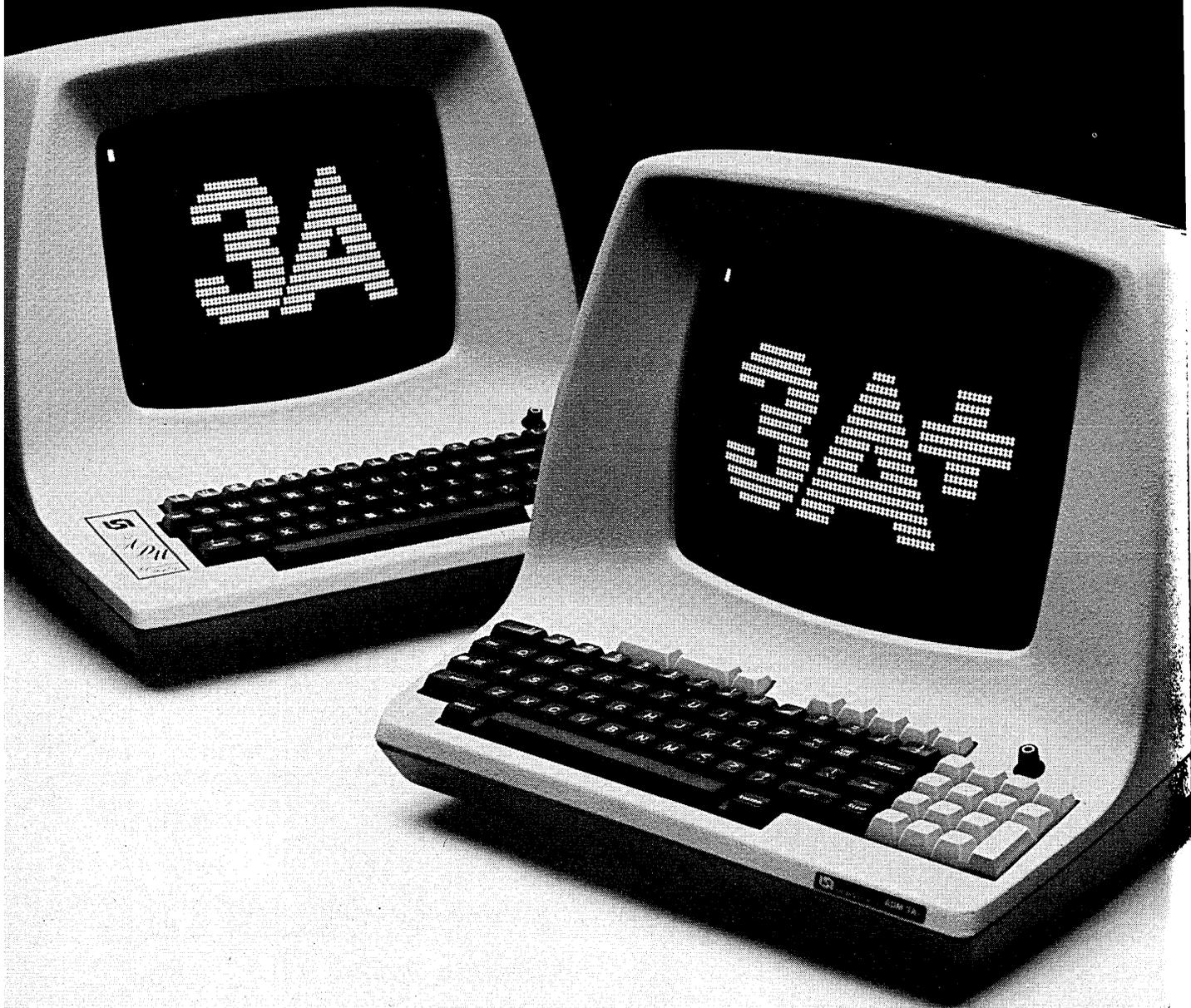


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NEWS IN PERSPECTIVE

counter the ultimatums, threats, and strong arm tactics of users facing continuing uncertainty over deliveries and support (DATAMATION, Oct. 1979).

Users are beginning to speak of far-reaching new initiatives from Burroughs to redress these problems. Some users are already talking of the "birth of a new company."

An Association of Burroughs Computer Users (ABCU) conference in Madrid last October encapsulated all the users' grievances. International boss Bill Conlin returned to Detroit to form a completely new organization within its international division. He also began laying an "innovative" new support fabric across the whole foreign operation, which Burroughs' chiefs are now beginning to look on as an "industry first" and a prototype for the 1980s.

The new organization, Product Distribution and Logistics—what one user defined as "getting everything together at one spot at one time"—was formed to plug a serious gap between Burroughs' foreign

The significance of software to Burroughs' future can't be underestimated.

marketing and U.S. production. The group director of the new organization, C. B. Turner, explained: "Under the old structure, systems were delivered in a haphazard manner with bits coming from all over the world at different times." Although a distribution function did exist, it didn't effectively correlate the scheduling of new production with existing field product inventories. Now, for the first time, this is being handled by a new revenue and inventory planning department within the organization which was formed in March. The benefits, says Turner, can already be felt. "It's now much easier to define our delivery requirements and more accurately predict shipping time."

Turner added that as a result, delivery of systems ranging from its B1000 series through its B7000 family have been identified by customer names through the third quarter of this year. "And we're now firming up fourth quarter deliveries in the same way." The company's foreign subsidiaries are being informed so they can advise their customers of shipment dates.

Another key department—Communications, Reporting and Analysis—has just been created within the old distribution services to address the related problem area of order processing. At the heart of this is a major new piece of data base software, OPARS (Order Processing And Reporting System), which was written in COBOL. Burroughs admits that OPARS was hurriedly brought into existence in January and is as yet largely untested. "It's not in its optimum state and its initial reports are certainly not at the levels we want," says Turn-

er. But the significance of software to Burroughs' future can't be underestimated. The data base will greatly improve communications between the field and Detroit by providing on-line information about orders, production dates, and other data.

Turner says reports from the data base are being drawn up and sent to subsidiaries on a monthly basis. "Their quality is poor now but it will improve as OPARS improves."

The OPARS inquiry facility that Burroughs plans to offer divisions and regions outside distribution will be of more direct use for international users. Some foreign subsidiaries could have this facility early next year. This means that an individual user's account manager working through his local head office could begin to get into the system. Observers point out that this could provide some much needed insight into Burroughs' current backlog, which is now running at record levels. "It also will better define exactly when a customer *does* require his system," explained one Burroughs manager.

Burroughs feels that the blend of its new department with OPARS should insure that a complete system can at last be scheduled and its delivery optimized. But to enhance this new program, the company is planning to go one step further by establishing what it calls "staging centers" at choice

foreign locations. At these centers the complete system will be assembled and verified prior to delivery.

According to Burroughs, the first of these centers in Europe will be in the U.K. and will handle its new B90 small systems. The location, Milton Keynes, is 50 miles from London and close enough to the company's major Scottish manufacturing operation. This first site is also slated to per-

To silence critics of its field support, Burroughs is setting up Remote Control Centers.

form the job of Group Control staging center for the European Economic Community (EEC) block of nine countries. Complete systems, says Burroughs, will be delivered mostly by trucks within Europe.

This center, which will be established by the end of 1980, will be augmented by another one in an undisclosed part of the continent. Sources in Holland expect this center, for the small system B1900, to be near Amsterdam, but Burroughs would not comment on this. All it would say was that the site hadn't yet been chosen.

The other abiding criticism of the company's international operation has concerned "patchy levels" of field support. And here again, the company seems to have silenced its critics, for the present at least,

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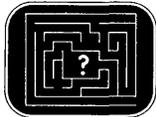
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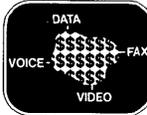


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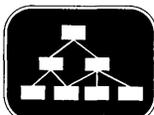


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NEWS IN PERSPECTIVE

with an aggressive response.

Complaints have centered around the failure in administration and coordination—this time of people (field engineers), rather than scheduling and delivery.

One senior member of ABCU summed up the problem by saying that its relatively expensive support operation had been poorly managed. Burroughs' response has resulted in a completely new and possibly innovative organizational structure, say observers. Burroughs calls it the Resource Control Center (RCC), the pilot of which was formed in Toronto, Canada, at the end of last year. Already other RCCs have sprung up in Brazil, and next will be Australia. By the end of this year the U.K. and France will have them, followed by West Germany, Japan, and others in 1981.

Known as the "silent company" for much of the '70s, Burroughs has begun to find its corporate voice.

At the front end of each RCC is the users' central call point, the Information Control Center, and behind this is the Product Support Center. According to Fred Rogers, general manager, international field engineering, each center is as much a preventive and diagnostics tool as a corrective one: "We've learned that 88% of calls are routine—no fuss, no bother."

Once again Burroughs has come up with a new on-line data base software in the form of two systems—RESPOND and RADAR. The former, as well as receiving customer calls, is a management information system to track field engineering, says Rogers. RADAR, on the other hand, is a program maintenance product that can remotely detect potential failures and deteriorations in performance at a user site.

The key to RESPOND is that it offers management visibility and dynamic overview of the field engineering function. Once RESPOND swings into action, an engineer on call is literally clocked and his performance measured by the system. This had led to fears that Burroughs' customer service engineers (as they now are known) may begin to resent working under such close scrutiny "and maybe even result in a Big Brother complex," says Rogers. "But this was not our intention—it's not a spy system."

Rogers also countered assertions that Burroughs was tightening up and cutting back on field engineers. "These measures were not brought in under duress, or to cut costs."

Rogers went on: "We just said to ourselves, let's forget everything we've done before and concentrate on what our users need." He added that one bonus of the monitoring function has been fresh insight into new training techniques for field personnel.

With its provision of RADAR, Burroughs is following the IBM lead by monitoring, tuning, and updating its customer base from a remote site. And, like IBM, it is becoming increasingly aware that service, software, and support will provide the key to market growth in the 1980s.

As yet, ABCU says it is too early to tell what tangible benefits will result from Burroughs' initiatives. "It's a major reorganization, and its effect will take time to filter through," says ABCU chairman Eric Holloway.

One thing that is clear is that Burroughs' actions have opened as many channels of communication within the company as outside of it. Known as the "silent company" for much of the 1970s, Burroughs has begun to find its corporate voice. One fear is that it may have tried to do too much in too short a time. Madrid sparked so much change that maybe it's a bit too much for users to swallow.

Rogers was in no doubt: "There will be no overkill. We've given our users what they've been calling for. In this business you can't stand still. The company is confident that it has maneuvered and marshalled its forces correctly. It feels that its future battles will be won by an improved power to communicate face to face with the users."

But with any major organizational change there are dangers. "They'll need the

next two years to gain management experience," said one senior ABCU member. "There will be lots of problems, and little praise. I hope they make it."

—Ralph Emmett

WEAVING WP & DP TOGETHER

AM Jacquard Systems sets sights on automating what has long been a manual domain—the office.

When Joseph Marie Jacquard invented the first binary controlled device, a weaving loom, back in 1801, he pleased the state, France, but not the weavers of the country.

The government of France bought rights to the device from Jacquard in 1806 and since then his invention has been in the public domain. But the country's weavers hounded, threatened, and otherwise harassed him to the point where he had to go into hiding. So, fear of automation existed even then.

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CIRCLE 51 ON READER CARD

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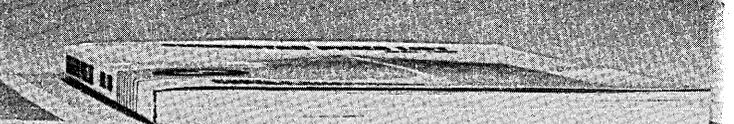
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NEWS IN PERSPECTIVE

And now the Jacquard name is again linked with automating what has long been a manual domain—the office. This is AM Jacquard Systems, which claims credit for being the first firm to combine word processing and data processing.

The fear of automation persists. At a Los Angeles celebration of National Secretaries Day, Karen Nussbaum, director of Working Women, a national association of female office workers, voiced the association's concern: "What we're up against is callous management, governmental indifference, and technicians whose standard for progress is wholly the economic motivation supplied by the corporation."

The management of AM Jacquard Systems isn't too worried, although Jack R. Bonne, vice president, marketing, admits his own secretary refuses to use the automated equipment he has provided her.

The company's recent growth would seem to give little credence to any grounds for concern. In 15 months' time, the company has gone from doing \$1 million per month in business to \$7 million.

A lot of this has to do with the acquisition of the company in December 1978 by AM international. In January 1979, AM merged into Jacquard the AMtext line of dedicated word processors formerly handled by its Vartyper Div. in East Hannover, N.J. The products are still manufactured in New Jersey but the line's headquarters sales force was moved to Jacquard's Santa Monica, Calif., headquarters.

Jacquard, which had never had a direct sales force before the merger, now has some 200 salespeople in the U.S. and expects to have close to 300 by the end of next year. Jacquard had been selling its gear through a dealer network it retains. Bonne said the company has converted most of its 50 U.S. dealers to the status of independent sales contractor, whereby they get their demonstration equipment free and sell on a commission basis with the company billing the end user.

The AMtext 425 word processor has joined the Jacquard line as the J 425. "It's a good complement to our line," said Bonne. "The 425 is an easy to use full screen word processing system." Jacquard's J 100 and J 500 word and dp systems are more sophisticated and more difficult to learn to use. Both feature a partial screen although a full screen unit is under development.

The J 100, called the videocomputer when it was announced in 1976, can support up to 15 slave crts. The J 500 is a standalone unit with 128K bytes of memory.

Jacquard uses its independent sales contractors to market to companies with sales of \$10 million a year or less. "It's a small businessman to small businessman relationship and it works well," said Bonne. The direct sales force inherited with the AMtext line sells to big business and the federal government.

The company uses what it calls "authorized software vendors" both to support and modify its software and to provide other software for its systems. Bonne said the company hopes to have at least two authorized software vendors in every one of its major marketing locations (they're in 52 now and expect to expand into 72) by the end of this year.

The company has 30 international distributors and sells directly in France and England. "It's got to do with the way a country is organized," said Edgar Bolten,

"We were the first with shared word processing and data processing."

founder and president of Jacquard. "In France, Paris is everything. It's not so clear in Germany and we've tested both direct and distributors, and distributors seem to do better. Germany seems to be five different markets."

Bolten sees the text processing market as "conservatively growing at about 50% a year and it'll probably be more like 75% to 80% in the U.S. and Europe."

Jacquard has 1,000 employees today, up from 150 just 15 months ago. When it was formed in late 1969 it was just Bolten, Mike Rogers, and a secretary the two had shared at TRW. It was formed as a

minicomputer systems house.

Its first system was for trade show registration. It debuted at Wescon in San Francisco in 1971. This system and Rogers were spun off in 1975 as Registration Services Inc. Two years later Jacquard went into production with its first product, the J 100 videocomputer.

"We were the first with shared word processing and data processing," said Bolten. "We stressed this at Syntopican in 1977 and at the '77 NCC [National Computer Conference] in Dallas. Most data processing firms do not have the commitment to understand the word processing market or the software people to implement word processing well."

When Jacquard was developing its trade show registration system, the company worked closely with Addressograph/Multigraph Inc. (former name of AM International). The first module of the system to be up and running was in A/M's Wilshire Blvd. office in Los Angeles. They modified an A/M embosser to be used with the system.

Asked if he had any notion then that his company eventually would be acquired by AM, Bolten would only smile. But then, the original Jacquard was a weaver and one dictionary definition of weave is "to unite in a coherent whole." So, maybe that's what's been done.

—Edith Myers

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CIRCLE 53 ON READER CARD

STRATEGIES

PLAN NOW, BUY LATER

Retail organizations grapple with the MIS planning process.

Carter Hawley Hale Stores, Inc., headquartered in Los Angeles, has put a hold on purchase of any new equipment for any

communications requirement whatsoever, pending a study of six selected departments' needs projected into the 1990s.

CHH, with department stores (including the Broadway Stores and Neiman Marcus), high fashion shops, and specialty stores in a number of states, is concerned about communications in the '80s.

Bob Wilhelm, CHH executive vice president, told a conference of the Association for Retail/Apparel Management Information Systems (ARMIS) that his stores are using 12 different types of POS (point-of-sale) equipment and "we do communications of various vintages."

He said top management has asked the involved departments to "tell us what we didn't know or could not imagine. We could visualize a combined voice and data net. We could visualize word processing machines talking to each other. We wonder how many cities are equipped for teleconferencing. We want to know what equipment, what technology we need to be ready."

What CHH wants is an integrated plan. "We're right in the middle now," said Wilhelm, "reviewing everything. We must make a choice soon." He advised other retailing executives, "if you haven't taken a good look at your communications yet, you should do it soon."

Max Beere, vice president, consulting division, ICS Consulting Group, Torrance, Calif., agreed. "Vendors are listening more than they ever have before," he told retailers. "You have a lot freer choice now than ever before." He sees a blending of data processing and communications into what he called a "polyprocessor reticulum, a network of cells or needs of users."

But, he noted, "we're faced with a need for behavior modification. Computer-

"The management of communications processes will first equal and eventually replace dp in the typical retail firm."

niks and communicators are parochial in their thinking. Communications has been a self-taught art learned at Ma Bell's plump knee." He said the first step in behavior modification is acceptance of unity.

Retailing and banking, for instance, "have a lot to gain from a closer relationship. There is a definite movement there, a coming together. There isn't much difference in their methods of operation. Retailers are beginning to accept bank cards and external data base check verification."

Beere feels that "future information managers will have to be innovators rather than caretakers. The future for the information movement couldn't be brighter."

Landen Miller, a partner with Touche Ross & Co. in Seattle, said the data processing function in retail stores "is really an aberration." He believes "the management of communications processes will first equal and eventually replace data processing in the typical retail firm." And he believes it is unrealistic to expect any one company or two to continue to control the data communications market.

Bob Bartlett, another Touche Ross partner from the firm's San Francisco office, said the best work will be "done by entrepreneurs. The innovations will come from new and smaller companies."

Terry V. Schlimmer, telecommunications systems manager, J. C. Penney Co.,

The price is right....,

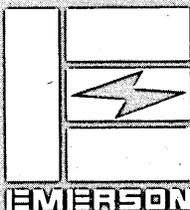
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CIRCLE 54 ON READER CARD

New York City, talked about the problems of network to network communications. He said his firm supports seven different data networks, all applications-oriented. They connect to the Visa data communications network and the TRW credit verification net. They use satellite communications for stores in Hawaii and Alaska. He said they are working with 15 suppliers and that "it will be 1985 before it really starts to look the way we want it to look."

Donald E. Norman, vice president of information systems for Target Stores, Fridley, Minn., said his organization is taking a task force approach to the development of integrated data communications. Target is part of Dayton Hudson Stores. Norman said Dayton Hudson's management style allows each operating company a great deal of autonomy even in network planning. Target has 98 stores and expects to have 175 by 1984. They are self-service, mass merchandising stores stocking some 65,000 items per store.

"We have a solid foundation of systems that work very well," said Norman, "but we knew they would be overrun if we did not upgrade with new technology to accommodate growth. We went into five-year, long range systems planning."

First an information steering committee was formed, made up of senior people. A survey was conducted via questionnaires to department heads in 1976. Next came consolidation, review and feedback, and preparation last year of a systems plan. Then, the task force approach. "We want to get user commitment."

Norman said a big problem has been lack of knowledge about office systems. "We have included office systems in our plan, but the wording is vague and general. There is a widespread ignorance of office systems at Target. We're babes in the woods in the area of studying and designing office systems. How do we specify this unknown into our system? We have been looking for an experienced office systems individual for six months with no success."

Target has 3,000 IBM 3653 POS terminals, 57 IBM POS controllers, 38 leased lines between stores, three multidrop leased lines, 10 RJE/crt leased lines, and 12 Watts lines used for voice by day and data at night. By the end of 1985 it expects to have 5,500 POS terminals, 1,000 video/printer terminals, and 90 POS controllers. The task force's job is to study savings potential, monitor progress, and give directions as needed. It is using regional minicomputers in the network for regional control with overall network control in Minneapolis. It uses a split stream multiplexor and a cluster controller and would like to have lines it could divide into two parts to accommodate different transmission speeds and different protocols. "We understand IBM is working on this in Europe and Canada but not in the U.S. We have submitted an RFQ, but so far

have had no response."

Target has a 3033 at headquarters and a Tandem computer in its Southern distribution center. It's considering IBM 4300s and 8100s as regional nodes but, "in my opinion, they're [IBM] not as advanced as Tandem." What Target is working toward now is an interim configuration as a pilot project.

Target's parent, Dayton Hudson, came up with what it called "a first in retailing and telecommunications" late last year with its Christmas Registry Computer. Using regular Northwestern Bell and AT&T lines, customers could touch crt screens in futuristic store displays to determine if a person they wanted to buy a gift for was registered. If the person was, the customer would next push the word "print" on the screen and see the gift preference displayed and simultaneously printed on a teleprinter. Key to the system were touch sensitive computer terminals (TSTS) developed by Information Dialogues, Inc., Minneapolis.

Bob Hughes, IBM, Raleigh, N.C. research center, sees software as the key to the future flexibility of computer use. "At Raleigh we are working mostly with software." But he worries a little. "As computers become more pervasive in automobiles, I wonder what it would be like to drive into a gas station and ask for the programmer."

—Edith Myers

UPSTARTS

STRATUS STRUTS ITS STUFF

It's a software company first, but it will also produce its own hardware.

Another beneficiary of the increasingly active venture capitalists, a new company called Stratus Computer Inc. in Natick, Mass., is attracting considerable attention among minicomputer professionals as it recruits a star-quality development staff for "a software company that will produce its own hardware."

Stratus was formed earlier this year by three local industry heavyweights. William Foster, onetime engineering manager for computer systems at Hewlett-Packard and recently vp for software development at Data General, is the Stratus president. Robert Freiburghouse, founder of Translation Systems, Inc., the Cambridge software house, and former manager of Honeywell's

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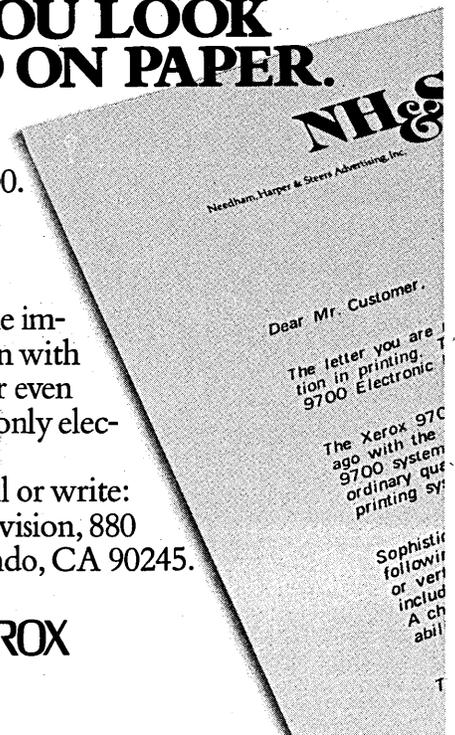
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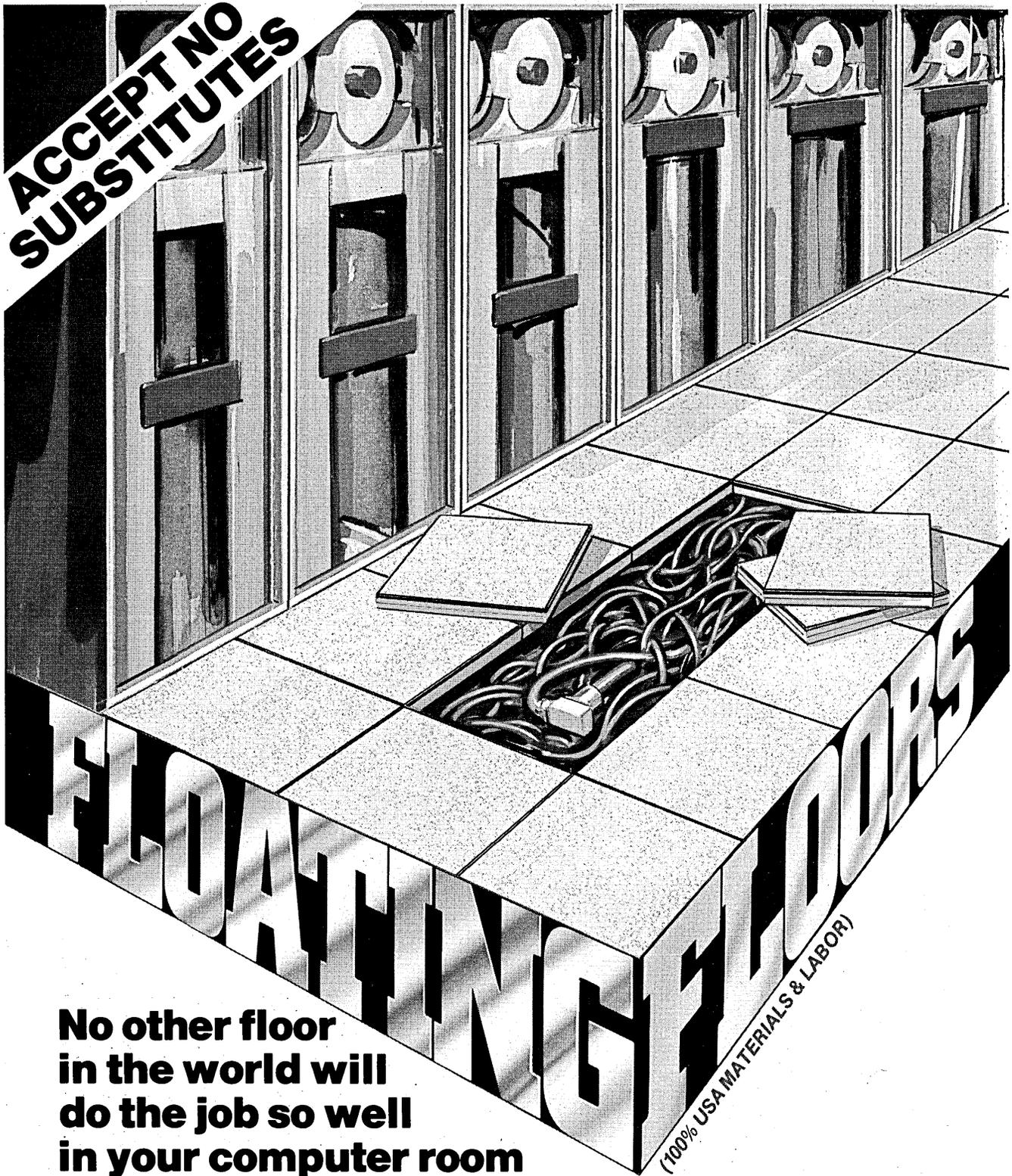
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CIRCLE 56 ON READER CARD

NEWS IN PERSPECTIVE

advanced language system program, is Stratus vp for software engineering. And Gardner Hendrie, former DG engineering director and himself the designer of the original 16-bit minicomputer, came in as vp for hardware engineering.

With a fresh design approach, solid financing, and the reputation of its founders, Stratus has become a talent magnet. New recruits include Steven Webber, for 15 years a mainstay in Honeywell's Multics

"The driving force behind our design is the software—and that's different from every other system out there."

program, who will direct the development of a new operating system; Jim Austin, DG's former director of engineering services; and Robert Reid, who was in charge of DEC 10 and DEC 20 processor development at Digital Equipment.

"All existing computer manufacturers have the same problem," said Foster. "Their systems were designed in the days when logic, memory, and peripherals were expensive, software was limited to a small number of specific applications, costs to maintain computers were relatively small, and minicomputers weren't used in critical on-line applications."

Obviously, things have changed, he said, but vendor requirements that current machines be backward-compatible to early designs severely limits the adaptability of new systems. DEC's VAX 11/780, he noted, had to be designed to be backward-compatible with the old PDP/11 line, "greatly restricting possible innovations."

For a newcomer who does not have to support a 10- or 15-year-old system design; for a computer that doesn't have to be backwards compatible; for an operating system that can optimize for the new economics, the new technology, the actual workload of the small and medium computer, the potential is simply tremendous, said Foster.

"Basically, all the computers out there were designed by the engineers and then given to the programmers, who were told, 'O.K., program it.' Ours was done from the opposite viewpoint," he explained. "The software people who developed the architecture and designed the overall machine determined that there really wasn't hardware available that could implement such an architecture, and that's why we are doing our own hardware. But the driving force behind our design is the software—and that's different from every other system out there."

The Stratus computer will be a virtual memory machine with a multiprocessor design, said Foster. The two prime concerns in the system development are reliability and expandability. "It's a multiprocessor design, but the user won't

even be aware of that. He knows he's got a computer system out there and when he needs more processing power, he can add more processors to it and it runs faster."

With the Stratus design, a user can start with a single modular processor and, adding processors as he grows, evolve it into perhaps a 40-processor system. Unlike the traditional mini upgrade with a cpu trade-in, nothing will be discarded with a Stratus upgrade, said Foster. "You add processors to it and build a bigger system. You don't throw anything away."

The only system in the market with this approach is Tandem, Foster said. "Our technical approach is totally different, not at all similar. But they've got that system that starts with two processors and goes up to 16, so they at least profess to have this ability."

"Our overall architecture, the way we have designed our hardware, the overall layout, the way the processors are tied together, and the way the peripherals and memory all fit into the system is totally transparent to the software," he explained. "That isn't true of other machines. When, for instance, you have a 16-processor Tandem system, the people who program it have to be very intimately aware that there are a lot of processors out there. Our design will make all that invisible to the user."

Foster refused to commit himself to

even a general announcement date. "Let me just say that we're very adequately financed and all the investors agree with us that the timing will depend upon when we have a really good product." Stratus has three institutional investors: Hellman, Gal Capital Corp. of Boston; Institutional Venture Associates of Menlo Park; and Business Development Services, the venture capital arm of General Electric Co.

Foster kept stressing the advantages of being able to design from scratch today. "Look at the product lines of Prime, Hewlett-Packard, Digital, Data General

"The timing [of any product announcement] will depend on when we have a really good product."

... they're all using operating systems that were designed 10 years ago.

"And 10 years ago, no one had the slightest idea how minicomputers would be used today!"

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June 23, 1980

NEWS IN PERSPECTIVE

of patches and integrate them at the start. Ten years from now, we'll probably have to start worrying. . . .

"But, we are trying to position ourselves to take advantage of change," explained Webber. "We're going to have a very structured high-level implementation, of course, and it's going to be thoroughly thought out before we do any actual coding. We're surveying the sort of things that are needed, that are desirable, necessary to be competitive—and we're going to design in enough of those from the start so that this won't need those kluggie hack-up add-ons that you find in most other operating systems these days."

"You see," said Foster, "we have 10 years' experience in looking at all these other operating systems. We know what is really needed and what isn't. And we won't have to drag along a bunch of garbage just to be backwards-compatible with something that was done in 1975, something you've got to keep doing to keep all the old customers happy."

—Vin McLellan

COMMUNICATIONS

WHERE TO DRAW THE LINE

Manley Irwin discusses the difficulties of regulating communications.

The prospect of AT&T operating a competitive subsidiary has generated much discussion in recent months. The issue was brought sharply into focus by the FCC's decision in the second Computer Inquiry, which essentially paves the way for Bell to step out from the regulated arena.

One regulatory economist who was not surprised by the concept of an unregulated Bell subsidiary is Dr. Manley R. Irwin, professor of economics at the Whittemore School of Business and Economics at the University of New Hampshire. Since the mid-1960s, Irwin has been tracing the convergence of computers and communications. Moreover, he was an architect of the FCC's first Computer Inquiry.

Irwin has written that "Bell may seek some accommodation with the Justice Department by pleading that changes in information technology have rendered the [1956 consent] decree's sanctions obsolete. Bell may find it necessary to seek a redefinition of 'communications' to include data processing on the grounds that the two are inseparable. . . ."

While these views are timely today, they appeared in November 1966 in a DATAMATION article by Irwin titled, "The Computer Utility."

"I see a conflict between the drift of regulation and the drift of technology," Irwin began during a recent interview. "All of a sudden no one owns the technology. The technology is not waiting, government is not waiting, R&D is not waiting, corporations are not waiting, and markets are erupting rather rapidly."

"Regulation is over its head. It can't chase a moving target. As the technology spreads, it means that Bell can't have it all. No one firm can have it all. The telephone industry can't have it all, the telecommunications industry can't have it all, and the computer industry can't have it all," Irwin explained.

"All of a sudden the dividing lines are gone. One company can't come up with a digital local switch, a digital toll switch, a digital PBX, new software, fiber optics, satellites, a local digital network, and a home information service simultaneously. The regulatory implications of that are phenomenal. All of a sudden the Bell System monolith becomes diverse and spread out and available to everybody," he said.

The key question is how a regulated company like AT&T makes the transition to an environment where it must compete with

others. "If you think the telephone industry has problems, the regulator is in even worse shape. The regulator by tradition wants clean demarcations with clean market lines. The technology has blown the regulator's rationale for existence. Our regulatory institutions are trying to save and protect their turf," he said.

But these major changes did not happen overnight, according to Irwin. In 1966 in his capacity as assistant to Bernard Strassburg, then chief of the FCC's Common

"If you think the telephone industry has problems, the regulator is in even worse shape."

Carrier Bureau, the first hint of changes began to appear. "We knew there was a pure telephone service, and we knew there was pure data processing. So we knew what was regulated and what was competitive. But as you moved closer to the middle, you got into a gray area we called 'hybrid' for lack of a more elegant term."

In the course of this study, which eventually led to the first Computer Inquiry, Irwin said some scenarios were examined. "We asked what happens if a user has a computer and uses it for switching and also for dp? And what happens if he has a dp machine but uses it to route messages?

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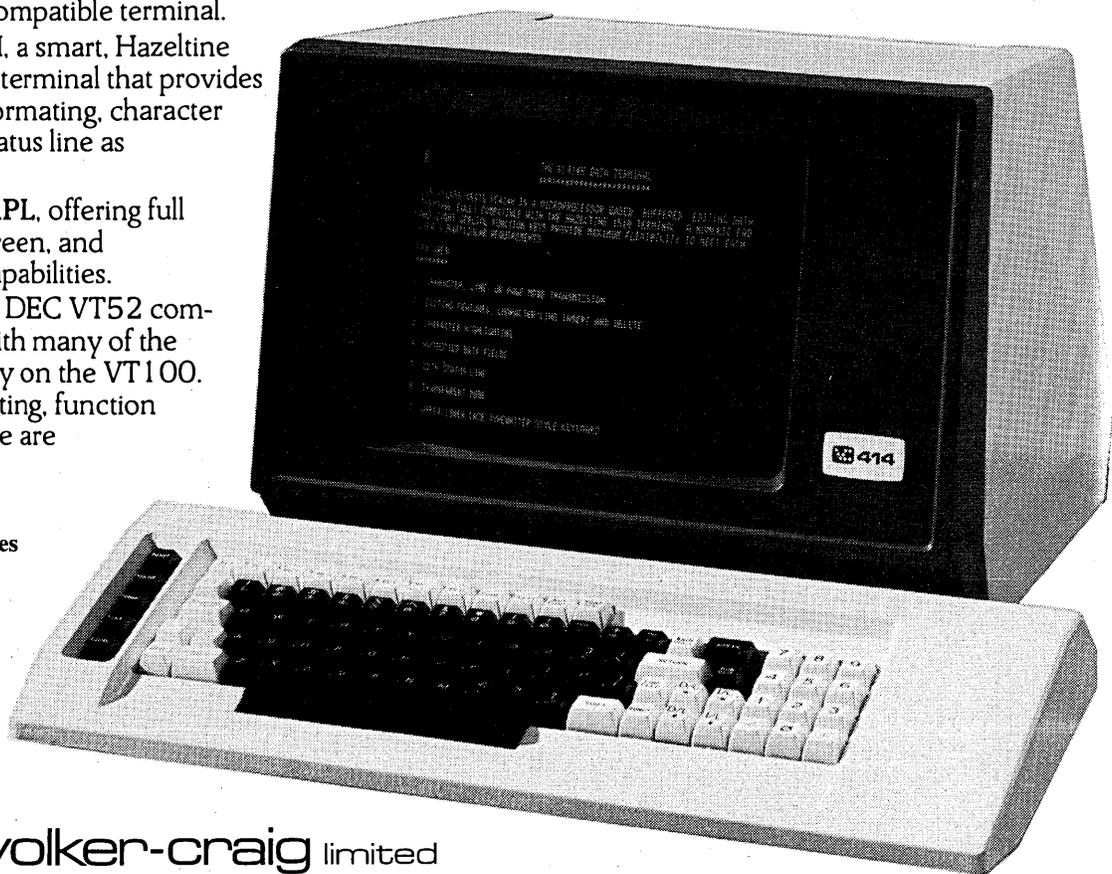
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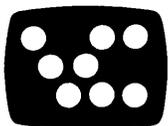
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NEWS IN PERSPECTIVE

"The reason the first Computer Inquiry has never been appreciated is that it set the commission thinking, it conditioned the commission to be receptive to MCI, to the specialized carriers, etc. For the first time, the FCC said one company can't do it all. That led to the whole policy of entry which changed Bell's traditional thinking," Irwin said.

In the wake of the 1956 Consent Decree only 10 years earlier, the FCC recognized that Bell was precluded from the unregulated arena. "So we didn't have to worry about Bell, but the commission tried to establish the ground rules under which other carriers could diversify into this new area," he explained.

"The problems facing the telephone industry today were bred and reared in a regulated environment. The environment changed, and they [AT&T] didn't know how to react and respond. I think Bell has now made the transition, but the cost has been phenomenal," Irwin stated.

Bell now has to choose its markets, and it will have to start marketing. It could take years for AT&T to get its unregulated subsidiaries into good shape, he said. But the problems for the FCC raised by this second inquiry decision are also large. "The GTE/Telenet decision, I guess, is a case in point. What is the appropriate amount of capital to transfer from a holding company to an operating subsidiary? Who's got the answers to those questions?" Irwin said the structure of the unregulated Bell subsidiary

Congress' rewrite of the 1934 Communications Act appears to have no better than a 50-50 chance of passage this year.

will probably be set arbitrarily by the FCC since there is so little precedent to go on.

If the first inquiry paved the way for today's events, Irwin gave Strassburg credit for raising the issues. "In a sense, Bernie was an entrepreneurial statesman who anticipated the future. He was a breed apart. Apparently Bernie's thinking also excited the commission because he showed them that here was a chance to anticipate policy rather than pursuing the role of archivist and merely writing history."

So, Irwin thinks the second Computer Inquiry decision may have been the first step in doing away with all regulation in the industry. He admits this could take 20 years since the commission must first closely monitor the entry of Bell into the unregulated subsidiary operations. Regulation may also shift gears into new areas.

"The new rationale for regulation will be privacy, maturity, and integrity for national transactions," Irwin predicted. "The regulators need a client. If they don't have one (and I think they're losing theirs), they'll invent one," he concluded.

—Ronald A. Frank

LEGISLATION

PROPOSED COM LAW IN LIMBO

Congress' rewrite of the 1934 Communications Act appears to have no better than a 50-50 chance of passage this year.

Now you see it, now you don't. This week it will pass, next week it won't.

The ways and means of Congress have been blatantly bared during the continuing dispute over H.R. 6121 and S. 2827, two legislative proposals that would restructure the nation's communications laws and dramatically alter the structural organization of AT&T. As of July 3, the last day before Congress' 18-day recess, the legislation seemed as far from passage as at any time during its tortuous history.

It had all seemed so simple on June 19, when the House Communications subcommittee passed a bill that would force AT&T over 10 years to split its manufactur-

ing and research arms into separate subsidiaries. The bill left to Congress, not to the Federal Communications Commission, the responsibility for gradual deregulation of the telephone industry. With action proceeding swiftly in the Senate, albeit with more regulatory responsibility relegated to the FCC, and with hearings scheduled by the Commerce Committees of both bodies, deregulation no longer seemed a midsummer night's dream.

"These are both good bills, although we like the House one better," said Henry Geller, Assistant Secretary of Commerce and head of the National Telecommunications and Information Administration (NTIA), at an information policy conference on June 23. "We need deregulation. We can't continue this administrative minutiae of always asking 'Mother, may I please introduce a new product?'"

"I'd say there is a 50-50 chance of passing the legislation."

Three hours after that sentence, the odds had dropped considerably. Geller sped off to attend a markup session of the Senate Commerce Committee. The session was canceled because of health problems of two key sponsors, Sens. Barry Goldwater (R-Ariz.) and Harrison Schmidt (R-N.M.). It was tentatively scheduled for two days later. At press time, it still hadn't been held, and when it will is anyone's guess.

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NEWS IN PERSPECTIVE

So is the date, if any, on which the legislation will pass. Three days after Geller's prediction, the odds fell close to what Las Vegas calls "off the board." Sens. Edward Kennedy (D-Mass.), chairman of the Judiciary Committee; Howard Metzenbaum (D-Ohio), chairman of the antitrust subcommittee; and Charles Mathias (R-Md.), the second ranking minority member, wrote a letter to Commerce Committee

Some fear the proposed legislation would gut the Justice Department's antitrust suit against AT&T.

chairman Howard Cannon (D-Nev.) requesting sequential referral of the Senate bill to the Judiciary Committee. The letter stressed the bill's "enormous competitive significance for the telecommunications industry" and expressed concern over its impact on the current Justice Department antitrust suit against AT&T, notwithstanding savings language in the bill (also contained in the House version) which purportedly would leave that suit unaffected. Both bills would also negate the 1956 Consent Decree which presently bars AT&T from unregulated markets.

The request, if granted by Cannon, will clearly delay any further Commerce Committee markup sessions in the Senate and could forestall passage of any legislation during the current session.

A similar situation now exists in the House, which until the day before adjournment had been sailing in comparatively smooth waters. On July 1, Rep. Peter Rodino (D-N.J.), chairman of the House Judiciary Committee, sent a letter to Rep. Harley Staggers (D-W. Va.), chairman of the Commerce Committee, expressing in strong



HENRY GELLER: "I'd say there is a 50-50 chance of passing the legislation."

terms his fear that the legislation could harm the Justice Department's suit. "This is clearly going to have an impact on the legislation," a House source said.

Rodino's letter surfaced just as the Commerce Committee was scheduled to begin marking up the legislation. The July 2 session was canceled, apparently for lack of interest. Only eight of the 42 committee members, six less than necessary for a quorum, were in their chairs when Staggers called the committee to order.

"This legislation is complicated and controversial, but oh so urgent," said House subcommittee chairman Lionel Van Deerlin (D-Calif.). "It cannot wait even until the next Congress."

"This will be the first pending business before the full committee when we return from the July recess," Staggers promised.

Geller was not available to quote odds on that.

—Willie Schatz

PRODUCTIVITY

MRP TO SAVE THE DAY

Manufacturing Resource Planning tools are being eyed as the savior for productivity problems.

A robot rather than a teenager to sell McDonald's hamburgers?

Dr. Courtenay M. Slater, chief economist of the Department of Commerce, broached this possibility at a Univac-sponsored conference on productivity, where she pointed out that "there will be more natural incentive for laborsaving capital investment in the '80s. We will not have the labor supply. There are fewer people turning 16 to do the menial tasks."

And she believes things like the robot, "like automatic checkout at the grocery store, are going to be needed."

Her charter at the Univac conference was to challenge manufacturers to increase productivity. She had another note to add, making the promise for the '80s look better than what happened in the '70s: "In the '70s, companies had to divert capital for pollution control, health and safety, and matters concerning the environment."

Richard W. Bourke, president, Bourke and Associates, Pasadena, Calif., worried about another kind of impediment to manufacturers' investing capital in productivity enhancing systems. "The suc-

cess rate of computer-based manufacturing systems," he said, "has been less than 20%, and as a consequence the image is kind of tarnished."

The tools have been lacking in the past, he said. "Applications software and canned programs have only been available in the very immediate past. We have learned that the benefits can be substantial, but there has to be a high level of investment, and management leadership is mandatory."

Bourke's own consulting practice specializes in implementation of manufacturing systems. "A large percentage of my business comes from people who have not done it right the first time." He said he used to refer to Materials Requirements Planning (MRP) but now MRP has come to mean Manufacturing Resource Planning to him.

"The '80s," said Bourke, "will be an exciting time because now the tools [for MRP] are there and the NIH [not invented here] syndrome is down the tubes."

He feels the earliest advances will be made on the West Coast because "West Coast companies tend to be a little bit more open to change." He also urged manufacturers not to "treat unions as adversaries. Bring them into the planning."

C. R. (Chuck) Williams, vice president and general manager, Americas Domestic Div., Sperry Univac, called the '80s, "the enlightened '80s in terms of computer usability; in fact, it's the decade of user ability."

He said the responsibility for implementing computer-based manufacturing systems in most companies is in the wrong hands—namely, the data processing department. "It must be accomplished by manufacturing management and not by the data processing people alone. Today's manufacturing managers are not intimidated by computers. They understand and recognize their potential."

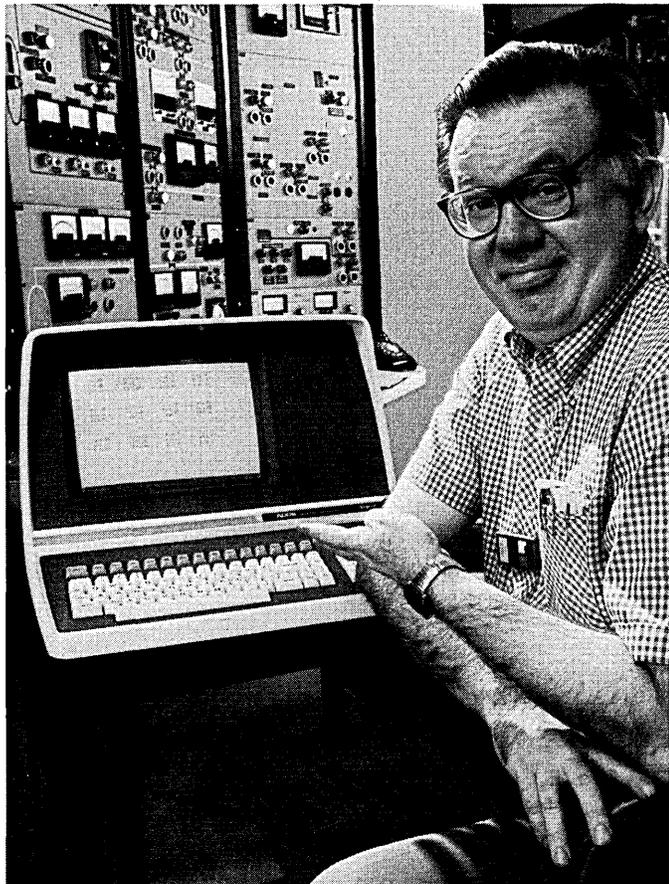
Manufacturing managers know their problems better than any MIS expert or computer vendor.

"But," said Williams, "they've [manufacturing managers] been waiting for some magic formula from either the MIS department or a computer supplier to solve their problem." He said the manufacturing managers know their problems better than any MIS expert or computer vendor. "Thus, they have the keys to solving their companies' productivity problems."

He said the next several years will be critical for many manufacturers. "High on the survival list will be those who have engaged contemporary manufacturing controls."

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NEWS IN PERSPECTIVE

compatible terminals both in Tempe and in West Palm Beach, Fla. The Florida operation is housed in a plant the company acquired a year ago from another ITT operation, ITT Semiconductor. At both locations the company is developing a computerized shop floor control that tracks the second-by-second status of every part and assembly and the activity of every person in the assembly area. It's a bar code and scanner-based system. Similar systems are in use in a wide variety of industries.

At the Buick Motor Div. of General Motors Corp. in Flint, Mich., assembly line foremen and materials control personnel are using bar-coded labels with scanners in an integrated and real-time scheduling/production control system. At the head of the assembly line, where automatic transmissions are made for Buicks, Oldsmobiles, Pontiacs, and Chevrolets, an operator applies to each transmission case a pressure-sensitive, bar-coded label that identifies the transmission type. The label also bears alpha characters for human reading.

The system not only provides an accurate count by type of transmission built before the completed product reaches the shipping department, but also makes possible the generation of production profiles (hourly, by shift or on demand) for such purposes as the evaluation of assembly line performance and improved planning, scheduling, and tracking. And it does these things with a reduction in the direct labor involvement in such tasks.

The ITT system has a motivational side benefit. The system knows which assemblies come from which assembly worker and it maintains an index of quality. As this index rises, the rate of inspection for a given worker's output declines until that worker is certified. When certification is achieved, assemblies bypass inspection. And certification is used as measurement in wage adjustments, promotions, and other forms of recognition.

ITT Courier developed a computerized shop floor control that tracks the second-by-second status of every part and assembly.

Best Industries, Houston, Texas, a company in the petroleum field, is implementing a manufacturing information system. Paul A. Schneider, director of manufacturing, said it has already minimized manufacturing response time to market requirements, has brought about a \$2 million inventory reduction, has increased shipments and increased customer service, and he calls his system "a plain vanilla version."

Schneider said when his company brought in a computer its justification was

manufacturing support, but through 1978 and 1979 there was minimal manufacturing support. "Data processing became a monopoly of the accounting function."

When he decided he wanted a manufacturing information system, he said, he faced choices. "We could have given data processing more people and let them do it. A number of vendors came in to tell us what they could do for us. Everybody was telling us 'trust me'—even our own internal data processing group." Schneider decided to trust himself.

"We treat the dp people as information plumbers. We don't care how they put the pipes together to make the information flow." He says he has no intention of ever writing a final chapter to his system's story.

—Edith Myers

MARKETING

TELIDON TEST SET FOR D.C.

Canada's Telidon beat out Prestel and Antiope for the videotex field trial in Washington.

It was a feather in the cap of the Canadian high technology industry when the Telidon system was selected for the videotex field trial that will begin in the Washington, D.C. area late this year. Canadians consider the pact a milestone since Telidon won the half-million dollar contract over some hefty competitors—the British Prestel and French Antiope systems.

Sponsors for the field trial include the Corporation for Public Broadcasting, the National Science Foundation, the Commerce Department's National Telecommunications and Information Administration (NTIA), and the Department of Health, Education and Welfare.

WETA-TV, Washinton's public broadcasting station, signed the contract with Norpak Ltd. of Pakenham, Ontario, and Electrohome Ltd. of Kitchener, Ontario. Norpak will supply the Telidon information provider terminal, encoders, and the statistical logging equipment; Electrohome will provide the tv monitors.

The videotex trial will involve 64 sites, including offices, homes, and educational institutions. Information services will come from such organizations as *The Washington Post*, the Smithsonian Institution, District of Columbia libraries, and major U.S. government agencies. The Telidon signal will be integrated into the standard

NEWS IN PERSPECTIVE

WETA station transmission but will be received only by the 64 sites with Telidon terminals.

Telidon was developed last year by the Communications Research Centre of the Canadian federal Department of Communications. A research group under the direction of Dr. Herb Bown had been working on a computer-aided graphics system when the British and French videotex systems were announced, which spawned the develop-

ment of Telidon.

The difference between the Canadian system and its competitors is the graphics package. While Prestel and Antiope use an alphamosaic or "building block" approach, Telidon employs an alpheometric approach. The Canadian developers claim the resulting picture on the screen is much smoother, providing at least 10 times the graphics resolution of the other systems.

Sources in the communications field indicate that both Prestel and Antiope researchers are now working on a dynamic redefinable character set to provide a Telidon-like quality for their systems. This capability, however, is not expected to be available before 1982.

U.S. manufacturers seem to be jumping on the bandwagon with versions of two-way interactive graphics systems. Some seven firms demonstrated such systems at the recent National Cable Television Association show. And with recent rulings on both sides of the border stating that cable companies must provide services beyond broadcast, there is an even greater demand for high quality interactive two-way home information systems.

The Canadian government decided to capitalize on this growing interest with an active marketing strategy for Telidon, particularly in the U.S. A trade delegation consisting of representatives from the Department of Communications and interested suppliers visited San Francisco, New York, and Dallas to demonstrate the system to newspapers, cable companies, as well as others.

Patrick Perkins, marketing manager for SED Systems Ltd., which participated in the trade delegation, said there are possibilities of further field trial announcements before the end of this year at sites in Texas, Georgia, and Kansas. He indicated that his company and the Department of Communications would be providing another demonstration in Chicago soon, and are also planning similar demonstrations in other parts of the world.

For future field trials, SED will be supplying the information provider terminal developed by Norpak Ltd. SED is working on a similar terminal, which it hopes to manufacture at a later date.

—Beverley J. Bleackley

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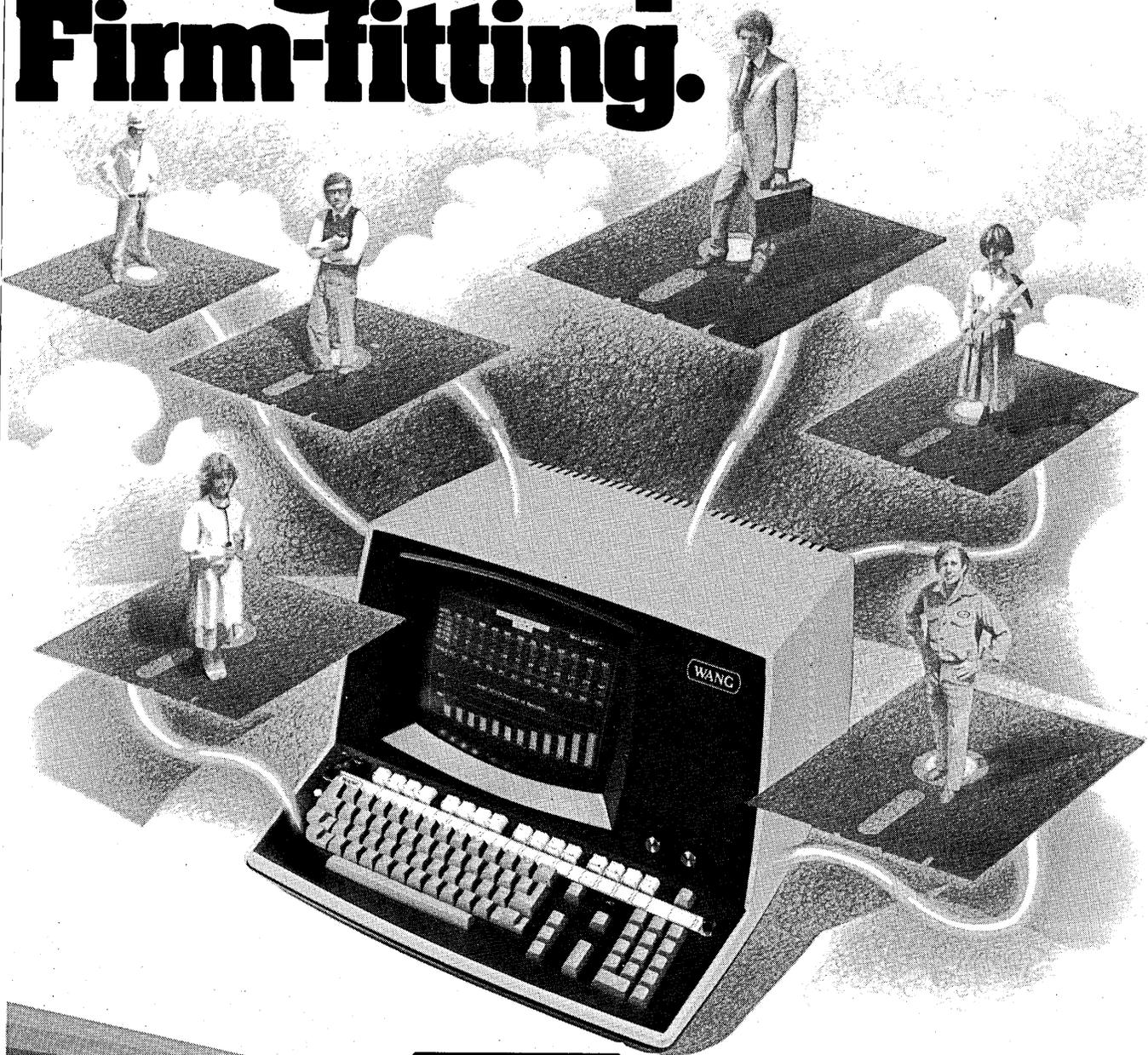
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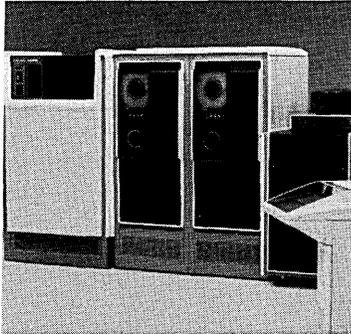
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NEWS IN PERSPECTIVE

facing attendees at the annual Syntopican conference held in Minneapolis by the International Word Processing Association.

In both technical sessions upstairs and equipment exhibits downstairs at the Minneapolis convention center, word processing supervisors were exploring ways to cope with the relentless march of technology that is combining word processing with other office automation functions and even dp operations. Vendor exhibits made it clear that the freestanding wp systems of yesterday were being upgraded with electronic mail, typesetting interfaces, and a

myriad of other advanced capabilities including communications. All the multifunction, multipurpose systems clearly pointed the way toward integrated corporate

The real Syntrex innovation was found in the clustered Gemini and Capricorn systems.

networks and made IWP members wonder where their operations would fit in.

As industry consultants were tracing the evolution of word processing into multifunction information handling systems,

attendees seemed intent on finding ways to retain their document handling operations. Industry sources at the conference agreed privately that the IWP needed to broaden its horizons to much more than word processing if the organization is to offer a viable corporate growth path to its membership.

Despite the management conflicts that confronted attendees, the exhibition was a showcase of the latest in office automation—though most product announcements dealt with evolutionary upgrades rather than innovative technical breakthroughs. A significant exception were the first products to be unveiled by Syntrex Inc., a venture capital startup supplier which showed a family of three systems.

The entry level Aquarius system was described as an "office appliance" that uses the IBM Model 50 Selectric typewriter as an I/O device. When modified to operate in the Aquarius workstation, the Model 50 is outfitted with a pad of control keys and a new cover—all with the blessings of IBM, according to Syntrex officials. Industry observers at the Syntrex booth were reminded of early days in the plug-compatible disk business and wondered if history was about to repeat itself in the office systems arena.

The Aquarius was designed to compete with the IBM Displaywriter, and both systems were demonstrated at Syntopican after having been officially announced the previous week. While the Displaywriter used the Model 50 Selectric for output only, Aquarius utilized the electronic typewriter as a full input and output device. The Syntrex system was small enough to fit on the typewriter return of a standard office desk and it was available at lower cost for some configurations than the IBM system.

But the real Syntrex innovation was found in the clustered Gemini and Capricorn systems. Offering upward compatibility for Aquarius users, the clustered systems had redundant disk storage with a failure protection scheme called Always Up. Data keyed into the systems was stored on both disk subsystems, and when a failure occurred in either storage unit, a built-in automatic dialer initiated a call to a Syntrex maintenance center so that operating parameters in the malfunctioning disk could be monitored by service technicians.

Much of the troubleshooting could be accomplished without on-site human intervention, according to Dan Sinnott, Syntrex president, and it was entirely possible that a user would first learn of the malfunction when the Syntrex service center called the customer to arrange for the replacement of components that had been isolated as the cause of the malfunction. Called the Service Genie, the automatic maintenance system clearly had implications for other office automation and dp systems even though it depended on fully duplexed disk subsystems for its fail-safe operation.

—Ronald A. Frank

Tomorrow-minded UNIVAC APPLICATION ANALYSTS



Martin Marietta Aerospace, NASA's Contractor on the Space Shuttle External Tank, has immediate openings for Univac Application Analysts.

Position requires designing and programming a variety of engineering and specific programs utilizing ANS/COBOL for application on Univac 11XX equipment.

Qualified individuals should possess a BS in Mathematics, Computer Science, or related discipline, and have a minimum of 3 years scientific and/or business programming utilizing data base methodology.

We offer competitive starting salaries and fully paid company benefits. These opportunities exist at the Michoud Assembly Facility located in Suburban East New Orleans. Qualified candidates interested in learning more about these opportunities at Martin Marietta...the tomorrow-minded aerospace people, should forward resumes including salary history to: Ms. Dottie McCann, Martin Marietta Aerospace, P.O. Box 29304, New Orleans, Louisiana 70189. We are an equal opportunity employer, m/f/h.

MARTIN MARIETTA

CIRCLE 69 ON READER CARD

"Our NCR operating software makes our programmers more effective."

Richard Shurley, Capital City Press,
Publishers of STATE-TIMES and MORNING ADVOCATE

SHURLEY:

We've come a long way in a short time. With NCR's advanced software we've gone from a simple batch system to an online virtual memory system that gives us direct access to the data base. In less than two years. We now have the system we need to respond quickly to the needs of our management.

NCR's MILLER:

You were one of our software pioneers, too.

SHURLEY:

We were NCR's 11th VRX site. And the first to install VRX TOTAL, VRX TRAN-PRO and VRX TRAN-QUEST.

NCR's MILLER:

It's very unusual for one user to step out front so often.

SHURLEY:

We kept coming back for just one reason: it kept paying off. It's hard for anyone with data processing experience to believe what



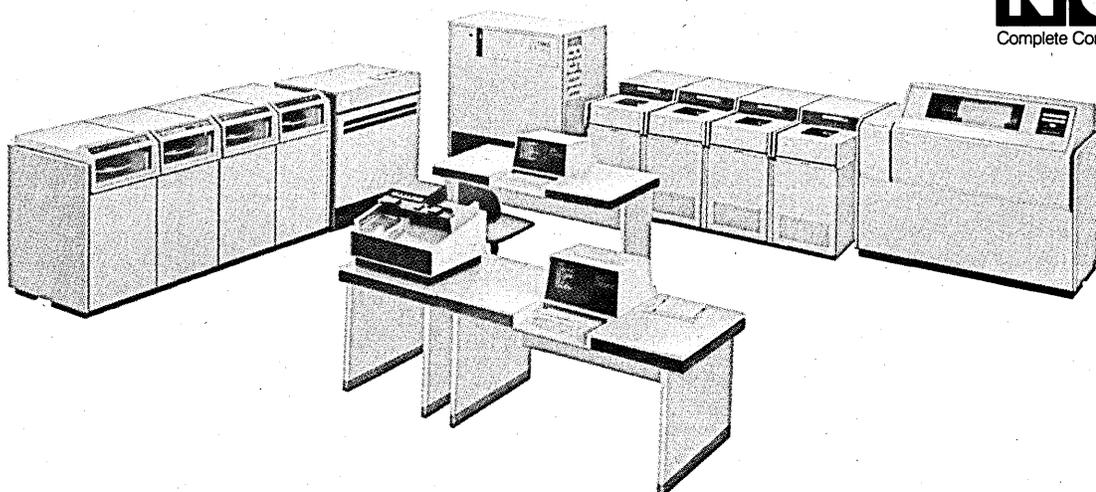
Richard Shurley (right) is Data Processing Manager of Capital City Press, Baton Rouge, Louisiana. Thomas Miller is the NCR representative.

we have accomplished with a small, efficient staff and NCR's versatile basic software. Our programmers have really broadened their potential.

* * *

VRX (for Virtual Resource Executive) is NCR's most sophisticated operating system. TOTAL is the data base management system. TRAN-PRO simplifies transaction processing. And communications programming. TRAN-QUEST makes it easy for anyone to get exactly what he needs to know out of the data base. But only if he is authorized to pass through the security barrier.

In inflationary times, programming efficiency is a particularly important objective. To find out how NCR can help you keep your costs down, phone your local NCR representative. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.



NCR
Complete Computer Systems

An NCR computer can make it happen for you, too.

CIRCLE 76 ON READER CARD

Now you can watch your four favorite programs...

The new HP 2626 display station will give a view of your computer system you've never seen before.

It lets you divide the screen into as many as four separate "frames," each attached to a different workspace in the terminal's memory. You can check a program listing in one frame and access a file in another. Fill out a form in one workspace while the computer loads the next form into another. Or do text preparation and editing in adjacent frames. Right before your eyes.

That's not all. The HP 2626 has two data communications ports instead of the usual one, so you can use the split screen capability to talk to two computers at the same time. Or log onto the same computer twice for simultaneous batch and interactive jobs.

More than meets the eye.

A high resolution character cell and a glare-reducing screen coating give the HP 2626 the sharpest, clearest display of any of our terminals. And that's saying a lot.

What's more, you can set line lengths of up to 160 characters in any workspace. Then scroll horizontally to get the entire picture. (The built-in thermal printer includes a compressed mode to print up to 132 characters per line.) Scroll vertically, too, or change the size of the frame at the touch of a key.

An interactive forms drawing module makes it easy to design forms, including drawing

horizontal or vertical lines with just a single key-stroke. You can even program the terminal for audio tones to cue your operator to critical or non-critical errors, or other conditions within a program.

Split decisions.

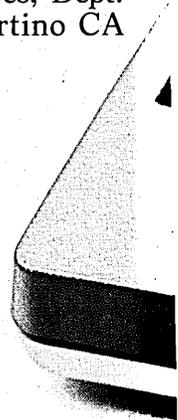
Hook up the HP 2626 to two computers (or the same one twice) and it's like getting a multi-tasking capability right in the terminal. Your systems designer can now compile, execute, monitor and edit programs as if two stations were available.

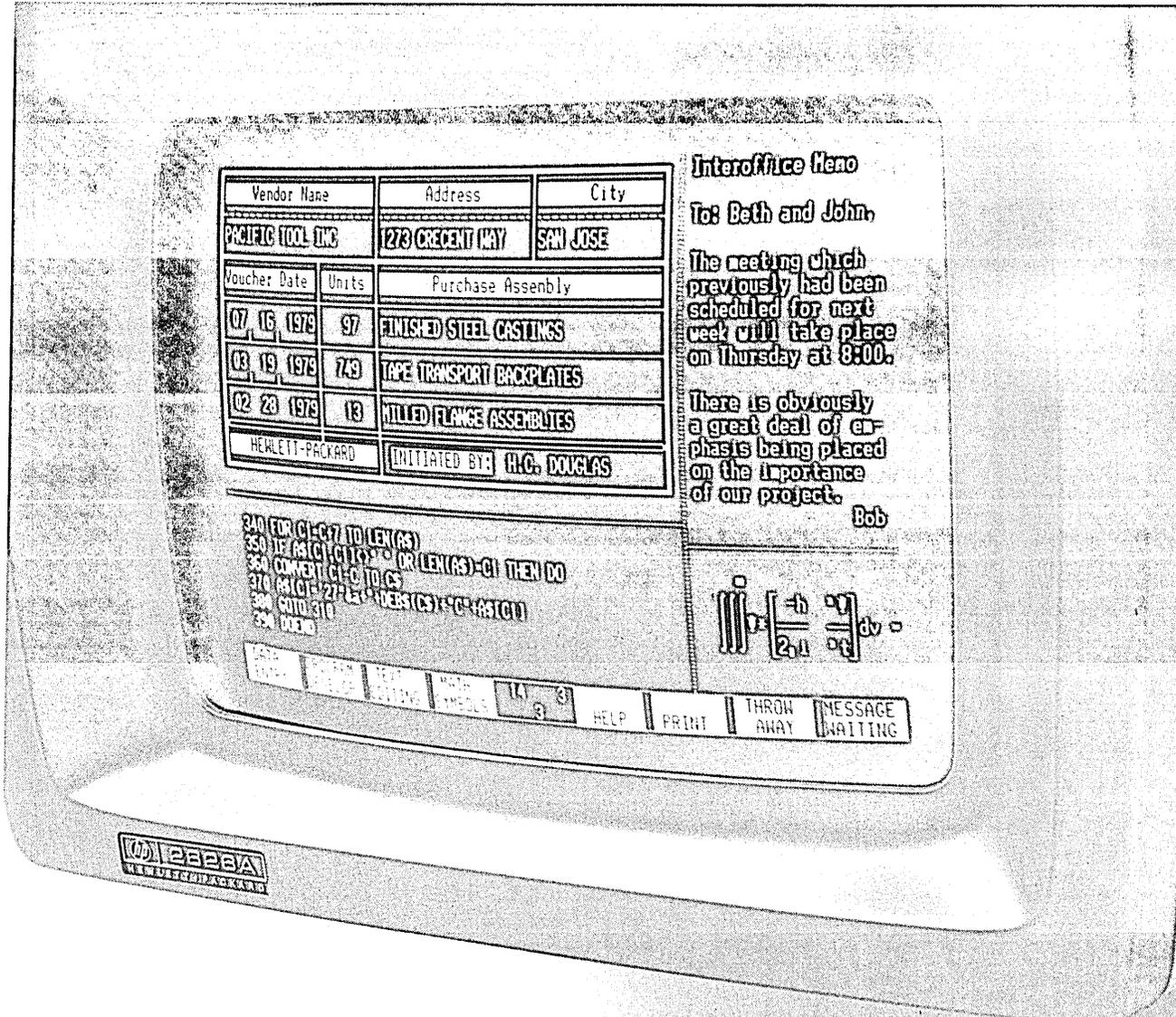
While your user is filling out a form, the terminal can be sending data from the previous form to a computer. And down-loading the next form into an adjacent workspace. By smoothing out the "type and wait" of data entry, you can take advantage of less expensive, low-speed transmis-

...same time.

sion lines without sacrificing the efficiency of your operator. The result? You'll get more out of the entire system.

If you'd like to watch a program on the new HP 2626 display station, or any of our terminals, just call your local HP sales office listed in the White Pages. You can also write for more information to Hewlett-Packard, Attn: Ed Hayes, Dept. 471, 19400 Homestead Road, Cupertino CA 94015. Or just return the coupon.





Vendor Name	Address	City
PACIFIC TOOL INC	1273 CRECENT WAY	SAN JOSE
Voucher Date	Units	Purchase Assembly
07 16 1979	97	FINISHED STEEL CASTINGS
03 19 1979	749	TAPE TRANSPORT BACKPLATES
02 28 1979	18	MILLED FLANGE ASSEMBLIES
HEWLETT-PACKARD		INITIATED BY: R.C. DOUGLAS

Interoffice Memo

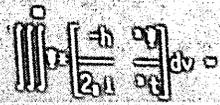
To: Beth and John,

The meeting which previously had been scheduled for next week will take place on Thursday at 8:00.

There is obviously a great deal of emphasis being placed on the importance of our project.

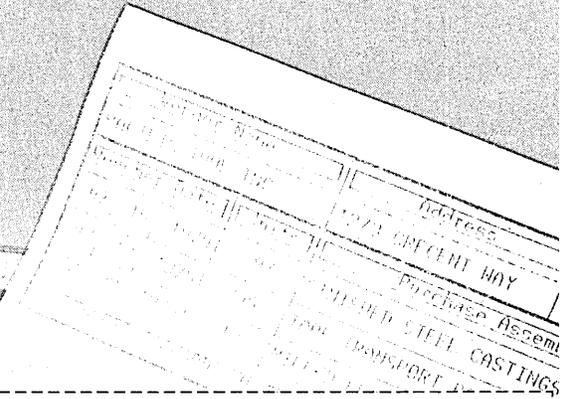
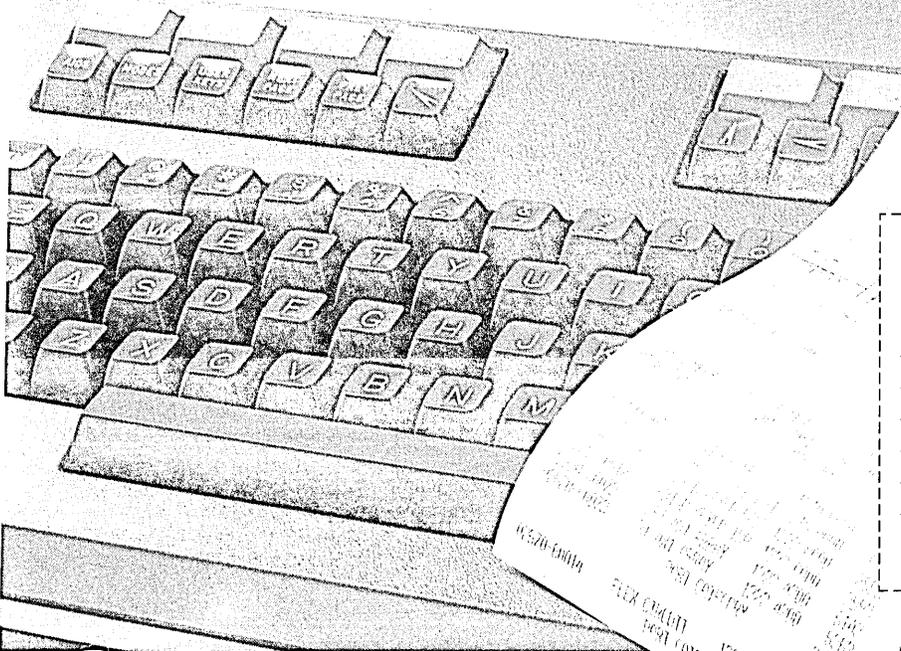
Bob

340 FOR C1-C7 TO LENS
 350 OF ASIC C1-C7 OR LENS-C1 THEN DO
 360 COMP C1-C7 TO LENS
 370 ASIC C1-C7 TO LENS
 380 C1-C7 TO LENS
 390 END



HELP
 PRINT
 THROW AWAY
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same station.



Yes! I'd like to find out more about the HP 2626 display station. Please send me your brochure.

I'd like more information on HP's family of data terminals.
 Please have a representative call me.

Name _____

Title _____

Company _____

Address _____

City/State/Zip _____

Phone _____

Mail to: Hewlett-Packard, Attn: Ed Hayes,
 Dept. 471, 19400 Homestead Rd., Cupertino, CA 94015.

CIRCLE 78 ON READER CARD

TV UNDER CONTROL

New information services allow viewers to control the tv instead of letting it control them.

Sometime sooner than many people would like to think, it may not be necessary to send the dog out to fetch the morning paper. Instead, you might start now training him to turn on the television.

On the screen will be all the news that's fit to print, and maybe then some. The tv will also display that day's shopping bargains, the status of your bank account, and even the recipe for that night's dinner. The idiot box will suddenly have a brain.

"Paper and transportation costs are increasing all the time," explained Alan Brighish, editor of *Videoprint* and a speaker at the second of two recent Washington seminars on "New Electronic Information Technology" sponsored by Cavanagh Associates. "At some point it will be more

economical to disseminate information by computer than by paper."

Based on the products displayed and discussed at the seminars, the industry was ready yesterday for the new era. It merely seems to be waiting for consumers to catch up. When they do, their tv sets and telephones will take on new importance. Almost anything they want will be at their fingertips.

In some places it already is. The French are heavily into Antiope, a videotex digital communications system which, through a handheld keypad the size of a pocket calculator, allows the user to call up a wide variety of information on his or her television set. As more services come on line, the less compelling it will be for subscribers to leave their homes. The French phone company is so impressed it plans to offer every subscriber a free Antiope terminal. Advertisers, bereft of the French equivalent of the Yellow Pages, will merely switch their brands to television.

"This is not a new technology," said David Simons of Digital Video Corp., Antiope's U.S. representative. "It's merely a way of applying techniques that already exist. It allows widespread access to and dissemination of predetermined information," basically through teleprocessing transmittal of characters on a given page sequentially and in digital form.

The system has been tested in the

U.S. by the CBS network and currently is being used by KCET-TV in Los Angeles. Results of further testing and recommendations for an optimum teletext standard are expected to be submitted later this year to the Federal Trade Commission, which will make the final decision on its use here in the States.

A similar system is being developed in Manitoba, where for the trifling sum of \$2 a month the telephone company will give subscribers a keyboard coded for their television. Project IDA will then offer information, transactional, educational, entertainment, and electronic mail services.

"The difference between us [Americans] and them," Simons said, "is that their governments drive technological progress harder." American technological progress, at least in the living room, has so far been limited mainly to The Source and MicroNET. The former, demonstrated at the first Cavanagh seminar, currently has 60% home users and 40% commercial. Eventu-

The French phone company is so impressed with Antiope it plans to offer every subscriber a free terminal.

ally it expects to have 2,400 programs for data bases and provide essentially the same services as Antiope and IDA. According to William Dreyfoos, national commercial sales manager for The Source, all presidential candidates are already on the system.

"Their privacy is protected because they don't have access to other individuals' codes," he explained, "so they can't check anyone else's data. We do a lot of electronic mail, too, and that's sparked most of the interest. Only a telephone is mandatory."

Even the banks aren't immune to change, seminar speakers stressed. Electronic funds transfer (EFT), which didn't fare well at the point of sale, is making a comeback in item processing. Many banks now will store their customers' checks, rather than return them. The customer instead receives a monthly summary of pertinent data with as much or as little detail as he or she desires. The bank will hold the check for 30 days, then record it on microfilm before trashing it.

"There were 28 billion checks written in 1977," said Patrick Portway, a board member of the EFT Association. "In 1985 there will be 52 billion. The cost of processing a check is somewhere between 29 cents and 52 cents per transaction. If half the checks were truncated, it would save \$1 billion per year." Banc One in Columbus, Ohio, a leader in banking by phone, will take EFT one step further this fall when it begins bill paying by phone. The bank will receive the bills and make the information available on the customer's television. The customer then picks what company, when, and how much he or she wants to pay.

—Willie Schatz

EDP SPECIALISTS career search opportunities \$18,000-\$50,000+

DATA BASE MANAGER to \$50,000+. Leading NJ co seeks mgmt level exp in DBA & a degree. Exposure to IDMS a must. This position is highly visible & offers excellent challenge & oppty in a state-of-the-art environment. Refer JD.

IMS DATA BASE ADMINISTRATOR to \$45,000. Need minimum 2 years solid IMS exp (Batch & On Line) for large scale distributed IMS environment. Good interface & communication skills important. Light travel. Refer NS.

DATA BASE ADMINISTRATOR to \$45,000. Super oppty w/a growing NJ DP organization. Must have exp in TOTAL, MARK IV, IMS, IDMS or other major Data Base System. Refer JD.

ANALYST to \$30,000. We currently have numerous opportunities for Analyst & Programmers at most levels of exp. Financial & Manufacturing Systems pre-

ferred. All costs paid by client companies. Refer JS.

SR. SYSTEMS to \$30,000. Billion dollar prestige mfg corp in choice VA location seeks Sr Analyst w/exp in Financial, Accounting, Payroll or Inventory areas. Large 370 OS, COBOL, IMS bkgd a plus. Refer DM.

TECH. SUPPORT to \$30,000. Major DP organization in Atlanta seeks individual w/either DOS or OS bkgd in support. Large IBM mainframe. Excellent training & career growth. Refer RS.

ARCHITECTURAL ANALYSTS to \$26,000. Join a systems development architectural staff dedicated to building advanced systems of the 80's. Be involved w/structured analysis & design, structured programs, interactive environment, paperless systems & user oriented systems. Refer BS.

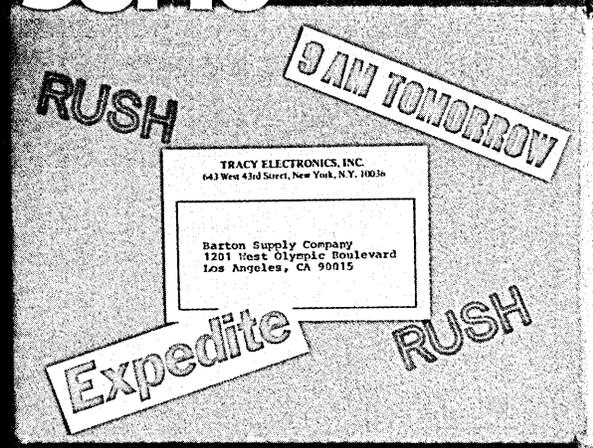
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BALTIMORE, MD 21204—R. Nelson, 409 Washington Ave., 301/296-4500
CHARLOTTE, NC 28202—J. Schwab, 1742 Southern Nat'l Ctr., 704/375-0600
CLEVELAND, OH 44131—A. Thomas, 5755 Granger Road, 216/749-6030
MCLEAN, VA 22102—D. Miller, 1710 Goodridge Drive, 703/790-1335
NEW YORK, NY 10036—N. Shanahan, 1211 Ave. of the Americas, 212/840-6930
PITTSBURGH, PA 15222—B. Sayers, 4 Gateway Center, 412/232-0410
PRINCETON, NJ 08540—J. Dean, 3490 U.S. Rt. 1, 609/452-8135
WILMINGTON, DE 19810—H. Greene, 3411 Silverside Rd., 302/478-5150
HOUSTON, TX 77096—G. Smith, 3000 Richmond Ave., 713/523-5504
LOS ANGELES, CA 90017—W. McNichols, 707 Wilshire Boulevard, 213/623-3001
SAN FRANCISCO, CA 94111—W. McNichols, 601 Montgomery St., 415/392-4353

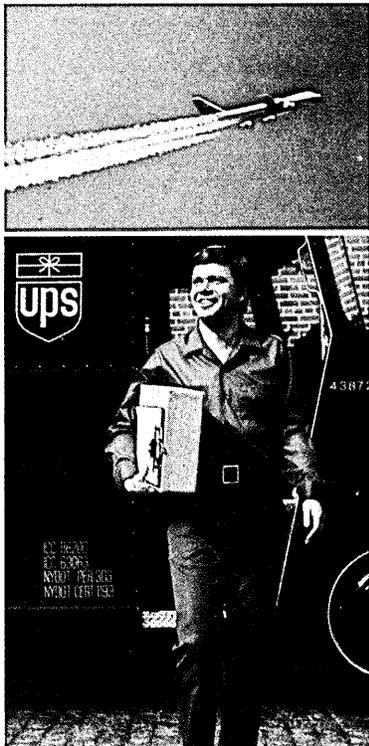
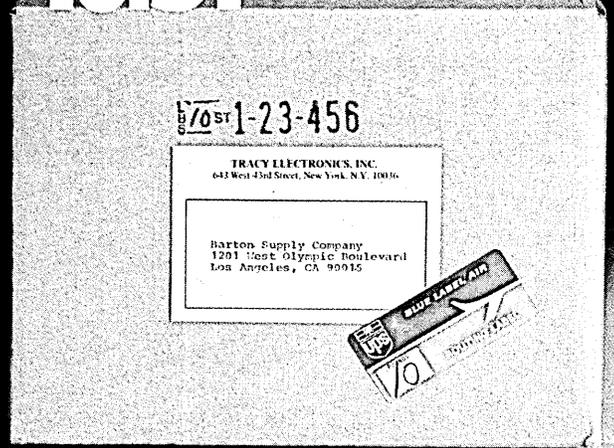
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A ten lb. package between New York and Los Angeles by overnight air costs about **\$36.48**



Same package shipped by UPS BLUE LABEL AIR Two Day Service. Cost **\$10.51**



United Parcel Service gives you an alternative to expensive overnight air delivery—Blue Label Air. It's the dependable two-day air service that can save up to 70% or more on every package you receive. And a tremendous amount of money at the end of a year.

Blue Label Air is a service of UPS. So that means dependability... a service you can rely on. Orders are delivered right into your hands, at no extra charge. And each package is automatically covered up to \$100 against

loss or damage.

Remember, we're not asking you to forget about overnight air delivery. For truly urgent shipments, it's invaluable. But for those deliveries that can fit a two business-day delivery schedule, Blue Label Air is the money-saving alternative you've been looking for. And with our recently expanded service area, we're helping more people save more money every business day.

Start saving today—Route your orders by Blue Label Air.

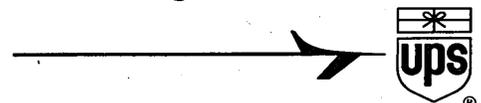
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CIRCLE 80 ON READER CARD



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BRS

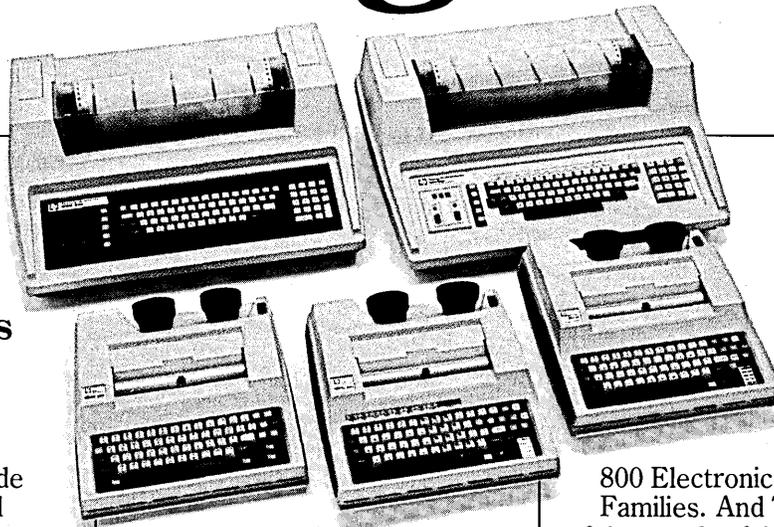
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TI's Data Terminals make data base information easy to manage.

Decision makers nationwide rely on TI's *Silent 700** and OMNI 800* Data Terminals and a variety of available data base services, as ideal solutions for fast, on-line access to essential information.

Data base service users realize that the low-cost Model 745 and the versatile Models 765 and 785 can be great for optimizing their on-line communications. With these portable terminals' built-in acoustic coupler, users can dial up the latest information from anywhere there is a standard telephone and electrical outlet. The compact Models 745 and 765 feature TI's thermal printhead for virtually silent 30 characters-per-second printing. For greater communications flexibility, the 765, with its unique bubble memory feature, can store inputted data even after the power is turned off. And the innovative 785, the first 120 characters-per-second thermal

printing portable data terminal, improves your transmission and communication capabilities.

The OMNI 800 Models 820 and 825 Keyboard Send-Receive Data Terminals are ideal for quick data turnaround. These efficient, desktop data terminals improve information flow with speedy 150 or 75 characters-per-second optimized bidirectional impact printing. Both models feature typewriter-like keyboards and can function in a number of data entry and computer timeshare environments.

Broad product selection, timely response and reliable performance make TI's *Silent 700* and OMNI 800 data terminals the answer for most any data base application.

TI is dedicated to producing quality, innovative products like the *Silent 700* and OMNI

800 Electronic Data Terminal Families. And TI's hundreds of thousands of data terminals shipped worldwide are backed by the technology and reliability that come from 50 years of experience.

Supporting TI's data terminals is the technical expertise of our worldwide organization of factory-trained sales and service representatives, and TI-CARE†, our nationwide automated service dispatching and field service management information system.

For more information, contact the TI sales office or Authorized Distributor nearest you, or write Texas Instruments Incorporated, P.O. Box 1444, M/S 7784, Houston, Texas, 77001, or phone (713) 937-2016. In Europe, write Texas Instruments, M/S 74, B.P. 5, Villeneuve-Loubet, 06270, France.



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TEXAS INSTRUMENTS

We put computing within everyone's reach.

CIRCLE 81 ON READER CARD

NEWS IN PERSPECTIVE

BENCHMARKS

NO GO FOR "STORDAHL": The proposed Amdahl and Storage Technology Corp. merger is off, and it seems the demands made by Fujitsu are the cause. Fujitsu and Amdahl signed a pact in 1972 stating that Fujitsu (holder of 28% of Amdahl Corp. shares) would continue as Amdahl's prime supplier of LSI components, and that the companies would cross-license their new circuitry developments. When STC entered the agreement with Amdahl, the pact between Fujitsu-Amdahl was satisfactory. Shortly thereafter, sources reported, Fujitsu insisted that Amdahl-STC either guarantee that it would sell a minimum number of large-scale computers using Fujitsu components or promise not to get into VSLI production. If not, Fujitsu vowed to enter the large-scale computer business in the U.S.—something it has not been able to do because of an updated pact signed with Amdahl in 1978. There was also some industry speculation that STC lost interest in Amdahl because of Amdahl's declining profitability. This theory was denied by STC.

IT'S NOT OVER YET: Although the controversial federal I/O standards are in effect, the feud continues. The standards were first implemented on June 23, and the next day a stay was slapped on them under an appeals court ruling. A few days later the Justice Department filed before the Supreme Court to have the stay order reversed, and was successful. The appeals court will have another go at the case in the fall; until then, the standards are on.

SYSTEM/38 IS ROLLING: After 11 months of fussing with software snags and on-site testing, IBM's System/38 is finally being delivered to customers. The original date scheduled to begin deliveries was August '79, but when the equipment wasn't up to par, the date was reset at mid-'80 (later narrowed down to July). IBM General Systems Division spokesmen were quoting delivery times of 18 months on systems ordered now. No details on volume of shipments, size of backlog, or possible cancellations due to the delay have been released.

RAVE REVIEW: Alanthus Computer Corp. and the Gartner Group, Inc., have unveiled RAVE, a forecasting tool that can predict residual values of used IBM 370-compatible computers. RAVE (Residual Asset Value Estimation) projects an appraisal of the used equipment's value under varying market conditions for the next four years.

Developed by the Gartner Group with support from Alanthus, the tool is designed to aid users and lessors in deciding whether to lease or buy, and on what terms. Gideon I. Gartner, president, stated, "We

think the marketplace needs this model because so many people were hurt by recent pricing actions by IBM, both in the leasing and user community. For example, other models were incapable of taking into account the effect of the 4331 pricing. Such information could have saved Lloyd's of London a few hundred million dollars." Data from the model will be available to Gartner and Alanthus clients on a "stand-alone basis or as part of Gartner's package of consulting services." The RAVE model is written in IBM's APL and comprises about 2,000 program statements. Its associated data base contains approximately 1 million characters of numeric information.

NEW HEAD AT AFIPS: Paul J. Raisig, Jr. has been named executive director for AFIPS, effective July 7. Raisig succeeds Jerry L. Koory, who had been serving as acting executive director since March 10. Most recently, Raisig had been a consultant in the Office of the Secretary of Defense, and to the Army Chief of Staff at the Pentagon. In connection with this work (reorganization studies to overhaul the Defense Department and improve the Army-wide Studies and Analysis Program), he aided the Egyptian Ministry of Defense by developing a plan to restructure the Egyptian armed forces. While serving as the vp of a Washington-based life insurance association from 1977 to 1979, he was the principal executive responsible for dp management. He has held numerous other positions in the dp field. As executive director of AFIPS, Raisig will have responsibility for the activities of the AFIPS headquarters office in Arlington, Va., including conferences, publishing activities, and the Washington Activities Office.

TELECOM MARKET TO DOUBLE: "World Telecommunications Study II 1980-1990," a study done by Arthur D. Little, Inc., culminates a two year effort that included 42 in-country surveys and an analysis of more than 90% of the world's telecommunications market. The study projects more than a twofold increase in worldwide telecom markets by 1990, growing from an estimated \$40 billion base in 1980 to about \$87.5 billion (constant 1979 dollars) by 1990, an average annual rise of 8.5%. Sharp changes are foreseen in regional patterns, such as the Asian region's growth rate from 1980's estimated market of \$10 billion to \$27 billion in 1990—a rate well above the world's average. This study is the first English language in-depth survey of the Russian market, and it shows that the U.S.S.R. currently accounts for one-third of the Asian telecom equipment market.

IBM UPS PRICES: IBM is increasing prices for some of its equipment, services, and program products. The increases are the result of a "normal business review" which

takes into consideration the effect inflation has on regular business costs. Rental and lease prices on some equipment are being increased 5% by the Data Processing Div. and 7% by the General Systems Div. Both divisions are increasing purchase prices on some products by 5%. Monthly maintenance for certain equipment goes up to a 10% increase, and hourly maintenance, educational courses, systems engineering services, and some General Systems Div. program products will also go up 10%. The increases in purchase prices, hourly maintenance, and services are now in effect. New prices on leases, rentals, monthly maintenance, program products, and education will be effective Oct. 1.

LIVERMORE LOVES CRAY: Lawrence Livermore National Laboratory (LLNL) is ordering a \$7.7 million Cray-1S/1000 computer system from Cray Research, Inc. of Minneapolis. LLNL is an R&D lab, operated by the University of California for the U.S. Department of Energy. It designs nuclear weapons and conducts research in other areas of national defense, laser and magnetic fusion energy, several nonnuclear energy technologies, and environmental and biomedical sciences. Says Dr. Gus D. Dorough, LLNL associate director for Chemistry and Computations, "The new computer will be used chiefly to solve the huge mathematical equations used in nuclear weapons design and laser fusion research."

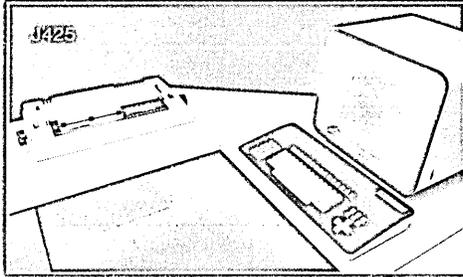
ACM ELECTION OVER: Dr. Peter J. Denning, professor and chairman of the Computer Science Dept. at Purdue University, was elected president of ACM for a two year term that began last month. He previously served as ACM vice president ('78-'80), council member at large ('74-'78), chairman of the Special Interest Group (SIG) board ('70-'74), and editor-in-chief of ACM's quarterly, *Computing Surveys* ('77-'79). Dr. Michael A. Harrison, professor of computer science at the University of California, Berkeley, was elected ACM vice president. Kathleen A. Wagner, a financial/budgeting systems consultant (administration) for the State of Wisconsin, is the new ACM secretary.

EXEC APPOINTMENTS UP: Executive appointments for the second quarter of 1980 increased a slight 1% over the first quarter, according to Wytmar & Co., executive recruiting consultants. This increase still leaves appointments 1% below the comparable second quarter of 1979. The deteriorating national economy is seen as the cause, and this slowdown in executive appointments is expected to worsen. The group claims third quarter executive appointments will fall off due to declining business conditions and the normal seasonal decline in executive appointments during the summer months. *

AM Jacquard Systems

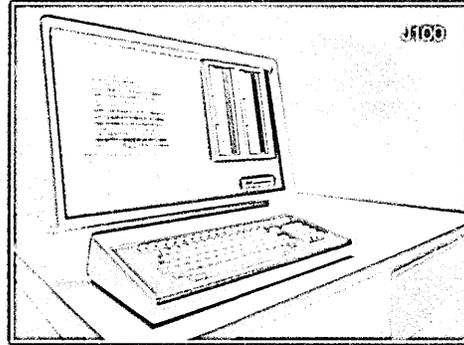
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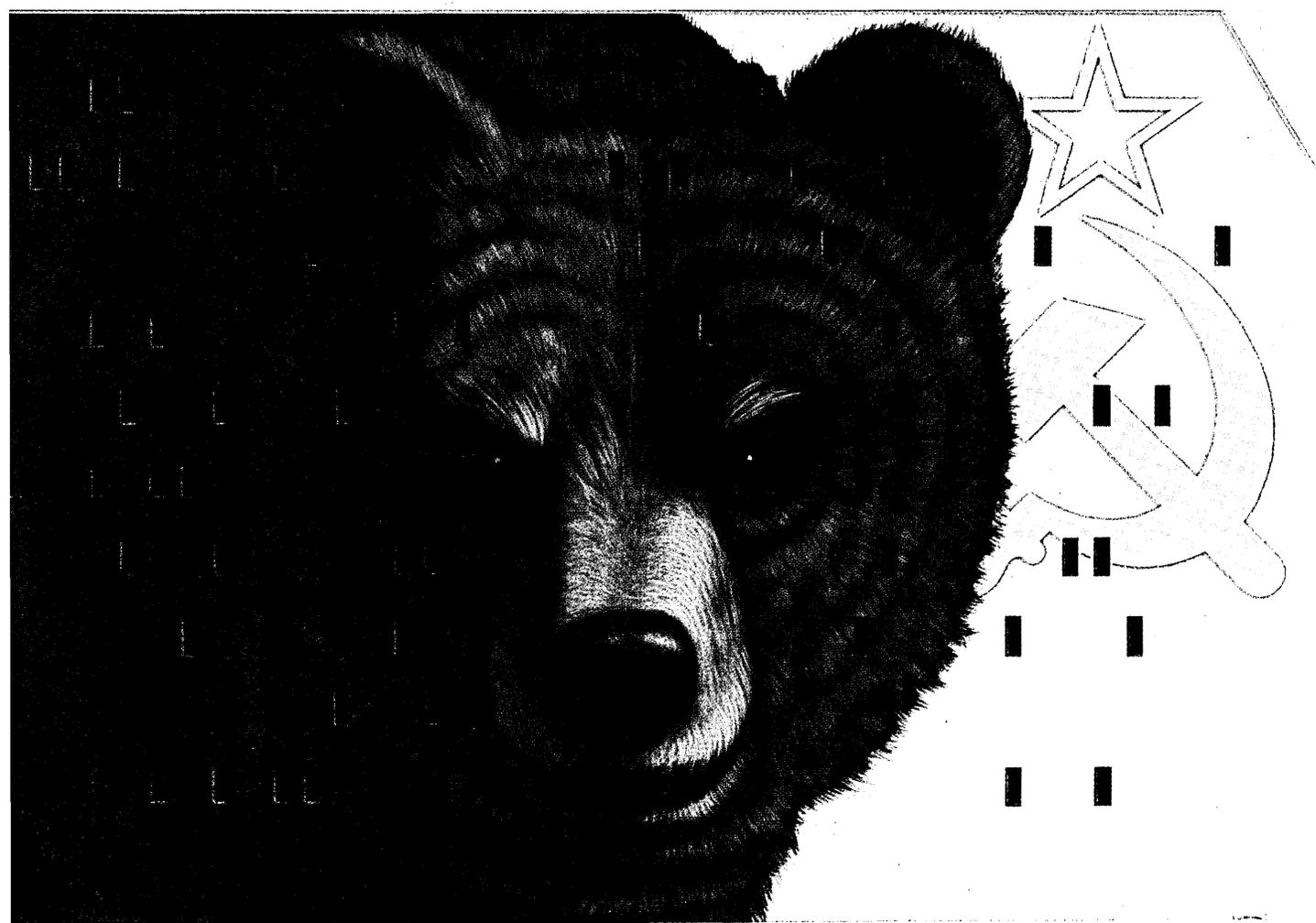
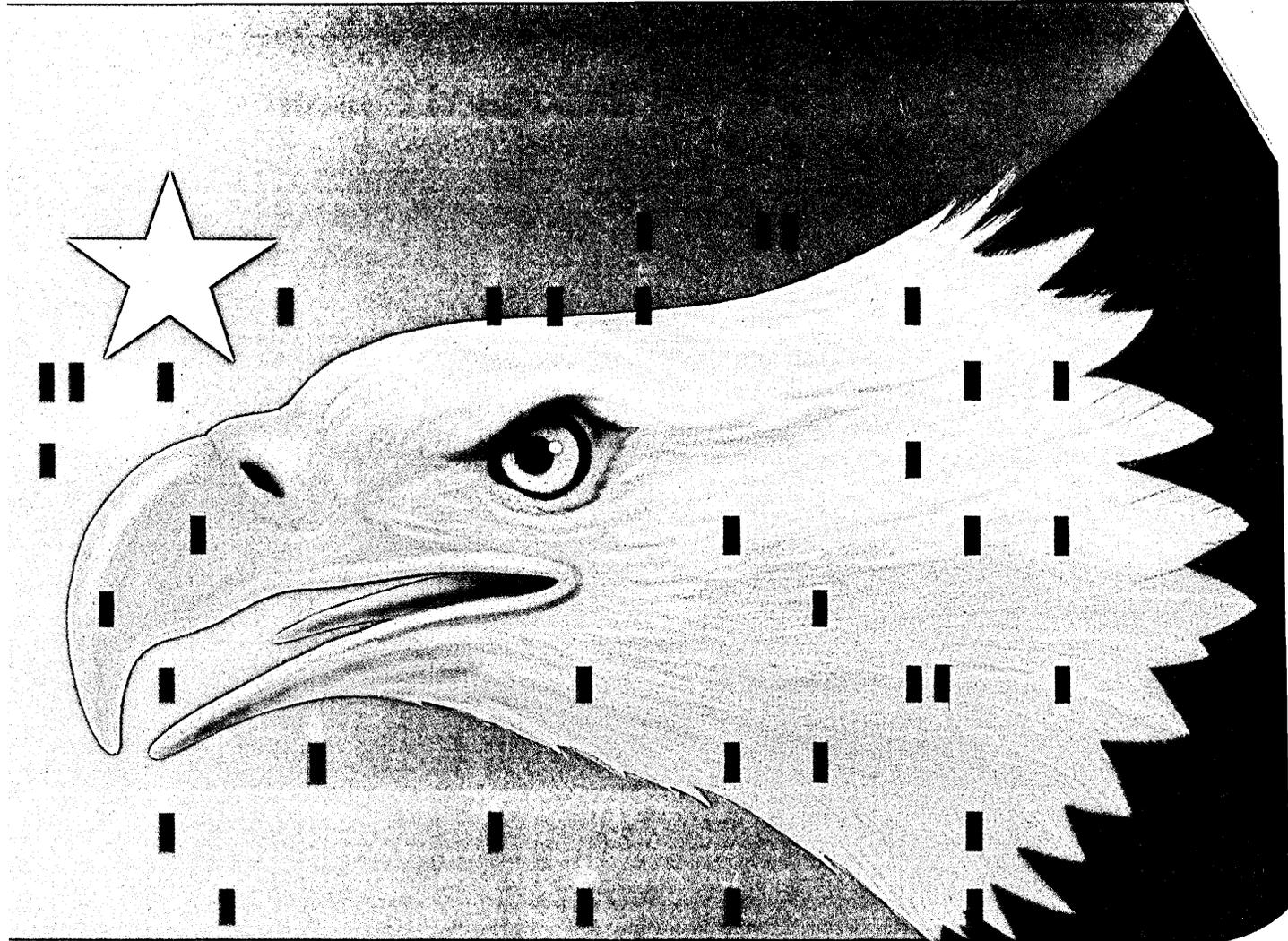
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A NEW SET OF GROUND RULES

by Archie J. McGill

In a half-century of regulating the communications industry, the Federal Communications Commission has never before acted with such far-reaching effect as it did recently in handing down the Final Decision in Computer Inquiry II. In this bold move, the FCC abandoned its attempts at distinction between, and separate treatment of, telecommunications and data processing. These two functions, in the past viewed as separate disciplines and markets, are relentlessly merging and emerging within a single information management marketplace. The FCC, in the Final Decision, is permitting a wide range of vendors to blend information processing functions more freely with telecommunications functions to be applied to industry and personal information management needs.

In effecting this change, the FCC, as it has done in the past, must continue to seek a delicate balance in its management of the remaining regulated portion of telecommunications functions while it pursues a direction of permitting competition to take on the role of surrogate regulator in the bulk of the information management arena. The FCC uses rules as the tools to cause change. The challenge for all the stakeholders in the information management arena is to assure that an orderly path from operations under existing ground rules to the implementation of a new set of ground rules is established.

Difficult as it may be to achieve a new kind of environment and a smooth transition, I have absolutely no doubt that it must be accomplished, because information processing and telecommunications functions share one common set of technologies; operate on one kind of commodity—information; and have one common set of user benefits—improved productivity, enhanced ability to manage complexity, and in many ways, ability to improve the quality of life of the individual. Given the need for the action described above, the issue is as follows: under the proposed ground rules, can the appropriate/desired environment be achieved? Will the needs of business and personal users of information management systems be met more fully than under the old ground rules?

In this emerging information manage-

ment marketplace, will carriers or computer vendors dominate? A flaw in the setting of ground rules can favor one party over another. A flaw could favor new entrants—cash-rich corporations, and foreign corporations possibly subsidized by their governments. On the other hand, a well-executed set of ground rules can permit all these to coexist to the benefit of their shareholders, employees, customers, and interested publics. It is this kind of balance for which I argue, a balance among all kinds of vendors—small vendors, foreign vendors, all vendors who have value to bring to a customer.

In short, and more to the point, let us not unduly handicap the players (who have earned historical success by substantial contributions) to the degree that their long- or short-term abilities to meet customer needs are threatened. Instead, let us seek to ensure the application of the full creative powers of all participants in the emerging information marketplace.

FCC'S PURPOSE THE SAME

I believe that the FCC's purpose in putting forth the Final Decision is completely consistent with the foregoing. The FCC's objectives are (1) to foster an environment conducive to innovative offerings, (2) to eliminate artificial boundaries between data processing and communications so that users can benefit from the merging of the two technologies, (3) to minimize the potential for cross-subsidy between regulated and unregulated services, (4) to promote fair and equal competition, (5) to protect the quality and efficiency of the national telephone service, and (6) to ensure open access to common carrier service.

However, while I fully embrace these objectives, certain aspects of the implementation requirements are somewhat ambiguous and need to be clarified. Some provisions place specifically on AT&T and GT&E handicaps that are not similarly applied to other vendors in the information management marketplace. Such handicaps, I believe, should not be applied to all vendors because they do not further the FCC's basic objectives and they prohibit vendors' abilities to meet customer needs.

The specific provision of the CI II Final Decision that most severely handicaps

Bell is the one that prohibits ownership of transmission facilities by the mandated separate subsidiary chartered to vend customer premises equipment and enhanced services. The separate subsidiary is constrained to acquire all transmission capability from among tariffed services. This should bring concern to customers looking for innovative, customized systems from their vendor, customers looking for a maximum number of significant alternative systems vendors, and policymakers who have an interest in a positive balance of payments and the relative strength of U.S. vs. foreign industry.

Why should this cause concern? The separate subsidiary would be constrained from being as able as its domestic and foreign competitors to respond rapidly to unique customer integrated system requirements and to provide customized solutions. The result is likely to be that the incentive and the innovative ability of the Bell System, whose capability for innovation has been historically demonstrated and whose potential contribution through innovation is at least as great as that of its existing and emerging competitors, will be severely diminished. The curious condition that would be created is that Bell, having provided the most comprehensive communications systems, would be measurably less effective in the role of a systems vendor, while the new participants would be permitted to be full systems vendors.

A LOOK AT THE PAST

Early on, telecommunications emerged in rudimentary form. Then, in 1934, the Communications Act was adopted with the principal objective of universal, affordable telecommunications service. In the '50s and '60s, technologies emerged that were applied aggressively to data processing as well as to telecommunications. The boundaries began to blur between these disciplines.

Beginning in 1967, competition was permitted to enter the world of telecommunications. This added complexity of emerging competition in a regulated industry, along with the application of digital processing to the building of systems cross-elastic with regulated services, created a regulatory dilemma.

The increasing graying of the demar-



The customer is demanding from vendors constant improvement in the price/performance of systems focused on rapidly changing business concerns.

cation between telecommunications and information processing brought about an effort to define that demarcation in the First Computer Inquiry of 1971. Continuing application of technology led to the obsolescence of CI I. Enter CI II.

In the 1960s, users became aware of the huge potential of data processing technology to help them solve business problems, and they began applying this technology aggressively. On the heels of this effort came the realization that an analogous but even larger opportunity awaited them—the application of a combination of data processing and communications technology against their business problems.

The nub of business communications opportunity lies in the understanding that from 20% to as high as 80% of total operating business expense is direct communications expense. Such expense includes mail, telephone, meetings, travel, document handling, and associated salaries. Much of this is personnel expense dollars.

In addition, business today is faced with stiffer competition; rapidly rising personnel and energy costs; a need to reach new markets through geographic expansion, including international; and therefore the need for timely, accurate, and relevant information to manage the resulting complexity. Thus, the customer is demanding from vendors constant improvement in the price/performance of systems focused on unique and rapidly changing business concerns.

COMPLEX USER NEEDS

In the face of this mounting complexity, users increasingly see the need for vendors to structure a complete system. Often, unique needs motivate users to seek solutions that are beyond the scope of what can be obtained "off the shelf." Certainly, no vendor can meet all systems needs of a customer. Thus, there is a desire for a choice among vendors.

In the past few years, we have learned to understand these business issues industry by industry, application by application. We have expended energy to create improvements in service, product provisioning, and policy and organization, focusing directly on customer needs as we understand them. There is still much that remains to be accomplished: systems architectures, modular/flexible/programmable products, maintaining service excellence in the face of increasingly complex telecommunications systems.

The needs described and the action implications are not universally applicable to all segments and customer sizes. The trend, however, is clear. Easy-to-use systems, excellent service, and price/performance and function improvements are universal needs.

The decision calls for detariffing all

customer premises equipment and all enhanced network services by March 1, 1982. The Bell System must form a separate subsidiary to sell detariffed products and services, which may include processing. (Other conditions in the Final Decision attempt to define basic vs. enhanced service and customer premises equipment, and address the degree to which resale of basic service is permitted by subsidiaries.) Within this framework the Bell subsidiary may not own or market transmission facilities or equipment, and is therefore not permitted to integrate customer premises and transmission equipment.

It would seem that these extraordinary constraints on the Bell System, but not on their competitors, are rooted in the FCC's desire to meet its objectives. We believe that the structural requirements and the resale provisions of the Final Decision for the subsidiary provide an adequate safeguard, and that the conditions listed above are not necessary; they are unduly restrictive and certainly not in the best interest of users.

Here are some recommended modifications:

Most important is that there be relief from the prohibition of transmission facilities ownership. This issue has been adequately covered in this article and its importance accentuated by the discussion on customer needs.

Secondly, definitional uncertainties exist. What is "customer premises equipment"? How can transmission equipment realistically be regulated separately from the customer premises equipment switching function? What precisely is meant by basic vs. enhanced service? Is the current implication that basic service is totally "transparent" too restrictive? It is my view that flexibility, subject to regulatory scrutiny of the carrier, be maintained. Let it be left to the market to decide how and from where function can best be provided.

Third, to the extent that the separate subsidiary is precluded from offering even resold basic services, customers desiring integrated information management systems will be less well served.

Fourth, the time frame in which change is to be accomplished is potentially too short for orderly transition to take place. Time frames proposed in the order to handle certain key financial and other issues should be reconsidered by the commission and be made event not calendar driven.

LEGAL ACTION NEEDED

Finally, open legal issues and uncertainties relative to the Consent Decree make it difficult to respond with certainty to the intent of the decision. Rapid resolution of such issues must take place through the legislative process if CI II is not to stagnate in the courts. Legislation can

provide the permanent answers to questions that have vexed the industry and the commission for the past decade. We are and have been urging Congress to revise the Communications Act to get those answers. We will continue to urge such action for as long as it takes to get firm ground rules consistent with the environment of the '80s and beyond.

At stake here is the efficiency and speed with which American industry can apply information management technology to address productivity improvement opportunity measured in the hundreds of billions of dollars in the mid-'80s; scarce resource conservation opportunity, as in energy management systems; and improvement in the overall quality of life for the American worker, such as reduction of business travel through electronic conferencing.

At stake, also, is the degree to which Bell will be permitted to compete against the influx of strong multinationals. Such competition is certainly evident in computers, electronic components, communications, as well as other areas.

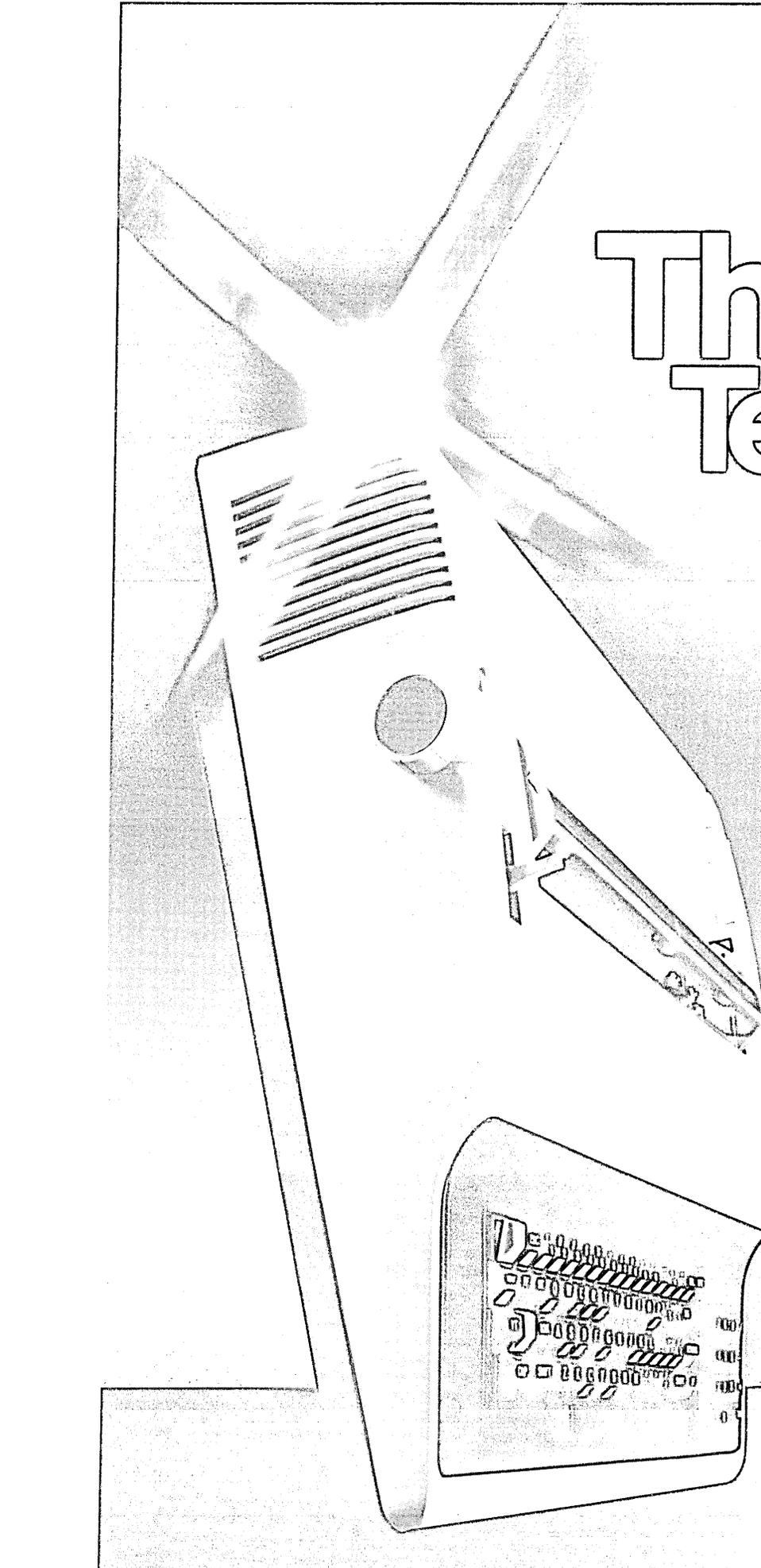
At stake, finally, is the degree to which this country will be assured of continued high quality, innovative, business and personal communications services.

In summary, if the promise of the blending of communications and data processing is to be realized by users and vendors alike, the services and underlying technology must be allowed to develop as freely as possible. The FCC's Final Decision, in Computer Inquiry II can, with some thoughtful modification, provide a framework within which this can happen. *

ARCHIE J. MCGILL



Archie McGill joined AT&T in 1973; since August 1978, he has been vice president of business marketing. Immediately prior to joining AT&T, Mr. McGill founded and was president of McGill Associates, a computer and telecommunications consulting firm. In his earlier business career, he was employed by IBM (1956-1969), and made history as IBM's youngest vp at the age of 33. Mr. McGill has lectured in Moscow, and visited China at the invitation of its Ministry of Post and Telecommunications. With his wife Jeanne and their seven children, he enjoys skiing, golf, and tennis.



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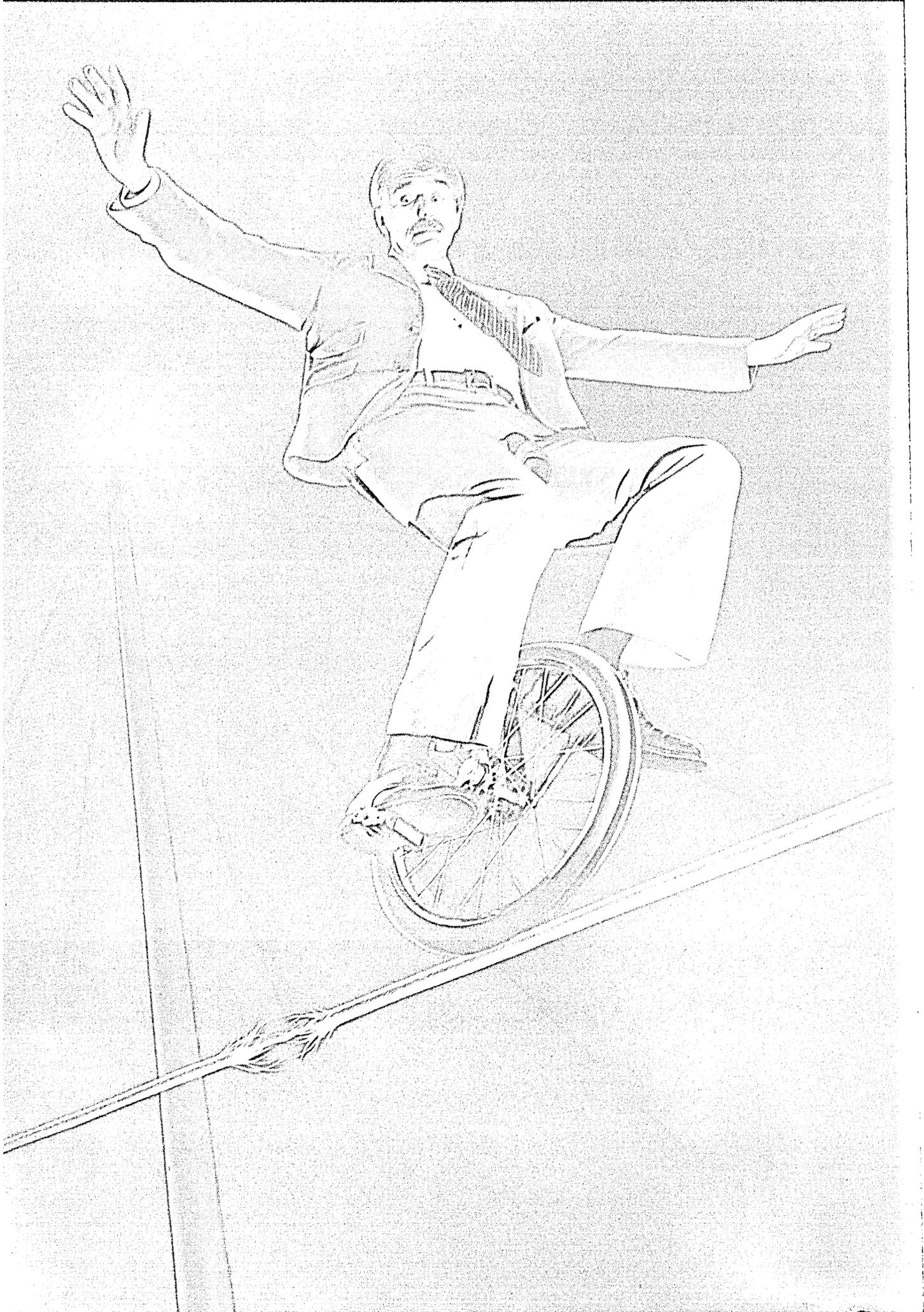
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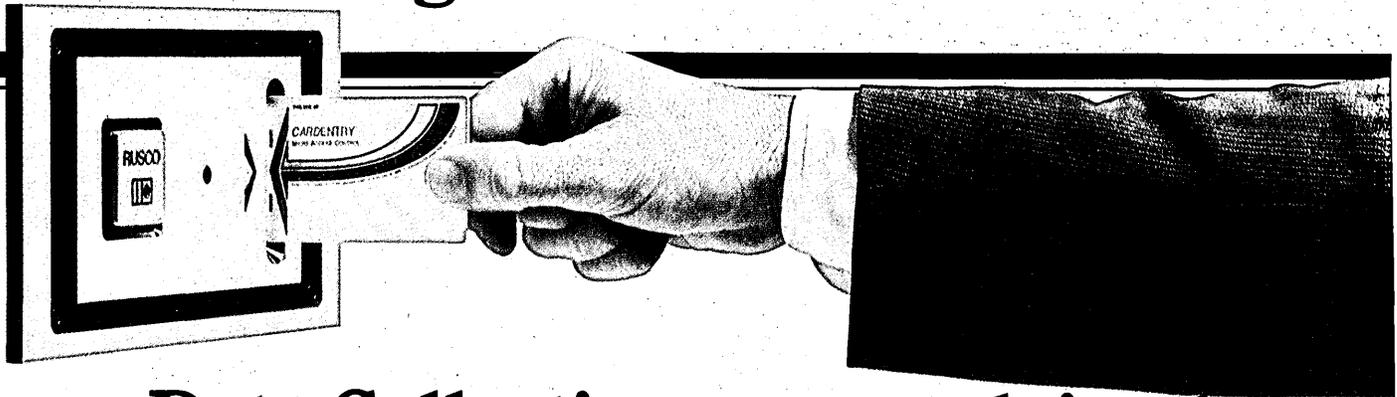
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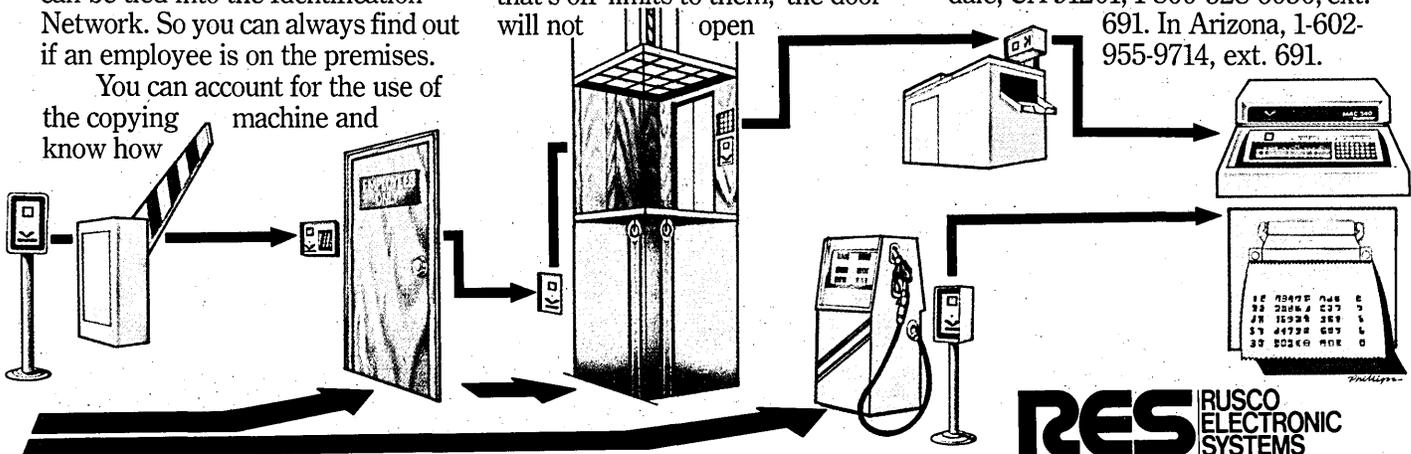
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CIRCLE 86 ON READER CARD

A look at the effect the FCC's Computer Inquiry II decision on AT&T will have on the marketplace, the suppliers, and the users of computer and communications goods and services.

AFTER THE FCC'S DECISION

by John M. Eger

"The FCC hit a home run."

That's the conclusion of Congressman Lionel Van Deerlin (D.-Calif.), chairman of the House Subcommittee on Communications and sponsor of the now famous, or infamous, "rewrite," H.R. 13015; son of rewrite, H.R. 3333; and the present offspring, H.R. 6121—a scaled-down version that deals exclusively with common carrier matters.

It might surprise the casual observer that Van Deerlin, who has been critical of the bureaucratic bungling of the Federal Communications Commission's past decisions, and who has worked assiduously to produce reforming, deregulatory legislation, should be so complimentary.

Yet, now that Computer Inquiry II—all concurring and dissenting statements by six of the seven commissioners—is on the table for everyone to dissect, it is becoming clear that the legislative environment that encouraged the decision is now promoting passage of some remedial legislation. Indeed, such legislation never looked more necessary, or for proponents of legislative reform, more promising. But to suggest that desire for legislation is the only motive for adulation is misleading.

In this case the monopoly, AT&T, also known as the Bell System, has annual revenues close to \$40 billion and total assets exceeding \$100 billion. There is little doubt that AT&T is not only a dominant force in the marketplace, but potentially the most influential, feared competitor in telecommunications or any related field, which is precisely the reason for Computer Inquiry I, which began over 14 years ago.

Charles Ferris, chairman of the FCC, in his separate statement commenting on the Final Decision, put it succinctly:

"In a very real sense this proceeding began in 1966 with the initiation of the First Computer Inquiry. The rules developed there were intended for the world of the large capacity central processing unit, accessed by telephone lines from remote unintelligent terminals. In that world, a line between communications and data processing was defensible."



PHOTOGRAPH BY JAMES JOERN

What safeguards are necessary to prevent Baby Bell from growing up with a nasty temper and a predatory disposition?

The advent of distributed data processing, however, made the Computer I rules obsolete. With the minicomputer it became possible to process data accessed from a central computer memory. The new "smart" terminals were both data processors and communications devices. Smart networks, such as Telenet's packet switched service, were next.

It became clear that the commission would be called upon more and more to make arbitrary decisions. These decisions were made more difficult by the desire to allow AT&T to participate in the evolving communications/data processing markets in spite of the 1956 Consent Decree. It became clear that there was a very real danger that in extending the grasp of regulation to allow AT&T to compete, its competitors would be ensnared in needless regulation.

This tendency on the part of administrative and regulatory agencies is often called "Regulatory Creep." The commission appeared to very much appreciate the significance of the fact that the twin technologies of computers/communications are no longer neatly divisible, a change which the technology itself is forcing, and to sense the moment and impact of its decisions. In that spirit the commission concluded that:

1. After a reasonable transition period (March 1, 1982), all customer premise equipment (CPE) will be deregulated from the "plain old telephone" to the "smartest" intelligent microprocessor, with only the marketplace and the consumer dollar to determine what is good or bad or in the public interest;

2. A demarcation line should exist between "basic" communications (narrowly defined as "the capacity for the movement of information" or "pure transmission") and "enhanced" communications, which for all practical purposes includes all other communications. It is the express intent of the commission to regulate the former under a traditional common carrier scheme and forbear from any regulation of the latter; and

3. AT&T and GTE (because of their obvious size) be permitted to offer unregulated CPE and "enhanced" services only through separate subsidiaries subject to a number of safeguards.

Thus, the commission swept away the complex and cumbersome scheme established in the late '60s in which it would first determine whether a service offering was (a) remote access dp, (b) hybrid dp, (c) hybrid communications, or (d) message and circuit switching; and then decide whether the services were to be exempt from regulation. Of course, carriers (other than the Bell System, precluded by a 1956 Consent Decree) could offer services under (a) and (b) but only under a separate subsidiary to prevent cross-subsidi-

zation from taking place. The present scheme is thus a notable departure. No longer will the commission be embroiled in a game of semantics, *i.e.*, is it data processing or is it communications? The commission has opted to return to first principles: is there only monopoly or is there room for competition? If the latter, why regulate at all?

PUSHED FENCES BACK

Ferris's assessment is too modest. The Final Decision in Computer Inquiry II does much more than simply halt "Regulatory Creep" by pushing the regulatory fences back to where only "basic" transmission is regulated and the data processing industry is not. The Final Decision significantly pushed the fences back to allow an entire market of computer/communications and information goods and services to develop free of regulation.

Secondly, while it is not yet well settled, the probability for robust entry into this unregulated environment is high, and with it, the promise of diversity and abundance in goods and services. Still, the central contentious issue in this decision, and the legislation bubbling in both the House of Representatives and the U.S. Senate, revolves around the gorilla theory: *i.e.*, where does an 800 lb. gorilla sleep? Anywhere it wants. In other words, if you let the Bell System compete in these new markets for CPE and "enhanced" services, what terms and conditions or safeguards are necessary to prevent "Baby Bell," (the new proposed Bell Systems competitive subsidiary) from growing up with a nasty temper and a predatory disposition?

The arguments are as many and varied as the participants in the debate. It is a given, most people agree, that without some action, AT&T—given its needs and the force of technology—will drag more and more of the free market for computers, data processing, and related goods and services under the umbrella of regulator at either or both the state and the federal levels.

Other debaters, acknowledging the inevitable marriage of technologies and the difficulty of narrowly constraining AT&T movement into these fields, seek divestiture of Western Electric, AT&T Long Lines, and perhaps even Bell Labs from the 23 Bell System operating companies. Variations on this approach entail divestiture of each of the operating companies or, at a minimum, some "arm's length" relationship among them. Or, if no divestiture should occur, among the operating companies, the labs, and Western Electric, This, of course, is the subject of the ongoing Justice Department antitrust suit against AT&T, which hangs like a sword of Damocles over all FCC and Congressional activity.

Resolution of this dilemma is difficult

and complex but essential for a free, robust market. It is certainly laudable to free the market by deregulation, and to free the Bell System as well, so that the consumer and the nation may have the benefit of its participation in the new arena for information technology. But there is no gain nor glory if in the process the commission gives birth to what Herbert Jasper, executive director of the Ad Hoc Committee for Competitive Telecommunications (ACCT), has called "Baby Bellephant," which, by virtue of its sheer size and the absence of any safeguards, distorts or even destroys over time what little competition the commission has caused to be created.

Contrasted with these concerns is, surprisingly, sympathy for the Bell System's plight expressed by four of the six commissioners in separate statements. Commissioner Joseph R. Fogarty, dissenting in part to the decision, felt strongly "It would be far wiser policy for the commission to balance the potential for cross-subsidization and the potential benefits of vertical integration in favor of cost accounting systems and continuing commission surveillance, rather than in favor of the rigid and total separation approach adopted by the decision." Continuing to underscore what he sees as an unfairness in the decision, Fogarty concludes: "It is a curious kind of 'procompetitive' policy that frees one class of competitor and hobbles another." He specifically criticizes the majority for making judgments on speculation when he argues: "In other words, whenever substantial risk of anticompetitive abuse is perceived in vertical integration, the decision opts for complete separation."

WHAT NEW UNIT CAN DO

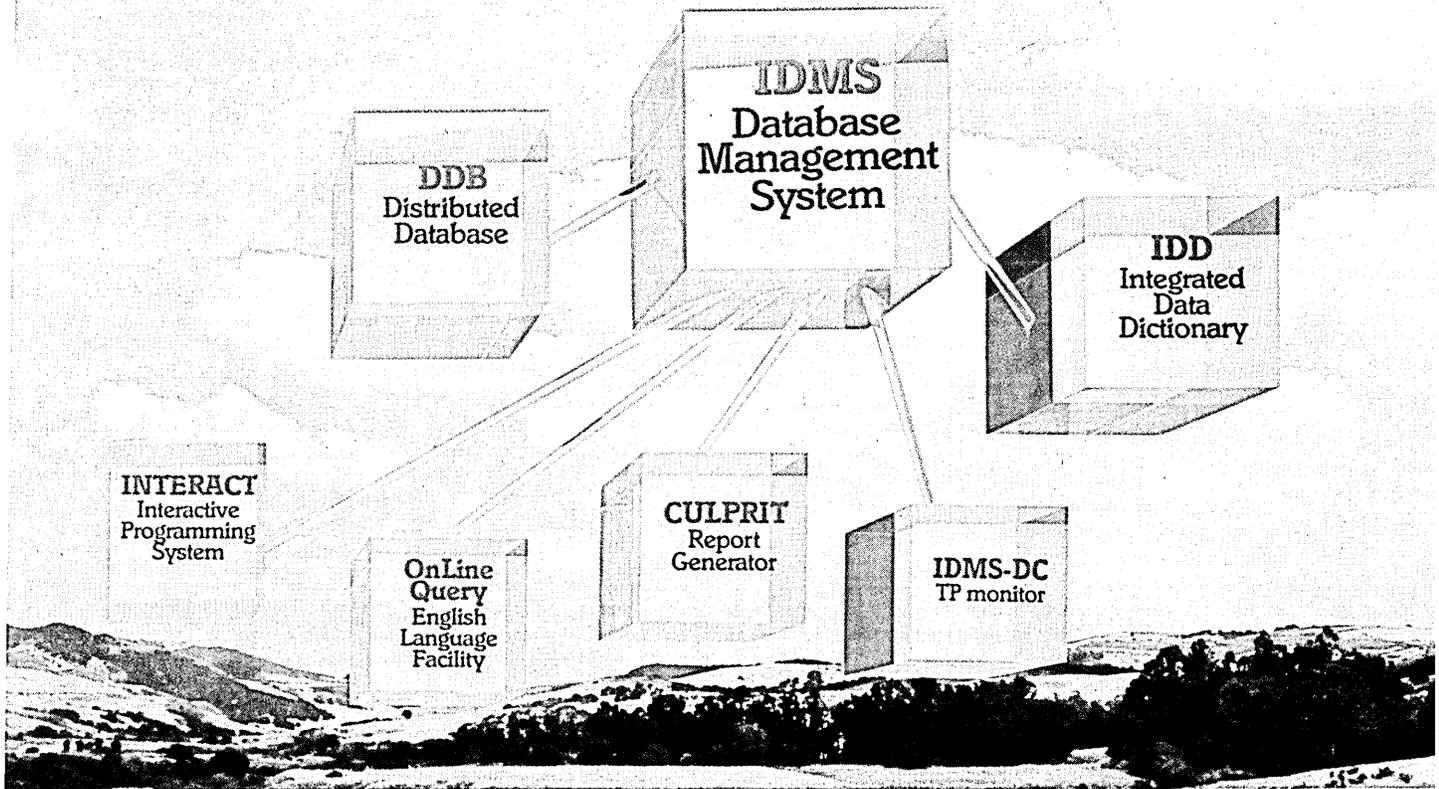
Well, since this is the core of the debate, let's examine what a new competitive subsidiary can and cannot do. As Fogarty sees the new subsidiary, it must:

- acquire its facilities on a tariffed basis from an underlying carrier and thus operate as a resale entity;
- keep separate books, personnel and officers, installation and maintenance facilities, and marketing operations;
- not share computer capacity with parent;
- deal at "arm's length" with any other affiliated equipment manufacturers; and
- disclose to the public all information relating to changes in the network design and technical standards.

On the other hand, as critics of the commission's approach carefully read and report on the Final Decision:

- Nothing precludes the subsidiary from entering into contracts with its affiliated manufacturer for installation, repair, maintenance, or training services in support of such equipment on a compensatory basis;

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CIRCLE 87 ON READER CARD

There is no gain or glory if in the process the commission gives birth to a "Baby Bellephant."

- The subsidiary may also rely on AT&T for administrative support and R&D (albeit not related to software). Among other things, this will permit the sharing of legal fees, participation in the advantage of bulk purchases with other affiliates, etc.;

- Significantly, too, the commission chose not to impose any capitalization plan on the separate subsidiary, although prior approval must be obtained later; nor is separate equity financing required. Not considered in much detail at all is the advantage all Bell System subsidiaries have under a consolidated financial statement, and whether the tax advantages of the common carrier utility can be used to support the unregulated subsidiary.

- AT&T can satisfy the commission by possibly creating only one new subsidiary.

It will undoubtedly be weeks, even months, before a fuller assessment of the decision is made and it is more widely understood. Aside from the sticky issues regarding structural separations and permissible information flows between the new subsidiary or subsidiaries and the parent companies, there are other legal and policy questions likely to be resolved only by Congress or the courts, and if the latter, probably only after years of litigation. Among the questions already visible are:

- Whether the commission has the authority or sufficient grounds otherwise exist to preempt state regulation, and in turn, deregulate all terminal equipment;

- Whether the commission adequately interpreted the law and had sufficient factual basis for deciding upon the degree of separation that it did. Commissioner Fogarty, for example, cites the recent Second Circuit Court of Appeals decision in the recent *Berkey Photo, Inc. v. Eastman Kodak Company*: "A large firm does not violate Section 2 [of the Sherman Act] simply by reaping the competitive rewards attributable to its efficient size, nor does an integrated business offend the Sher-

man Act whenever one of its departments benefits from association with a division possessing a monopoly in its own market. So long as we allow a firm to compete in several fields, we must expect it to seek the competitive advantages of its broad-based activity—more efficient production, greater ability to develop complementary products, reduced transaction costs, and so forth. These are gains that accrue to any integrated firm, regardless of market share, and they cannot by themselves be considered uses of monopoly power."

- The 1956 Consent Decree between AT&T and the Justice Department, settling the anti-trust suit then pending, which limits AT&T to essentially offering only regulated common carrier communications, is an ever more serious question. The commission's majority feels its actions are consistent with the decree. A minority argues that the FCC has attempted to override or nullify the effect of the decree. Neither Justice nor AT&T has yet spoken but clearly AT&T has more to worry about now that the commission has placed the burden more squarely on the shoulders of AT&T and Justice to prove the contrary;

- The demarcation between "basic" and "enhanced" services allows the offering of AT&T's Advanced Communications Service (ACS) but only as a separate subsidiary since protocol and code conversion are seen as "enhancements." This, of course, might impact so-called voice related store-and-forward or "mail box" systems as well as prevent them from being provided by the Bell System except under separate subsidiary. The whole area, however, is subject to further inquiry by the commission.

- The demarcation between software or data base services and hardware or facilities is not mentioned at all. The rapid development of teletext and videotext services, which blur the broadcast and print distinctions from common carriage, raise serious First Amendment

questions of "content" regulation, and also pose unique concentration of ownership issues not heretofore considered;

- Lastly, the commission only forbears from regulation of "enhanced" services; it did not deregulate them, thus raising the question of the commission's power to forbear, or more, to deregulate at all. Strict constructionists of the 1934 Communications Act will argue that the commission has neither authority. A corollary concern is whether its decision to "forbear" in this area suggests the commission is consciously retaining jurisdiction to regulate at a later date.

CONGRESS CAN REMEDY

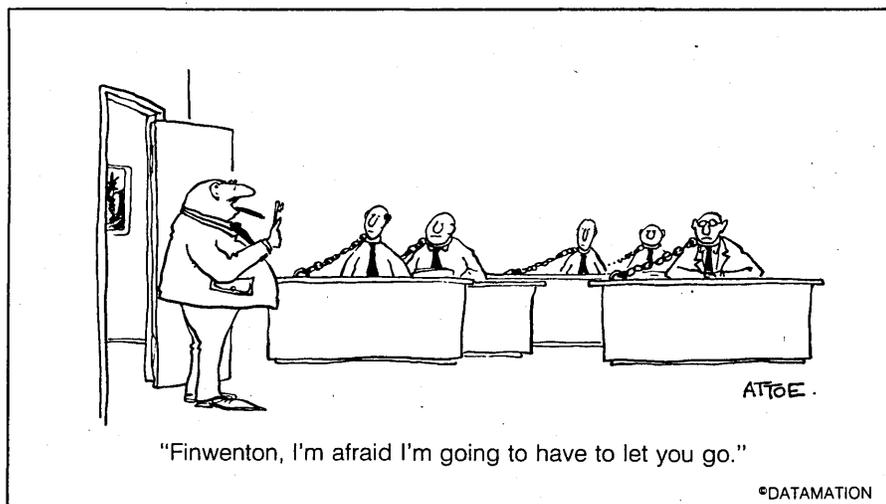
These obviously are deficiencies or weaknesses that can be remedied by legislation if the Congress so desires, and a consensus—if only by acquiescence—can be reached by the parties. For the Bell System, legislation might mean stronger structural separation and information flow conditions, such as Congressmen James Broyhill (R-N.C.) and Timothy Wirth (D-Colo.) have developed, which require total separation over a transition period; but it will end the Consent Decree battle which the Computer and Communications Industry Association (CCIA) began by appealing for review within hours after the decision hit the street (over 30 organizations also filed to intervene before the June 13 deadline.)

It may also blunt a possible Justice Department attack of the commission's decision (not that they think they can win arguing that a 24-year-old Consent Decree decision is relevant in this field of rapidly changing high technology) which may be made to preserve options for settlement of their present anti-trust suit. This could be a quid pro quo for AT&T.

The new competitors, of course, believing as they do that the commission hasn't adequately settled the separation issues, would welcome support from the courts or Congress; certainly the users, the International Communications Association in particular, have a high stake in the prompt resolution of this debate to give certainty and stability to the present situation. They would favor Congress putting these issues to rest rather than letting litigation proliferate.

There are obviously rough spots in the terrain ahead; there are likely to be new issues joined, old fears unearthed. Yet, the Final Decision of Computer Inquiry II is a fact; it is a "home run." However, it is sadly still the seventh inning. *

John Eger, an attorney in Washington, D.C., was formerly the director of the White House Office on Telecommunications Policy. He is a contributing editor to DATAMATION.

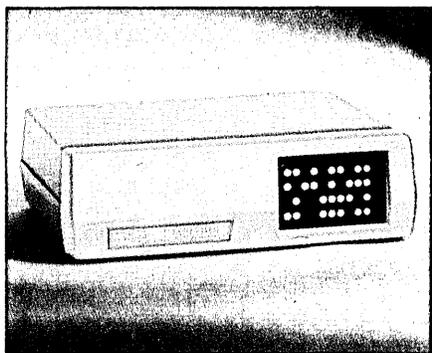


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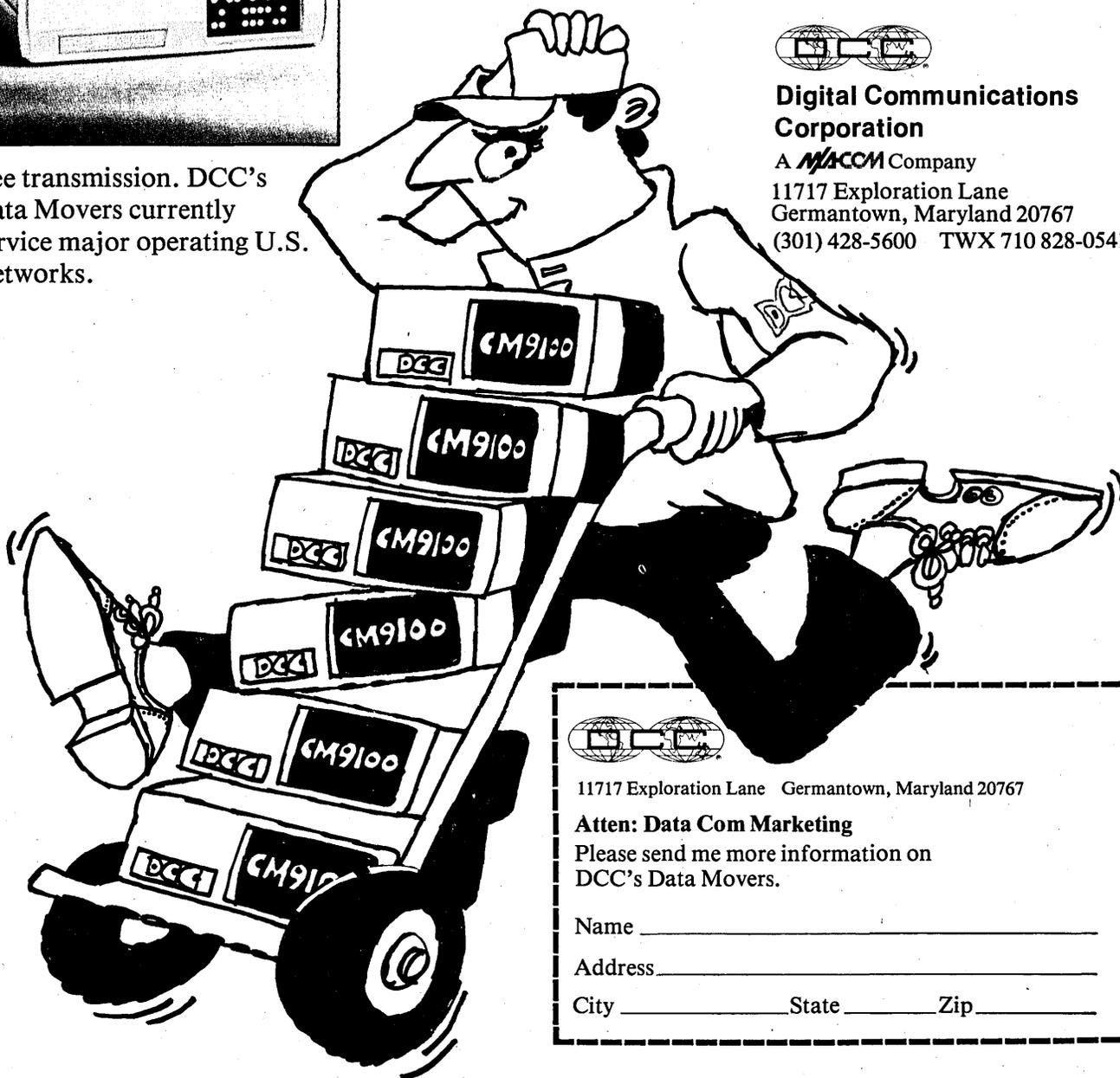
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Q. A little company like Olivetti does all that?

A. We're not exactly little. Had \$2.3 billion in sales worldwide last year. We have 28 factories. Employ 57,000 people. Do business in over 100 countries. Worldwide, we're one of the top companies in office automation.

Q. Okay. So you're a giant. But there are hundreds of suppliers out there. Why do I need Olivetti?

A. One reason is that we're pretty hard to match when it comes to return on investment. In some cases, downright impossible. Our ET221 is the only electronic typewriter for \$2,000 with text display. And our TES401—also with display—has the most text editing power of any desktop unit for \$6,000. Our Copia 2000 is the only copier under \$16,000 that reduces, collates, and prints on two sides. Should I continue?

Q. Never mind. I get the picture. But nothing's perfect. What about service?

A. If you mean technical support people, we've got them. In

36 major cities. As a matter of fact, we have one of the biggest service organizations in the business. We're ahead of Lanier, Wang, and Qyx. And all of our technical people use state-of-the-art equipment to test and train with.

On the other hand, if you mean software and sales support, we've got that, too. In just as many places. In fact...

Q. Yeah, okay. Suppose I'm not in one of those 36 cities.

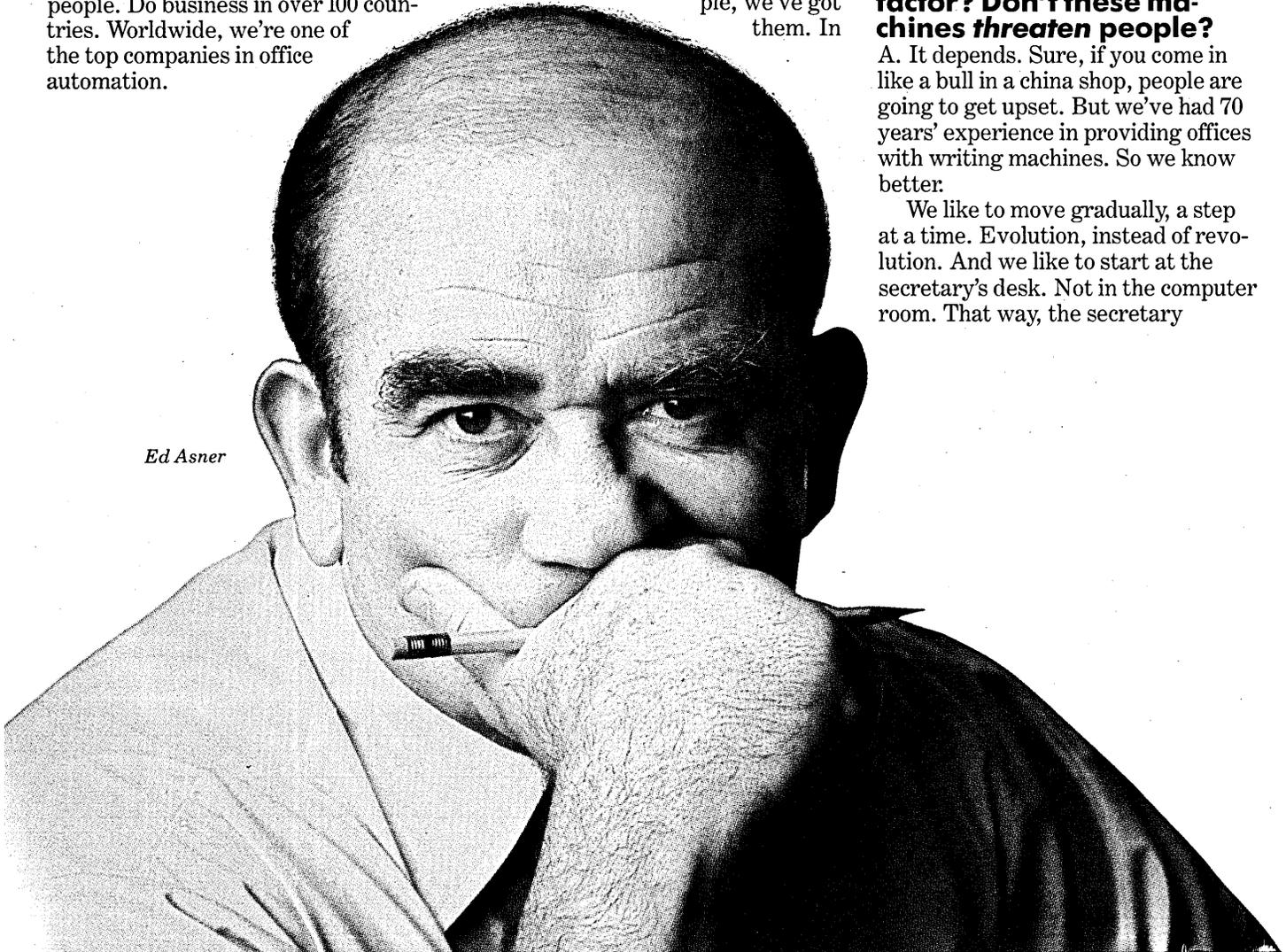
A. We can handle it. We've got 2,000 dealers, and we're in every state. If we can't service a product, we won't sell it.

Q. What about the human factor? Don't these machines threaten people?

A. It depends. Sure, if you come in like a bull in a china shop, people are going to get upset. But we've had 70 years' experience in providing offices with writing machines. So we know better.

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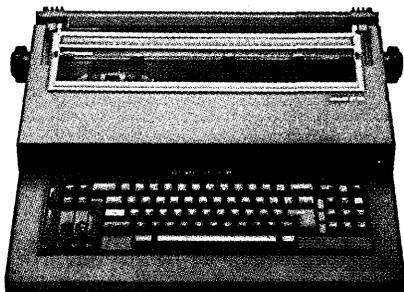
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TOUGH QUESTIONS ABOUT

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TES401: the most text editing power of any desk-top unit for \$6,000.

Brings word processing to the secretary's desk. Approaches text



editing power of much more costly machines, yet easy to master. Removable, dual-source memory with automatic merge (so you can "mass produce" personalized letters).

Many advantages over "mag card" machines—at same or lower cost. Thin window text display. Interchangeable print wheels.

TES501: the only word processor under \$10,000 with information retrieval.

You can access the external memory (100-page discs) at the touch of a key. Thin window text display. Handles words or numbers equally well. Sort by up to 40 different qualifiers. Perfect for operations like selective mailings, calling for high-speed search and retrieval, plus automatic personalization and typing. (Not Shown)

TES701: the CRT text editor to beat.

All the power of the TES501, plus page text display. Ideal for statistical



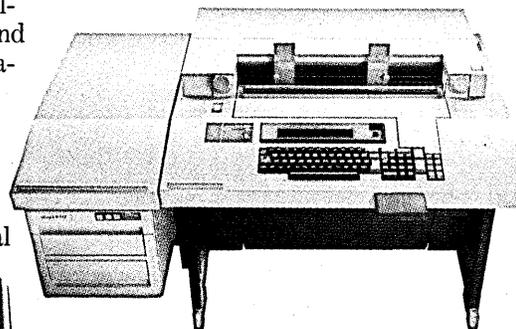
typing and documents requiring a lot of formatting and revision. Stores on single or dual diskettes. Interchangeable print wheels. High-speed printer. Easy to learn because it instructs operator.

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Prints 30 copies per minute, any size. A unique "batching" system easily

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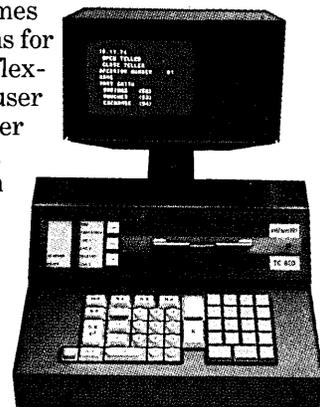
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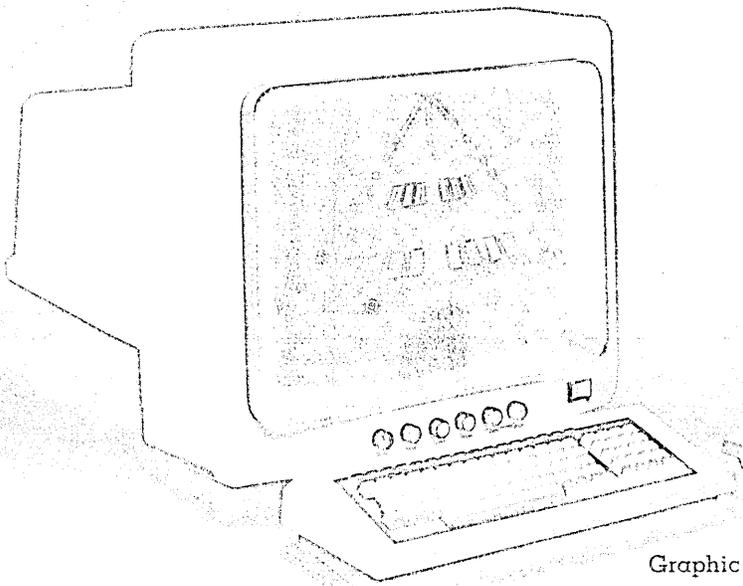
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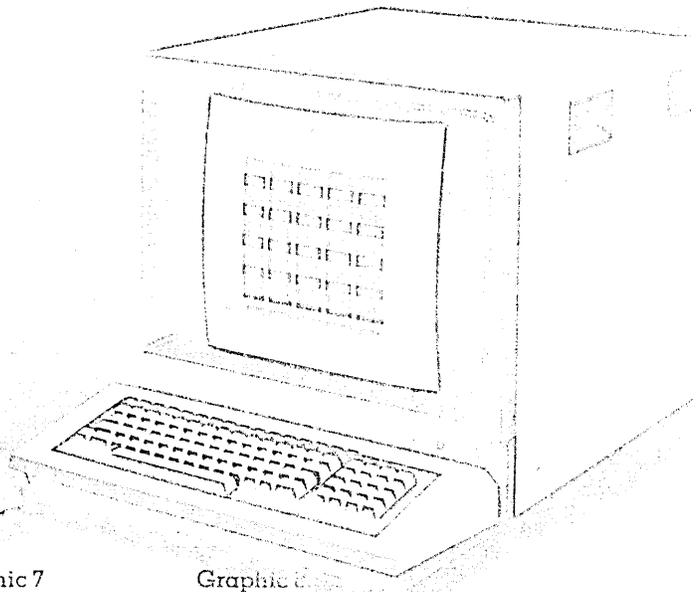
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CIRCLE 90 ON READER CARD

The Graphics People

The 12 companies that garner nearly all the data transmission revenues.

DATA COMMUNICATION CARRIERS

NAME	DATA COM REVENUE (\$K)	% OF TOTAL COMPANY REVENUE	1978 DATA COM REVENUE (\$K)	1979 TOTAL REVENUE (\$K)	1979 TOTAL NET INCOME (LOSS) (\$K)	FISCAL YEAR ENDS
AT&T	2,309,150	5	1,845,000	46,183,000	5,674,000	Dec. 31
GT&E	797,656	8	206,960	9,957,817	612,193	Dec. 31
Western Union Corporation	451,227	62.8	171,900	718,472	4,033	Dec. 31
ITT World Communications Inc.	169,788	100	125,700	169,788	41,707	Dec. 31
United Telecommunications	68,098	3.8	48,800	1,792,078	182,887	Dec. 31
TRT	28,382	100	—	28,382	7,119	June 30
Tymnet	23,900	100	16,500	23,900	2,900	Dec. 31
Continental Telephone	21,370	1.9	14,939	1,347,587	114,296	Dec. 31
Central Telephone	20,000	3.3	16,200	750,500	83,100	Dec. 31
WUI	16,425	15	4,600	110,163	19,656	Dec. 31
COMSAT	16,283	6.2	11,366	262,635	40,185	Dec. 31
RCA	15,819	1	14,680	7,454,600	—	Dec. 31
Graphic Scanning	12,033	43	9,112	27,985	2,201	June 30
SP Communications	9,900	10	4,990	99,000	14,900	Dec. 31
Rochester Telephone	8,064	4.7	7,700	171,574	26,950	Dec. 31
MCI	6,412	5	3,702	128,252	10,925	Mar. 31
American Satellite	5,619	35	3,565	16,057	(4,812)	Dec. 31
FTC Communications	1,100	20	647	5,500	—	Dec. 31

The business of the carriers listed represents essentially all of the data transmission revenue generated in the U.S. or between the U.S. and other nations. Communications is a regulated game, but we know efforts are under way to reduce that regulation which we feel will be reflected in new names appearing on this list in the coming years. For the present, however, it's still a corporate field with the likes of AT&T, GT&E and ITT.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

195 Broadway
New York, NY 10007
(212) 393-9800

The principal business of the Bell System is communications. Most of the work is done through a group of individual operating companies that provide an integrated nationwide network of facilities that can transfer information in virtually any form—voice, data, graphics—between appropriately equipped terminals throughout the country. This business provided AT&T with an annual revenue in excess of \$46 billion in 1979. We do not know how much of this is directly attributable to data communications. Since Bell refuses to break out even a hint of these figures, we relied

on Bell watchers, available data, and gut feelings to reach the estimate that 4% of Bell's revenue comes from data transmission, while another 0.5% comes from tariffed products, including data sets and Teletypes used in data transmission. Our best estimate puts the data com revenue figure at slightly more than \$2.3 billion for 1979.

GENERAL TELEPHONE & ELECTRONICS CORPORATION One Stamford Forum Stamford, CT 06611 (203) 357-3797

GTE remains number two in the telephone business. GTE Communications Network Systems was established in December 1979 to provide private and public voice, data, and message communications systems tailored to meet the diverse requirements of corporations, government agencies, and other organizations. This group brings together the expertise and resources of three companies to form Communications Network Systems Resources. GTE Telenet, first on the list, is a newly acquired but well-established supplier of public and private data communications network services and systems. GTE Telecommunications Systems is a major supplier of private all-digital switching systems for voice

and data. The third company in Communications Network Systems Resources is GTE Information Systems, a supplier of financial data base services for business. GTE's data communications figures for 1979 are impressive. The company claims 8% of the annual revenue is data com related, a figure totaling \$797.6 million—up from the \$206.9 million data com revenue figure of a year ago.

WESTERN UNION CORPORATION One Lake Street Upper Saddle River, NJ 07458 (201) 825-5316

If Western Union Corporation would send itself a telegram it would probably sing "Better luck next year." WUC heads into its 128th year of business following a less-than-successful 127th year of business in 1979. For the corporation as a whole, net income was \$4 million, compared with \$45.7 million the previous year. The total operating revenue picture looked better with revenues up 11% to \$718 million in FY '79. As a holding company, WUC conducts business through subsidiaries with its Western Union Telegraph Company, a communications common carrier and principal holding, engaged primarily in the business of providing telecommunications services to business, government, and

DATA COMMUNICATION CARRIERS

the public. In 1979 the corporation's two largest nonregulated subsidiaries—Western Union Data Services and National Sharedata—were unprofitable, and it became clear that substantial additional investment would be required to rehabilitate them. National Sharedata was sold and Data Services reconstructed by reducing the work force by 45% and integrating the functions of sales and maintenance of Data Services' terminals with those of the Telegraph Company. Without these two companies, WUC estimated a 62.8% data com share of the annual revenue, which this year totals \$415.2 million.

ITT WORLD COMMUNICATIONS INC.

**67 Broad Street
New York, NY 10004
(212) 797-3300**

ITT World Communications Inc. is one of 14 groups within the ITT Communications Operations Group (COG). Last year Worldcom extended its record, voice, and data com services into broader markets and inaugurated several services. City-Call service offers savings of up to 40% on long-distance calls between 88 cities in the United States. The Marsplus service links travel agents to reservations computers of participating airlines. Similar services are planned for hotels, car rental agencies, and cruise lines. FaxPak service now provides a nationwide network linking previously incompatible facsimile terminals. Worldcom also offers telex, telegram, leased channel, and other services between the U.S. and other countries. ITT recently announced a new service named Intertext, which it claims is an alternative to telex. Intertext is under the wing of another subsidiary, ITT Domestic Transmission Systems, Inc. Worldcom lists its 1979 annual revenue at \$161.8 million, of which 100% is data communications related.

UNITED TELECOMMUNICATIONS, INC.

**Box 11315
Kansas City, MO 64112
(913) 676-3232**

United Telecommunications offers a fine mix of resources. Its telephone system is the third largest in the country, with 4.5 million telephones installed. The company owns United Computing Systems, a computing service organization, and also has a 24% share in data com manufacturer Rixon. In addition to this, United has a software sales activity, and owns Calma, a manufacturer of interactive graphics equipment. North Supply Company, another affiliated company, distributes telecommunications, electrical, and security and alarm products. This year the data communications line (without Rixon) accounted for 3.8% of the annual revenue, or about \$68 million. This is a \$20 million increase from last year.

TRT TELECOMMUNICATIONS CORPORATION

**1747 Pennsylvania Avenue N.W.
Washington, DC 20006
(202) 862-4556**

TRT, a subsidiary of United Brands, Inc., started business in 1903 as Tropical Radio Telegraph Company—the communications link of the United Fruit Company and its fleet of banana ships. In the early '70s TRT was operating one of the primary telex networks, serving the Caribbean and Latin America. In April 1979, TRT acquired Norfield Electronics (now TRT Data Products), which produces corporate message switching systems for data, telex, and TWX. Among the products that TRT recently introduced is the multispeed Stortex, an automated high speed store-and-forward telex system, and the Eltex IIE system, which delivers a 400% capacity increase in switching telex messages. TRT achieved a 24% growth rate over '78, bringing the '79 total revenue figure to \$28.4 million.

TYMNET, INC.

**20665 Valley Green Drive
Cupertino, CA 95014
(408) 446-6659**

The largest U.S. public packet communications network, Tymnet provides local telephone-call access for about 250 U.S. metropolitan areas and, via IRCs, from 28 countries. Approximately 300 host computers are connected to the network. Services include advanced electronic mail system (Ontyme II); a wide variety of financial services to the credit/finance industry; and private network services. Typical devices with which Tymnet interconnects include asynchronous and synchronous terminals, polled terminals, transaction terminals, and synchronous and asynchronous computer interfaces. Network applications include time-sharing, order entry, credit card processing, inventory systems, data base management, and flight planning. Tymnet says that data com is 100% of the annual revenue, which totaled \$23.9 million in '79, up from \$16.5 million in '78.

CONTINENTAL TELEPHONE CORPORATION

**56 Perimeter East
Atlanta, GA 30346
(404) 391-8446**

Continental, a small community telephone company that does not handle heavy metropolitan business, is the nation's fourth largest telephone company. In 1979, Continental enhanced its terrestrial communications capabilities by moving into the satellite field. It entered into an agreement to own one-half of American Satellite Corporation's business and signed agreements with two Western Union Corporation subsidiaries to secure the furnishing of available satellite capacity to

American Satellite. ConTel Data Services Corporation, the data com arm of the company, provides automatic data processing services in payroll, customer billing, accounting, and processing of long distance revenue for system companies. A major data center is located in each of the company's three regions. It estimates the data com revenue to be 1.9% of the total revenue, or \$21.4 million. This is a one-third increase over '78's \$14.9 million figure.

CENTRAL TELEPHONE & UTILITIES CORPORATION

**O'Hare Plaza
5725 East River Road
Chicago, IL 60631
(312) 399-2749**

Central Telephone & Utilities is the fifth largest regulated telephone company in the industry with 1.9 million telephones installed. The biggest portion of its business is in Nevada, followed by Florida and Illinois. Highlighting the company's utility business is the recent acquisition of Digitech Data Industries. CTU estimates its data com revenue at 3.3% of annual revenue. With roughly \$4.5 million attributable to Digitech and the manufacturing end of the business, we estimate another \$20 million attributable to the carrier portion of the business, up from \$16.2 million one year ago.

WESTERN UNION INTERNATIONAL, INC. (WUI)

**One WUI Plaza
New York, NY 10004
(212) 363-6400**

The family tree for WUI, Inc. now reads: the major subsidiary of Western Union International, which became a wholly owned subsidiary of the Xerox Corporation in 1979. WUI, Inc. is the number three international record carrier behind RCA Globcom and ITT Worldcom. Western Union International, Inc. provides international telecommunications services, including telex, cablegrams, leased channels (both teletype and voice/data), facsimile, datel, data base (DBS), high speed data (50- and 56-kilobit), maritime satellite (Marisat) and satellite television. The company recently began an expansion of data services to additional points. It estimates the data com revenue to be about 15% of annual revenue, or about \$16.4 million.

COMSAT

**Communications Satellite Corporation
950 L'Enfant Plaza
Washington, DC 20024
(202) 554-6000**

Comsat is engaged primarily in providing international, maritime and domestic communications satellite services. It furnishes satellite services to common carrier companies for communications principally between

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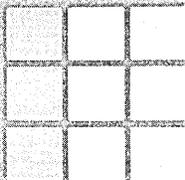
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DATA COMMUNICATION CARRIERS

the United States and foreign points. It is the U.S. agent for Intelsat, from which it derives more than half of its revenue; the rest is from Comstar satellites leased to AT&T for U.S. domestic communications. A subsidiary of Comsat General is a partner with subsidiaries of IBM and Aetna Life & Casualty in Satellite Business Systems (SBS). We estimate that the data com revenues are at 6.2%, or \$16.3 million, up from '78's mark of \$11.4 million.

RCA CORPORATION
30 Rockefeller Plaza
New York, NY 10020
(212) 598-5900

With the sale of RCA Alaska Communications on June 1, 1979, RCA Corporation is left with two communications subsidiaries: RCA Global Communications (Globcom) and RCA American Communications (Americom). Globcom marked its 60th anniversary year hauling in 37% of total international record carrier industry revenues. It offers a broad variety of communications services to more than 200 overseas locations. Americom achieved profitability for the first time in 1979 as demand for satellite services exceeded the capacity available on the company's two orbiting spacecraft. To meet this growing

demand RCA launched its third domestic communications satellite on Dec. 6. However, contact with the satellite was lost four days later during a maneuver to place it into a permanent orbit over the equator. RCA plans another launch for June 1981. A new wide-band data service for business and industry—56 Plus—was introduced in 1979. We estimate the total data com revenue to be much less than one percent (.0024%) of the total revenue, or \$15.8 million.

GRAPHIC SCANNING CORPORATION
99 West Sheffield Ave.
Englewood, NJ 07631
(201) 569-7711

Deciphering the revenue figures of Graphic Scanning and its communications carrier subsidiary, Graphnet, is not an easy task. The main portion of the corporate business consists of receiving unstructured customer data, compiling and formatting it, selecting a route and carrier for its transmission, translating the outgoing message to a format and protocol for whatever terminal or computer is to receive it, and then transmitting it over other carriers' lines. Only a limited amount of the functions performed, 10% Graphics claims, are pure data processing (such as data base

update), and no inquiry response is said to be supported. Of the \$28 million annual revenue that Graphic Scanning charted last year, we figure slightly more than \$12 million is from data com. Other business includes radio paging, using its own subsidiary radio common carrier, and a telecommunications system through another subsidiary, Comnet.

SOUTHERN PACIFIC COMMUNICATIONS COMPANY
One Adrian Court
Burlingame, CA 94010
(415) 692-5600

SP Communications Company (SPC) is a wholly owned subsidiary of the Southern Pacific Company, the train people. The initial SPC network, established in 1970, followed the right-of-way of the existing Southern Pacific railroad system from San Francisco through Dallas. SPC's growth and expansion to a national system required completely new northern routes. In July 1974, SP Communications became the first of the nation's specialized common carriers to offer coast-to-coast private line communications service. It now provides nationwide private line and real service to 80 metropolitan areas, and uses

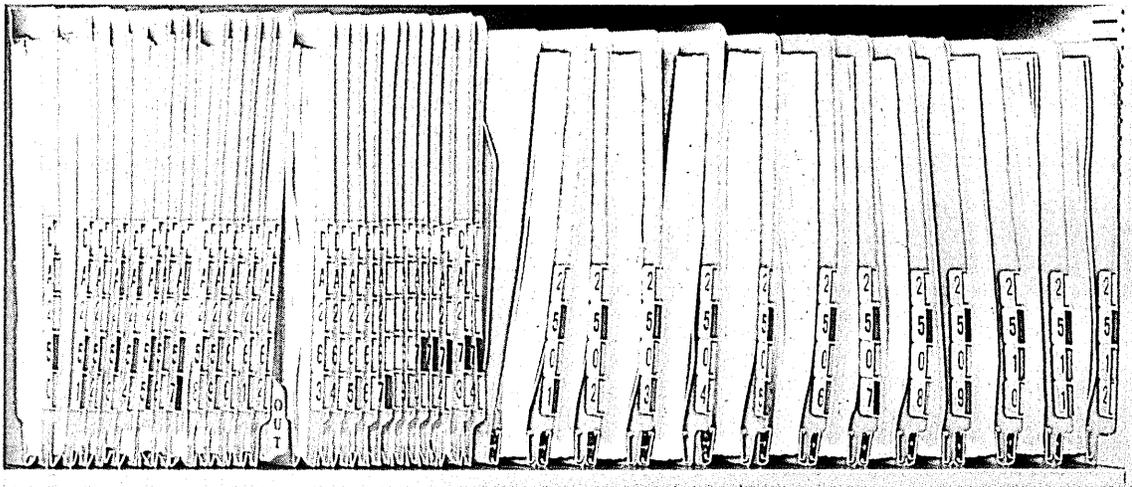
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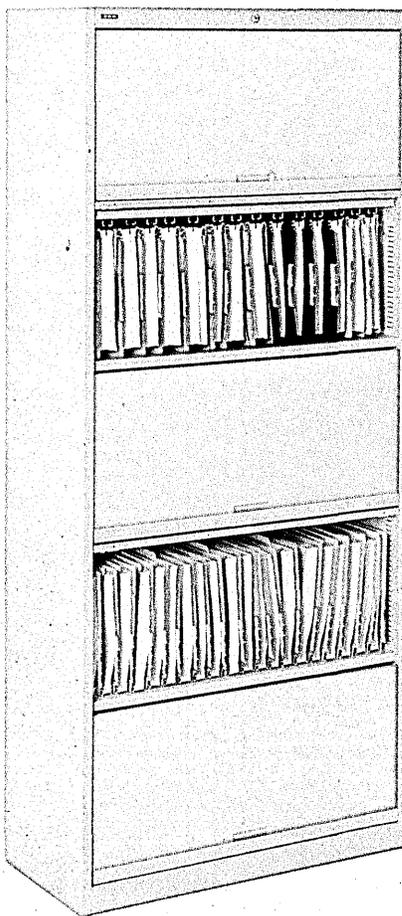
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a combination of land-based microwave, broadband cable, and satellite facilities. We estimate SPC's data com revenue to be almost \$10 million, or about 10% of annual revenue.

ROCHESTER TELEPHONE CORPORATION 100 Midtown Plaza Rochester, NY 14646 (716) 325-9871

Rochester is the seventh largest telephone company, with holdings mostly in New York State. The origin of the company was in 1899; in 1921, the company assumed its present name and form. In 1959, Rochester Telephone became the first unaffiliated, independent telephone company to be listed on the New York Stock Exchange. Rochester Telephone Corporation, along with two operating subsidiaries, Highland Telephone and Sylvan Lake Telephone Company, gives regular service to over 326,000 customers. An unregulated subsidiary, Rotelcom Inc., was started in 1978 to provide corporate growth through "new opportunities" in telecommunications; late in 1979 Rotelcom announced establishment of a data communications subsidiary. We estimate this subsidiary to be responsible for about 4.7% of the annual revenue, a figure totaling slightly more than \$8 million for 1979.

MCI COMMUNICATIONS CORPORATION 1150 Seventeenth St. N.W. Washington, DC 20036 (202) 872-1600

MCI, a long distance carrier employing microwave circuits to serve business users, was authorized in 1969 as the first of the specialized common carriers. Its primary business is intercity long distance voice telecommunications. The majority of MCI's data com income is derived from dedicated leased lines arranged exclusively for data transmission. MCI also offers the Execunet service, a one-way, dial-in-dial-out, shared intercity service enabling customers to originate or terminate calls for MCI-served cities via MCI-provided local business telephones. For calendar year 1979, MCI claims that 5% of its annual revenue was generated in data com—a total of \$6.4 million.

AMERICAN SATELLITE CORPORATION 20301 Century Blvd. Germantown, MD 20767 (301) 428-6000

American Satellite Corporation, a subsidiary of Fairchild Industries, Inc., has been a satellite carrier since 1974. In mid-1979, Fairchild and Continental Telephone Corporation

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FTC COMMUNICATIONS 25 Broad Street New York, NY 10004 (212) 747-5660

FTCC calls itself the smallest of the five recognized international carriers. Among its offerings are cablegram service to 133 countries, overseas telex message service via its computerized Eltex Switch, and Datel service to Europe. Data com revenues for 1979 totaled \$1.1 million.

This survey was prepared by Louise C. Shaw, with Marva Levine and Roseanna Guilsano.



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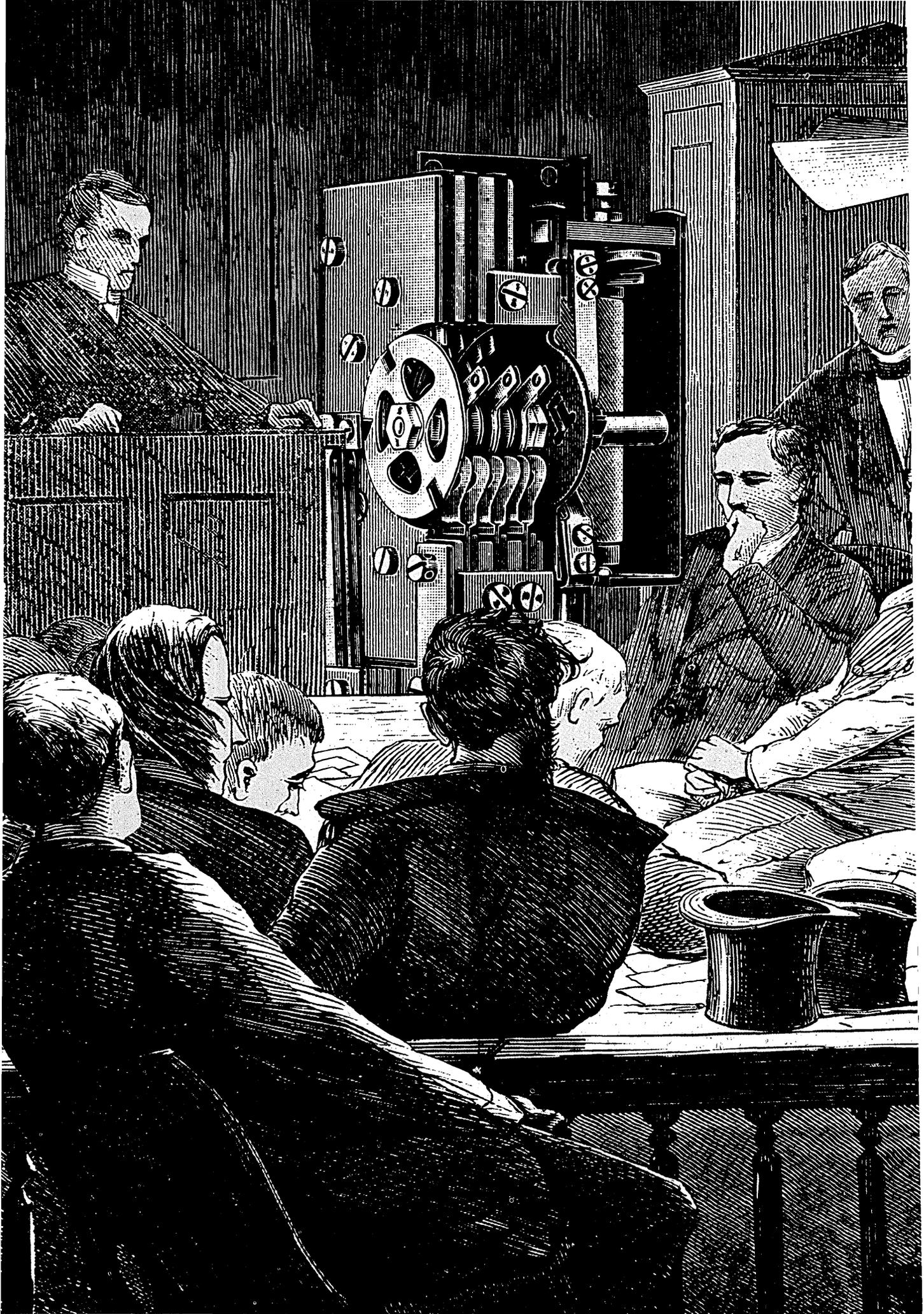
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Understanding the potential legal impact of warranty limitation clauses in computer contracts may help purchasers avoid costly litigation.

SHARPENING YOUR CLAUSE

by Robert A. Spanner
and William F. Mack

Consider the following scenario: a company decides to automate its manual accounting and inventory control systems, or to bring them in-house from an outside firm, or to switch to a new computer system. A computer manufacturer is contacted, and a personable young sales representative dutifully appears. After analyzing the tasks to be performed, he announces that not only can his product do the prescribed jobs, but it can also perform other wondrous feats as well. A contract is signed, the computer is delivered and installed, and management waits in hushed anticipation as the first printout emerges—a random collection of letters and numbers. Or worse, the printout *appears* intelligible, and it is not discovered until weeks later that the computer is generating highly imaginative data, causing pandemonium on the production floor and in the controller's office. After repeated attempts by the manufacturer to remedy the situation, management turns to its contract with the manufacturer to see what its legal rights are—and gets its second big shock.

This tale of woe is probably occurring less and less frequently; the computer industry is one of very few that have been turning out better products with greater capacity at lower prices year after year. But the kind of catastrophe described above does happen, and such occurrences will inevitably become more numerous as the annual sales of computers increase. And, when computer malfunction does strike, it can be crippling if not fatal.

As computers become less expensive, they become accessible to progressively smaller firms, companies that are less likely to have in-house legal staff or to undergo the expense of having legal counsel negotiate the sale. But the computer purchaser or lessee should be aware that the computer manufacturer's contract is generally a well-crafted legal document designed to protect the manufacturer's interests by, typically, purporting 1) to exclude from the contract all promises and representations previously made, 2) to

disclaim most warranties, and 3) to narrowly limit the scope of remedies available upon breach of contract by the manufacturer. It is therefore critical that the lessee or purchaser understand the potential legal impact of these clauses, so that he may make an informed decision to accede to them, or to try to purchase elsewhere, or to renegotiate them insofar as his bargaining power permits. Such an understanding of the scope of the manufacturer's contractual duties may also avoid misunderstandings and hard feelings, as well as costly litigation.

Article 2 of the Uniform Commercial Code (UCC), adopted by every state but Louisiana, governs computer sales transactions. The UCC is clearly applicable to the sale of hardware; hardware is obviously identifiable as a "goods." However, applying the UCC to the simultaneous sale of hardware and programming adds a conceptual wrinkle, particularly where the purchasers have no complaint with the computer, but find the "package" as a whole to perform inadequately. Programming, standing alone, might be considered a "service" rather than a goods, and thus not subject to the UCC, but the courts have generally treated the sale of the hardware/software package as a "goods" subject to the UCC.

By its terms, the UCC also applies only to "sales." Courts have usually applied the code to leases that were, in substance, a sale, such as where the lease was really a financing mechanism, or where the lease term and renewal periods approximated the useful life of the computer. But a short-term lease probably would not be found to be a UCC transaction.

DEFINING WARRANTIES

Warranties that may arise under a computer contract fall into two categories: warranties expressly made by the manufacturer concerning the equipment sold, and those implied by operation of law.

The UCC broadly defines express warranties to include any affirmation of fact relating to the goods sold which becomes part of the basis of the transaction between the buyer



Unfortunately for the prospective computer customer, what the UCC gives the buyer in some sections, it permits the seller to take away in others.

and the seller. Such express warranties may be embodied in promotional material, demonstrations of like equipment, manufacturer's specifications or descriptions, and the representations of sales personnel, as well as explicit warranties in the contract itself. Whenever a manufacturer makes a material representation as to the performance of its computer, that, generally speaking, constitutes a warranty, which binds the seller unless he excludes or modifies them by contract.

In addition, the UCC creates two implied warranties which accompany every sale of goods unless adequately excluded or modified in the contract. The implied warranty of "merchantability" requires that the goods be fit for ordinary purposes, i.e., that it be of average quality for goods of that type. And where the seller has reason to know that the buyer is relying on the seller to select or furnish goods for a particular purpose, the more rigorous implied warranty of "fitness for a particular purpose" arises. Thus, where the manufacturer of a system should know that the buyer is relying on its skill to provide an appropriate system to handle the buyer's peculiar requirements for its inventory management system or payroll, for example, the seller must provide a system that will perform those functions.

Unfortunately for the prospective computer customer, what the UCC gives the buyer in some sections, it permits the seller to take away in other sections. In the contract the manufacturer may modify or exclude any of the warranties previously discussed, including express warranties. The manufacturer usually avails himself of this opportunity.

The implied warranties of merchantability and fitness for a particular use may, under the UCC, be modified or excluded by a disclaimer so long as the disclaimer is conspicuous in the contract and uses the proper language. Although attorneys may quibble about the propriety of words used or the conspicuousness of the disclaimer, the disclaimers are usually enforced, and several computer cases have acknowledged their validity.

A disclaimer of express warranties presents more difficult issues. There are good commercial reasons for the parties to a sales transaction to wish to set down in a final expression of terms the extent of the seller's warranty liability, and to eliminate the use of previous negotiations, tentative agreements, or prior sales representations to increase the seller's warranty obligations beyond anything ever contemplated by the parties in their final agreement. However, this rarefied model of gentlemanly negotiation at arm's length does not necessarily conform to commercial realities. Too often, the customer is induced to buy or lease by glowing descriptions of the product in sales literature, by im-

pressive demonstrations, and by the promises and assurances of the manufacturer's sales personnel—responsibility for all of which is then completely disclaimed in the manufacturer's form contract, unbeknownst to the unsophisticated customer.

MERGER CLAUSE INCLUDED

Whatever might be said about the policies and equities implicated in disclaimers of express warranties, it is typically the commercial practice to include in computer equipment contracts a clause disclaiming all prior warranties and representations of any kind, and stating that the written contract is the final "complete and exclusive" agreement of the parties. This provision, sometimes called a "merger" clause, serves to preclude subsequent consideration of prior representations, promises or agreements (or contemporaneous oral agreements) in determining what are the terms of the contract between the parties. (The legal doctrine which gives effect to such a merger clause is called the "parol evidence rule.")

Under the UCC there are several important exceptions to the enforcement of merger clauses under the parol evidence rule. For example, the agreement may be interpreted (i.e., explained or supplemented) where appropriate by the prior course of conduct of the parties or by industry practice. Secondly, where the written contract does not purport by its terms to be complete, the purchaser may be permitted to prove consistent additional terms for the court's consideration. *Fargo Machine & Tool Co. v. Kearney & Trecker Co.* provides an illustration of how far some courts may go in applying this "merger" rule exception. In that case the court allowed into evidence representations in the sales literature provided to the buyer prior to execution of the written contract of purchase. The representations were admitted, not as proof of independent warranties (which would have been foreclosed by the disclaimer of warranties in the contract), but rather to establish "the standard of the product's performance" under the contract warranty that the product was free of defects in materials and workmanship. The reasoning apparently was that since the standard of performance was not defined in the contract, the court could look outside the contract for consistent additional terms defining that standard of performance.

This approach has far-reaching implications. It would make all sorts of precontract promises and representations admissible and would substantially neutralize the effect of merger clauses in computer contracts. Since this case presents an instance where the exception almost swallows the rule, it might not be followed in other courts, but the case does demonstrate how courts seek to avoid

giving merger clauses full effect.

In a number of breach of warranty cases, computer customers have tried to avoid the effect of merger clauses in contracts by adding to their breach of contract claim a claim for fraud, based on the same representations made outside the written agreement that the contract's merger clause precluded from consideration as a contract claim. In *Clements Auto Co. v. Service Bureau Corp.* the court rejected the proposition that contract terms such as a merger clause could cut off a claim for fraud. That ruling is consistent with the accepted common law view that contract disclaimers cannot foreclose an action for fraud. The court's ruling also comports with commonsense notions of fairness. It seems unjust to allow someone to fraudulently induce another to enter into a contract and then to permit the terms of that contract to cut off the other party's right to later sue for fraud.

But proving fraud is much more difficult than proving breach of contract. There are a number of elements that must be proven in fraud actions which need not be proven in contract actions, such as actual reliance upon the misrepresentations by the defrauded party, the materiality of the misrepresentations, and (in some jurisdictions) knowledge of the falsity of the representation. So although a merger clause can perhaps be circumvented by also alleging a fraud claim, such a claim is by no means an adequate substitute for the breach of warranty claim that would be available absent the merger clause.

The principle to be deduced from all this is that a merger clause is a very powerful contractual device which can radically realign the obligations and risks assumed by buyer and seller. Especially where the equipment being purchased is as complex and has the inherent risk of faulty performance, as is a computer, the purchaser or lessee should acquiesce to a merger clause only with circumspection.

LIMIT OF REMEDIES

In addition to warranty disclaimers, the typical computer contract severely restricts the remedies available against the manufacturer in the event of a breach of contract. The UCC permits such limitations on damages, subject to certain exceptions. One of these is the doctrine of unconscionability. Under the UCC, a computer manufacturer may exclude his liability for "consequential" damages (which means he can prevent recovery against himself for all the foreseeable harm that would flow from the failure of the computer, such as lost profits, recompense that had to be made to third parties because of the failure, etc.), but such a limitation on liability is only effective if it is not "unconscionable" (which roughly means one-sided and oppressive).



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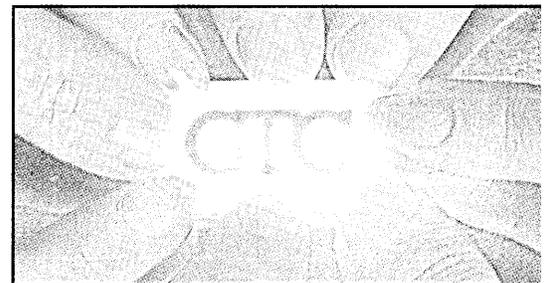
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CIRCLE 96 ON READER CARD

A merger clause is a very powerful contractual device that can radically realign the obligations and risks assumed by buyer and seller.

The unconscionability doctrine has enjoyed its greatest success in consumer transactions. Few business entities have successfully worked it. The court in one computer case, for example, indicated that a clause excluding all contract remedies would be unconscionable. However, clauses limiting the computer manufacturer's liability to repairing or replacing defective equipment and barring recovery of damages have been upheld. An attack upon such a limitation-of-remedy provision in a commercial context on the grounds of unconscionability would be difficult to sustain.

Under the UCC, a contractual limitation of remedies will also be ineffective where the remedy provided "fails of its essential purpose." This circumstance most frequently arises where a contract limits the seller's obligations for breach to repairing or replacing any defective parts, yet after repeated attempts the seller is not able to repair the defects. In such an instance, the object of the remedy provided (to restore functioning goods to the purchaser) cannot be effected by the seller. Thus, where a computer manufacturer could not, after weeks or months, put its equipment in good working order and maintain it, the limitation of liability to repair or replacement would have failed of its essential purpose and would be void.

One form of limitation of remedies to which the computer customer must pay particular attention is the contractual statute of limitations, which provides that a claim under the contract must be brought within a specified period of time. Ordinarily, a lawsuit for breach of a written contract can be brought quite a long time after the breach, the number of years depending on the particular state's

statute of limitations. But a contract clause shortening the period in which suit can be brought is valid and enforceable if the period provided is commercially reasonable and is sufficiently long to enable the purchaser to learn of defects in the purchased goods. Limitation periods of a few days, or even a few months, have been held invalid. But a contractual limitations period as short as one year might well be upheld, as a purchaser discovered to its dismay in *IBM v. Catamore Enterprises, Inc.*, when the First Circuit Court of Appeals reversed an \$11 million judgment against IBM because suit had not been brought in time. The lesson is clear: suit *must* be instituted within the period specified in the contract. If a computer purchaser wishes to continue to work with the manufacturer to correct computer malfunction and has no immediate desire to disrupt its working relationship with the manufacturer by bringing suit, an agreement whereby the manufacturer waives the defense afforded by the contract limitations period must be executed; otherwise, the purchaser will lose his right to sue for any claim arising out of the contract or its breach.

REJECT AND REVOKE

The customer's remedies as set forth in the computer contract are supplemented by two closely related and very important UCC rights—the right to reject and the right to revoke acceptance of unsatisfactory goods. When computer equipment does not function properly or otherwise does not comply with contract requirements in a material respect, the UCC permits the buyer to reject the equipment within a reasonable time and recover not only any monies paid but also

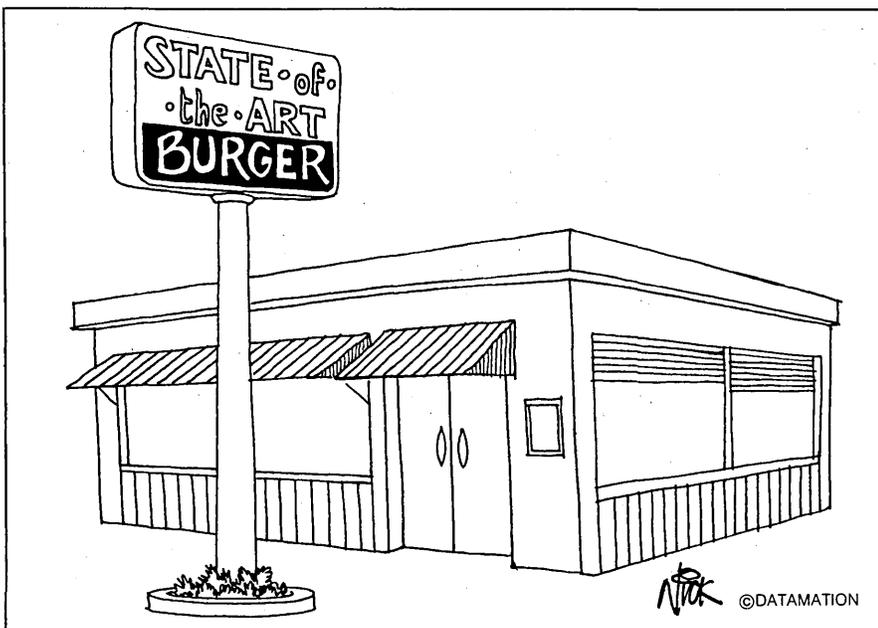
certain damages. However, this right of rejection is modified by the seller's right, upon learning of the problem, to correct any deficiencies in a timely manner. What makes the application of these rules so sticky is the fact that installation of a computer is not like delivery of a shipment of potatoes. A buyer can look at a potato and tell if it conforms to contract requirements. But merely inspecting a computer is anything but revealing; the machine must be installed, programmed, and debugged to see if it works, and even then no one will know for sure whether it is working properly until there has been an opportunity to determine over a period of time whether or not the data are reliable.

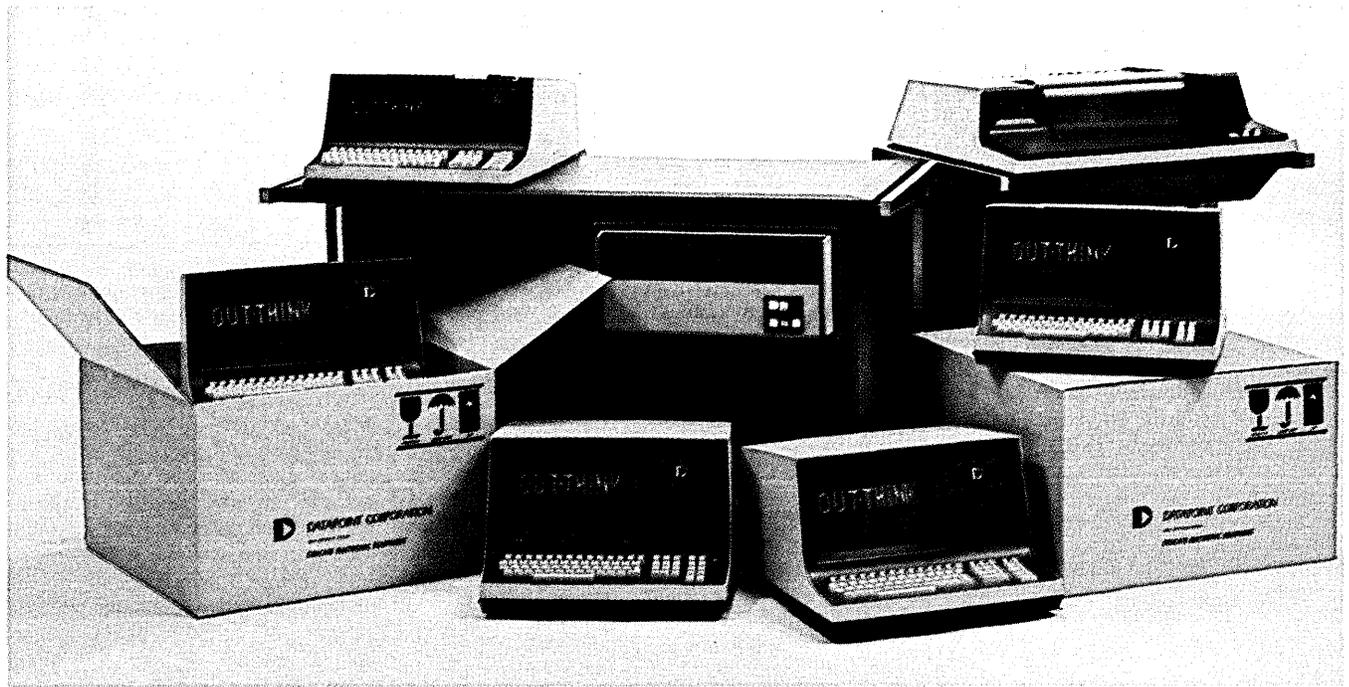
Thus, although a computer purchaser must reject defective equipment in a timely fashion, he must at the same time afford the manufacturer sufficient time to correct any defects. Too precipitous a refusal to accept any type of goods can render a purchaser liable to the seller for wrongful rejection; this legal doctrine is particularly applicable in the computer context, where courts have repeatedly noted the awesome complexity of such machines and the high rate of initial installation failure.

This being so, the best way for the purchaser to preserve his right to reject is to notify the manufacturer, after each unsuccessful attempt to rectify computer malfunction, of all remaining deficiencies, and to request that all remaining problems be cured as soon as possible. This has the effect of relieving the purchaser of responsibility for delay in rejecting (since many cases have recognized the principle that the delay inherent in repeated attempts by the seller to repair defective goods does not render a subsequent rejection of goods untimely), while at the same time preserving to the seller his opportunity to cure defects.

A purchaser need not forbear forever though. After a reasonable opportunity has been afforded the manufacturer to rectify malfunctions, the purchaser may reject the equipment, buy alternative equipment, and sue for the difference in price and other damages.

A related remedy under the UCC is "revocation of acceptance," which is, in essence, a slow method of rejecting. A purchaser may revoke a prior acceptance of goods either where defective goods were accepted on the reasonable assumption that the defects would be remedied (as, for example, where the manufacturer acknowledged the defect but promised to rectify it) or where latent defects were not able to be discovered until later. In the typical computer malfunction situation that ends up in litigation—where the installation is defective from the outset and the manufacturer repeatedly attempts to remedy the defects until the purchaser loses





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DATAPPOINT

CIRCLE 97 ON READER CARD

The typical computer contract severely restricts the remedies available against the manufacturer in the event of a breach of contract.

patience—whether the customer's subsequent cancellation of the contract constitutes a rejection after withholding acceptance or whether it constitutes a *revocation* of acceptance is a matter of interest only to law professors. The same remedies are available to the purchaser in either case.

The real issue of importance to the purchaser or lessee of computer equipment is whether the right to reject or to revoke accep-

tance can be nullified by a limitation-of-remedies clause, such as a provision purporting to limit the buyer's sole remedy to repair or replacement in the event of breach of contract. Generally, where the seller failed to successfully cure substantial defects in the computer within a reasonable amount of time, the buyer would be released from the limitations of the "repair or replace" clause on the ground that the limited remedy had

failed of its essential purpose.

In those situations where the "repair or replace" clause had failed of its essential purpose, it would almost certainly not prevent the buyer from exercising his right under the UCC to reject or revoke acceptance.

We have not attempted here to survey exhaustively the law of contracts under the Uniform Commercial Code; such an undertaking would require multiple volumes. Nor would any given decision or principle of law set out here necessarily control a particular case, for decisions under the UCC are often inconsistent, and the outcome of litigation so frequently turns on facts peculiar to the particular case. What we *have* attempted to do is to discuss the typical computer contract warranty and remedy clauses, and to illustrate what their effect may be on the purchaser or lessee.

A computer represents a very substantial capital investment; moreover, faulty performance can have a profound effect upon a company's operations. We believe that before a purchaser or lessee agrees to the limitations and disclaimers in the typical computer contract, he should fully understand the implications of doing so. *

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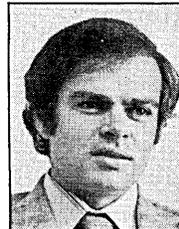
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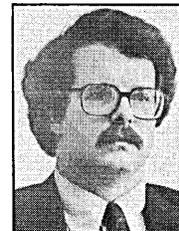
CIRCLE 98 ON READER CARD

ROBERT A. SPANNER



Presently with Severson, Werson, Berke & Melchior, San Francisco, Mr. Spanner specializes in commercial litigation and trials. He graduated in 1973 from Stanford Law School, where he was a note and research editor for the *Stanford Law Review*.

WILLIAM F. MACK



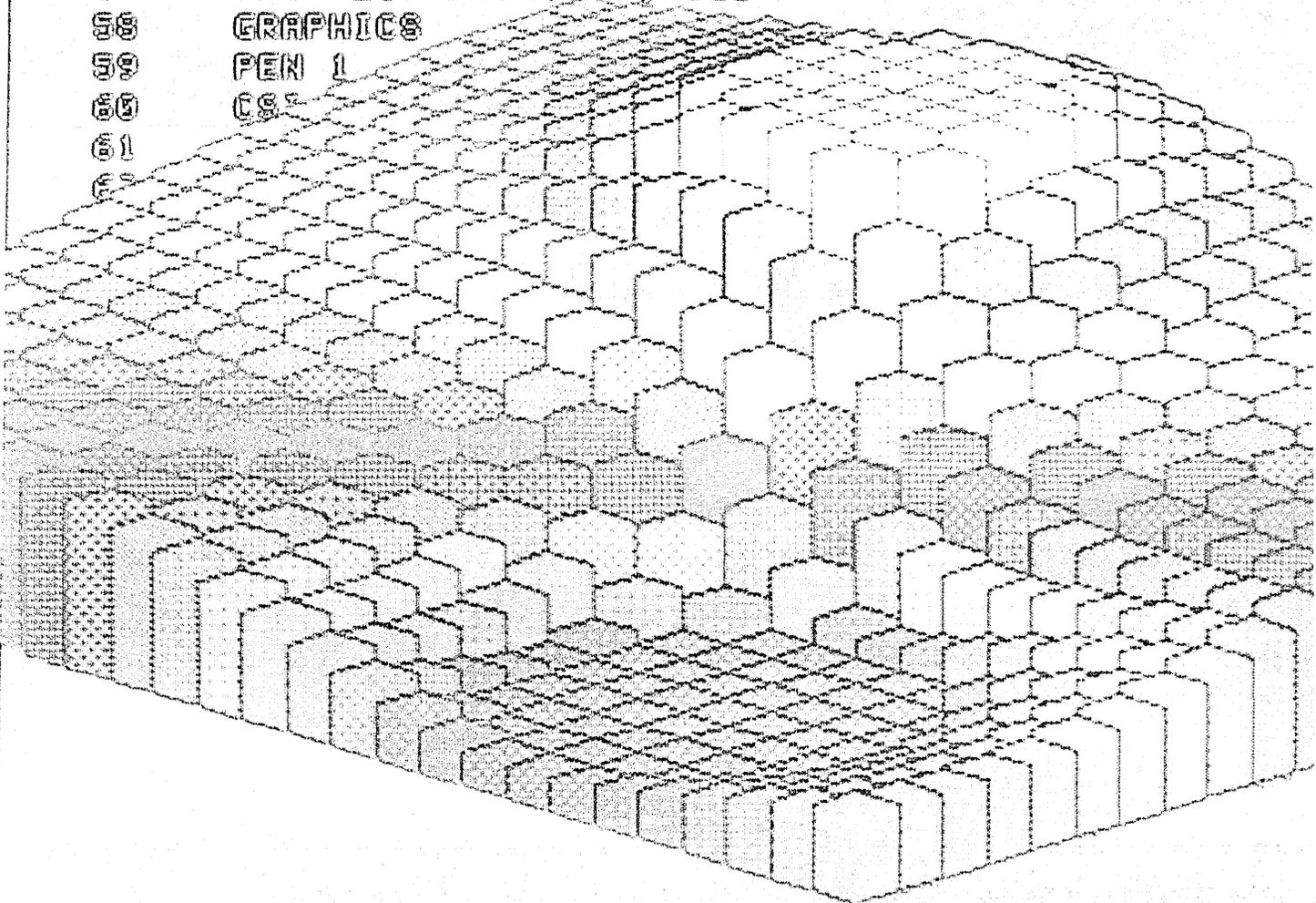
Mr. Mack, an associate attorney with Severson, Werson, Berke & Melchior, is primarily engaged in commercial litigation. A graduate of the

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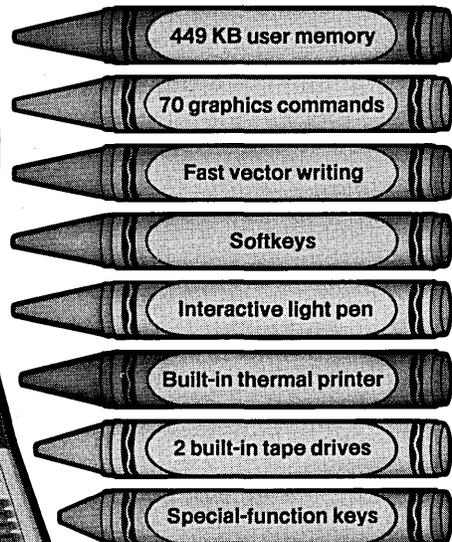
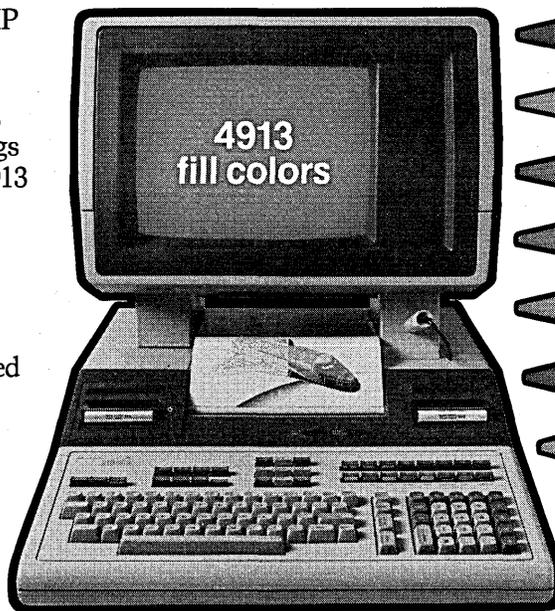
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51 MAT PLOT A(52:69),FILL
52 AREA INTENSITY 0,0,0
53 MOVE A(70,0),A(70,1)
54 MAT PLOT A(70:73),FILL
55 AREA INTENSITY A(70,3),A(70,4),A(70,5)
56 MOVE A(74,0),A(74,1)
57 MAT PLOT A(74:77),FILL
58 GRAPHICS
59 PEN 1
60 CS
61
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Color and computation integrated in a desktop

A new desktop computer — the HP System 45C — combines flexible color graphics and interactive computing in a totally integrated, high-throughput system that plugs into the wall. Features include 4,913 fill colors, 70 graphics firmware commands, high-speed vector writing, an interactive light pen, special-function keys, softkeys, a built-in thermal printer, two built-in tape drives, HP's enhanced BASIC, and up to 449K bytes of user memory.

Designed especially for engineers, scientists and others faced with complex design, analysis, and data acquisition and control problems, the System 45C can handle problems that range from Fast Fourier transforms on 65,000 data points, to multiple linear regressions on 50



variables, to project management with up to 18,000 activities for CPM or PERT analysis — all without accessing a mass memory device. And the system can output numerical data to the CRT in sharp, accurate color graphic format for quick, precise interpretation. A dedicated I/O channel between the 13-inch color display and the mainframe ensures

excellent throughput and performance.

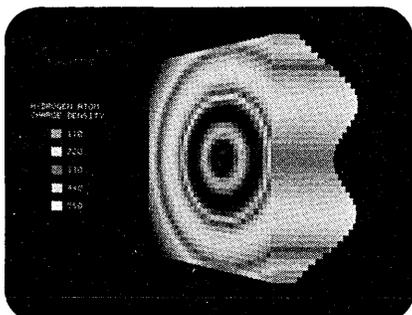
Color works harder

The System 45C's color CRT, with its pixel spacing of .34 mill center to center, uses advanced technology to ensure high-resolution. The CRT uses a shadow mask incorporating a screen covered with triads of phosphor dots with red,

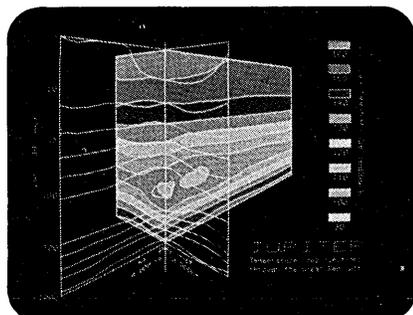
◀ Cover

Image from a System 45C desktop computer. In this 3-D plot, color and height of prismatic solids show values of the function: $U = \text{MAX}(-.17 \text{ MIN}(.21, ((x-.9)^2 + y^2)^{.1} - ((x-.5)^2 + (y-.7)^2)^{.1}))$. Image and computations are enlarged to approximately 150%.

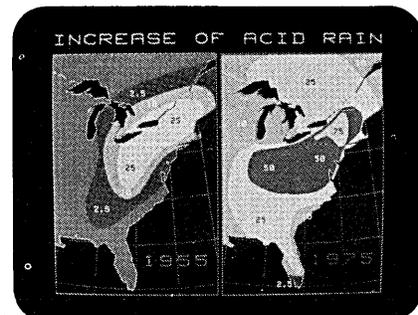
Excited state of H₂ atom



Jupiter's giant red spot



Increase of acid rain



green, and blue emissions. Each phosphor type is activated by an electron beam from a corresponding electron gun. A metal shadow mask guides the beams so that they reach the correct phosphors. This technology provides the user with eight basic colors: white, red, yellow, green, cyan, blue, magenta, and black.

To provide up to 4,913 fill colors, "dithering" is used. In this process, the 560 x 455 graphics raster CRT is divided into 4 x 4 arrays, containing 16 elements called pixels. In each array, each of the 16 pixels can be turned either on or off. The many combinations of pixels being turned on or off in three different memory planes (one for each primary color) creates the great variety of color shades on the CRT.

The system's precision raster scan display uses sophisticated electronic correction technology to minimize pincushion distortion and CRT magnetization and ensure color purity. To achieve long-lasting color convergence, the system provides soft-

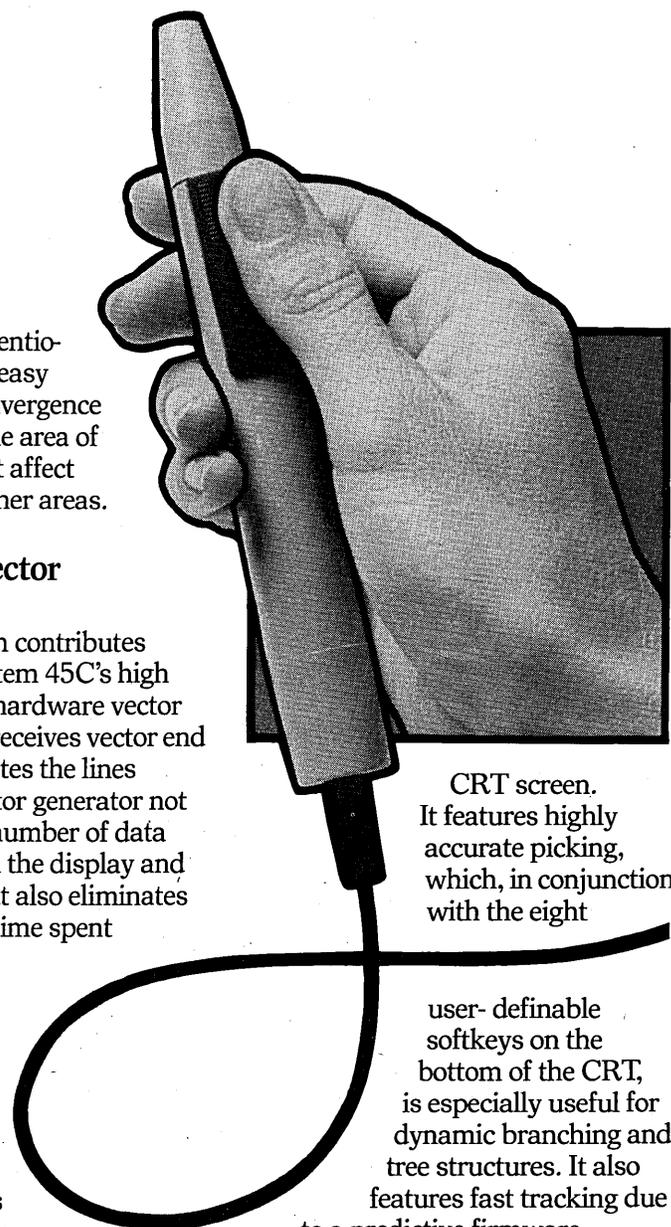
ware-assisted potentiometers for quick, easy adjustments. Convergence adjustments in one area of the screen will not affect adjustments in other areas.

High-speed vector generator

A feature which contributes greatly to the System 45C's high throughput is its hardware vector generator, which receives vector end points and generates the lines between. The vector generator not only reduces the number of data transfers between the display and the mainframe but also eliminates mainframe CPU time spent calculating points within the line.

Interactive light pen

The System 45C's interactive light pen provides a fast, easy way to pick, move, and construct objectives directly on the



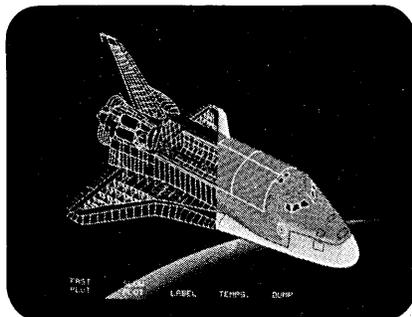
CRT screen. It features highly accurate picking, which, in conjunction with the eight

user-definable softkeys on the bottom of the CRT, is especially useful for dynamic branching and tree structures. It also features fast tracking due

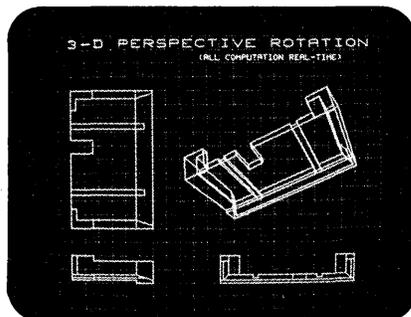
to a predictive firmware algorithm that enables the CRT

Continued on page 8

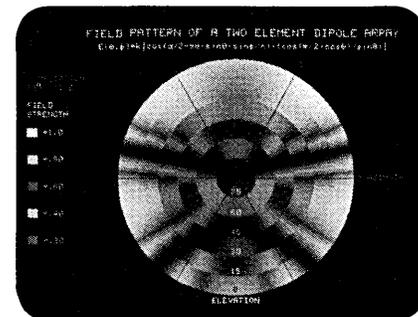
Wire frame design



3-D perspective



Antenna radiation



Interactive software links HP 3000, IBM mainframe

New solution for distributed processing applications.

HP's IML/3000 software (Interactive Mainframe Link) makes the HP 3000 a good complement to your IBM mainframe (or compatible) system. Using IBM 3270 binary synchronous protocol, IML/3000 permits easy programmatic access or update of CICS or IMS data bases on your mainframe through powerful, high-level program statements embedded in HP 3000 user programs. It also permits direct access of the mainframe through HP user terminals.

IML/3000 can provide a smooth transition to distributed processing and improve mainframe productivity. It allows new applications to be implemented on one or more HP 3000s while still having access to mainframe data. Doing this brings processing power closer to users and can reduce communications volume and cost. Alternatively certain of the applications already on the mainframe may be converted to the HP 3000 thus reducing the mainframe's teleprocessing workload.

Network flexibility

With IML/3000, an HP 3000 appears to the mainframe as a remote bisync 3270 cluster control unit. Like a 3270, up to 32 "devices" can be connected to each emulated control unit. Up to 32 control units can be attached to a single leased line. The "devices" can be either HP 3000 programs using IML/3000 statements for programmatic access and update or HP terminals

using the Inquiry and Development Facility. IML/3000 lets you multidrop HP 3000s on the same bisync leased lines you are already using for your 3270 terminals, thus reducing communication line costs. In conjunction with DS/3000, which provides interactive communication between HP 3000s, IML/3000 will allow you to configure a network that reflects your organization's structure.

High-level intrinsics

IML/3000 Programmatic Access and Update uses 14 high-level "intrinsic," analogous to subroutine calls, that maximize programmer productivity by automatically handling a lot of the low-level "bits and bytes" programming work required by

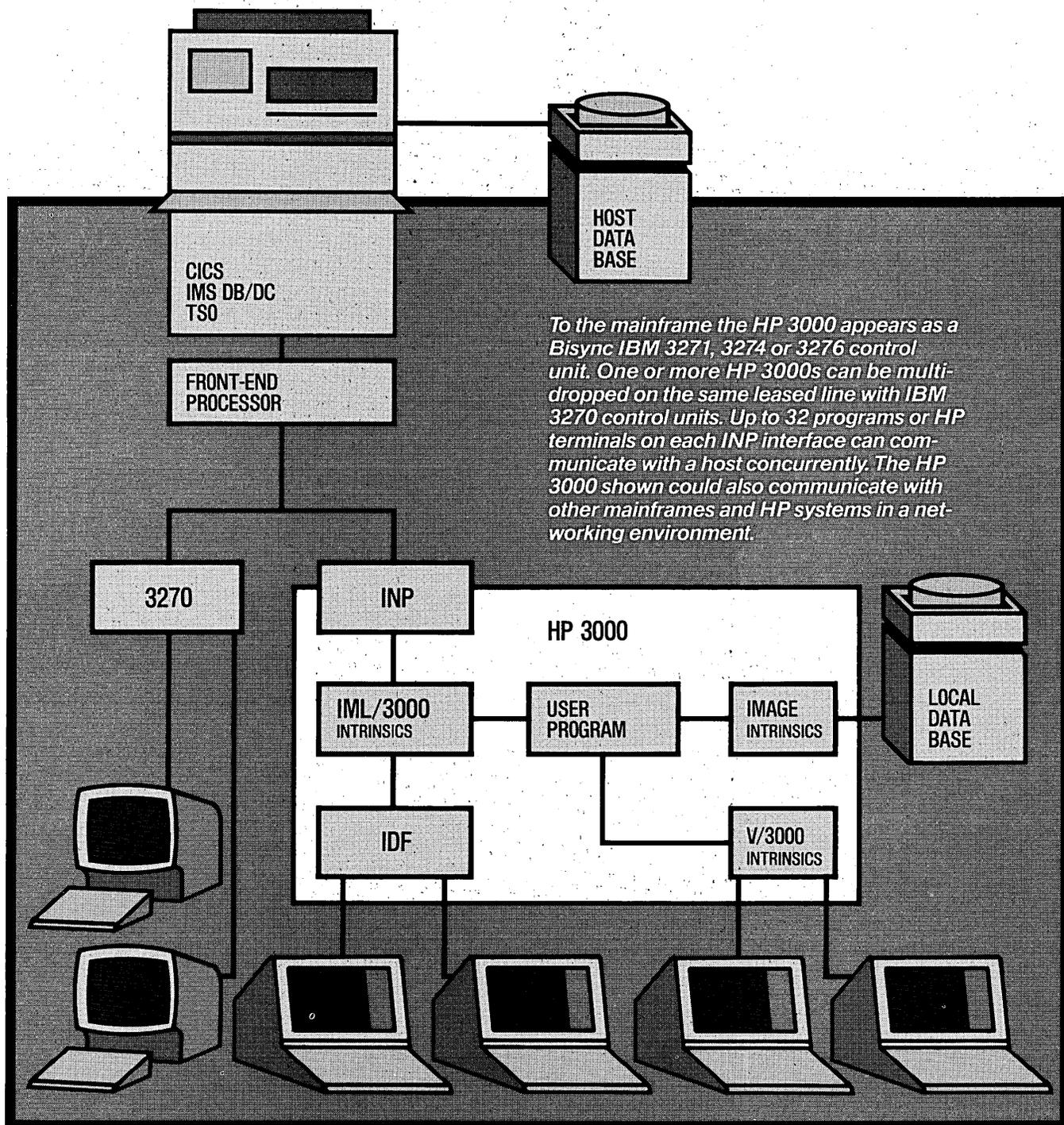
many 3270 emulators. When data is returned from the host, for example, it is in EBCDIC, and it includes 3270 control characters interspersed with data. IML/3000 handles all protocol management so that you need not worry about terminal ID, polling sequences or screen control. It also handles EBCDIC to ASCII conversion automatically.

The 14 intrinsics — which include such calls as READSCREEN, WRITESCREEN, READFIELD, and WRITEFIELD — can be used in COBOL, COBOL II, BASIC, FORTRAN, or SPL programs.

Integrated data bases

IML/3000 intrinsics can be combined with the intrinsics of other HP 3000 software —

IML/3000 Intrinsics (Program Statements)	Function
OPEN3270	Initiate IML/3000 activity from the program
RECV3270	Receive a screen of data from host
TRAN3270	Transmit a screen of data to host (equivalent to pressing 'Enter' key on a 3270 terminal)
READSCREEN	Read a screen of data from host into a buffer
READFIELD	Read a specific field of data from host into buffer
WRITEFIELD	Update an unprotected field
RESET3270	Equivalent to pressing 'Reset' key on 3270 terminal
STREAM3270	Equivalent to pressing a sequence of keystrokes on a 3270 terminal keyboard
ABORT3270	Aborts an outstanding request to receive or transmit a screen (no-wait I/O only)
CLOSE3270	Terminates IML/3000 activity from the program
VERS3270	Returns the current version of IML/3000 on the HP 3000
ERR3270	Provides easy-to-read diagnostic messages
FIELDATTR	Provides helpful programming information describing specific fields
SCREENATTR	Provides helpful programming information describing the virtual 3270 screen



To the mainframe the HP 3000 appears as a Bisync IBM 3271, 3274 or 3276 control unit. One or more HP 3000s can be multi-dropped on the same leased line with IBM 3270 control units. Up to 32 programs or HP terminals on each INP interface can communicate with a host concurrently. The HP 3000 shown could also communicate with other mainframes and HP systems in a networking environment.

such as V/3000 for screen handling, IMAGE for data base management, KSAM for file handling, or DS for distributed systems, to develop very powerful, flexible applications. For example, a COBOL program

could be written using IML/3000, V/3000, and IMAGE/3000. A user sitting at an HP terminal could enter information under the control of V/3000. The program could look at each item entered and decide if it should

be sent to an IMAGE data base, a mainframe data base, or both. The program would then use the appropriate intrinsics to do so. To retrieve data, the program would determine whether the data

Continued on page 6

Interactive mainframe link

Continued from page 5

is on the HP 3000 IMAGE data base or on the mainframe data base. It would then use the appropriate intrinsics to retrieve it. The terminal user does not have to know where the data is located, since the data bases on one or more HP 3000s and the mainframe have been made to appear as a single, integrated data base.

Easy terminal access to mainframe

The IML/3000 Inquiry and Development Facility (IDF) allows almost any block-mode HP 264X terminal attached to the HP 3000 to emulate the principal features of an IBM 3277 or 3278 terminal attached to an IBM 3271, 3274, or 3276 control unit. IDF uses IML/3000 intrinsics in conjunction with HP 264X escape sequences. It displays on the HP 264X CRT the 3270 screen image which IML/3000 constructs from the data stream received from the mainframe. It also monitors the 264X function keys which are used to implement certain 3270 functions.

A few keystrokes on the HP terminal keyboard is all that is required for the terminal to gain direct access to the mainframe. No programming is required. IDF may be used either with host teleprocessing applications such as CICS or IMS DB/DC programs, or for access to host timesharing services such as TSO. A standard access

method such as BTAM, TCAM or VTAM must be used on the host.

IDF provides great user flexibility since it allows you to develop programs on the mainframe from the HP 3000 terminal, as well as on the HP 3000 itself. These programs can then talk to each other interactively using IML/3000.

Low overhead

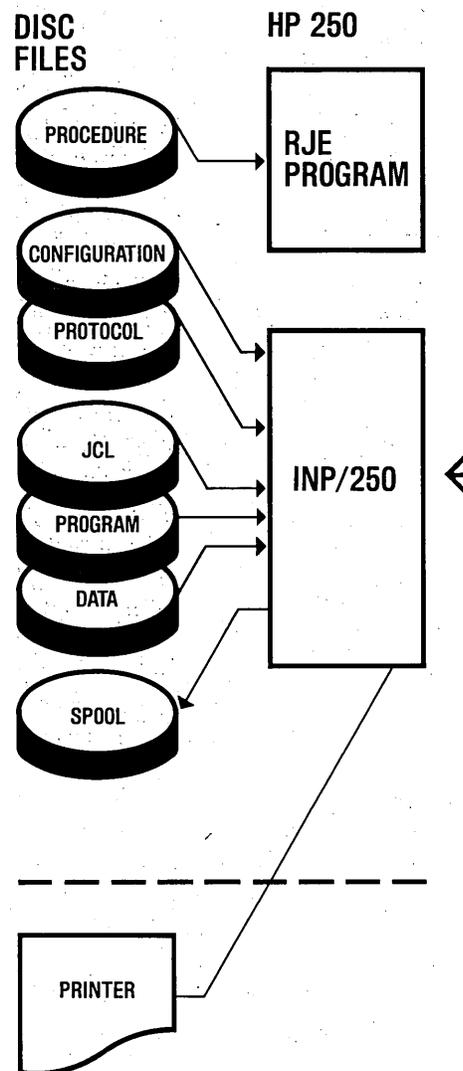
And you don't have to worry about CPU degradation using IML/3000. HP's Intelligent Network Processor (INP) keeps CPU overhead of the 3270 control unit emulation to a minimum. With a silicon-on-sapphire microprocessor and 32K bytes of fast RAM, the INP not only handles protocol data buffering, error checking and polling, but also takes care of decoding the 3270 data stream into 3270 screen images. In short, the INP handles the basic job of the 3270 control unit. This means better performance for IML/3000 and HP 3000 processing alike.

With its networking flexibility, high-level intrinsics, easy terminal access to a mainframe, and low CPU overhead, IML/3000 makes the HP 3000 an ideal tool for providing a smooth transition to distributed processing and improving mainframe productivity.

The cost is \$3,500 for one copy to run on one HP 3000. Additional copies for other systems cost \$1,400 each.

For further information, check B on the reply card.

Automatically executing program commands contained in a PROCEDURE file RJE250 can configure and load protocol code on the INP/250 then send the JCL program and data for a job to be processed by the host. The results are sent back to the HP 250 for printing or disc storage. At any time other users can be modifying or creating files for other job runs.



INP lets HP 250 run remote programs automatically

With the introduction of INP/250, the benefits of intelligent communications are extended to the small business system. INP/250 is an intelligent network processor, a board that uses its own memory, logic, and central processing unit to handle the communications protocols that would otherwise be processed by the main CPU.

INP/250 does more than save CPU cycles; it gives the HP 250 performance of a different order. Known since its introduction as a small powerful standalone processor, the HP 250 now adds the capability to perform automatic remote job entry with large mainframes.

Like the recently introduced INP/3000, the INP/250 contains a powerful SOS microprocessor and 32K of RAM.

With the addition of this board,

and the RJE/250 software that comes with it, the small business user can make the HP 250 emulate an IBM 2780/3780 batch terminal and communicate over data lines at speeds up to 19.2K bits/sec. The INP board takes care of all protocol handling, leaving the main CPU free to treat the RJE program just as it treats any other task in a multi-user configuration.

RJE/250 runs the show

The RJE/250 software can set up a communications link and run background batch programs automatically.

The first time a batch program is run, RJE/250 will prompt the user as to how to enter the required data to open the communication lines. Command and control sequences can be stored in a PROCEDURE file to run the program and a CONFIGURATION file of data on transmission speed, parity, code, transmission mode, etc.

Thereafter, all the operator has to do is call RJE/250 and select PROCEDURE from the softkey menu. RJE/250 will request "ENTER FILENAME"; once chosen, the appropriate PROCEDURE file will enter the commands to run the batch program.

These commands, typically, will first OPEN a communications line by dialing up the mainframe and downloading the configuration parameters

and protocol code to the INP/250 chip. The program will then execute several SEND orders, to transmit job control statements, the batch program, and the data to the mainframe. On the command to RECEIVE output from the host, RJE/250 will print out or store results.

CPU busy elsewhere

The operator, meanwhile, can detach from the RJE program and use the HP 250 for other tasks. Because the INP controls communications, the RJE data

transmission does not affect the CPU response time for other users.

INP/250 will operate with full or half duplex RS232 modems, and with RS366 auto-dialers. It has automatic answering capability, providing for unattended operation once a PROCEDURE is initiated. Results may therefore be received during off-hours, when telephone charges are low.

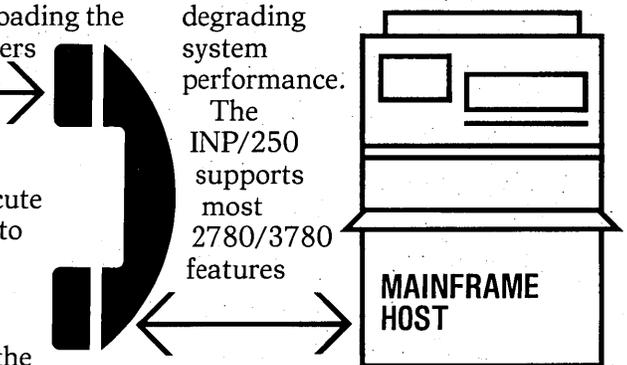
With this new package, small businesses can access large mainframes through a service bureau, while retaining the use of their own small computer. Large decentralized organizations can use several HP 250s to perform local processing and record-keeping, and to exchange information with the central computer, without degrading system performance.

The INP/250 supports most 2780/3780 features

and offers several extras, including data origination from keyboard or disc file (but not punched cards).

The INP/250 comes bundled with the RJE/250 software. Price of the package, with one cable, is \$3,225.

Check C on sender reply card for more information.



Color graphics

Continued from page 3

cursor to move at the same speed and in the same direction that the user moves the pen. This in turn allows the user to do precise digitizing and to know exactly where the pen is pointing. The pen even makes it possible to track a cursor over area-filled colors.

Powerful graphics firmware

The System 45C's powerful graphics firmware is designed to help users make fast, efficient use of the system's various hardware and software features, and to enable users to get their applications up and running quickly. The firmware includes the 40 BASIC commands found on the System 45B, as well as 30 new statements for easy, effective use of color, interactive I/O, and geometric constructions. The POLYGON and RECTANGLE statements, for instance, automatically draw regular polygons and rectangles. And the FILL parameter allows a user to color-fill the insides of figures without calculating points.

The firmware provides the user with a high degree of control over hardware and software. It allows, for example, individual access to the three memory planes and assignment of one of the eight basic colors to each of the three memory planes. This gives the advanced programmer great flexibility in creating a variety of sophisticated color graphics.

Two color models—the color cube and the color cylinder—can

be used for selecting area colors. Since all 4,913 colors in both models are logically and numerically organized, colors can be used to directly reflect the result of arithmetic or algorithmic calculations of variables such as temperature, stress, and so on.

Easy linkage to peripherals

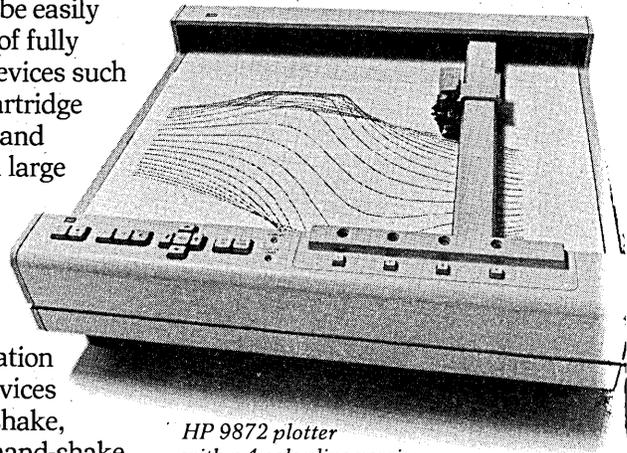
The System 45C can be easily linked to a wide variety of fully compatible peripheral devices such as flexible discs, large cartridge discs, printers, plotters, and digitizers, as well as to a large assortment of electronic instrumentation. An input/output ROM extends the BASIC language to exchange data and control information with various external devices via asynchronous handshake, vectored interrupt, fast hand-shake, or DMA. All linkages are handled through plug-in interface cards, including 16-bit parallel, BCD input, HP-IB, Real Time Clock, RS-232C Bit Serial, Incremental Plotter, Disc Interface and ASYNC/BISYNC data communications.

Unified Mass Storage Commands save programming costs by allowing users to address each new device with only a single program line change. The system provides a file-by-name directory and gives the choice of serial or random file organization. Variable record lengths conserve mass memory space, while extensive data buffering balances I/O to provide maximum throughput.

The System 45C.

Powerful, and flexible. A fully integrated color graphics/computation desktop system—with 187 KB of memory, HP's Enhanced BASIC, powerful graphics firmware, up to 4,913 colors, and color utilities software—is only \$39,500.

For more information, check A on the reply card.



*HP 9872 plotter
with a 4 color line version
plot of computation shown on cover.*

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**HEWLETT
PACKARD**

Data administration is surveyed to determine how much similarity there is between the DA function described in the literature and the one actually being implemented.

WHAT DO DATA ADMINISTRATORS REALLY DO?

by **Ian B. McCririck**
and **Robert C. Goldstein**

Despite the newness of the title data administrator, the position has already gone through a change of jargon, originally being called "data base administrator." However, in many minds a *data base* is something on a computer, and, in order to emphasize the broader scope of this job function, the alternative name is now used most often. In cases where some managers advocate both positions, the DBA performs a more specialized, usually technical, function often associated with a particular application area. This approach is understandable; the data base concept has usually been implemented application by application, leading to the existence of multiple, largely independent data bases within a single organization.

Data administration has recently been the the subject of considerable attention in the industry literature. Most articles are conceptual: they begin with the premise that data is a basic organizational resource that can and should be explicitly managed, much as human and financial resources are managed. From this premise a job description is developed setting forth the functions to be performed, and perhaps including a list of qualifications for the employee. Two points are always evident. First, since the job requires an extensive array of high-level administrative and technical skills, it is unlikely there would be any qualified candidates for the described position. Secondly, since data administration can become a major center of organizational power, many observers wonder about the willingness of current managers to relinquish control over their data to this new entity.

Despite these two serious difficulties, the data administration position is appearing and getting filled at a rapid rate. It is rare to visit a large organization with a sophisticated dp center and not be invited to "meet our data administrator." Inevitably, one wonders how much similarity there is between the DA function described in the literature and the one that is actually being implemented. In order to

shed some light on this question, we have surveyed the state of data administration in Canada.¹

A package consisting of two questionnaires was developed and validated using standard social science techniques. The package was then sent to 555 large computer users in both the public and private sectors.

An EDP Profile Questionnaire was initially directed to the manager of the edp activity in each organization. This questionnaire was concerned with general characteristics of the organization and its dp activity, and included the question of the existence of a data administration function. If such a function did exist, its manager was asked to complete a Data Administration Profile Questionnaire which dealt with the characteristics (organizational structure, experience, tools, scope) and responsibilities of the group.

Responses were received from 253 organizations, about 43% of the sample. All major categories of organization were well represented as shown in Tables I and II. Of the 253 respondents, 71 claimed to have data administration functions. Table III breaks down these responses by organizational type.

LESS THAN A THIRD

The first interesting result is contained in the response statistics. Data administration, at least as a separate, identifiable group, is not nearly as widespread as we thought: only 28% of the responding organizations had this position.

An attempt was made to find out what features distinguished those organizations having data administrators from those not having the function. A number of organizational and dp characteristics were selected, including those suggested by Nolan's Stage Model of dp development,² which associates

creation of the DA function with an advanced level of dp maturity. It appears that organizations with very large dp activities and those with more than 10 years' experience with computers are somewhat more likely to have data administrators than those with smaller or newer dp functions. However, the correlations, while significant, were small, suggesting that a large, experienced dp group may be a necessary but not a sufficient condition for the establishment of data administration.

An alternative hypothesis, supported by the data, is that DA functions are more likely to have been established by organizations in industries with high profits in recent years. The availability of discretionary funds for experimentation may thus be an important factor. Since, of course, statistical analysis reveals only correlation, rather than causality, it could be argued by a data administration enthusiast that the establishment of a DA function was responsible for the unusual profitability. However, it would take an extraordinary degree of faith to propose this explanation for the exceptional recent profitability of natural resources and energy companies and those involved in high technology areas, or for the traditional high profitability of banking and insurance firms.

The remainder of this article summarizes some of the survey's findings about characteristics and responsibilities of data administration function in results based on 69 returned Data Administration Profile Questionnaires.

The level of formal education attained by the responding data administrators is shown in Fig. 1. It offers no surprises. Fig. 2 shows how the university degrees, both undergraduate and graduate, break down by academic area. The bulk of the degrees in the "Other" category are in engineering or sciences other than computer science. The 2 to 1 majority of computer science specialists over those with business degrees is indicative of something that appears frequently in our results. The data administrator is primarily a technician, concerned with implementing a data base system and keeping it working. The planning and coordination of data usage with-

1. The survey was conducted as part of the master's thesis "A Survey of the Data Administration Function in Large Canadian Organizations" submitted to the Faculty of Commerce and Business Administration, University of British Columbia by Ian McCririck, June 1979.

2. Richard L. Nolan has published several articles describing the model. The most recent is "Managing the Crises in Data Processing," *Harvard Business Review*, March-April 1979.

in an organization, an important part of the job in theory, does not in practice seem to be receiving much attention.

Some 91% of the respondents described themselves as having a computer technology background, and 93% had system development experience. By contrast, only about half claimed even one year of experience in a functional area of business.

DA GROUPS NEW

Although discussion of the data administration concept began around 1971, nearly 60% of the DA groups from the responding organizations were less than two years old, another 25% had been around for three or four years, and only 11 out of 69 had more than four years' experience (Fig. 3). Thus, the findings in the following sections must be recognized as reflecting a function that is still in the process of evaluation. This is further indicated by the small size of most DA groups; 80% had five or fewer employees.

Perhaps the single most interesting result in this section was organizational placement of the DA function. This is consistent with previous indications that current data administrators have a largely technical role. However, it is clearly not a good position from which to exercise coordination and control over the corporate data resource.

The data administrator of the conceptual literature is responsible for the organization's data resource; that is, all the data for which there are formal collection and usage procedures. However, in our survey, 77% of the respondents stated they had no responsibility for any non-machine-readable data, and in only one-third of the organizations did the DA even have control over all machine readable data. The tendency to associate the DA function only with machine-readable data is another indication of the emphasis on a DBMS support role rather than the broader one of data resource management. Similarly, machine-readable data that has not been placed under control of a DBMS often remains the "property" of its users. In contrast, in principle, it probably should be the DA who decides what form (manual or automated) is appropriate for particular sets of data and when data base technology is justified. In response to a set of questions dealing with the responsibilities of the DA group, approximately 80% of data administrators stated that they were responsible for identifying effective data base applications and developing tactical and strategic plans for the evolution of the corporate data base. On the other hand, only around 30% had responsibility for relating the cost of acquisition of data to usage or for policies governing the collection of data for application systems.

One of the most cited advantages of

TABLE I

PRIVATE SECTOR RESPONSES

NUMBER SURVEYED	RESPONSES
Out of 120 largest Canadian industrials by sales	58
Out of 6 largest real estate companies by assets	5
Out of 10 largest merchandising companies by sales	7
Out of 25 largest financial companies by assets	12
Out of 15 largest insurance companies by assets	9

TABLE II

PUBLIC SECTOR RESPONSES

ITEM	MAILED	RESPONSES
Federal government	27	17
Provincial government	67	32
Universities	23	15
Cities	8	6

TABLE III

TYPE	NO. OF RESPONDENTS	NO. WITH DA FUNCTION (%)
Wood, pulp, and paper	9	0 (0)
Primary metals and fabrication	11	2 (18)
Petroleum and coal products	19	7 (37)
Chemical and chemical products	11	3 (27)
Food, beverage, and tobacco	18	4 (22)
Accommodation and food services	1	0 (0)
Electrical products	1	0 (0)
Automotive products	4	0 (0)
Printing and publishing	6	0 (0)
Miscellaneous manufacturing	1	0 (0)
Industrial equipment	3	1 (33)
Construction	3	1 (0)
Transportation	7	0 (0)
Telecommunications, communications	8	5 (63)
Department, supermarket, variety stores	10	1 (10)
Household and personal products	3	1 (33)
Property development, management	5	1 (20)
Information processing equipment	2	1 (50)
Electric, gas, or water utility	14	6 (43)
Bank, deposit, or credit agency	12	5 (42)
Life insurance	13	4 (31)
Government department or agency	40	10 (25)
Universities	15	7 (47)
Other	37	12 (32)
Total	253	71

the data base approach is the opportunity of making data collected by one part of an organization available to other parts that can effectively use it. Consequently, one of the major responsibilities of a data administrator should be to seek opportunities for data sharing and coordinate the exchange. We asked the DAs in our sample how much of their machine-readable data actually was shared among applications, and how much they thought could effectively be shared in the absence of technical or other constraints. As shown in Fig. 4 (a), two-thirds of the organizations reported that less than 25% of their data was used by more than one application, and only three organizations shared 25% or more. Even more interesting is Fig. 4 (b) which shows the extraordinary degree of disagreement among the DAs about the potential for sharing data.

PRIMARY TOOLS OF DA

The primary tools of data administration are the Data Base Management System and Data Dictionary Directory System. Some 64 out of 69 responding organizations used a DBMS, and 14 of them used more than one. In general, though, DBMSs were not used extensively. In nearly half of the organizations, less than 20% of the applications (measured by their dp budgets) used a DBMS, and only three organizations claimed that 80% of their organization operated in a data base environment. This is probably indicative of a transitional stage where many major applications developed in the pre-data base era are still in use. Whatever the reason, not having all applications using the DBMS obviously complicates efforts to manage an organization's data resource in a coherent manner.

FIG. 1.

DA EDUCATION LEVELS

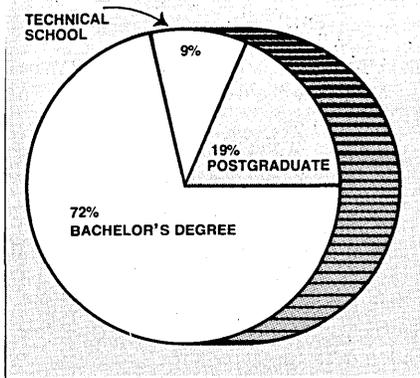


FIG. 2.

DA DEGREES

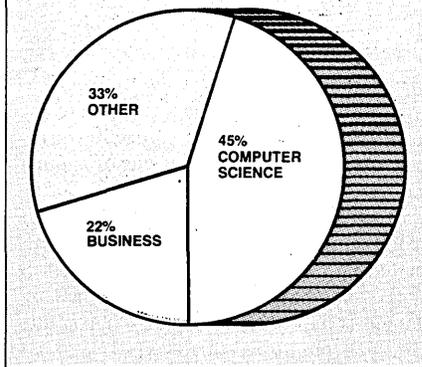


FIG. 3.

YEARS OF DA EXISTENCE

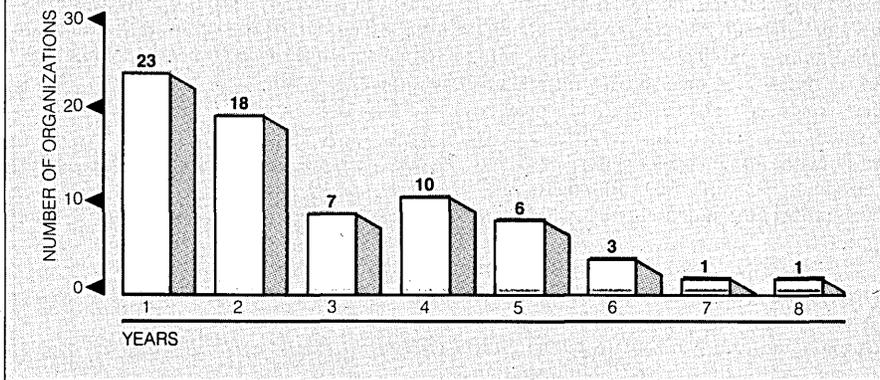
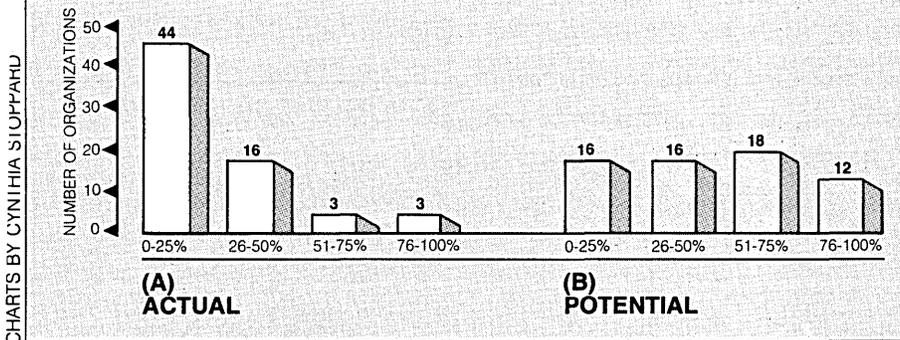


FIG. 4.

PERCENTAGE OF MACHINE-READABLE DATA SHARED AMONG APPLICATIONS



CHARTS BY CYNTHIA SIUPPAHD

The survey also asked when the data administration function was established relative to the acquisition of the DBMS. Two-thirds of the respondents reported that the DBMS came first. While this is not surprising, it is somewhat disappointing. Presumably, the decision to acquire a DBMS ought to be part of a coherent data resource management plan. Installing the DBMS before developing the plan is a bit reminiscent of the '50s and early '60s, when many firms acquired computers because it seemed the right thing to do. The technical and/or financial failure of many of those early, poorly planned efforts at computerization are being mirrored today as organizations put in place the hardware and software for a data base environment without the necessary planning and coordination.

This conclusion is supported by the fact that less than two-thirds of the organizations with a data administration function used a Data Dictionary/Directory System and in most cases, it was acquired after installation of the DBMS. A DD/DS—a data base of information about the data base—is unquestionably one of the most important tools for effective data administration.

A search of the literature produced a list of 38 activities describing the major responsibilities of a data administrator. Survey participants were asked whether each of these items was, in fact, their responsibility, the percentage of their time spent on the activity, and how they expected that percentage to be different two years later. A number of interesting results emerged from this section.

First, there was fairly general agreement that the list of theoretical responsibilities culled from the DA literature matched their job descriptions. When the times spent on each of these activities were totaled, however, nearly 20% of the DA's time was unaccounted for. While it is possible that this discrepancy is simply the result of errors in estimating time spent on 38 distinct tasks, there is no obvious reason why these estimates should have uniformly erred on the low side. Thus, it may be that there are some other tasks that consume a significant fraction of the data administration effort. Unfortunately, our questionnaire neglected to provide for this contingency.

A comparison was performed on the time-per-responsibility responses between longer existing and more recently established DA groups to discover any shifts in importance of particular tasks between the early startup phase and the later steady state. Few significant differences were found, suggesting, perhaps, that none of the respondents had yet stabilized the job.

A similar analysis performed on the responses to the questions asked how the time spent on each task was expected to be different two years later. These questions produced

The data administration functions are more likely to have been established by organizations in industries with high profits in recent years.

one of the most fascinating results. The majority of respondents felt they would be spending more time in two years on every responsibility on the list. Only one item got the votes of as many as 10% of the DAs for becoming *less* important—the development of backup, recovery, and restart procedures.

Four other responsibilities, also clearly dealing with startup tasks, were placed in the "less important two years later" category by 5% to 10% of the DAs. Many responsibilities dealing with the establishment of policies and development of procedures, which would be expected to consume time only at the beginning, were reported by the majority of respondents as growing in importance. It is difficult to account for this. It may be, though, that the DAs, still heavily pressed by the problems of making a DBMS operational and getting critical applications to work, simply don't expect to complete their more general planning and policymaking tasks within a two-year period.

PEOPLE PROBLEM AVOIDED

As far as any significant political problems associated with creating a major new power center, and how companies have been able to find people who combine both the technical and administrative skills, the survey suggests these problems have been avoided rather than solved. The most publicized model for a data administrator is the chief financial or personnel officer—an individual who is responsible for the allocation and usage of a major resource throughout the organization. The results of our survey suggest that they have instead adopted the model of the technical specialist, not unlike a telecommunications manager, who is responsible for understanding an exotic technology.

The internal power struggles for control over information have not occurred

because there has not been any widespread effort to take control of data away from applications. We were not told of any case where one user was required to change a procedure in order to meet the information needs of another user; only a minimal amount of data sharing seems to be taking place. Although there is general agreement among the respondents that formation of a coherent, overall set of policies and procedures for information management is part of their job, they apparently haven't accomplished this task.

A more typical example of what has actually happened is probably something like this: decision is made to acquire a DMBS to meet the need of a particular application or a related group of applications. The justification for the DMBS, in this case, is based on its use as a sophisticated file access method. An individual or group is charged with becoming expert in this complicated piece of new software in order to be able to perform maintenance and enhancements, and provide consultation to users. This group is usually staffed with former systems analysts, and often acquires the title "data administration" when, in fact, the function is actually DBMS support.

Once established, the group discovers there is an array of other responsibilities that may be theirs, but they don't have the time or the training or the organizational clout to fulfill them. Virtually all data administration groups appear to exist as staff functions within dp departments. This has several implications. First, they will, in general, be perceived by non-dp people basically as technical specialists. Secondly, they will not be visible to top management, and usually not able to influence decisions about non-computerized information. Finally, they are not in a good position to coordinate data handling activities among applications, and certainly not to require a user department to

make changes in its procedures that may be needed to make the data useful elsewhere in the organization.

Thus, while the dp department is seemingly a logical place for the data administration function to arise, a group in this environment is not well placed to carry out most of the nontechnical responsibilities of data resource management. Furthermore, it is difficult to see how these groups can evolve from such a beginning to a more appropriate position in the organization.

In fact, one large company that participated in the survey reported it had made two previous unsatisfactory attempts at establishing a data administration function in the dp group. It was now convinced that effective management of the corporate data resource can only be done by a group outside the dp activity. The company is now in its third attempt, this time in the corporate planning department. *

IAN B. MCCRIRICK



Mr. McCririck is a systems analyst leader in the Computer Management Systems Division of B.C. Hydro and Power Authority, Vancouver, British

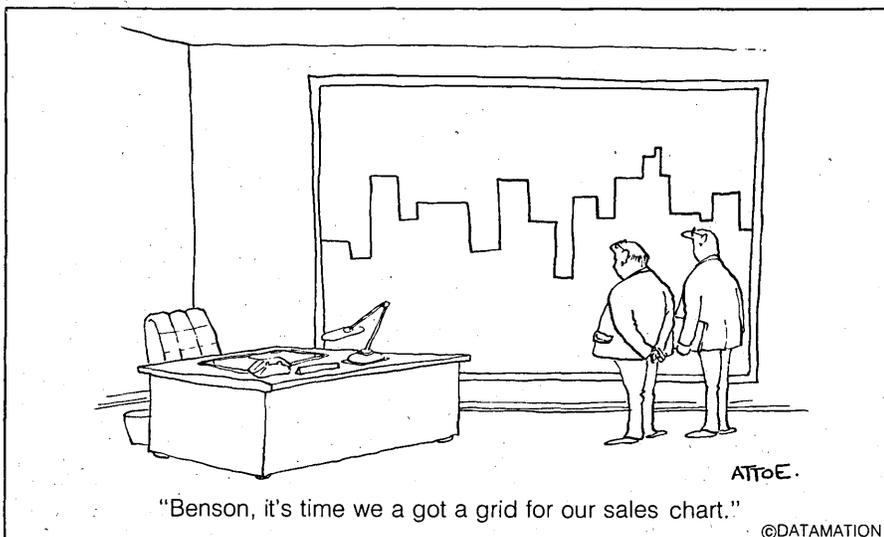
Columbia. His responsibilities include long range MIS planning and data administration, and standards for systems development and maintenance. He joined B.C. Hydro in 1970 as a senior systems analyst.

ROBERT C. GOLDSTEIN



An associate professor of management information systems on the faculty of commerce at the University of British Columbia in

Vancouver, Prof. Goldstein's research interests include both technical and administrative aspects of information management. His book, *Modeling Privacy Costs*, which estimates the impact of privacy legislation on computerized personal data systems, was recently published.



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Touch sensitive input devices take advantage of the natural instinct to point at what is wanted.

by Louise C. Shaw

A growing number of computer applications require a man-machine interface that is not satisfied by the conventional computer terminal. For many applications, the keyboard terminal is too unwieldy or complex. Interactive users need a simple, natural communication technique. Conventional terminals can be intimidating or discouraging.

Touch sensitive input devices take advantage of a natural instinct to point at what is wanted. When a finger is placed on the surface of a touch-sensitive sensor, the coordinates of the point of contact are transmitted to the host computer; the need for light pens, wands, cursor mouse, joy sticks, or digitizer stylus are eliminated. Untrained operators can select functions, control commands, or data from a menu displayed on the surface of the sensor. Pictures and ideographs further simplify the process, and transcend language barriers.

The intended application of the touch sensor dictates how and where it is mounted. For an application that requires choosing from a small number of fixed positions, such

WHY TOUCH SENSING?

as a replacement for push-buttons, the mounting can be on a fixed picture or a surface with permanently inscribed legends. For an application that requires a large number of choices, the sensor may be mounted on a computer-driven device. The gas plasma display and conventional crt are commonly used for this purpose.

A typical interactive application uses a question and answer dialogue between the computer and operator. The computer displays the question and the response choices, and the operator touches the item that answers the question. This approach can be extended to include a tree search or hierarchy of menus. In a typical data base access application, the computer may generate and display the

names of categories of files. The user touches the name of the category. The computer then reads the coordinates of the touched point, and displays a directory of accessible files for the desired category. A touch by the user signifies the chosen file. Continuing in this manner, a sequence of two or three would lead the untrained operator to a selected data item in a short time. The menu selection technique is a natural method for data entry where menus correspond directly to existing application operations, and occurs, for example, in many retail stores.

In control applications, the computer displays the choices available and thereby simulates a set of push-buttons. Unlike a "real" operator's console with many but-

tons, the simulated console will only display those buttons that pertain to the situation. In many applications, this reduces the chance for confusion and error.

The use of computer-generated graphics and diagrams coupled with touch input can further simplify the process control operator's console. In the past, dials, clock-like readouts, and numeric displays were common features. Now, a single crt or plasma display presents a block diagram of the major component parts of the process. The operator touches the diagram at the point of interest and the computer responds by displaying the relevant parameters. For small volumes of data entry a computer-generated picture of a numeric keyboard allows "key-



Provisions for helping the user have to be built into the system.

TOUCH-SCREEN TERMINAL MANUFACTURERS

NAME	MODELS	COST	TOUCH SCREEN	ON-SITE MAINTENANCE	DELIVERY TIME
Carrol Manufacturing Corp. 1212 Hagan St. Champaign, IL 61820 (217) 351-1700	Datamedia 3025A	\$1,000-2,600	Infrared	Yes	30-45 days
	TPCM 40X32	\$1,000	Infrared	Yes	4-6 weeks
	TPCM 32X32	\$1,200	Infrared	Yes	4-5 weeks
	Others available upon request				
General Digital Corp. 700 Burnside Ave. E. Hartford, CT 06108 (203) 289-7391	VuePoint	\$3,000 in quantity	Infrared	board exchange	45 days
Information Dialogues, Inc. 15500 Wayzata Blvd. Suite 606 Wayzata, MN 55391 (612) 473-2556	TST 180	\$2,175 quantity 50-99	Capacitance	board exchange	30 days small quantities
Magnavox Display Systems 1313 Production Road Fort Wayne, IN 46808 (219) 482-4411	Model 28 Touch Panel	\$975	Infrared	—	90 days
TSD Display Products, Inc. 35 Orville Drive Bohemia, NY 11716 (516) 589-6800	Touch Screen Digitizer	\$865-\$2,400 price determined by model and quantity	Acoustic waves	Yes	45 days

ing in" of numeric data. The touching of a picture of a speedometer or thermometer scale, for example, allows the user to set an approximate speed or temperature setting without the need for a physical switch or a mechanical joy stick.

POINT TO THE PICTURE

An alternate means of data entry to menu selection and simulated keys or push-buttons is to have pictures of objects generated by the computer. The operator touches that portion of interest in the picture. This allows a customer to walk through a parts replacement catalogue without knowing the technical names of subassembly components. Room reservation or seating reservation systems which display a floor map of rooms or a schematic of the seating arrangement allow a reservation clerk or the customer to make a choice by touching the desired room or seat on the schematic.

It may sound strange to consider the "resolution of the finger," the "baud rate of the hand," or the "bit storage capacity of the human." Still these notions must be considered by the application programmer who de-

signs the programs that use touch input. Ignoring these factors leads to systems that degrade the capabilities touch input possesses. For example, an attempt to use all 80 columns or 30 rows of the display would be disastrous. The selection items on display have to be separated by at least the thickness of the finger. At any instant, the number of available choices and selections should be small (ideally under 10). Too many choices create confusion.

A large selection must be converted into a short sequence of small choices—the hierarchy approach. The wording and structure of diagrams have to be self-explanatory to the uninitiated user. Provisions for helping the user have to be built into the system. The user must be offered more information or details upon request. When the system detects erroneous or invalid input, it must explain to the user how to insert correct information. Aborting the session or simply stating that the input is wrong is not adequate. Clearly stated diagnostic messages and illustrative examples must be available. The user has to have an obvious means at his disposal to correct or change his inputs. The "erase" feature

should take the user back to the previous picture frame, not to the beginning of the session. The application program should acknowledge each transaction. If there is no immediate feedback to the user that the system has heard (or felt) the input, frustration or irritation is likely to result.

The underlying design principles are straightforward as long as the programmer remembers there is a human being at the end of the touch sensor.

TOUCH SENSOR TYPES

Several technologies have been used in the design of a touch sensor. The sensors currently available on the market use the properties of diverse physical phenomena. A common technique in the design of touch sensors is to have a signal generated by the sensor travel through some media. The signal is then detected by the sensor. If a finger has been placed on or near the media, the finger modifies or changes the character of the signal. The detector measures the changed characteristics of the signal and determines the presence and position of the finger.

COMMENTS***APPLICATIONS**

MTBF 15,000 hours
 40 lines in X, 24 lines in Y
 Parallel interface to host
 40 points in X, 32 points in Y
 Parallel interface to host
 32 points in X, 32 points in Y

Education
 Public Information
 Factory data entry

MTBF indefinite
 300-19,200 baud rate
 12 lines of 40 characters
 50,000 hours of display time

Executive information retrieval
 Automatic test equipment
 Point of sale terminal

MTBF 5,000 hours
 110-9600 baud rate
 32 discrete touch pads

Retail
 Library search and retrieval
 Management control

MTBF 16,000 hours
 Matrix 16X16
 Local indication audio tone
 Parallel transfer 10 seconds

Education
 Public Information
 Factory data entry

MTBF 10,000 hours
 50-9,600 adjustable baud rate
 Host interface parallel 8-bit
 Tristate
 ASCII RS232

Education
 Medical record keeping
 Airline reservations

*Unless otherwise indicated, host interface is RS232

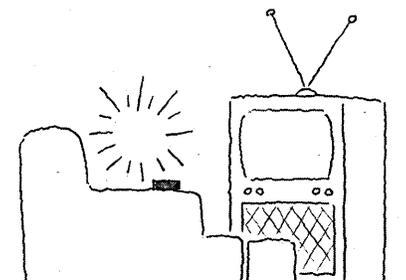
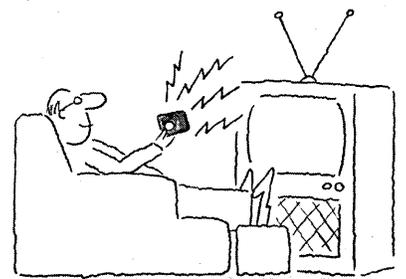
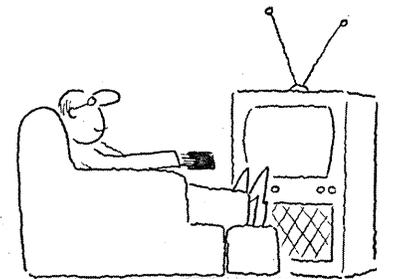
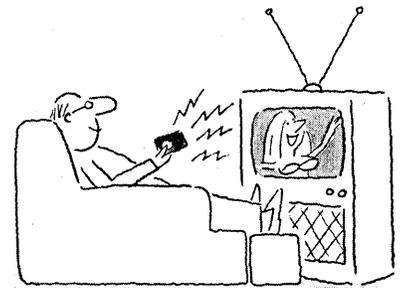
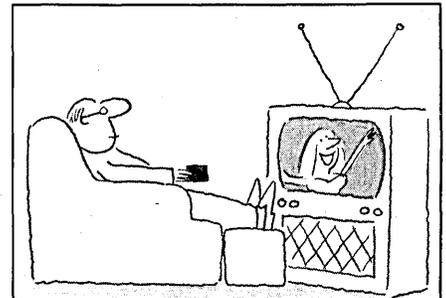
One of the oldest techniques employs infrared (IR) light as the signal method and photo detectors as the signal receiver. The Plato terminals, which have been used extensively for computer assisted instruction (CAI), have employed arrays of IR light emitting diodes mounted on two adjacent sides of a rectangular frame. The frame surrounds a display area. The remaining two sides of the frame have the photo detectors mounted opposite matching IR emitters. If no finger is present, each detector can detect the light of its corresponding emitter on the opposite side of the frame. If a finger is present, the light beam is blocked and the finger is detected.

Another commercially available system uses acoustic surface waves on a transparent surface as the generated signals that are modified by a finger presence. The acoustic waves generated along two sides travel along the surface. A finger on the surface causes the waves to be reflected. An echo detection system, similar to that used in sonar, listens for the echo. The elapsed time between wave creation and echo return is used to compute the position of the finger. The transparent surface is placed over a crt.

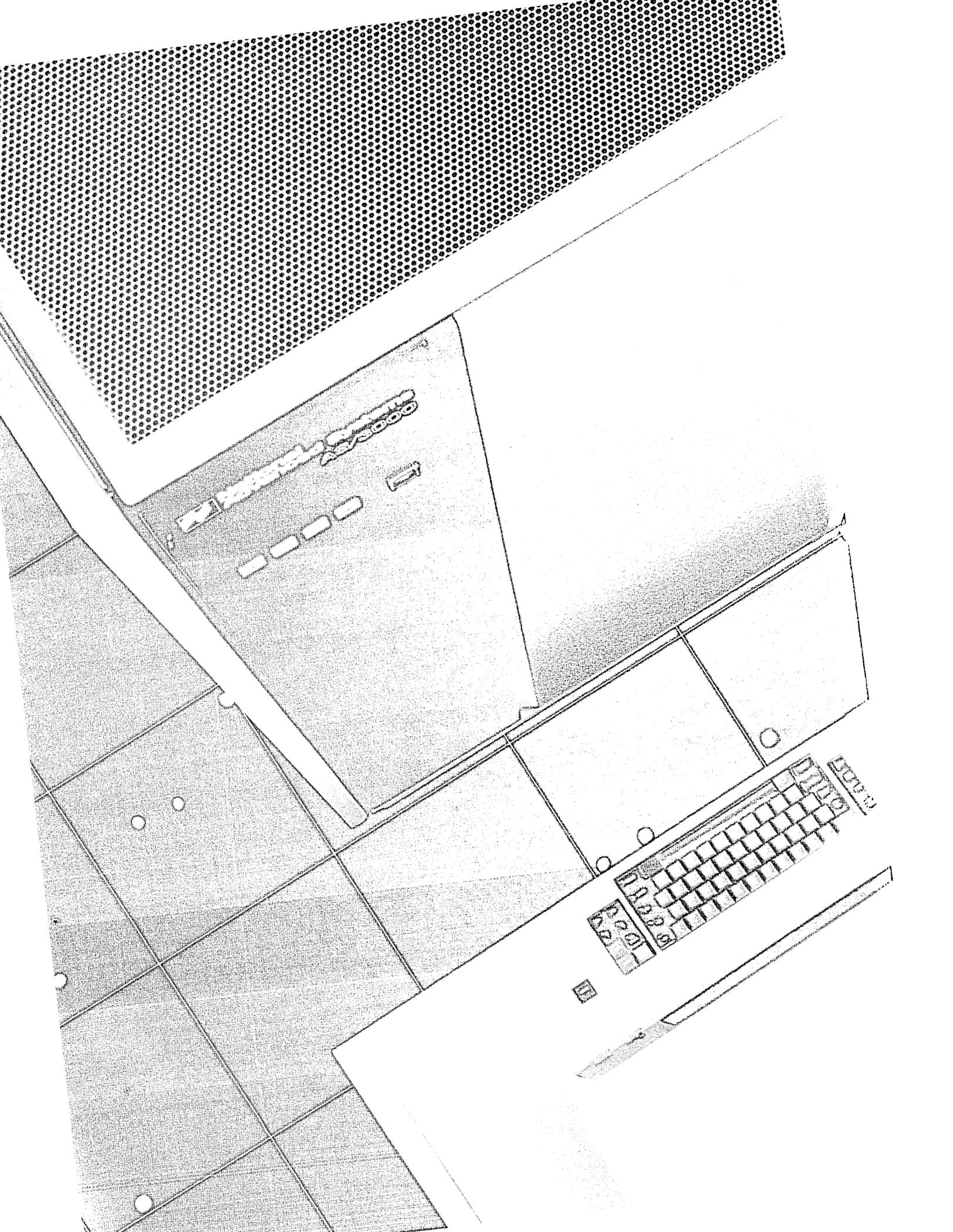
Another system that uses a transparent overlay on a crt involves two sheets. One sheet is glass-coated with a transparent resistive substrate. A second sheet is plastic with a transparent conductive layer. This second sheet is near, but not touching, the first sheet. The voltage of a signal depends on the point of contact, and voltage measuring sensors compute the x-y coordinates of touch.

Some systems have electrically conductive material on the surface of the touch-sensing area. The finger on the surface changes the electrical characteristics of the conductive material. The capacitance and/or resistance of the human body is used to electrically alter the conductive path on the sensor. By measuring the change of electrical signal the finger's presence is detected. By having several conductive circuits on the surface, the identity of the modified circuit locates the position of the finger.

There are many techniques for touch sensing, and each has a definite use and advantage. In the near future, as distributive processing expands, the number of users who can benefit from touch input will increase; the appropriate technology is waiting. *



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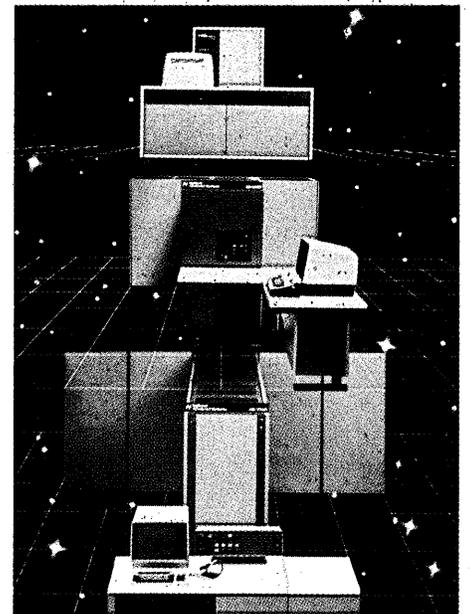
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PEOPLE

CHIEF OF THE MOHAWK

Ralph O'Brien has been described at various times by industry-watchers as a boy wonder, overpaid, ruthless, a good guy, and politically to the right of Attila the Hun. The only way to reconcile these disparate adjectives is to go to the man himself.

O'Brien, 50, is, of course, the man who took over ailing Mohawk Data Sciences in 1975 and, as its president, orchestrated its dramatic comeback. The company now makes a better return on equity than 80% of the other companies in the industry, according to O'Brien. He says, "The success we've had I attribute to having a good management team. I brought in 90% of them. I put lots of responsibility on the individual, and there's lots of pressure to perform. If they don't, they realize it before we have to tell them.

From word one, you know O'Brien's from the Boston area—he hasn't lost a bit of his Yankee accent. He graduated from the University of Massachusetts, began a career in accounting, hated it, and joined the sales force of the Monroe Calculator Co. Monroe was absorbed by Litton Industries, and O'Brien became a Litton senior vp at 39. Two years later he was executive vp.

What is his driving force? Fun. "I've never enjoyed anything like I've enjoyed business," he says. "Anyone who thinks it isn't fun should switch jobs. Of course work should be fun. Being stuck in a job you don't enjoy—that's the worst thing I can imagine. I'm in the office at 8:30 and leave at 7 or 8 at night, but I don't work on weekends. I used to, but I decided I wouldn't anymore unless absolutely necessary. In today's pressured environment, if you put in five long days, it's best for your mental health and your family's to do something else on weekends. To be successful in business is no great accomplishment. If you work seven days a week and have no family life—big deal! Any intelligent person can succeed on those terms.

"To me, a successful human being has a family life and a cultural life, too. You know, we don't have a single executive here



RALPH O'BRIEN — A professional manager, not a computer person.

who has ever been divorced. There's nothing wrong with divorce if you're unhappy. But gee—here, we're all happy in our jobs and in our home lives.

"I never ask anybody where they're going or what they're doing. If someone wants to take Friday off to go to the Poconos with their kids—great. I hire someone to do a job, not work X number of hours. If people don't have another life outside of MDS, they're foolish. One vp's car is here by the time I'm here every day. He must come in at 7 a.m. And he leaves early. He has little kids. I say to myself, 'Hey, that's smart! He can be with his kids after school and for dinner. It's wonderful. I think jobs have to change to accommodate people. Unfortunately, they won't change fast."

O'Brien's two outside passions are golf (with a 12 handicap) and reading. "I read two or three things at once, for instance, a historical novel like *Chesapeake*, a book on the history of technology, and one on business. I can't keep up with all the journals and magazines coming across my desk. My mother fostered this habit. She never allowed me to have comic books. Instead I read *Tom Swift*, *Anthony Adverse*, *Treasure Island*. My mother was a nurse who was a captain in World War I. She was on the front lines in France. My dad was a corporal and never got over the fact that she outranked him so highly." This history could be why O'Brien favors hiring women in the industry. "I think you're going to see

women making great strides in both the sales and technical ends. I can't believe any company would oppose having a woman progress as far as her talents will take her."

When asked about industry trends, O'Brien says, "The key thing I feel very strongly about is that there's no one single direction the industry should be taking. It's common for people to use shorthand like ddp, office of the future, etc. It's such a tremendous oversimplification. The term should be outlawed. It's as ridiculous to say 'office of the future' as it is to say 'factory of the future.' That's like saying one tool could run all future factories, whether they made steam generators or men's suits. The future office will be a far different place than it is today because we'll solve particular problems in particular offices to make them more cost and time effective."

O'Brien also states, "I consider myself a professional manager, not a computer person," and perhaps that's why he's able to take a somewhat serene overview regarding Mohawk's endeavors within the industry. "You've got to keep an eye on the competition," he says, "but you can't become overly preoccupied with what your competition is doing or you'll find your long-term strategy will be driven by external forces, not internal ones.

"We're all coming from different places. Each of us has to have a strategy that fits our own company. If we had to react to what others are doing, we'd be constantly switching course. We can't allow ourselves to become paranoid. We do stay away from segments of the industry that are dominated by a single company because by one act they could change our fortunes completely. We have to improve continually and make the price performance better anyway, but not because of competition with others."

MDS is located in Parsippany, N.J., a very green and tranquil town. O'Brien lives 15 minutes from the office on eight acres of land, but he becomes distressed at the thought of planting things on it. "I'm not a gardener or a do-it-yourselfer at all," he protests. He'd rather read. He's instilled this love of reading in his three children: Holly, 25; Douglas, 22; and Kristin, 17.

While O'Brien's wife Barbara enjoys reading "people" journalism, her husband disdains it. "Who cares what Ralph O'Brien eats for breakfast?" he asks scornfully. So the answer to that one will remain forever shrouded in mystery.

—Merrill Cherlin

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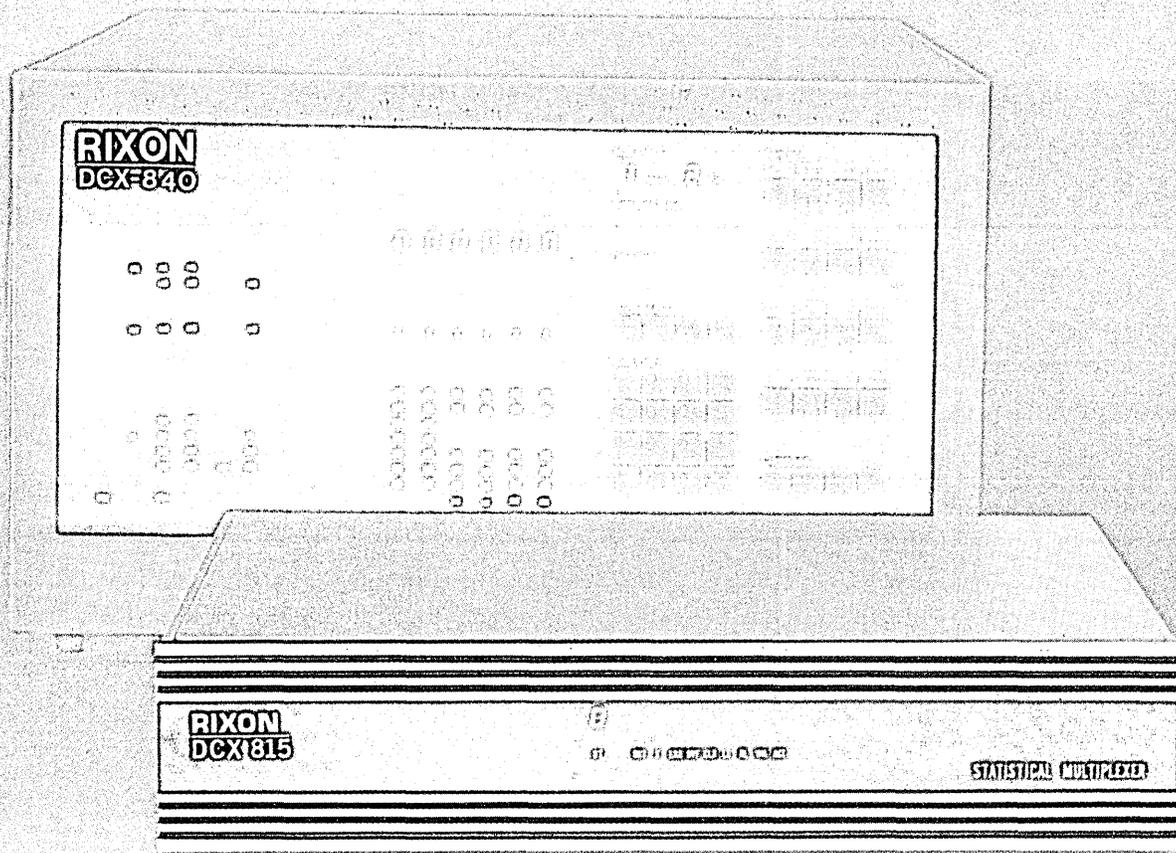
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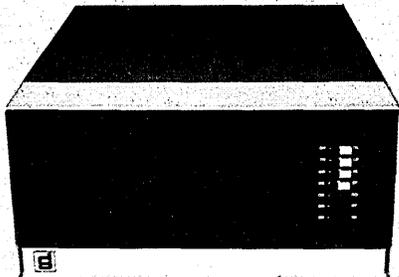
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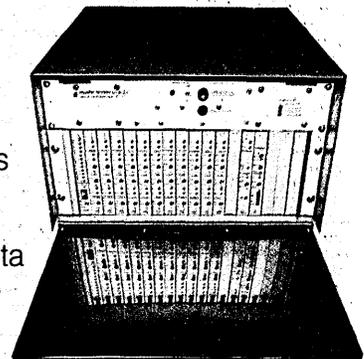


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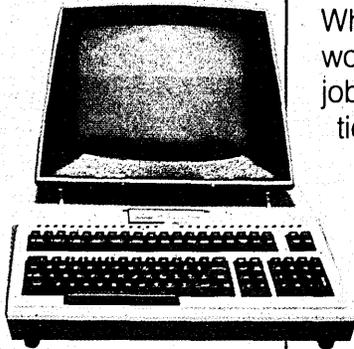
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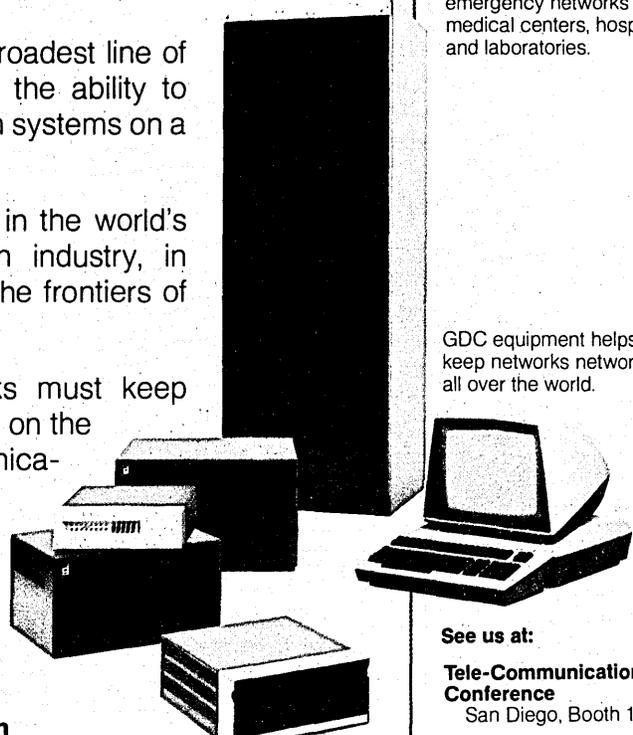
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NETWORKING



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HARDWARE

OFF-LINE

With a \$375,000 grant from IBM, the New York University Graduate School of Business Administration established a Center for Research on Information Systems. The center plans to encourage research into topics related to the management of information processing activities within organizations. Research will concentrate on the application, evaluation, and management of computer systems that help managers solve problems and implement decisions.

Venture Development Corp., the Wellesley, Mass., consulting firm, predicts roughly a 50% growth in the value of small business computers shipped this year. The firm expects 1980 shipments worth \$2.98 billion, compared to 1979's \$1.99 billion. By 1984, the firm forecasts a \$9.1 billion market. For the study, Venture defined "small business computers" as entry-level, standalone systems with at least 8KB of memory, and an end-user price of under \$100,000, including I/O and mass storage peripherals.

Under a manufacturing license agreement, Ampex will begin producing memory cores and core memory products for Control Data. CDC will use the Ampex manufactured memory to satisfy internal requirements and to support its oem core memory contracts. Additionally, Ampex will set up a repair and refurbishment program to service CDC's installed base of core memory products. As part of the agreement, Ampex will purchase some of CDC's capital equipment and parts inventories.

ACOUSTIC COUPLER

The LEX-11 is a 300bps acoustically coupled modem with the ability to communicate with other LEX-11s and Bell 103A data sets. It can operate in full or half duplex,



and it has both originate and answer capabilities. The unit has a battery power option, allowing up to 2½ hours of operation. The LEX-11 has an RS232 interface. Pricing starts at \$175. LEXICON CORP., Miami, Fla.
FOR DATA CIRCLE 301 ON READER CARD

WORD PROCESSING

Addressing the office automation market, this vendor of standalone word processors has developed a pair of integrated control units (ICUs) that allow its existing word processors to share peripherals and make use of larger mass storage. Dubbed Office Automation Systems, the line consists of two ICUs, one capable of supporting eight workstations and printers (System 8), the other capable of supporting up to 64 devices (System 64). ICUs can be linked together to support however many workstations a user requires.

Workstations can be either the vendor's existing floppy-based System 3000s or the new OASys Model II workstations (essentially a model 3000 sans floppies). The ICUs provide additional mass storage, access to shared peripherals, and communications capabilities. Each workstation still handles its own word processing functions, so a failure at one workstation or at an ICU doesn't bring all word processing to a halt.

Workstations and ICUs can be connected at distances of up to 2,000 feet via co-ax cable; ICUs also can be connected via

co-ax links of up to 2,000 feet. A System 8 can support up to 10MB of disk, while a System 64 can handle up to 70MB. A small System 8 with four I/O ports and 2MB of disk sells for \$11,900. An eight-port System 8 with 10MB of disk goes for \$16,900. The OASys Model II workstation is \$4,700. NBI INC., Boulder, Colo.

FOR DATA CIRCLE 300 ON READER CARD

COLOR GRAPHICS

This vendor has developed color graphics subsystems for use with its PDP-11 and VAX-11/780 computers. The raster scan vsv11 and vs11 use bit-slice microprocessors to control dynamic color displays (or black-and-white monitors gray scales). The vsv11 is for use with LSI-11 bus computers, and the vs11 works with PDP-11 UNIBUS computers; software support comes from RSX-11M or 11s as well as the VAX/VMS operating system. Each is offered with a 19-inch color display terminal (the VRV02) or a monochrome VT100 terminal. A joystick is provided for cursor control. The subsystem comprises three units in addition to the display terminal.

The DMA graphics subsystem has an

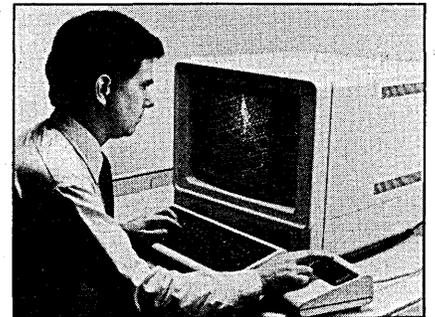
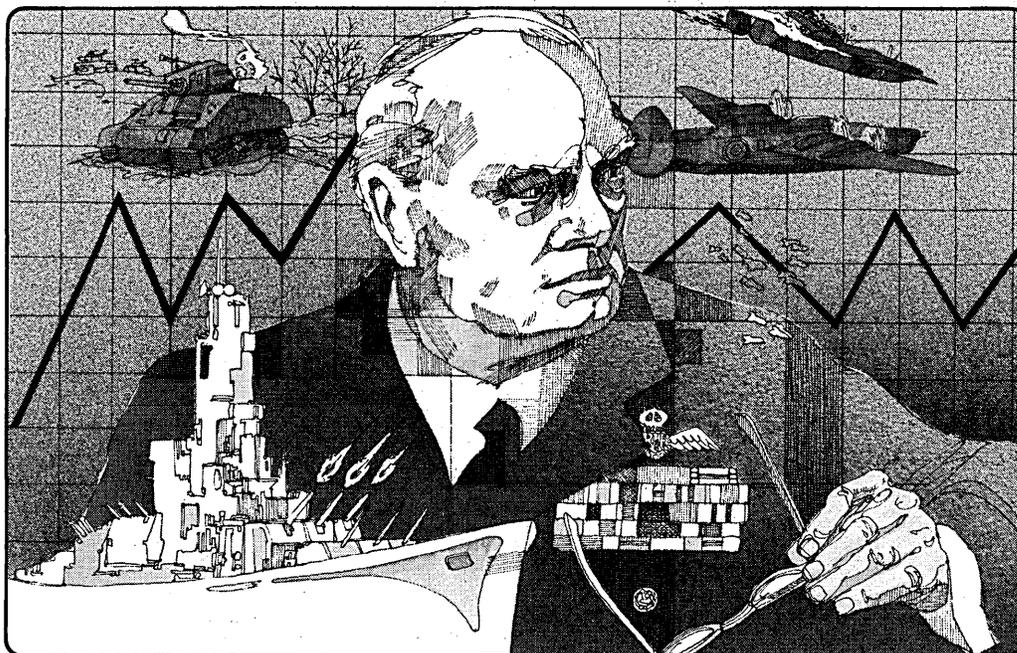


image processor, a sync generator, and an image memory. Image memory is provided by a 512 × 512 × 2 bit video frame buffer; a switch allows interlaced operation at 512 × 512 × 2 bits or noninterlaced operation at 512 × 256 × 4 bit resolution. An additional image memory can be added to double system capacity to accommodate 16-color static or dynamic displays. With color

If Churchill had used SPSS[®], he might have saved his statistical department a lot of blood, sweat and tears



In waging war... and business... great executives know that good data analysis is a matter of life and death. Winston Churchill knew it:

"One of the first steps I took on taking charge of the Admiralty... was to form a Statistical Department of my own—one that I could trust to pay no attention to anything but realities. This group was able to present me continually with tables and diagrams illustrating the whole war. I (therefore) had from the beginning my own sure, steady source of information, every part of which was integrally related to all the rest." (*The Gathering Storm*—pp 467-68)

Thanks to the honest and tireless efforts of his Department, most of the war's

critical decisions were based on facts, not hunches. Had they been able to use the SPSS Data Analysis Package, the Department's analysts could have explored the legions of data more quickly, efficiently, creatively... with easy-to-generate tables, graphs and reports, as well as sophisticated statistical analysis.

Using the SPSS Graphics Option, Churchill might have had graphs showing The Battle of Britain in terms of German and British aircraft losses by time. Using regression

analysis, Churchill would have had an excellent estimate of future losses.

As a matter of fact, Churchill might have been able to do it on his own, without the Department, because SPSS is so easy to use. Churchill himself could have learned from the excellent SPSS self-teaching manual. No special training in computer language would have been necessary—SPSS talks, listens and reports in the user's language: plain English!

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CIRCLE 104 ON READER CARD

HARDWARE

terminal option, the vsv11 is priced from \$13,600; the monochrome version starts at \$7,900. A color vs11 starts at \$14,200, and a monochrome vs11 subsystem begins at \$8,600. Both color and monochrome versions use a VT100-like keyboard. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 302 ON READER CARD

COMMUNICATIONS TESTER

The model 834 Programmable Data Comm Tester, designed for use by first-line field technicians, is a portable go/no go tester that aids in locating the fault in a failed communications network, thus eliminating finger-pointing in a multivendor environment. The \$3,700 (base U.S. price) tester monitors the data link; technicians can use it to simulate data terminal equipment (DTE) or data communications equipment (DCE). The tester performs standard bit error rate (BERT) and block error rate (BLERT) testing, as well as performing CRC-16, LRC-8, and CCITT-CRC-16 block checking to verify the accuracy of transmissions through the net. Users can program the unit to perform tests specific to their communications network; these tests can be burnt into ROM packs. The vendor also offers ROM packs preprogrammed for special tests. The 834 can be configured from its keyboard for synchronous, asynchronous, and HDLC operation, with data rates to 19.2kbps. Full and half duplex operation and a variety of character sets (ASCII, EBCDIC, hex, or user-defined) can also be selected from the keyboard. Error messages are displayed on a single-line display. TEKTRONIX, INC., Beaverton, Ore.

FOR DATA CIRCLE 303 ON READER CARD

MICROCOMPUTER NETWORKING

A local networking facility for this vendor's microcomputers, Z-Net, supports up to 255 stations interconnected via coaxial cable. Network Protocol Software (\$200 per system license) controls packet-switched traffic over the co-ax connecting SDS 2/01 Shared Data Stations and the vendor's recently announced MCZ-2 family of microcomputer systems. A Network Station Transceiver, the NST 2/01, contains the transceiver electronics needed to connect an MCZ-2 or SDS 2/01 to the co-ax network. Transceivers connect to the co-ax link through standard BNC "T" taps, which allow a station to tap in or out of the network without affecting the other stations.

The SDS 2/01 combines a Z80-based microcomputer with 64KB of memory and from 10MB to 40MB of disk, providing a hierarchical multiuser file system. The Z-Net concept is based on sharing expensive system components (such as peripherals and data bases), while distributing the elements most susceptible to price erosion: processors, memory, and crts. Z-Net is said to address two major problems: providing

low-risk, modular expansion capabilities to growing business users, and providing a means for integrating diverse equipment (including other computer systems) into an integrated network. An MCZ-2 station can serve as a "universal controller," interfacing alien devices to the Z-Net. The MCZ-2 operating system, RIO/CP has a multitasking kernel that allows breaking applications into modular tasks for concurrent execution. The SDS 2/01 starts at \$13,750. The NST 2/01 is \$950. Discounts are available to quantity purchasers. ZILOG, INC., Cupertino, Calif.

FOR DATA CIRCLE 306 ON READER CARD

CRT TERMINALS

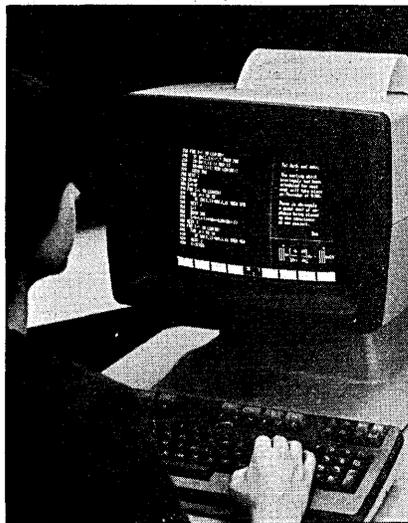
This long-established crt terminal manufacturer chose NCC to unveil its latest line, the Executive 80 series. The first two members of the family were on hand in Anaheim. The model 20, listing at \$1,295 quantity one, is a buffered terminal with a number of video highlighting and formatting capabilities. The model 30 goes beyond the model 20 by adding expanded function key capabilities, additional transmission modes, paging,

HARDWARE SPOTLIGHT

CRT TERMINAL

The 2626A crt terminal is more than just another crt—with its windowing capabilities and dual communications port it can function as up to four virtual terminals. It's compatible with the vendor's existing 2645A terminals, so current users can put the 2626A on a system in place of the earlier terminal; applications developers can then begin to exploit the additional capabilities of the new terminal.

The terminal has a large memory capable of holding up to 119 lines of 80 characters (or up to 59 wide lines of 160 characters). This memory can be segmented into four work spaces. Up to four windows can be defined on the screen, allowing the user to display the contents of the various



data validation, and editing capabilities; its pricing starts at \$1,695. Standard Executive 80 features include line drawing, a status line, video highlighting, and horizontal split-screen display. An enhanced video option allows displaying normal-size characters, double-size characters, and 132-character lines on a 15-inch display screen. HAZELTINE CORP., Greenlawn, N.Y.

FOR DATA CIRCLE 304 ON READER CARD

32-BIT MINICOMPUTER

There's a new 32-bit minicomputer on the block: Data General has made its entry into the market, after several years of speculation (fed, in part by its sales force) in the dp community. The Eclipse MV/8000, the hardware and software compatible with existing 16-bit Eclipse processors, supports up to 128 user terminals (and up to 255 processes), with each user having an address space of up to 512KB out of a total system virtual address space of 4.3-billion bytes.

A hardware enforced eight-ring protection mechanism provides hierarchical space of up to 512KB out of a total system virtual address space of 4.3 billion bytes.

work spaces (not all work spaces must be on the screen at any one time). Displayed windows allow independent scrolling, both horizontally and vertically. The 2626A has editing functions and the ability to move data between work spaces. Dual data communications ports allow the user to access two different computers, or two ports on the same machine. Or, the second RS232 port can be used to drive a local printer. Optionally, the 2626A can be had with an integral thermal printer, capable of printing up to 132 character lines in a compressed print format. Sortkeys (function keys) can be used to configure the terminal and to support a simplified man/machine interface with appropriately written applications programs. The terminal supports forms definition and edit checks for data entry applications.

The 2626A's screen can display 24 lines of 80 characters, with a 25th and 26th line reserved for status messages and sortkey labels. The basic unit displays upper and lower case ASCII characters (as well as line-drawing characters for forms design and displayable ASCII control characters for debugging). An optional character set extension provides math symbols, large characters, and foreign language characters; international keyboards also are offered. RS232 communications (at standard rates from 110bps to 9600 bps) are standard, with current loop interfacing available as an option. The basic terminal sells for \$3,950; with an integral printer, the price is \$5,100. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR DATA CIRCLE 305 ON READER CARD

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HARDWARE

A hardware enforced eight-ring protection mechanism provides hierarchical protection of software; the MV/8000's AOS/Vs 32-bit operating system resides in the inner four rings, with the remaining four rings available to protect oem or user-developed software from unauthorized access, modification or duplication. In addition to the 32-bit operating system, three ANSI standard 32-bit languages are available: FORTRAN 77, PL/1, and BASIC. The MV/8000 instruction set is a superset of the Eclipse instruction set, allowing use of 16-bit Eclipse software, including compilers, without resorting to emulation. COBOL was notably absent from the list of MV/8000 native language compilers announced, but . . . according to the vendor, 16-bit COBOL will run 20% to 30% faster due to the MV/8000's greater internal performance, even though the object code won't take advantage of new 32-bit instructions.

In addition to the cpu, the MV/8000 has a separate System Control Processor and an I/O Processor. The SCP includes a console controller, diskette drive for loading system microcode, and facilities for fault logging and system diagnostics. The

IOP is a 64KB Eclipse processor, connected to the MV/8000 via a burst of multiplexor channel, capable of transfers at rates exceeding 16MBps. The cpu has a 1KB instruction cache, and supports up to 2MB of memory in 256KB increments. A 16KB memory cache speeds data transfers between memory and the rest of the system. A write from cache to memory takes 550nsec for 16 bytes, and a read takes 440nsec. A hardware Address Translation Unit maintains a table of address translations and access privileges for the 256 most recently referenced pages of memory.

An entry-level, 512KB system, including console, eight-line asynchronous modem interface, 96MB disk, and 800/1600bpi mag tape, sells for \$153,150. The AOS/Vs operating system licenses for \$10,000 for the first copy, and \$3,000 for subsequent systems. A large commercial system with 2MB of memory, system console, eight-line async modem interface, three 16-line terminal interfaces, 64 crts, four 277MB disks, two tape drives, 900 lpm printer, and licenses for AOS/Vs, AOS/Vs SORT/MERGE, and 16-bit INFOS II, Transaction Processing Management System,

COBOL, and INFOS QUERY goes for \$504,700. Deliveries begin in October, and quantity discounts are offered. DATA GENERAL CORP., Westboro, Mass.

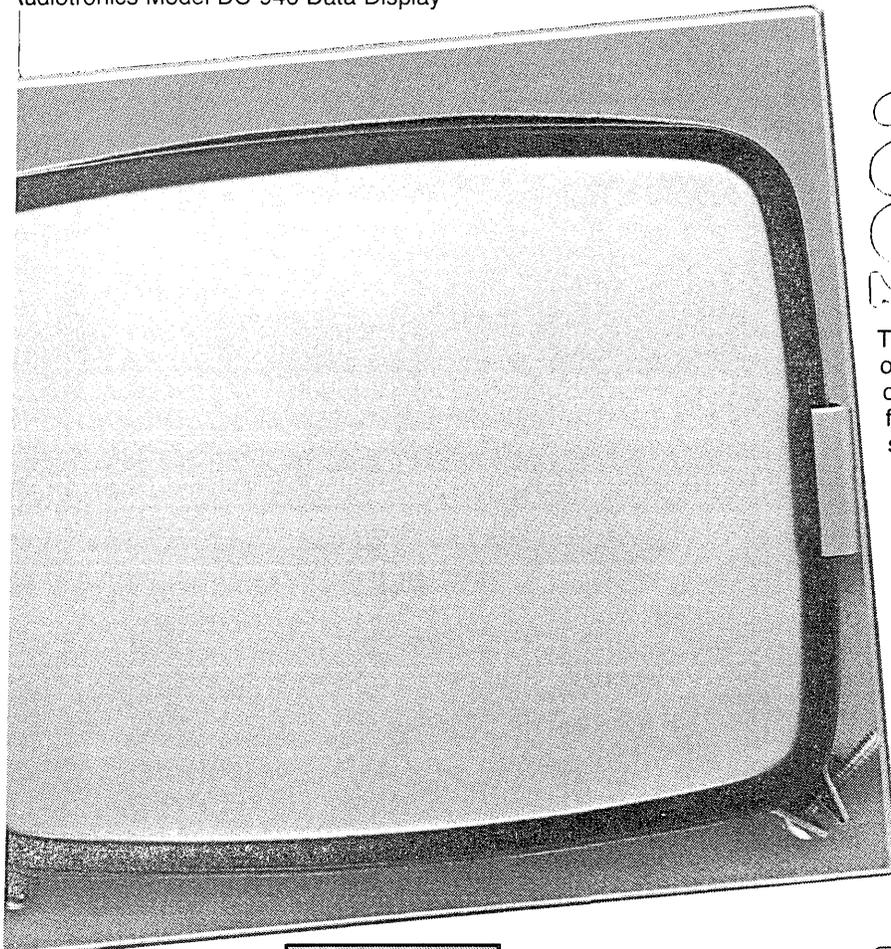
FOR DATA CIRCLE 307 ON READER CARD

3270-TYPE DISPLAYS

The PDS270 information display system, intended for use with this vendor's PIXNET and Response data communications network systems, is functionally equivalent to the IBM 3270 system. Additionally, the PDS270 sells for less than corresponding IBM displays, and includes an integral response time monitor, and built-in diagnostics. Up to 32 devices—displays and printers—are supported in a PDS270 cluster. The displays have 15-inch screens, organized as 24 lines of 80 characters; a 25th line is used for status information. A typical configuration, consisting of controller, 12 display stations, and a 160cps printer, sells for \$63,000; the same system is \$1,212 per month on a three-year lease (maintenance included). Initial shipments start next month. PARADYNE CORP., Largo, Fla.

FOR DATA CIRCLE 308 ON READER CARD

Audiotronics Model DC-946 Data Display



actual size

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CIRCLE 105 ON READER CARD

HARDWARE

IDEOGRAPHIC TERMINAL

With growing trade between the U.S. and the People's Republic of China, as well as other nations in the Orient, communications becomes ever more important. Unfortunately, the ideographic written languages of the East don't lend themselves to easy TWX or telex communications.

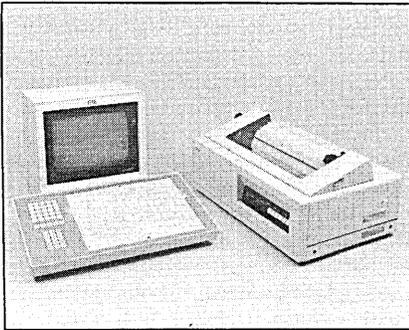
The current Chinese technique for communicating via teletypewriters consists of (usually manual) translation of each ideograph (oriental printed character) into a four-digit code, transmission of these numeric codes, and subsequent retranslation to ideographs. Essentially a table look-up operation, these ideograph-to-numeric-code (and vice versa) translations are an appropriate application for a microprocessor and some ROM.

A California company recognized this, and since 1973 has developed communications terminals for ideographic messages. The IPX 5460 line consists of both receive-only and keyboard send-receive terminals.

An integral microprocessor-based character generator handles 9,600 Chinese ideographs, and, with appropriate firmware changes, smaller Japanese and Korean characters. The terminals have a flat-panel keyboard capable of generating 9,600 ideographs (19,200 with an optional extended character set) with no more than three key-

strokes required to each character in the standard set.

A 14-inch crt displays each charac-



ter formed on a 20 x 24 dot matrix (30 x 36 and 40 x 48 formats are supported for larger characters). For printed ideographic output, a dot matrix printer with a 24-wire print head can be used to print 1,800 characters per minute; a hammer-spring dot matrix line printer is available for 3,000 character per minute output. If the receiving terminal is a standard teletypewriter, the message will be printed as four-digit Chinese-standard telegraph code for subsequent manual translation.

The terminal's 16-bit microprocessor-based controller has an RS232 interface (50bps to 9600bps) and 20mA/60mA current loop interface. A telex interface is optional. The controller can

support a cluster of keyboard/displays, a printer, and dual floppy disks. An RO IPX 5460 sells for \$25,000 and an ASR unit is \$40,000. These prices are for 9,600-character Chinese communications; units for Korean and Japanese (with smaller character sets) carry lower prices. IDEOGRAPHIX, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 309 ON READER CARD

PASCAL PROCESSOR

The PASCAL-100 is a 16-bit cpu module for S-100 bus microcomputers. Based on Western Digital's PASCAL Microengine, a chip set that executes PASCAL P-code, the PASCAL-100 includes a Z80 processor subsystem and an optional 1MB addressing capability. Packaged on two boards that plug into adjacent slots on the bus, PASCAL-100 uses the Z80 subsystem to provide compatibility with existing peripherals and software (including CP/M). Both processors in the PASCAL-100 can address 128KB of memory, with a mapping feature breaking memory into 8KB pages. The optional 1MB addressing capability breaks memory into 2KB pages. Mapping is under software control. The two-board set sells for \$1,485 to start, with hardware and software options separately priced. DIGICOMP RESEARCH CORP., Ithaca, N.Y.

FOR DATA CIRCLE 310 ON READER CARD

SOFTWARE/HARDWARE PROFESSIONALS

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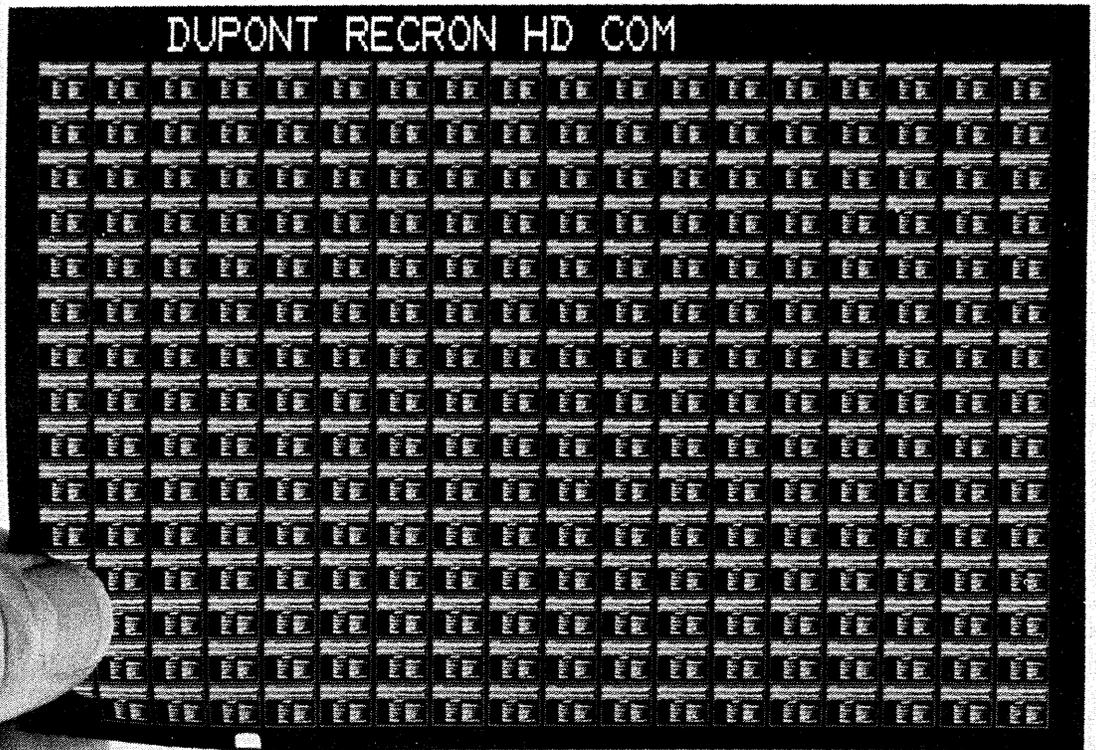
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SOFTWARE AND SERVICES

UPDATES

Amdahl Corp. is attempting to further encroach on IBM's customer base by offering system software enhancements to IBM users. Previously available only to Amdahl customers, the first package offered to IBM sites will be the VM/Performance Enhancement (VM/PE), which reduces system overhead when OS/VS2 MVS or OS/VS2 SVS runs concurrently with VM/370. VM/PE has been available to Amdahl users since the end of 1978.

San Francisco Bay Area-based software consultant Gopal K. Kapur has a new slogan for programmers: "In God we trust. Everything else we walkthrough."

As Bell system switching equipment becomes ever more sophisticated, operating companies are able to offer a wider variety of services. Call Waiting, Call Forwarding, Speed Calling, and Three-Way Calling are already offered in most areas of the country using ESS central offices. Yet another service, the Voice Storage System (VSS), is now being tested in Philadelphia. VSS supports Advance Calling (record a message now for delivery at a prespecified time) and Call Answering (recording a message when a customer doesn't answer his phone). "The potential of VSS is only limited by lack of imagination," according to Duane Carey, a senior engineer at Western Electric's Network Services HQ in Lisle, Ill. If the VSS tariff is right, we suspect some users will have enough imagination to use it as a store-and-forward facility for both fax and digital data traffic during off-peak hours. Bell may have similar suspicions: VSS transmits the stored message three times, effectively wiping out savings possible by delaying until after 11 p.m.

INQUIRY PACKAGE

The Interactive Inquiry System, IQ/32, allows ad hoc queries to data base files via a simplified user interface. It lets users get answers to one-time requests without resorting to programming. The vendor also announced the packaging of the latest releases of its transaction processing software under the name of Reliance II. The software runs on the vendor's 32-bit minicomputers, with Reliance II supporting up to 128 transaction processing terminals (the vendor says a 128-terminal system used for data collection should provide response times ranging from 1.5sec. to 2sec.). Reliance II

is priced at \$12,500.

IQ/32 provides non-dp users with an access tool to Reliance II files. Reliance II sees to it that only authorized users at designated terminals can access files; it also controls the type of access allowed. Using IQ/32, a user presents a fill-in-the-blanks definition of the retrieval criteria. Output can be viewed at a crt or sent to a printer. The query language provides statistics for numeric fields. A "help" command can assist the user in formulating an inquiry. IQ/32 licenses for \$3,000. PERKIN-ELMER CORP., Computer Systems Div., Oceanport, N.J.
FOR DATA CIRCLE 326 ON READER CARD

SOFTWARE SPOTLIGHT

GRAPHICS

As the ANSI technical committee X3H3 moves toward establishing a standard for graphics functionality, this hardware vendor has expanded into the software market with Template, a computer and device independent graphics package based on the West Point developed Graphics Compatibility System (GCS). The vendor expects X3H3's standard will most closely resemble GCS, of which Template is a superset.

Written in primarily FORTRAN for machine independence, Template should appeal to applications developers faced with developing a system for use with a variety of devices. Template also can help develop new applications or migrate existing applications. A variety of 32-bit (or larger word size) computers—including those from IBM, CDC, DEC (VAX), Prime, and SEL—are supported, with others planned. Graphics devices supported include the vendor's product line, as well as Tektronix, Calcomp/Sanders, Nicolet Zeta, and raster scan devices. Device drivers and loosely defined features of FORTRAN are written in hardware-dependent code.

To provide hardware independence, Template uses a Graphics Status Area (GSA) as a common communications area for describing hardware dependent features and system status information. Entirely a 3D system, Template handles 2D graphics by fixing the display area on a plane perpendicular to the z-axis. Device coordinates can be

specified in several different units, with "inches" as the default value; for device independency, percentage units (1 "percentage unit" = 1% of the display surface dimension) can be used. Coordinates can be rectangular, polar, spherical, or cylindrical; either absolute or relative coordinates may be specified.

Template provides a set of subroutines for drawing, displaying alphanumeric (in a variety of fonts), manipulating images, and interaction with the user. Template also supports color graphics on suitable devices such as color displays and COM recorders.

A structure facility allows grouping subroutine calls into entities that can be used later (in much the same way an assembly language programmer uses macros). Individual parts of a display can be defined as named or numbered "segments." Segments can be operated on as single entities.

When interactively developing displays that will ultimately be produced on different hardware, the Template software can format the user's display to correspond to the aspect ratio of the intended output media, such as 35mm slides.

Template is priced at \$25,000. The software team responsible for developing and maintaining the software has been set up as a group separate from the vendor's graphics hardware developers. MEGATEK CORP., San Diego, Calif.

FOR DATA CIRCLE 325 ON READER CARD

FINANCIAL HIGHLIGHTS

Significant Figures (000 omitted)

For the Year

Premiums written
Underwriting income (loss)
Investment income net of expenses
Net operating income after taxes
Net realized investment gains (losses) after tax
Extraordinary item
Net income

Composite ratio
Average shares outstanding

	1979	1978	Per Cent Change
Premiums written	\$338,150	\$313,725	7.8%
Underwriting income (loss)	332,775	304,217	9.4
Investment income net of expenses	(2,256)	(13,854)	83.7
Net operating income after taxes	40,865	32,136	27.2
Net realized investment gains (losses) after tax	38,957	17,054	128.4
Extraordinary item	27,020	14,124	91.3
Net income	\$1,431	\$1,221	17.2
Composite ratio	\$ 25.467	\$ 17.705	43.8%
Average shares outstanding	99.8%	103.8%	
	5,362	5,155	

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- CORNING GLASS WORKS now executes an average of more than 16,000 ASI-ST runs monthly against TOTAL data bases and standard files.
- UNION CARBIDE's usage of ASI-ST averages over 6,000 runs per month at each of its worldwide data centers where ASI-ST is used with IMS.

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SOFTWARE AND SERVICES

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FOR DATA CIRCLE 330 ON READER CARD

RSTS/E JOB ACCOUNTING

Job accounting and performance monitoring data are captured by Rabbit-3, an assembler program for PDP-11s running under RSTS/E. Detail accounting information—cpu time, connect time, device time,

disk usage, etc.—is logged into ASCII stream data files. Job state conditions, including I/O wait, keyboard wait, run state, and other monitor states, are also available. Optionally, RMS indexed files can be produced for access by Datatrieve or other on-line data base retrieval programs. The system manager can get system monitoring data from a user log file. This audit trail can be useful in detecting security breaches by showing who used a given resource, as well as when, where, and how much of the resource was used. Rabbit-3 output files can be used by the vendor's Rabbit-1 billing, invoicing, and cross-charging system, as well as Rabbit-2, a package that provides graphic analysis of system performance. Rabbit-3 rents for \$99 per month; a perpetual license goes for \$2,500. RAXCO INC., West Palm Beach, Fla.

FOR DATA CIRCLE 329 ON READER CARD

SYSTEM SOFTWARE

An enhanced version of the VAX/VMS operating system, four compilers, and two utility packages, beef up this vendor's software support for its 32-bit VAX-11/780 computer. The new version of the operating system includes a new editor, instructional aids, a message utility, system tuning and disk protection features, and additional security through the use of encrypted passwords. It also supports additional devices, including

up to 4MB of MA780 multiport memory (in addition to 8MB of local memory), the DR780 high-speed interface, and other recently introduced peripherals. The operating system is normally bundled into the VAX system price; technical OEMs that buy unbundled processors can get the new operating system, including support, for \$20,000.

The new compilers produce native 32-bit object code. The four languages supported are BASIC, COBOL, FORTRAN (a new version), and CORAL 66. Extensive I/O, character and matrix handling features are provided in VAX-11 BASIC, along with an integrated HELP facility and application-related utilities; BASIC licenses for \$8,000. The COBOL compiler reportedly goes beyond the ANSI 1974 standard by including features planned for the next COBOL standard (expected in 1981); it licenses for \$12,000. A superset of FORTRAN-77, the FORTRAN compiler performs optimization and is upward compatible with older versions of FORTRAN; its license fee is \$7,000. A real-time and systems implementation language, CORAL 66 is said to fully conform to the U.K. government's official definition. CORAL licenses for \$10,000.

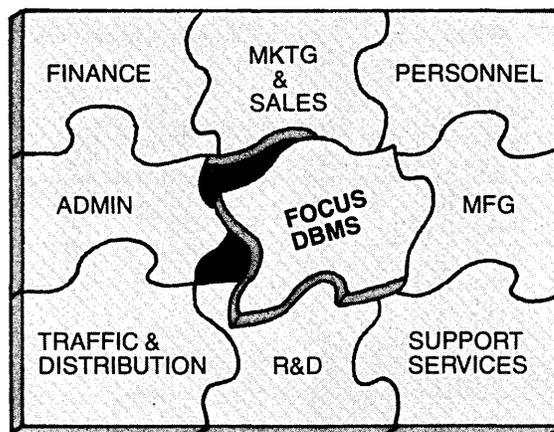
The vendor's Forms Management System (FMS), developed originally for the PDP-11, has been extended to the VAX. With FMS, users can create and modify forms

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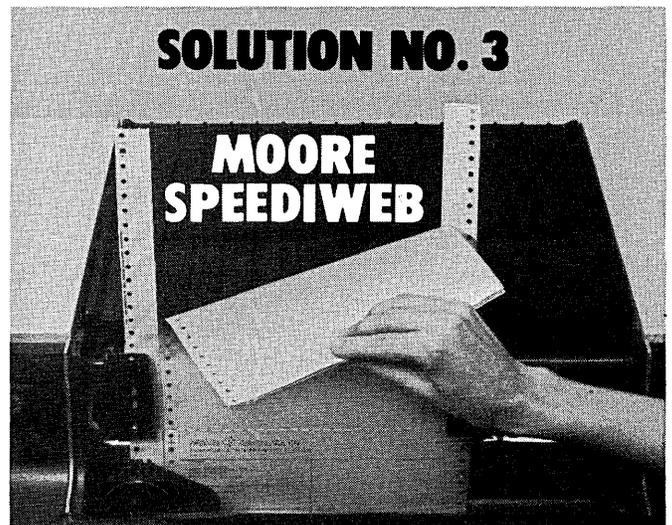
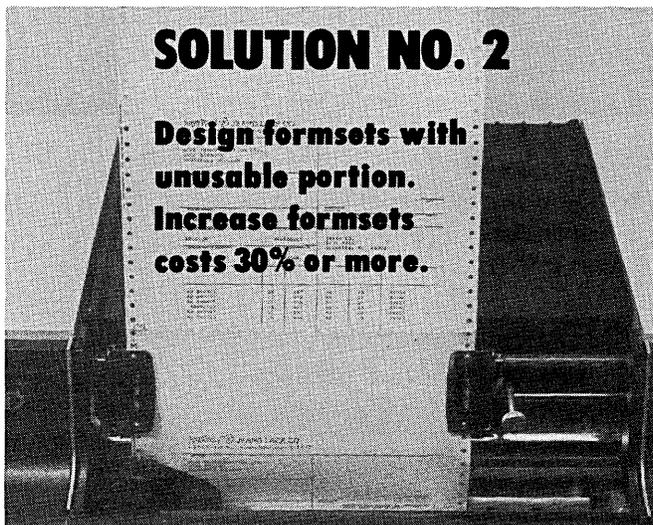
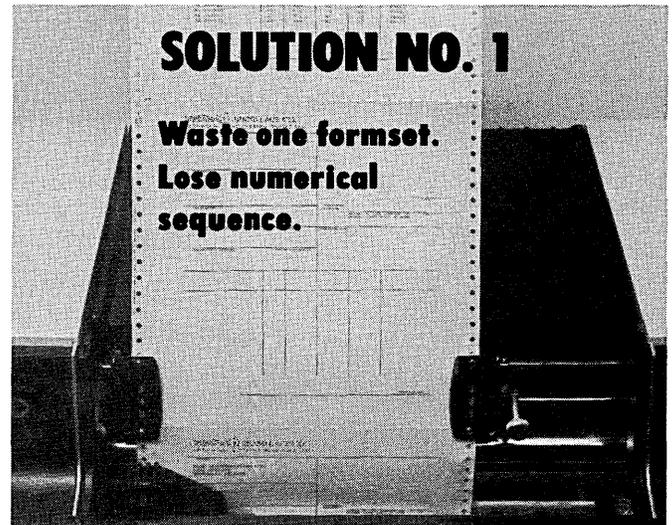
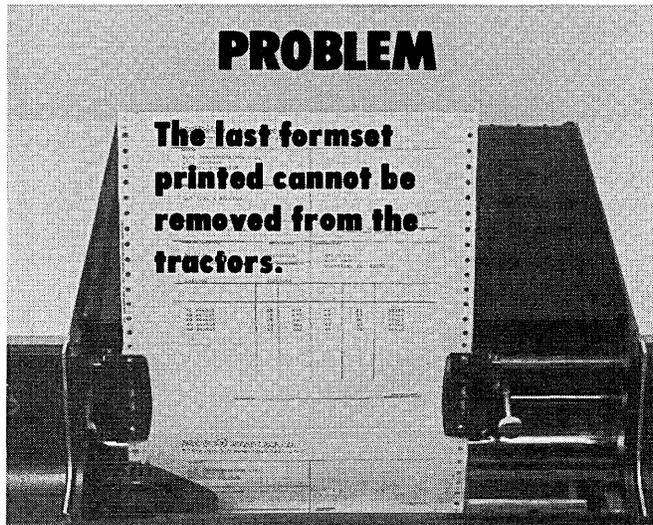
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SOFTWARE AND SERVICES

compatible with standard VAX applications programming languages. Access to RMS, variable length record support, and single inquiry access to multiple files have been added to a new version of the Datatrieve inquiry, data maintenance, and reporting language. Datatrieve and FMS each carry a \$4,500 license fee. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 328 ON READER CARD

FORTRAN DEBUGGER

Written for Hewlett-Packard's System 1000, FBUG/1000 is a source-level FORTRAN debugging package. FBUG/1000 runs under HP's RTE operating system, letting users dynamically insert breakpoints, run programs, and inspect locations referenced by variable names and listing line numbers.

The debugging package consists of two modules. The first processes source programs, producing relocatable binaries and structural information. The second module controls execution of the absolute program; this module makes use of the structural data gathered by the first module and handles user commands. As many as eight breakpoints can be defined (by source-listing line number), and each can be executed a user-specified number of times before taking effect. Variables can be displayed and modified by name.

Both conventionally compiled and

FBUG-compiled routines can be mixed in a program. In fact, the vendor says FBUG-produced programs can be used in production systems at a cost of less than two words of memory and 4usec of execution time per statement. In this case, a user can invoke FBUG's run-time module if an unexpected error crops up in a supposedly clean production program. FBUG/1000 licenses for \$995 per cpu; source code is offered for \$6,000. CORPORATE COMPUTER SYSTEMS, INC., Aberdeen, N.J.

FOR DATA CIRCLE 332 ON READER CARD

CRT UTILITIES

A pair of utility programs for DEC's popular PDP-11 minicomputer (running under RT-11, RSX-11M and 11D, and IAS) provide increased support for crt terminals from a variety of vendors. A set of subroutines callable from FORTRAN, BASIC, or COBOL, VIDIO/11 (VIDEO I/O) provides the applications programmer with independence from the specific types of crts being used on the system. The package provides protected fields (regardless of whether or not the terminal supports them), echo-suppression for sensitive data, cursor control (if the terminal supports it), and human engineering features. VIDIO/11 carries a permanent license fee of \$1,500 (one cpu, one operating system).

SCRNIO/11 (SCREEN I/O) offers

screen management and includes the VIDIO/11 package. Screen formats are held in files accessible to user application programs. The package's subroutines allow manipulation of the screen format and its defined fields. Fields can be assigned attributes (fill, justify, optional, mandatory, etc.) and error checking can test for ranges or valid sets of values. Multiple screens can be used simultaneously; the last line of the terminal screen is reserved for error messages and interaction with the user. SCRNIO/11 licenses for \$3,500 (including VIDIO/11). PENNINGTON SYSTEMS INC., Pennington, N.J.

FOR DATA CIRCLE 333 ON READER CARD

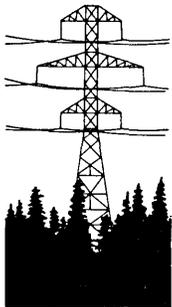
MICROCOMPUTER COBOL

An enhanced, more efficient COBOL compiler is now available for this vendor's Z80-based microcomputers. Based on the 1974 ANSI standard, the compiler now supports interactive ACCEPT and DISPLAY verbs, LANGUAGE for printer files, and file naming at run time.

The compiler now makes more efficient use of memory, allowing compilation of programs containing more than 3,000 lines in a 64KB system. The compiler is offered on either minidiskette or eight-inch IBM-format diskettes for a price of \$95. CROMEMCO, INC., Mountain View, Calif.

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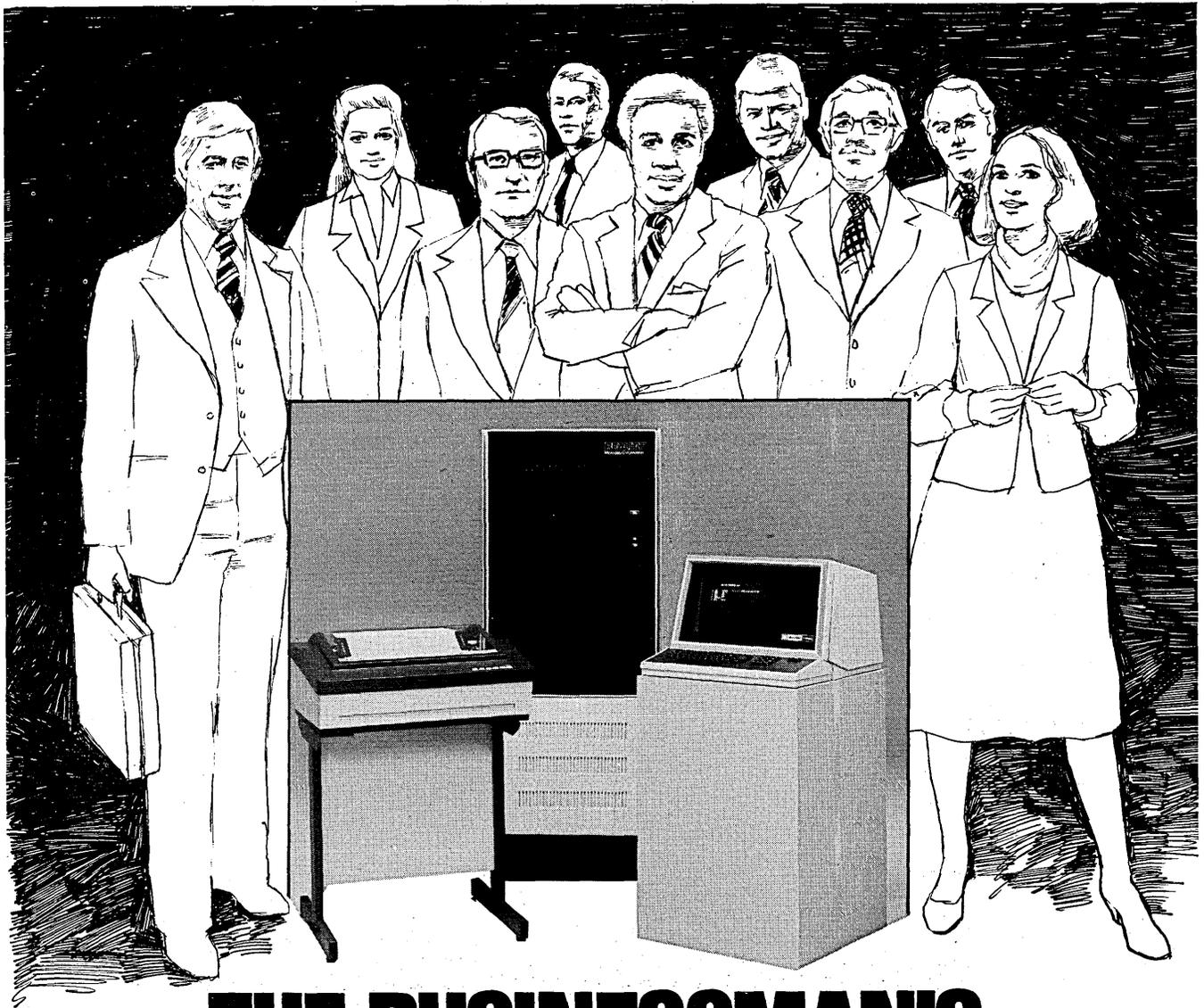
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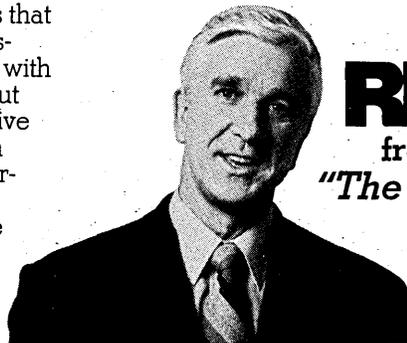
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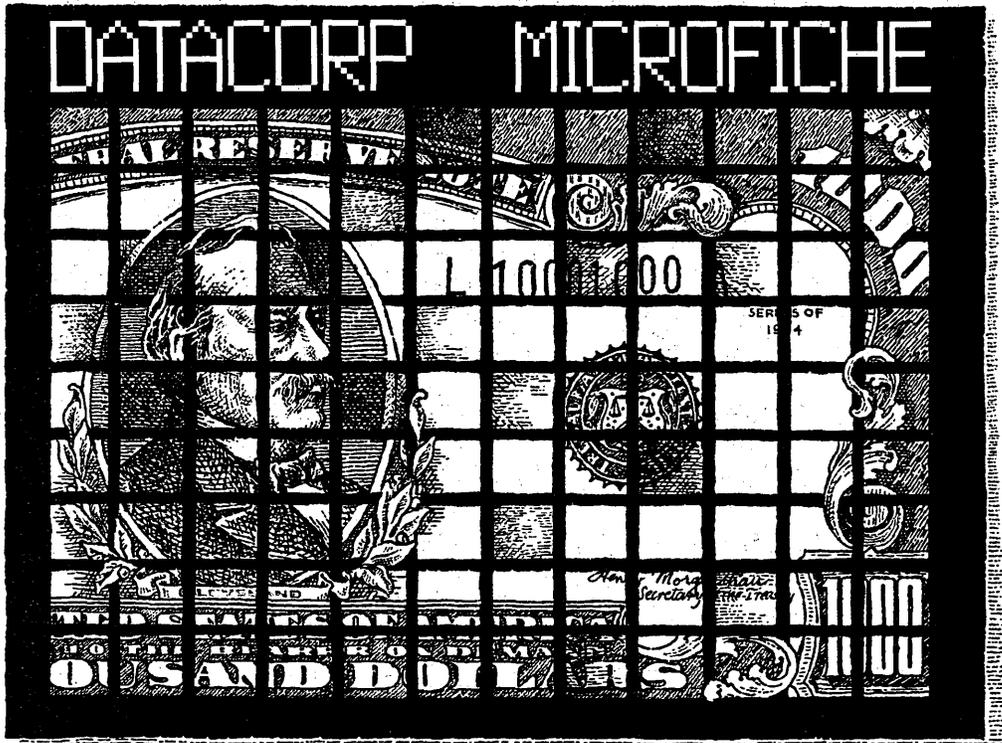
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SOURCE DATA

BASIC COMPUTER PROGRAMS FOR THE HOME

by Charles D. Sternberg

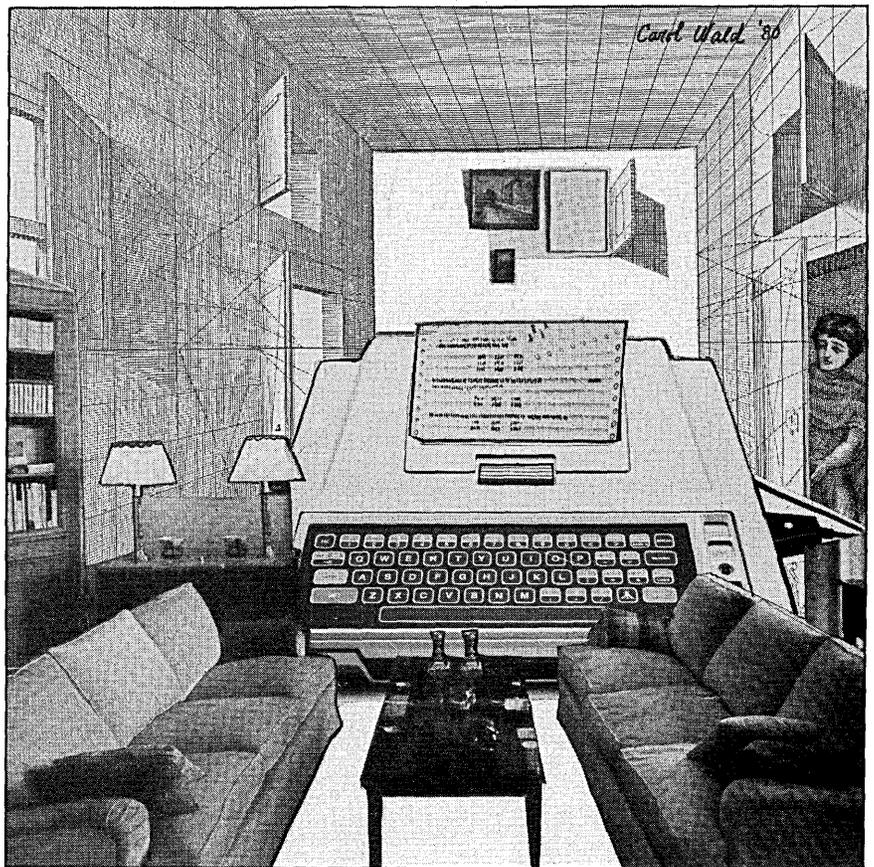
The microcomputer can be a good business solution for doctors' offices and hardware stores too small to benefit from traditional computers or time-sharing. The more frivolous features of outfitting micros with game cartridges is at least salable. But the third variety of small machine, the home computer, is a concept that has, at least for the time being, more hype than flight.

"The objective of this book," the author states, "is to provide a set of programs that will make your computer start paying for itself the moment it crosses your threshold." How this is to be accomplished is never made clear. One supposedly saves money just by keeping records of everything from the contents of one's checkbook to the uncollected bills on a paper route. Or does the home computer "pay for itself" by providing a record of gas mileage between cities, or the contents of the family freezer?

In any case, the author's next claim is more elaborate: "As you gain familiarity with computer use, moreover, modification of these programs to utilize features of your particular machine should present few difficulties."

Programs must be more than list makers and this book should be more complete. Hardware is not mentioned or suggested. There is a page and a half of introduction and a half of appendix. In between are 81 programs, and for each an average of half a page of documentation is included on description, functions, instructions for use, data entry, data format, output description, and comments.

The hoped-for readership is meant to be made up of people with no previous experience in programming or data processing. But giving no more information about program entry than "Programs should be entered and tested exactly as shown" is not much help to the average homeowner devoting a Sunday afternoon to getting a home computer to start paying for itself. The author apparently imagines a connection between BASIC and people who spend time on programs like "Utility Bill Anal-



ysis," "Weight Control," and "CB Radio." The actual use of this book would require at least a week with a good introductory book on BASIC.

Programs provided include household expenses, supermarket list, lawn/plant care, school grade reporting, and even a tarot card dealer, written in straightforward BASIC and tested on an Altair 8800b. But how really useful are they?

Keeping a checkbook balanced is a valid goal, but it is not new, and does it really require a computer? That programs for diet planning can be of great assistance for institutions this size of hospitals is obvious and has been proved. But how useful, on a daily basis, can a breakfast output like the following be: BACON 60, ORANGE JUICE 60, BANANAS 85, TOAST 70, MARGARINE 25,

SOFT BOILED EGG 80, CALORIES 380? The program ignores the fact that eating and dieting are a mixture of absolute and variable caloric values.

Other programs border on the ludicrous: "Tv Scheduling Basic Version. This program eliminates difficulties arising from family television viewing conflicts. It produces a weekly viewing schedule that details the time, channel, and person scheduled to view a particular television show."

Personal computers are already widely accessible and the industry is a fascinating one, but this book offers little understanding of the field or of potential home applications. Hayden Book Co. (1980, 330 pp., \$8.95.)

—Sally Williams-Haik

SOURCE DATA

REPORTS & REFERENCES

AI AT STANFORD

HEW has published a booklet about the Stanford University Medical Experimental System for Artificial Intelligence in Medicine (SUMEX-AIM), an AI network serving major universities nationwide and funded by the National Institute of Health. The booklet features a chapter on the history of computing, a summary of computing processes, speculation of the future of AI, and descriptions of SUMEX projects and applications in biochemistry, clinical medicine, and psychology.

For a single free copy of *The Seeds of Artificial Intelligence: SUMEX-AIM*, contact the Office of Science and Health Reports, Division of Research Resources, National Institute of Health, Bethesda, MD 20205, or Research Resources Information Center, 1776 East Jefferson St., Rockville, MD 20852.

GRAPHICS SUPPLIERS

The Harvard Lab for Computer Graphics has published a directory of computer graphics suppliers. Hardware, software, systems, and services companies are listed and briefly described by product and services offered, sales year founded, officers, and number of employees.

"The 1980 Directory of Computer

Graphics Suppliers: Hardware Systems, Software and Services" is \$17 (\$19 outside the U.S., Canada, and Mexico). Directory Dept., the *Harvard Newsletter on Computer Graphics*, P.O. Box 89, Sudbury, MA 01776.

DATAPRO USER REPORTS

Datapro has some new All About reports—"All About Plug-Compatible Disk Drives" and "All About Plug-Compatible Tape Drives." Also newly available is "How to Select and Use Add-On Main Memory." Reprinted from recent Datapro 70 supplements, each report includes the usual user surveys and equipment comparisons as well as an overview of the subject. \$15 each. Datapro Research Corp., 1805 Underwood Blvd., Delran, NJ 08075, (609) 764-0100.

DISTRIBUTED PROCESSING

Pathways Through Data Processing: Distributed Processing Systems is a handbook for company management. Aimed at providing a general understanding of distributed dp, the book advocates placement of the ddp responsibility with a vice president for information services. Most of the discussion, however, is about ddp equipment and usage, with only superficial mention of management issues.

Key business ratios used are briefly defined in an appendix. There are quite a

few: current assets to current liabilities, net profits on net sales, net profits on tangible net worth, net profits on net working capital, net sales to tangible net worth, net sales to net working capital, collection period, net sales to inventory, fixed assets to tangible net worth, current liabilities to tangible net worth, total liabilities to tangible net worth, inventory to working capital, current liabilities to inventory, funded liabilities to net working capital, and sales per employee. A worksheet with instructions is provided for making comparisons with your own company. The report is available for \$165 from the Business Economics Division of Dun & Bradstreet, 99 Church St., New York, NY 10007, (212) 285-7636.

INDUSTRY RATIOS FROM D&B

A financial analysis of the Computer Industry is available from Dun & Bradstreet. SICs (standard industry classifications) covered are 3573, computing equipment manufacturing; 7372, computer programming and software; 7374, dp services; and 7379, computer related services not elsewhere classified, including rental, leasing, repair, and maintenance. Ratios are given in six different categories: for all firms in a given SIC, for the 25% most profitable firms, for firms with sales under \$100,000, firms with sales between \$100,000 and \$700,000, firms with sales over \$700,000, and com-

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- A University degree, at least 4-6 years of working experience, and fluency in Italian and English

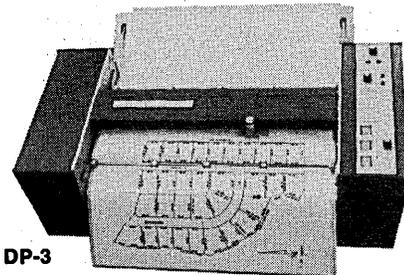
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First off, at 180 cps and with space/blank compression, you get higher throughput for higher volume data flow.

You also get a nine-wire head with a 9 high by 7 wide dot matrix. Which gives you true lower case descenders plus underlining.

The 310 Ballistic Printer also has a buffer expandable from 512 to 2048 that allows you to dump a full CRT screen in a split second.

THE 310 BALLISTIC PRINTER FITS RIGHT IN.

Our printer is totally compatible with all Lear Siegler terminals or with any RS-232C

interface. It fits anyplace you have a CRT terminal or small business minicomputer system.

Feature	LSI 310	TI 820RO
Speed	180 cps	150 cps
Dot Matrix	9-wire head (9 hi x 7 wide)	7-wire head (7 hi x 9 wide)
Lower Case	Standard, with descenders and underlining	Standard, but no descenders or underlining
Buffer	512 expands to 2048	Fixed 1280
Space/Blank Compression	Yes	No
Interfaces	Serial and parallel	Serial only (parallel not available)
Current Loop	Standard	Optional
Forms Control	14 settings standard	Optional
Elongated character sets	Standard	Optional
Price	Base Price \$2045 Expanded buffer - 100 Price as shown \$2145	Base Price \$1995 Options \$10 Price as shown \$2305

The 310 Ballistic Printer is capable of satisfying low-speed day-to-day requirements and is economical enough to handle those high-speed tab runs, too. With the patented Ballistic printhead and 100% duty cycle, no job is too difficult.

NOW YOU'VE GOT A CHOICE.

With the 310 Ballistic Printer, Lear Siegler brings to computer printers the same high standards that made our Dumb Terminal® video display the standard for an entire product category.

That makes us a "full terminal" supplier now — that means CRTs and printers, too. Texas is no longer the lone star.

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SOURCE DATA

parative ratios for the years 1975 through 1978.

Key business ratios used are briefly defined in an appendix. There are quite a few: current assets to current liabilities, net profits on net sales, net profits on tangible net worth, net profits on net working capital, net sales to tangible net worth, net sales to net working capital, collection period, net sales to inventory, fixed assets to tangible net worth, current liabilities to tangible net worth, total liabilities to tangible net worth, inventory to working capital, current liabilities to inventory, funded liabilities to net working capital, and sales per employ-

ee. A worksheet with instructions is provided for making comparisons with your own company. The report is available for \$165 from the Business Economics Division of Dun & Bradstreet, 99 Church St., New York, NY 10007, (212) 285-7636.

INTRO TO TELECOM MANAGEMENT

A nontechnical introductory manual designed for the new telecommunications manager details this vendor's view of the job with emphasis on "basic tools, techniques, and knowledge necessary to make a

rapid and significant dent in the corporate telephone bill."

The Bell System's offering, services, and marketing system are described and discussed. A section on choosing phone systems emphasizes PABX selection, including contract, request for quotation, and request for proposal guidelines. User organizations, interconnect associations, independent telephone associations, Bell operating companies, and state regulatory agencies are listed. There is a glossary as well. \$30. The Telecom Library Inc., 205 W. 19 St., New York, NY 10011, (212) 691-8215.

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VENDOR LITERATURE

SYSTEM BROCHURE

The TDC 2000 Basic System is illustrated in this 24-page full-color brochure. The vendor's digital process management system described in the brochure covers field instrumentation, process connected systems, process interface units, communications, central operating centers, and computer-assisted process management. HONEYWELL INC., Pelham Manor, N.Y.

FOR DATA CIRCLE 352 ON READER CARD

INTELLIGENT DATA STORAGE SYSTEMS

This full-color, three-panel foldout illustrates microprocessor controlled, RS232-based cartridge, disk, and solid state buffer storage systems. Product descriptions are provided, as well as definitions for several applications (including data acquisition, communications, and processing, all matched to each unit's characteristics). Among the storage systems' capabilities discussed in the brochure are remote data logging, message compression, baud rate conversion, data and program storage, paper and punched card emulation, and Winchester disk backup. COLUMBIA DATA PRODUCTS, INC., Columbia, Md.

FOR DATA CIRCLE 355 ON READER CARD

UNIVERSAL PINOUT FOR BYTE-WIDE MEMORIES

A 12-page paper describes this vendor's approach to upgrading byte-wide memories for ROMs and EPROMs. The format illustrated, "How to lay out a printed-circuit board to incorporate future higher density memories," has received approval by the Joint Electron Device Engineering Council (JEDEC). Detailed in the paper are the "flexibility and universality" of the pinout, permitting interchanging of 24- and 28-pin EPROMs, EEPROMs, ROMs, PROMs, and RAMs of several densities. The paper also explains why 28 pins are required on 64K EPROMs to "implement system control functions that eliminate bus contentions between large capacity memories in high speed microcomputer systems." INTEL CORP., Literature Dept., Santa Clara, Calif.

FOR DATA CIRCLE 351 ON READER CARD

Doing it on Kodak film costs less.

An impact printer can chew up an awful lot of paper. Trouble is, the paper it chews up is costing you more and more every year.

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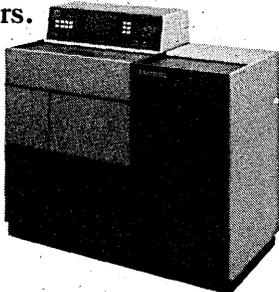
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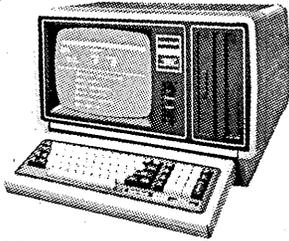
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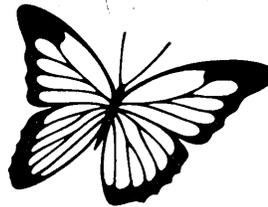
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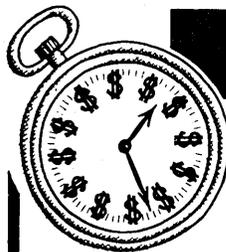
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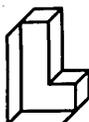
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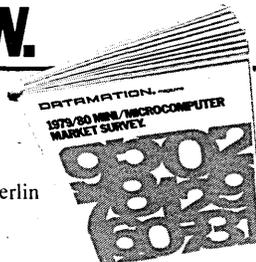
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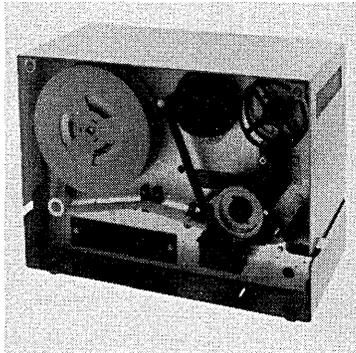
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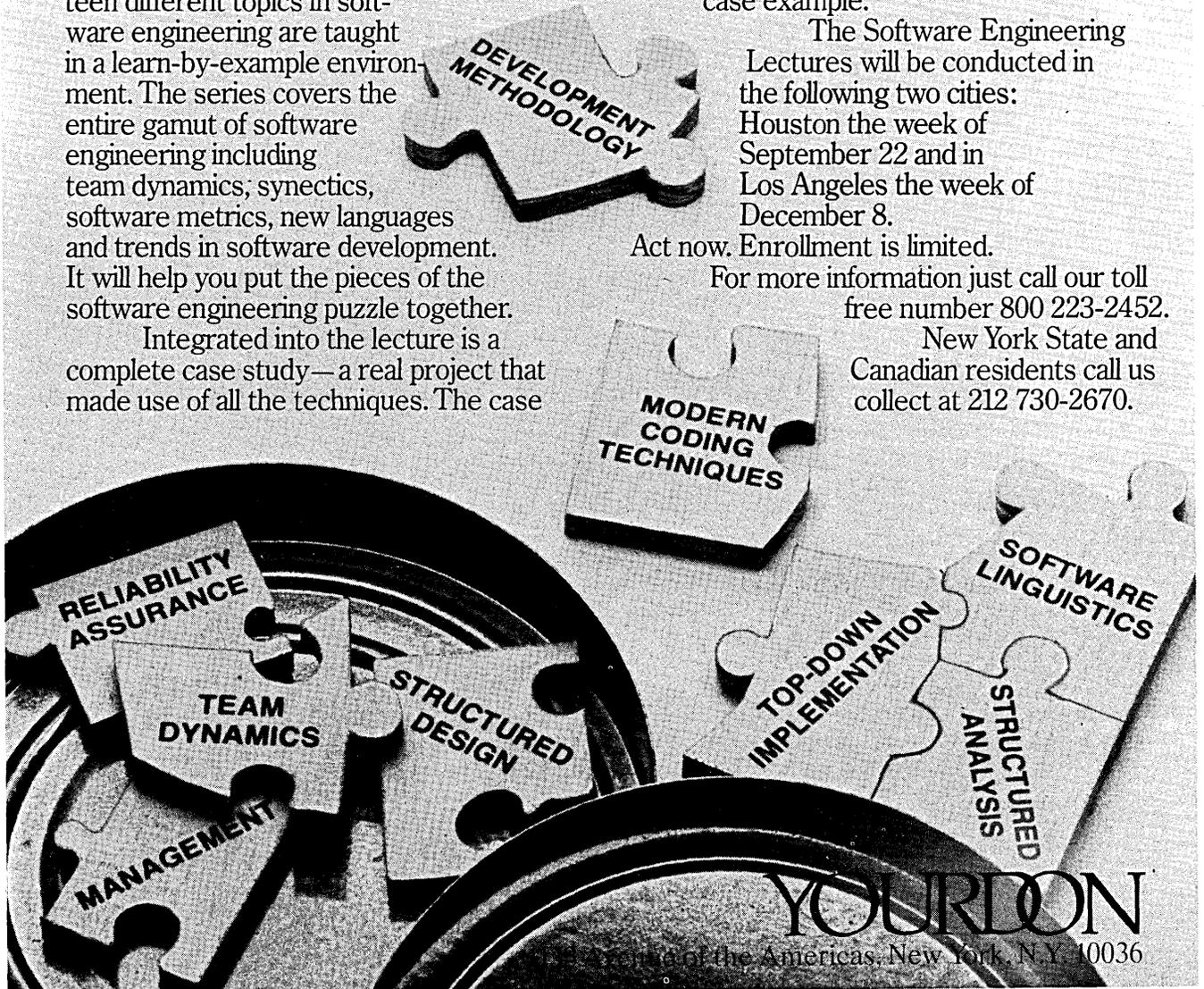
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CIRCLE 128 ON READER CARD

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READERS' FORUM

WE'RE TRYING TO DO IT RIGHT!

In Robert Glass's insightful Readers' Forum (Nov., p.181), "We're Doing It All Wrong!" he lamented the fact that computing managers were not reading program listings. He also suggested that most of the documentation about a system belongs in the program listing. We agree wholeheartedly with Mr. Glass.

It is not easy to convince first-level managers of the importance of reading listings. Even more difficult is the task of convincing senior management to allow the abandonment of the tried and true program description documents external to the listing. We accomplished both by providing a convincing argument that what maintenance programmers really value is the listing.

At our installation, computing managers read program listings to ensure that they comply with strict coding standards and conventions. These coding standards require lengthy prologues (narrative descriptions) that describe the purpose of each procedure within a program. They require programs be modularized into procedures that average less than 50 lines of source code. Also, specific guidelines require the indentation of code to show logical subordination (and to line up IF-ELSE and BEGIN-END pairs), the use of robust, explanatory in-line comments, and the following of strict rules for the naming of program elements.

This emphasis on the listing did not come about by accident. Approximately two years ago we surveyed our 18 programmers and found they overwhelmingly preferred the program listing to other forms of program documentation. These other forms included flowcharts, hierarchy diagrams, HIPOs, narrative descriptions, and data base design documents.

We used a technique known as paired comparisons to evaluate the results of the questionnaire related to the relative value of various software documentation tools. The essential feature of the method is that it transforms a simple rank order of preference to an interval scale. The interval scale not only shows which documentation tools are preferred, but also shows how *much* they are valued over other tools. The fact that programmers use the listing was no surprise, but the amount of preference was eye-opening. The normalized preference for the listing was twice as high as for the second-place documentation aid. Flowcharts, HIPOs, and other documentation aids scored even lower.

As a result of the survey and the dialogue which grew from it, we have deemphasized program documentation external to the listing. Flowcharts, HIPOs, and data base design documents have been abandoned as documentation tools. Instead, program design languages are being used to develop structured, readable program listings. We believe that the probability of documentation accurately

reflecting the program is much higher if the documentation is in the listing itself.

Our software managers do read listings and use them to control the quality of delivered software. We hope that by spending additional time and money to produce a quality listing, we can produce reliable and maintainable software. Our shift in emphasis away from detailed external program documentation is quite recent. We don't yet know if it will be completely satisfactory, but suspect it will be no worse, and less costly, than voluminous, out-of-date, and unused external documentation. Although it is still too early to completely evaluate our approach, initial indications are good. One thing is certain: the programmers are a lot happier.

We're trying to do it right!

—G.E. Anderson, K.C. Shumate
Oceanside, California

ONE VOTE: LET'S KEEP IBM WHOLE

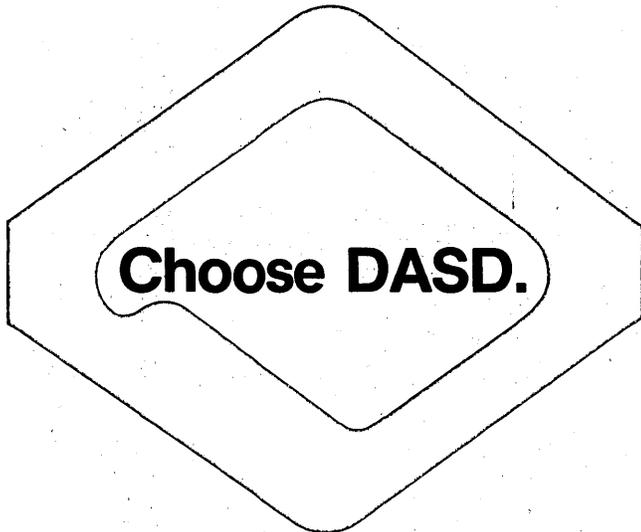
In the next few months the antitrust trial of the U.S. vs. IBM will probably be concluded. The costs to both IBM and the United States have been staggering, but affordable.

The end result of this trial will have profound effects on not only IBM and the computer industry worldwide, but also on the economic and defense strength of the U.S. Because of the key role IBM continues to play in the development of the computer industry; because the United States leads the world in computer system development, manufacture, and usage; and because of the increasingly vital role the computer industry plays in our nation's defense and economic well-being, I believe that breaking IBM into smaller companies will lead to a weakening of our economy and defense posture. I also believe that it will not lead to the realization of the objective of antitrust legislation (e.g., increased competition), and that those objectives can be accomplished more effectively through other means.

The U.S. must expect continually to encounter and be challenged by crises such as the one in the Middle East and more recently in Iran and Afghanistan. We must present a strong defense, and this requires technically superior, highly effective weapons in order to stand up to the larger armed forces of our opposition. Such technically superior weapons have been developed from defense research, the space program research, and from the computer industry, which has been driven by IBM.

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FORUM

don't provide fancy features (e.g., it trailed other computer manufacturers in the implementation of virtual storage concepts), still computer usage would not be at its current level if it were not for IBM's massive development and marketing success. Because of the sheer number of systems installed, IBM designs have become standards.

Imitators have not had to perform the same level of extensive product planning; design and other development work has been simplified, and consequently, their product development costs have been significantly less than IBM's.

This does not mean that all is in favor of the independent manufacturers. Because of its size and market dominance, IBM can easily afford to underprice independent computer and component manufacturers. Consequently, IBM must be watched.

However, dissolution of IBM would dilute its research effort and its ability to develop system products. Thus, IBM should be left intact to continue its industry leadership.

An effective way to provide the protection required by independent competition is to monitor IBM's business and technical activities. If a small company were to complain of unfair pricing practices, the complaint could be investigated by the federal government (e.g., the FTC and the Justice Department), and if such practices had occurred, IBM could be fined, the plaintiff compensated for damages, and the unfair practice stopped.

Technical activities could be monitored by standards. There currently is a federal standards activity to establish a set of common dp standards for all federal systems and thus protect the dp industry as a whole (although the federal standards activity, as well as all such standards activities, is a necessary joke).

An effective method, in the case of IBM, is to require IBM to disclose system design and interface specifications at the time of delivery and installation of the first unit. Such specifications should describe accurately and in detail the physical, electrical, and/or logical operation of the system hardware or software component(s). Manuals on all system components should be available users and IBM competitors. Further, the federal government should be provided with a test bed system (purchased from the vendor) to test all standards related to delivered products.

The final disposition of the IBM antitrust case warrants special consideration because of the impact it can have on the U.S. as well as the computer industry. America can lose its world leadership because it has failed to set national goals beyond the space program. Such national goals are needed to provide the technology to develop a strong defense. Because our most recent Presidents have failed to set national goals, companies such as IBM are America's bastion against losing technical superiority to other nations.

Pete Moulton
 Washington, D.C.

WILL HISTORY REPEAT ITSELF?

Problems of productivity among white collar workers are causing a flurry of activity in the field nebulously called the "office of the future."

It appears that the stewardship for office automation is split between the information systems function and the administrative function. The executive for information systems can easily make the case that office automation is an extension of computer technology. The administrative executive can make a strong argument for procuring word processors to replace hundreds of typewriters.

If these executives were polled to answer the question: "Will dp and wp ultimately converge?" the systems executive would answer, "It is inevitable." The administrative officer would respond, "Probably not." They are both right and both wrong.



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Systems Development and Operations Management

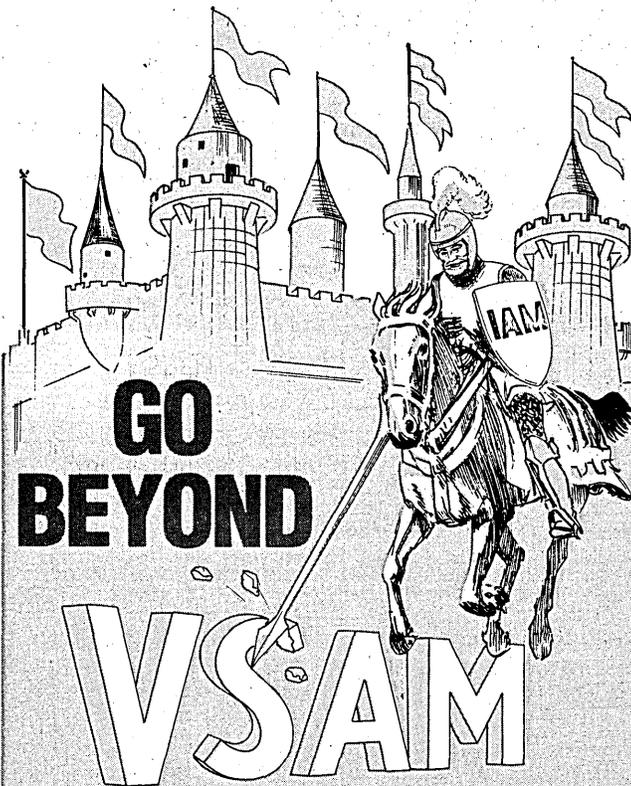
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FORUM

The strongest argument for integration stems from the concept of total information management and is based on the idea that information resources must be systematically managed to provide timely, accurate information to an organization's decision makers. These information resources are usually defined as dp, communications, and office system facilities to control the flow of coded and narrative data. These data are the foundation of the enterprise's information bases: large-scale, centralized computers manage the organization's data bases and are connected to remote locations through the corporate telecommunications network (leased from public vendors). Office automation devices are considered an extension of the electronic tentacles of the information management complex. The opposing school is based on effectively enhancing the administrative support of the individual, localized units that fulfill specific missions.

The intense competition among office product vendors confuses the issue. Both approaches are often advocated by different divisions of the same manufacturer as done by IBM, Raytheon, and Burroughs. Until recently, word processing equipment was not easily integrated into a dp network. However, mainframe manufacturers view the office environment as a potential for expansion of their marketplace, and these manufacturers are in a strong position to capture a significant share of the market.

The issue of convergence of dp and office automation appears to be contentious. However, organizations that invest some time and effort in planning and analysis will find applicability for both concepts. For certain applications, it makes sense to interface office systems devices with the dp flow. In other cases, standalone equipment configured to support local functions is most appropriate. The decisions are based on sound systems engineering, not organizational turf.

The office of the future is an elegant concept that has striking similarities to the elusive management information system concept of recent historical fame. Like MIS, the key to the office of the future concept is the integration of major subsystems (word processing, reproduction, distribution, records management, administrative support, and telecommunications) into a unified, hierarchical structure. The implementation of office systems is a pervasive, rippling change that will affect the way business is conducted in the organization. Executive support is essential in both cases.

The ultimate objectives of the office of the future are, like MIS, to increase white collar productivity, improve the quality and accessibility of information for decision-making, enhance communication patterns, and provide better service inside and outside of the organization.

These concepts are more concerned with executing processes *differently* rather than just executing *faster and cheaper*. The strategic and comprehensive nature of both movements can be misunderstood by management, who are inherently apprehensive about increasing dependency on electronic technologies.

While MIS systems focus on the use of data base and on-line systems to convert coded data to information, the office of the future involves the conversion of narrative data to information, using computer and communications technologies. Both approaches require that non-dp personnel attain a comfort skill level in using terminals and other electronic devices in the conduct of their daily activities. Considering these similarities, many seasoned dp or MIS managers view the office of the future with a feeling of *déjà vu*.

The question is, "Will history repeat itself?" Or will systems builders learn some lessons from our experiences with MIS? There are some encouraging signs. The importance of top level executive support for the office of the future is generally acknowledged. Although it may be lip service, attention is being given to the human implications of office automation. And, more and more "snowproof" information systems managers are graduating to these higher executive levels. With their broadened business perspectives, they can translate the technical approaches into understandable business language and promote the program.

—Gerald S. Maskovsky
Philadelphia, Pennsylvania

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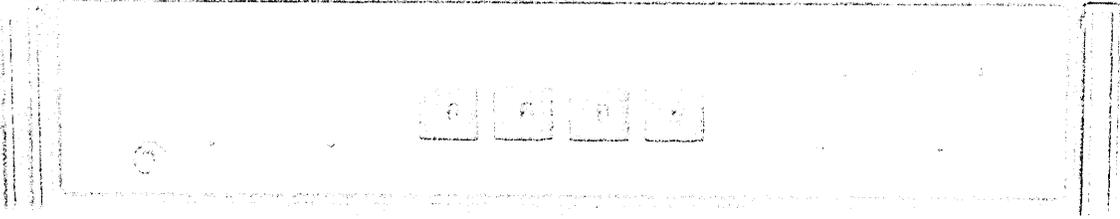
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WE FOUND A HOLE IN THE OBSOLESCENCE THEORY

The business community is paying a high price for the rapid pace of developments in data communications. Because new equipment has a nasty habit of rendering current models obsolete.

Teletype Corporation is doing something about it. In our industry we're one of the few companies manufacturing its own customized MOS Chips. And it's helping us build a rare flexibility into our data terminals.

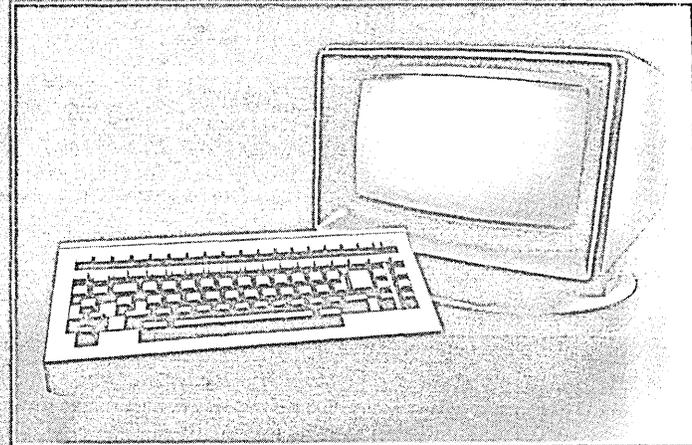
Modular design and built-in electronic adaptability let us redefine and enhance our equipment long after it's gone on line.

So our customers can have the newest features. Without absorbing losses in the form of prematurely obsolete equipment. Or paying for brand new terminals. Or disrupting their entire system.

In business, keeping pace with data has become crucial. The distance between managers and critical information has widened to alarming proportions.

Teletype Corporation is helping bridge that gap. As a member of the Bell System, we're coupling their communications knowledge with our own research and development.

And it's working. We're making early obsolescence a thing of the past. So you won't have to fear the future.



TELETYPE WHERE DATA BECOMES INFORMATION



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