

VOICE OUTPUT



**A SURVEY OF ACCOUNTING PACKAGES
REAL LIFE IN THE OFFICE OF THE PRESENT**

We'll back up our disks— and anyone else's.

That's right. Ask any other supplier of peripheral products for system backup, and you'll find that some can supply a disk, some can supply a cartridge recorder, others a streaming transport. But none can supply the choice which Kennedy can offer.

Kennedy is the only company that can offer an SMD compatible 8" 40 MByte disk drive (Model 7300) and an 80 MByte 11" Winchester disk drive (Model 8380). To back them up, Kennedy has a 1/2" cartridge recorder (Model 6450), and Model 8389, 1/2" Data Streamer Tape Transport.

Kennedy was the first to utilize the 1/2" 8M cartridge for disk backup. Kennedy was the pioneer in Winchester disk technology, and was a leader in developing a low cost streaming tape drive.

All of these products were conceived and designed to meet the need for reliable, low cost backup — for our systems or for any other system.

Kennedy has always backed its products. That's why we're No. 1. Call or write us about your problem.

We won't back off.

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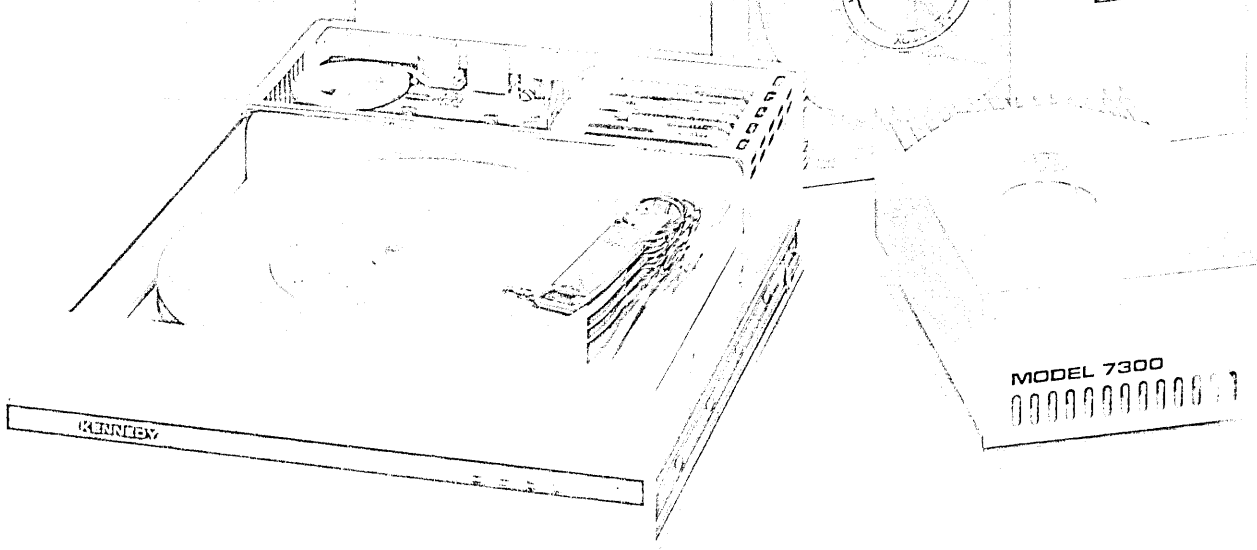
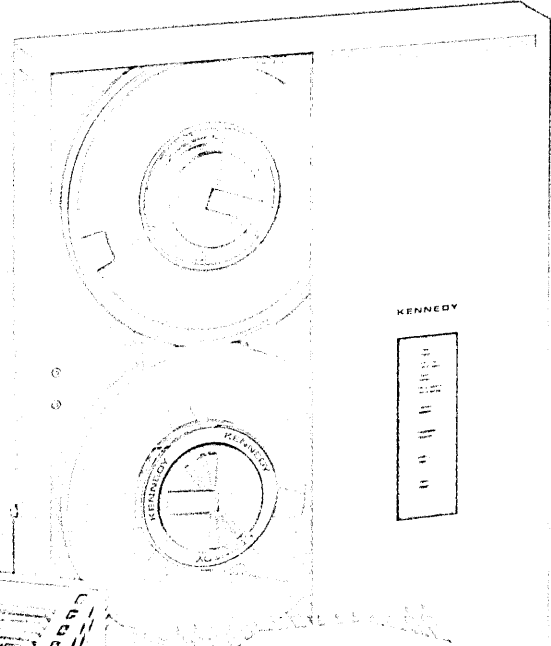
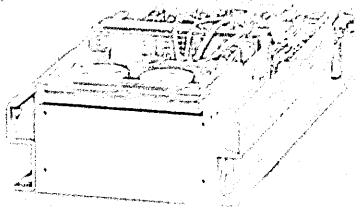
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AM Jacquard Systems

The AM Jacquard J121 entry level computer system does two things for your office. Word and data processing.

And it does a whole lot more. It interfaces to AM Varityper phototypesetters, can easily communicate with mainframes, and can handle electronic mail and a multitude of tasks that other systems can't. And all for about \$13,500 per screen.

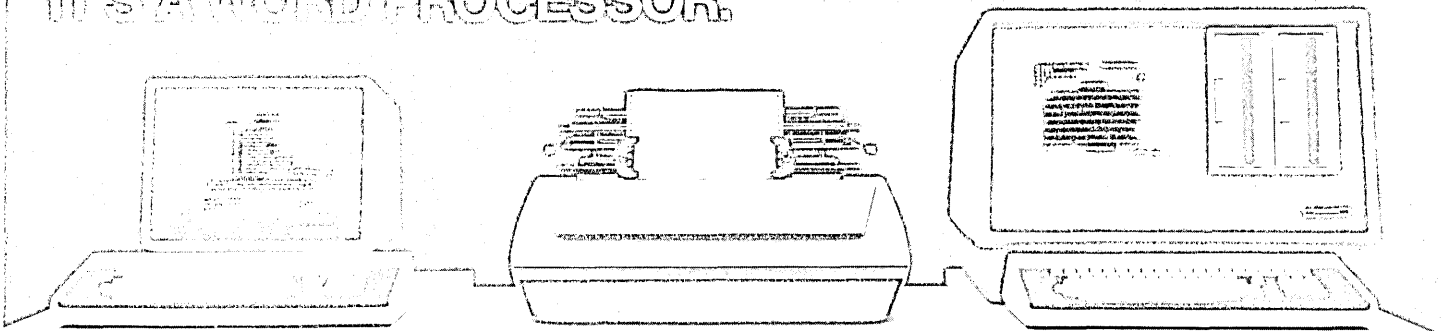
This efficient office automation system can grow with your business, too. Buy it now with only two workstations and add more, for under \$5,000 per screen, as you need them. The J121 offers ease of operation, expandable on-line storage, high speed throughput, and comes with

a choice of two letter-quality printers.

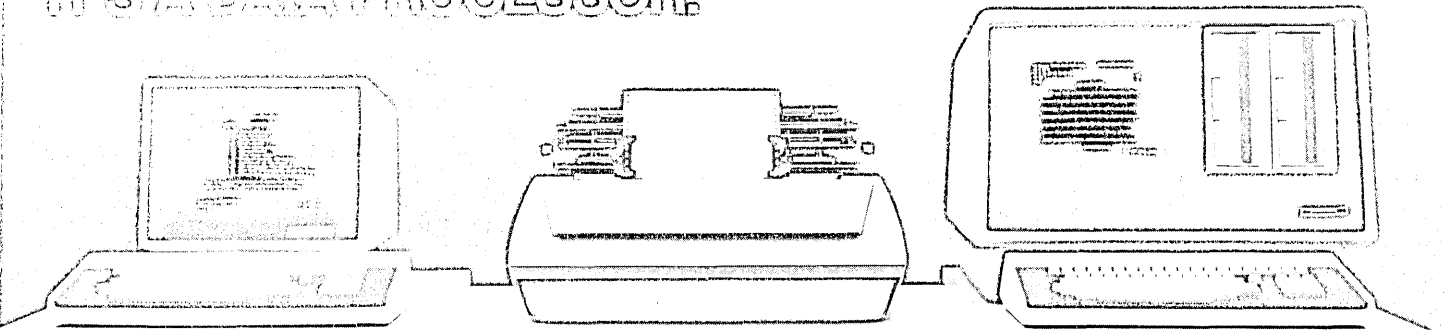
The AM Jacquard J121 is designed to boost your office's productivity and profitability. No one, but no one, offers so much versatility and flexibility for the money. And we know what we're talking about. Our parent company, AM International, Inc., has been designing products to modernize offices for more than 90 years.

If you want to know more—and you should—about our Datapro award-winning J121, contact AM Jacquard Systems, the Informationists, a division of AM International, Inc., Dept. 777, 3340 Ocean Park Blvd., Santa Monica, CA 90405. (213) 450-1242, Ext. 777.

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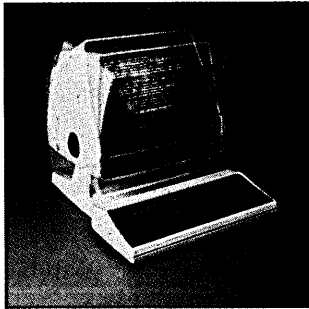


IT'S A DATA PROCESSOR.

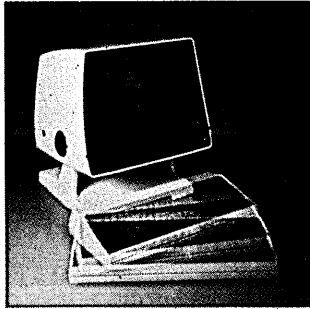


IT'S A STEAL AT THE PRICE.

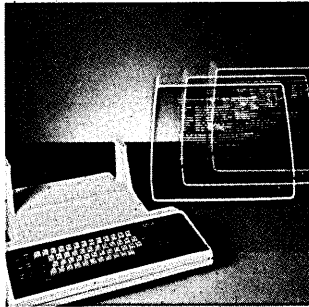
EASIER.



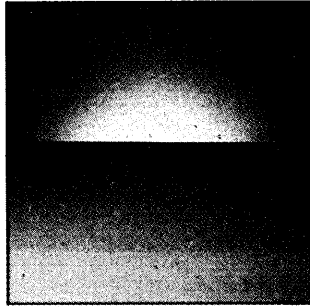
Easier To Look At



Easier To Work With



Easier To Upgrade



Easier To Move Elsewhere

It's a word that best summarizes the benefits of the Memorex 2078 Display Station. Important benefits for users of some of today's most popular CPUs, including the IBM 43XX. And of today's most advanced communications protocols, like SNA/SDLC.

The 2078 Is Easier To Work With.

People who are more comfortable are more productive. That's why there are more "people" features designed into the 2078. A non-glare screen and keytops. Non-reflective moldings. Recessed display. And a monitor that tilts 30% up and 15% down. There are also more operational features. Like a line and column indicator. An alternate cursor. An operator information line. And keyboard click and non-click select.

The 2078 Is Easier To Move Around.

Space is always at a premium, be it on a desktop or an entire office work area. Which is why Memorex made the 2078 both compact and versatile. The whole package measures just 17" wide by 19" high by 24" deep. And it weighs a mere 55 pounds. A detachable keyboard, and a removable monitor

that can be conveniently placed on a shelf, further increase workspace efficiency.

The 2078 Is Easier To Get The Way You Want It.

It can be ordered with your choice of five screen capacities, from 960 to

3564 characters. With five keyboards, including 75-key EBCDIC typewriter, ASCII typewriter and EBCDIC data entry as well as 87-key ASCII typewriter and EBCDIC typewriter with numeric pad. And an impressive list of options, including selector light pen, security keylock, an unprotected field indicator and a special conditions alarm.

The 2078 Is Easier To Get When You Want It.

It's built for SNA/SDLC, right now. It's built for customer installation in a matter of minutes. But for all of the reasons the 2078 from Memorex is easier to appreciate, the biggest might be delivery. Because 2078s are available in quantity, immediately.

So take the easier way out. And the smarter way. Contact your local Memorex representative today. Or Laurie Schuler at (408) 996-9000. Memorex Communications Group, 18922 Forge Drive, Cupertino, CA 95014.

MEMOREX

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CIRCLE 5 ON READER CARD

AUGUST 1981/\$4.00 U.S.A.
VOLUME 27 NUMBER 8
This issue, 159,720 copies

FEATURES

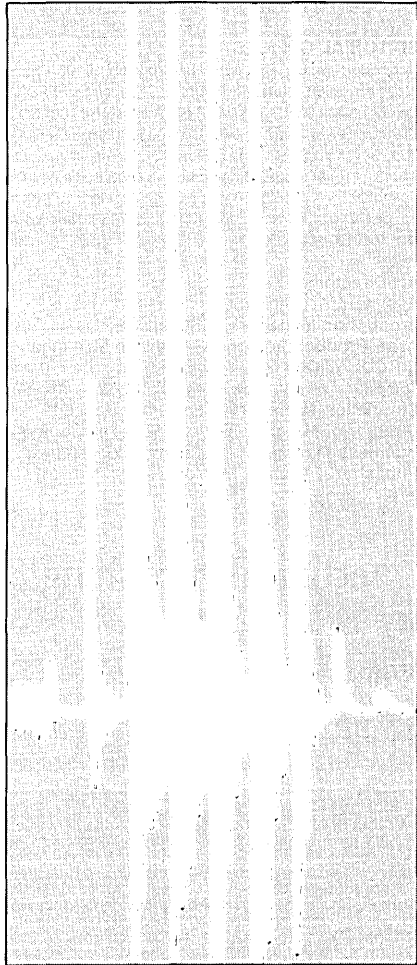
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Paul Masters

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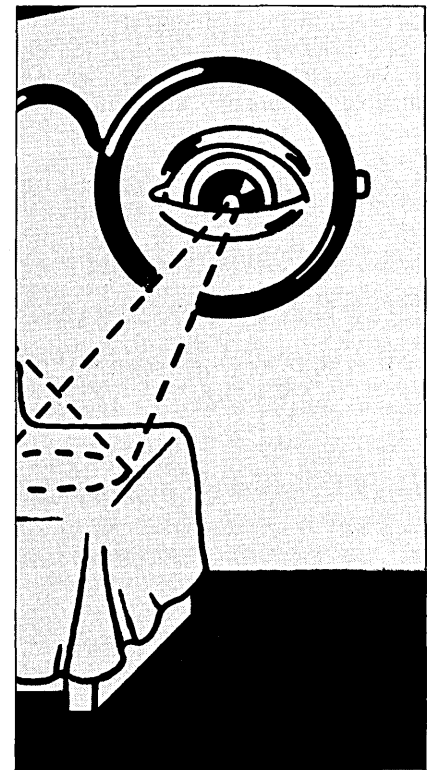
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COVER PHOTOGRAPH BY RONALD DEMILT;
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MENT CORP.

THE AJ 833.

ONE TERMINAL TO HANDLE ALL YOUR APPLICATIONS.

If you're using a lot of different printing terminals for a lot of different jobs, you're losing efficiency. Operators can't easily switch. Training becomes complicated. Various supplies must be stocked. And maintenance can be a real problem.

Now consider the AJ 833 daisy wheel printer. No other terminal of its kind can match it for applications versatility. It's ideal for timesharing, communications, text processing, letter writing, even high-resolution plotting.

And APL jobs of every kind.

The AJ 833 is so versatile because we've built-in a lot of capability. Such as a unique, *totally programmable keyboard*, including seven multi-function keys. A non-volatile memory for storing terminal status. Bidirectional 45 cps printing. Selectable line rates up to 450 bps. X-Y plotting.

And a long list of options including 600/1200 bps full duplex operation, a 16K or 32K memory, and 2741 compatibility.

Plus a text enhancements package with bold face printing, automatic

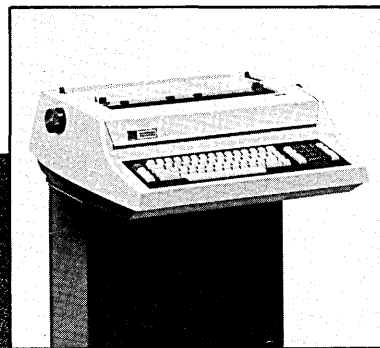
centering, underscoring, and margin justification. There's even a proportional spacing option.

So your AJ 833 can handle virtually all your printing terminal applications, especially those that require letter-quality typing.

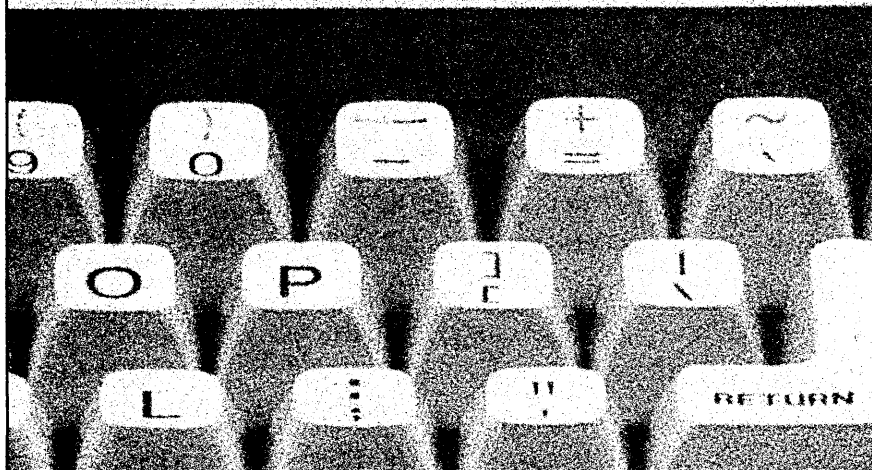
If you have AJ 832's installed, we can upgrade them to full AJ 833 capability.

Call your nearest AJ regional office for details: San Jose, CA (408) 946-2900; Rosemont, IL (312) 671-7155; Hackensack, NJ (201) 488-2525. Or write Anderson Jacobson, Inc., 227 Devcon Drive, San Jose, CA 95112.

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CIRCLE 6 ON READER CARD

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Introducing NCR's user-friendly family of general purpose terminals.

Meet a new family of quality general purpose terminals featuring increased operator convenience. A new family from NCR, already a leading supplier of special purpose terminals around the world.

The whole family is ergonomic. From non-glare screens to detach-

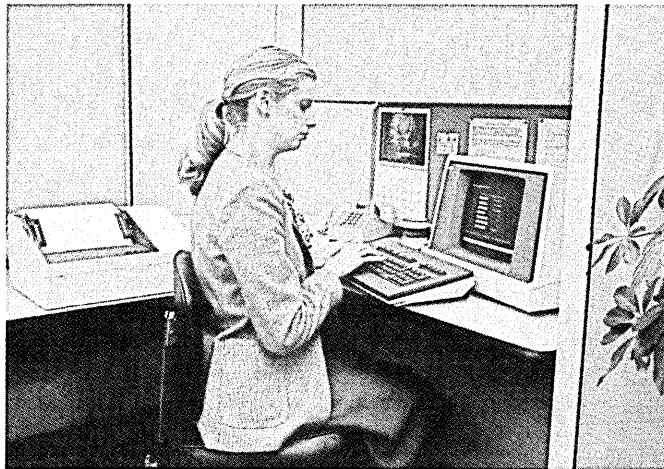
able keyboards, these terminals are designed to accommodate every operator. Even the soft neutral colors are selected to resist soil and please the observer.

Ease of operation means more productivity from your system. Compact size and light weight assure adaptability to limited work areas. Rigorous testing eliminates problems due to RF interference and static discharge. And, like all NCR

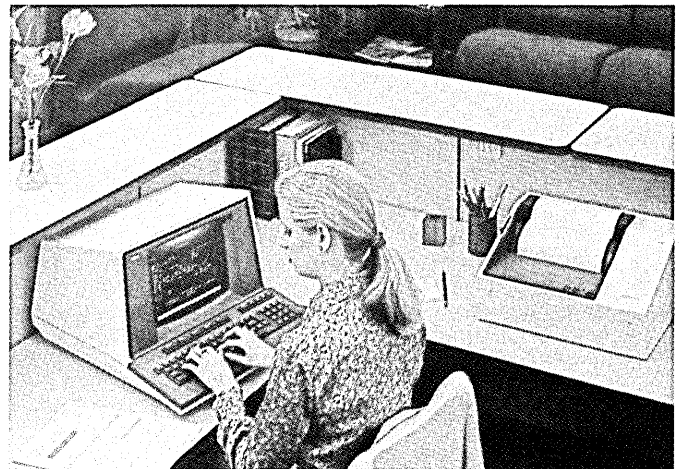
equipment, they are backed by NCR's quality service available almost everywhere.

For a personal introduction, just call your local NCR office, or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

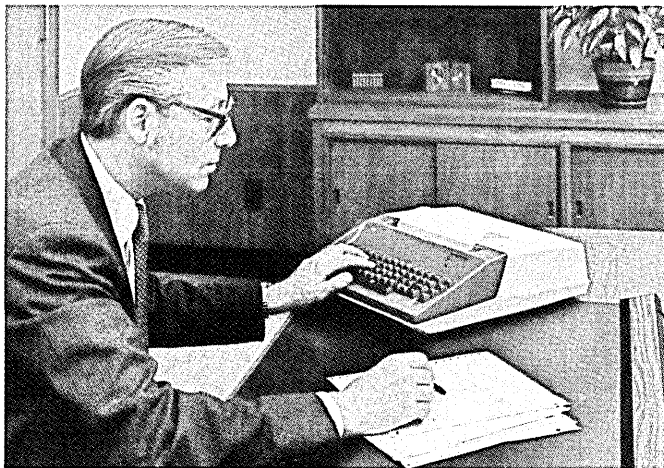
NCR
Complete Computer Systems



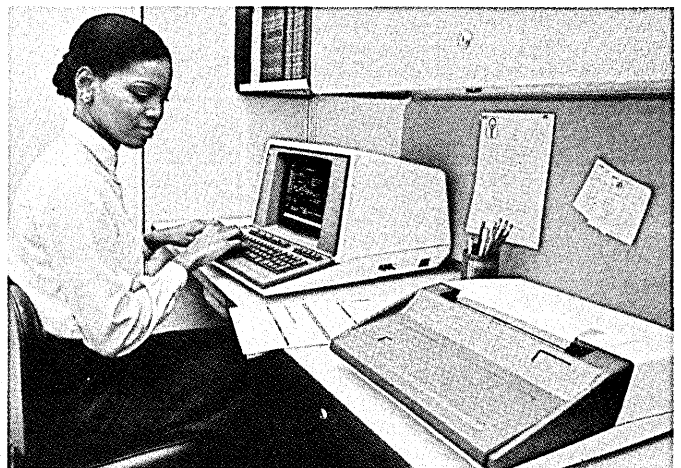
Compact 6410 matrix printers, that print at a constant 90 LPM, are available with either tractor or friction feed. The 7900 CRTs, with models that operate in block, page or character mode, are also available with either fixed or detachable keyboards.



7900 display terminals weigh less than 25 lbs. Their versatile keyboards and non-glare green displays assure easy use and readability. 6425 non-impact printers silently produce hard copy at a steady 240 LPM and can print up to 99 copies under software control.

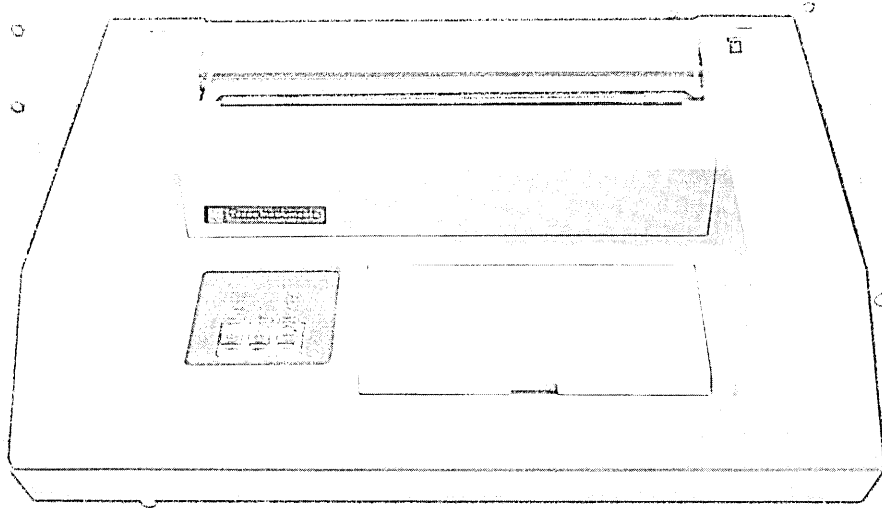
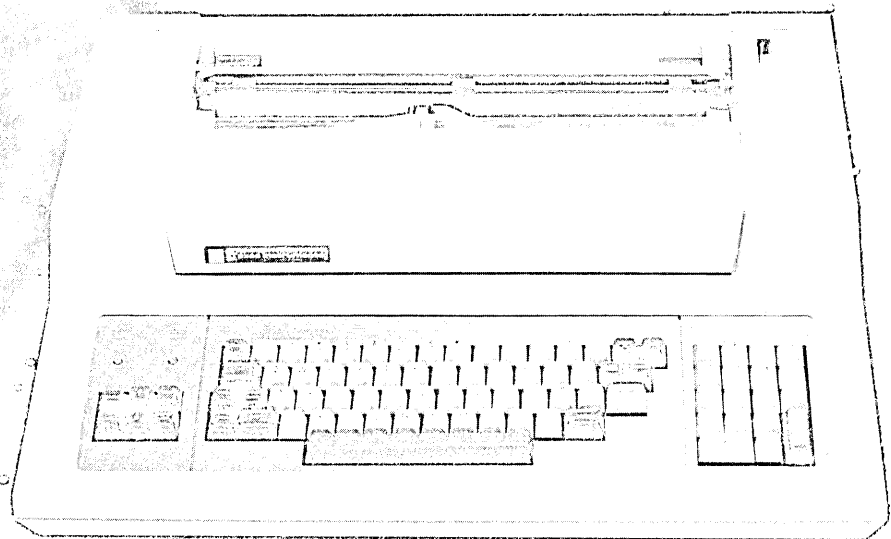


Open the door to your data base with our 2600 KSR terminals. Weighing less than 13 lbs., their compact size and quiet non-impact printing allow use in almost any office environment.



Our versatile CRT/printer workstation packages are available in TTY compatible models adaptable for use on a wide variety of systems or applications.

CIRCLE 7 ON READER CARD



An announcement of universal impact.

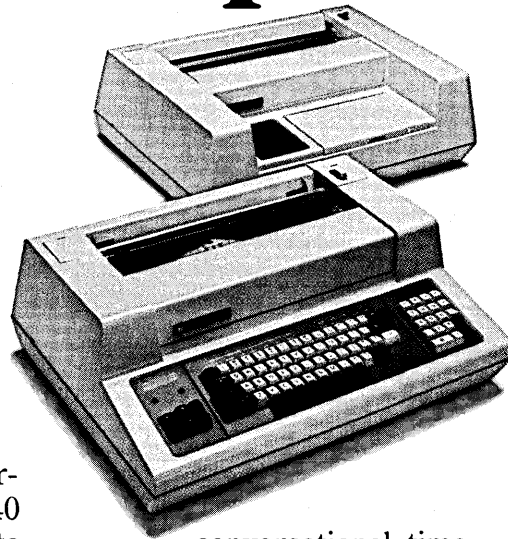
Announcing TI's new 840 KSR and 840 RO Electronic Data Terminals.

Meet the newest members of the field-proven OMNI 800* Family. Designed for versatility and reliability, the 840 Keyboard Send-Receive Data Terminal and 840 Receive-Only Printer combine low cost and high performance with compact and attractive styling.

Both 840 models feature 75 character-per-second optimized bidirectional printing with 9×7 dot matrix characters and can handle 132 column-wide friction-fed or tractor-driven forms.

The 840 RO, ideal for remote unattended print applications, provides answerback memory, paper-out and carriage jam detection/transmission with optional speeds up to 9600 BAUD. With the optional 2,000 character buffer, the 840 RO is also well-suited for CRT hard-copy print applications.

The 840 KSR, designed for telecommunications and



conversational time-sharing, includes a full ASCII keyboard, optional numeric keypad and last character printed visibility. And, the 840 KSR forms control option allows the operator or host computer to easily change print size, spacing and form size.

For printing flexibility, both 840 models offer an enhanced print option providing a selectable 9×9 or 15×9 dot matrix character font allowing for true underlining and descenders. The selectable 15×9 dot matrix generates enhanced quality print for word processing applications.

To meet your impact printing application needs, the 840 models can provide the performance you expect at a price you can afford.

TI is dedicated to producing quality, innovative products like the Models 840 KSR and 840 RO. And TI's hundreds of thousands of terminals shipped worldwide are backed by the technology and reliability that come from 50 years of experience.

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

For more information on the Models 840 KSR and 840 RO, contact the TI sales office nearest you, or write Texas Instruments Incorporated, P.O. Box 202145, Dallas, Texas 75220, or phone (713) 373-1050.



*We put computing
within everyone's reach.*

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CIRCLE 8 ON READER CARD

HUMAN DESIGNED SYSTEMS



Loved. For our impressive 132-column terminal

No longer do you have to choose between the best performing 132-column display terminal and the best priced 132-column display terminal. HDS makes the choice for you — the *concept 108*.

With the best of everything you always hoped for in a 132-column display terminal. Great price: \$1230 in OEM quantity 75. Great features: • switchable 80/132 column format • ASCII or APL/ASCII models • four full pages of display memory standard (eight pages optional) • non-volatile memory for permanent configuration storage • windowing • programmable function keys • multiple user-selectable character sets • I/O capability for networking between multiple communications lines • large buffer and buffer overflow control for high-speed operation • self test • advanced text editing, data entry/retrieval and business graphics functionality • ...and many more user/human designed features providing everything you need for optimum versatility and flexibility in applications development.

And ready for delivery to you in 30 days.

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CIRCLE 9 ON READER CARD

Twenty Years Ago/Ten Years Ago

LOOKING BACK

EDITOR'S WEED-OUT

Industry analysts predicted a dim future for most computer manufacturers because "the hardware business had too narrow and vertical a market." A "weed-out" was forecast, leaving only three or four dominant firms. They had sound reasons for this pessimistic prediction. In 1961, the number of manufacturers could not: 1. continue the huge investments into advanced technology without a solid market alternative (i.e., tv sets, electric razors) to absorb the losses, 2. deliver adequate field support and software, 3. continue mass production of large and medium systems, and 4. compete with all the other companies producing similar products. The analysts concluded the weed-out would occur within a "handful of years." Other observers disagreed, pointing out that no companies had left the computer industry since mid-1958. The prophets of doom had also predicted smaller firms would collapse first, but many of these firms exhibited strong staying power. Control Data's 160A, 1604, and 924 (not yet released in August '61) were cited as perhaps the best examples of a small firm's staying power. Some other companies cited as destined to advance were Packard Bell Computer, RCA, Burroughs, Philco, Honeywell, and GE.

BIG BUSINESS WITH A FUTURE

In 1971, Seymour Cray, Control Data's computer genius, said, "After the 7600, I'm not going to work on any more small machines." (Cray's dream to build his own supercomputer became a reality in 1972 when he and fellow ex-CDCers Frank Mullaney, George Hanson, and Noel Stone formed Cray Research, Inc.)

To dispel the spreading rumor that RCA's computer systems operations were going to be sold off, L.E. Donegan, Jr., vp and general manager of the division, issued an internal memo expressing the company's "unequivocal" intention to remain in the business. If Donegan wasn't convincing enough, RCA's president Anthony L. Conrad backed him up by videotaping his own reply to the rumor. Conrad said that Donegan and his management team were fully supported by RCA, and that the company's

1971 investment in hardware and software would be the highest in RCA's history. In fact, Conrad said, computer investments would top any prior venture investments—including color tv. Another indication of RCA's commitment was its decision to start up marketing operations in Britain. C. Ridley Rhind, formerly with IBM, would act as general manager of the U.K. operation, and he had received approval to hire 40 employees for the venture.

Intel came up with an innovative marketing strategy to discourage long-term leases of IBM 3330s. If the user agreed to rent the 3330 on a monthly basis, and signed a letter of intent for Intel's compatible version, Intel would pay the difference between IBM short and long lease charges. The agreement would be good until Intel delivered the replacement, and the company expected to begin deliveries by the end of 1972.

*

In a report entitled "Communications Technology for Urban Improvement," the National Academy of Engineering recommended several projects ready for pilot testing. The NAE panel that wrote the report was chaired by Peter Goldmark, president of CBS Laboratories, and included members from dp manufacturing, communication carriers, aerospace firms, and universities. Among the proposals were anti-crime surveillance of city streets using cameras and computers, on-line polling of cable tv viewers to establish product and political preferences, computer assisted instruction using two-way cable tv, an automated parking lot controlled by remote sensors and a computer, and a transportation pilot that would provide mass transit users with routing, scheduling, arrival times, and other on-line information through terminals adjacent to each commuter stop. The panel reported that the technology for these projects would be available in the '70s. Connecticut was judged a good area to start the pilot projects, primarily because some exploratory work had been done there by state agencies. Although cost estimates were supplied for many of the panel's recommendations, it was not disclosed where the money would come from.

—Deborah Sojka

THE COMPUTER SMALL ENOUGH TO CONQUER DDP.

Our DDP solution is literally at your fingertips.

The MSI HandHeld Computers are the low-cost answer to your distributed data processing needs. Because our family of portable data-entry computers allows information to be recorded right at the point of action.

The programmable MSI HandHeld Computers can be hand-carried to wherever data needs to be gathered. Instead of recording information on a scratchpad or form, you simply key the data directly into the unit's solid state memory.

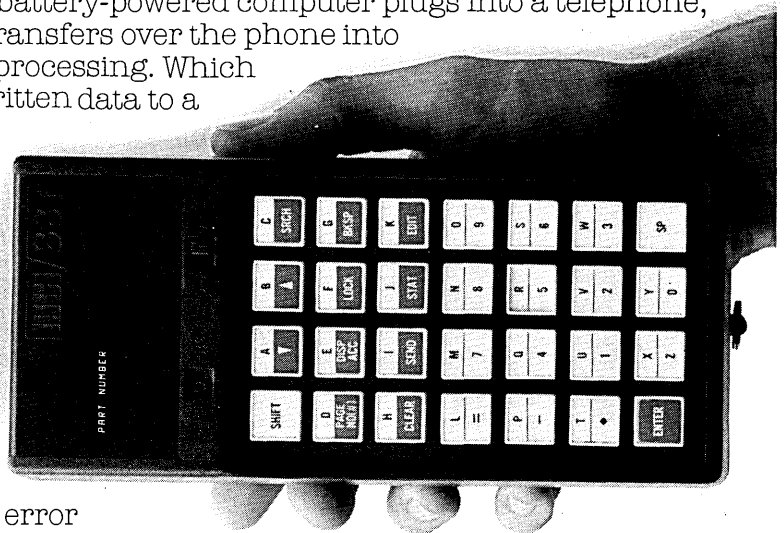
Then, at the end of the day, our battery-powered computer plugs into a telephone, and all the stored data automatically transfers over the phone into your central computer for immediate processing. Which means no more delivering the handwritten data to a central location, where it must be transcribed, and then keyed in on a stationary workstation.

Because our computers are microprocessor-based and user-programmable, they can instantly become highly specialized applications devices, for use in such areas as order entry, inventory control, financial reporting, manufacturing control, retail reporting, and field data collection. They provide functions such as data storage, prompting, error checking, editing, range checking, calculation, and more.

Thanks to MSI, field people become more productive, and information turnaround is significantly accelerated. MSI HandHeld Computers can result in a 30 to 60% reduction in data-gathering time. Which adds up to bottom-line cost savings. Not to mention happy top management.

MSI is the world leader in portable data-entry computers, with over 170,000 units delivered. And our global sales, service and support network will always be there to back you up. For more information, call us toll-free at 800-854-3024. (In California call 714-549-6375 collect.) Or write to MSI Data Corporation, 340 Fischer Ave., Costa Mesa, CA 92626.

We'll show you how to put DDP within easy reach.



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We put computing in the palm of your hand.

CIRCLE 10 ON READER CARD

Paradyne

Paradyne.

We make Modems...

We understand most people know us for our modems. And we're proud of the fact.

We worked very hard to develop our leadership position in modem technology. Our history of modem "firsts" reflects well on our people and our engineering abilities.

We were the first with high speed LSI modems. The first with high speed microprocessor modems. The first with the 14,400 bps modem. The first with a 16,000 bps modem designed for computer data. And, most recently, the first with an end user 9600 bps modem for under \$2,600.

But today, Paradyne is much more than a modem company.

We're a complete Data Communications Company!

**Superior modems/
network management**

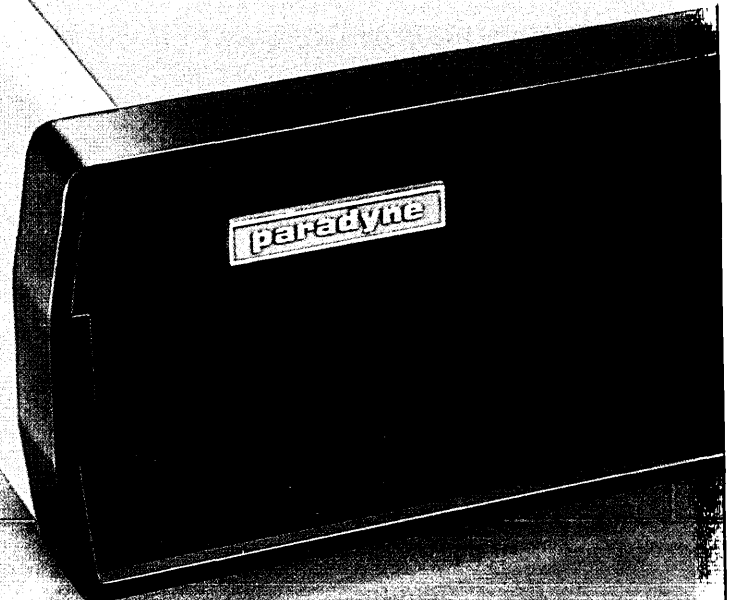
As the leader in using LSI and microprocessor technology in developing

modems, Paradyne produces a complete family of modems for operation at data rates of 1,200 to 16,000 bps.

Because we were also the first to use modems to measure line impairments, our **ANALYSIS** Network Management System offers features unique in the industry. In complex RJE, teleprocessing and distributed networks, **ANALYSIS** constantly monitors the status of all modems, telephone lines and terminal connections.



ANALYSIS: Network Management System



and Much More!



RESPONSE: Distributed Data Processing System

With our new **DATALYZER** option, **ANALYSIS** can now provide system performance information such as response time for CRT's and computer transaction time. Our newest advance, the **NETWORK ADMINISTRATOR** makes problem management, inventory control and report generation capabilities available to the teleprocessing network manager.

It's no wonder that **ANALYSIS** has become the standard against which other systems are measured!

"State of the art" distributed data processing

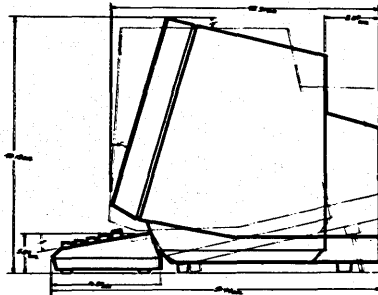
By concentrating on the data communications aspects, Paradyne has developed high speed systems to simplify remote data processing over a variety of communication media.

Paradyne's **PIX** system permits the computer to do what it does best — batch processing — by relieving it of telecommunications tasks. **PIX** allows remotely located peripherals to appear to the host computer as if they were in the computer room.

To provide networking capability in more complex processing environments, **PIXNET** allows the devices attached to multiple **PIX** systems to interconnect with more than one IBM host computer.

The result? More efficient, cost effective communication!

Paradyne's **RESPONSE** adds a new level of advantage to the benefits of

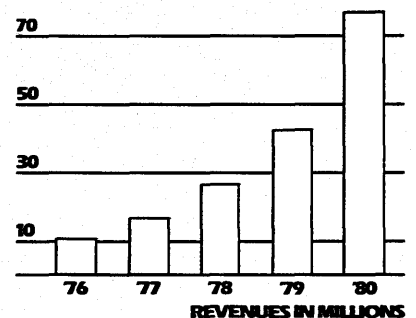


Products Engineered for People

PIXNET by providing the capability for on-line, interactive processing applications.

RESPONSE gives IBM users a distributed data processing capability by putting processing power in remote locations and utilizing **PIXNET** for its communications functions.

The result? Again, more efficient and cost effective communication!



Rapid growth and advanced technology

With annual revenues increasing at a rate of over 50%, Paradyne is a leader in an industry known for its rapid growth.

We've used advanced technology to develop and patent superior communications products. Products that have better features, lower costs, and longer lives. Products that satisfy today's data communications requirements better than available alternatives.

Our remarkable sales increases to both end users and to "Value-Added-OEM's" indicates our philosophy of using superior technology to develop unique data communications products has been accepted by the marketplace.

We're **PARADYNE**...THE Data Communications Company of the 80's.

If you would like to know more about Paradyne's products, write on your letterhead or call:

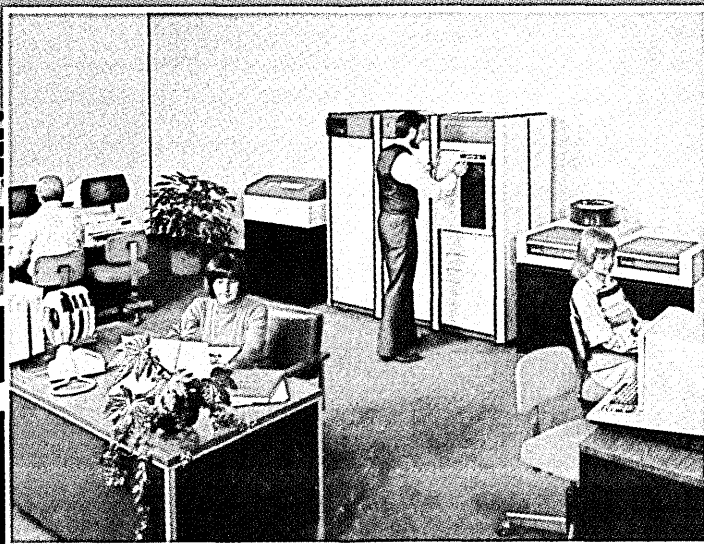
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CIRCLE 11 ON READER CARD

μP14400

200 reasons to buy the BTI 8000



BTI 8000 32-bit multiprocessor system

With one BTI 8000, you use up to 200 terminals simultaneously running programs in COBOL, FORTRAN, BASIC and PASCAL. What's more, you can run interactive and batch jobs at the same time — in any mix!

The key is BTI's exclusive Variable Resource Architecture. Starting with an entry level system, you can increase processing power by a factor of ten, by just plugging in modules — up to 8 CPUs, up to 16 Mbytes of memory and up to 8 Gbytes of mass storage. All without rewriting any software.

The BTI 8000 also features a virtual memory environment, fail-soft architecture, built-in security and privacy, and remote diagnostics. And, if

all that's not enough, consider this: the base system price for the BTI 8000 is 30% lower than that for comparable systems from other "supermini" manufacturers.

As for reliability and support, they're an established BTI tradition, thanks to more than 10 years' experience with service via remote diagnostics. BTI currently supports over 3000 systems in the U.S., Canada and the United Kingdom. For even more reasons to buy the BTI 8000, contact your nearest BTI sales office.

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COMPUTER
SYSTEMS

Corporate Offices: 870 West Maude Avenue, Sunnyvale, CA (408) 733-1122; Regional Offices: Piscataway, NJ (201) 457-0600; Palatine, IL (312) 397-9190; Atlanta, GA (404) 396-1630; Sunnyvale, CA (408) 749-0500. Sales Offices in major U.S. cities. In the United Kingdom: Birmingham (021)-477-3846.

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CIRCLE 12 ON READER CARD

LOOK AHEAD

NT READIES NEW GEAR

If software support for Northern Telecom's recently announced 503 terminal seems a bit weak, just wait a couple of months. Sources say the company is about to ink an agreement that will allow it to offer the popular CP/M-based operating system. The conversion would be a simple matter of buying the diskette and loading its program into the 503, which is one of the few terminals that can act as a personal workstation as well as emulate an IBM 3270. Future hardware additions, it is rumored, may include an 8-inch drive and later a Winchester-type drive, both plug-replaceable with the 5¼-inch unit.

MAKING THE ROUNDS

William Coombs apparently is well on his way to becoming the most traveled marketeer on the value-added network circuit. Coombs reportedly will become vp of marketing at GTE Telenet after having held the same post at the ill-fated Xerox XTEN operations. Before that, Coombs was chief of marketing at Tymnet. His first goal at Telenet will be to make the data network profitable. Internal GTE projections show red ink at Telenet until at least 1983, and Coombs will try to speed up the turnaround.

ZENITH LOOKS TO THE FUTURE

Micros may soon replace Teletype and Teletype-like terminals at the user end of timesharing services, predicts Don Moffet, who took over as president of Zenith Data Systems last April after a two-year stint as president of Sycor (the ddp firm acquired by Northern Telecom).

Meanwhile, Zenith is devoting much time and money to software development, expecting to have 65 to 70 people in its software group by year-end. Among the new products due out of this group is a souped up version of Visicalc called SuperCalc. Not forgetting the hardware side, the firm by fall will have two new disk drives -- a double density 5¼-inch diskette with 1.6 Mbytes of storage, and an 8-inch hard disk with 10 Mbytes of storage and an 8-inch floppy backup. Zenith will also offer its own matrix printer, which will run at 180 cps and cost about \$1,500.

NAS EYES ALTERNATIVES

National Advanced Systems is studying several alternative replacements for its aging San Diego-built AS Flash 5000 mainframes with which it competes against the IBM 4341, sources tell us. Options are reported to include: an in-house design perhaps developed from the erstwhile C400; the Hitachi M240, a Japanese-built 4300 competi-

LOOK AHEAD

OLIVETTI PLANS NEW GENERATION

tor which uses 64K chip technology; and IPL Systems' 4000 series already sold by CDC as Omega 480, which Intel briefly marketed in Europe in the second half of 1979 before becoming NAS. If NAS opts for the IPL range, it would probably be as part of a wider deal with Olivetti, merging their European PCM operations since Olivetti owns 30% of IPL. If the choice is the Hitachi M240, NAS would find itself sharing yet one more Hitachi system with German PCM BASF, which plans to announce the Japanese system on the European market in the third or fourth quarter.

Olivetti plans to launch its new generation of products, code-named L1, around April of next year. The range will be the first unified ddp line that completely emulates all the products of earlier generations, confides an Olivetti source. At least four different divisions developed the Italian firm's current offerings, with the resulting legacy of incompatible operating systems and software. Also in the works is a new integrated communications architecture dubbed ONE (Olivetti Network Environment), which may follow Ethernet standards but is more likely to offer higher bandwidth to allow voice handling.

GOINGS-ON AT PERKIN-ELMER

Perkin-Elmer's Data Systems group in Oceanport, N.J., is readying a new, low-end 32-bit mini to lure OEMs and systems houses that are running out of steam on 16-bit machines. Meanwhile, sources say P-E corporate has its eye out for a graphics company to acquire so that it can establish a strong foothold in CAD/CAM, one of its stated objectives.

FAT CARDS, SMART CARDS

"Telepayments with the 'smart card' were promoted in literature supporting the French PTT's first massive test of home videotex, begun last month in Velizy, a suburb of Paris. But whether or not the use of the chip-in-a-card would be part of the test (it isn't in the initial stages) is still debatable. Some officials said it wouldn't be; others said it would but would be some months down the road and limited to 300 of the 2,500 participants. Critics of the smart card continue to call it "too late" because the cards with chips have to be 0.030 inches thick -- too thick for standard credit card imprints. If the cards are tested, terminals from Thompson and "fat" cards from Honeywell-Bull are expected to be used. They're to be programmed to authorize payments to the postal giro only and will not be capable of crediting or debiting bank accounts.



It's like multiplying your CICS programming staff by ten.

TRANS IV lets you increase programming productivity ten times or more – without adding CICS programmers.

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With it, programmers can write on-line application programs interactively, without referring to CICS macros or internals.

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With our Informatics classes and learning aids, programmers are fully productive with TRANS IV within a week.

The Problem Solver. If you've got a scarcity of CICS expertise and a growing demand for on-line applications, find out the details of TRANS IV.

It's an impressive system that can help you go a long way toward maximizing your CICS investment. In a very short time.

TRANS IV is one more way Implementation Systems from Informatics help you manage human energy problems.

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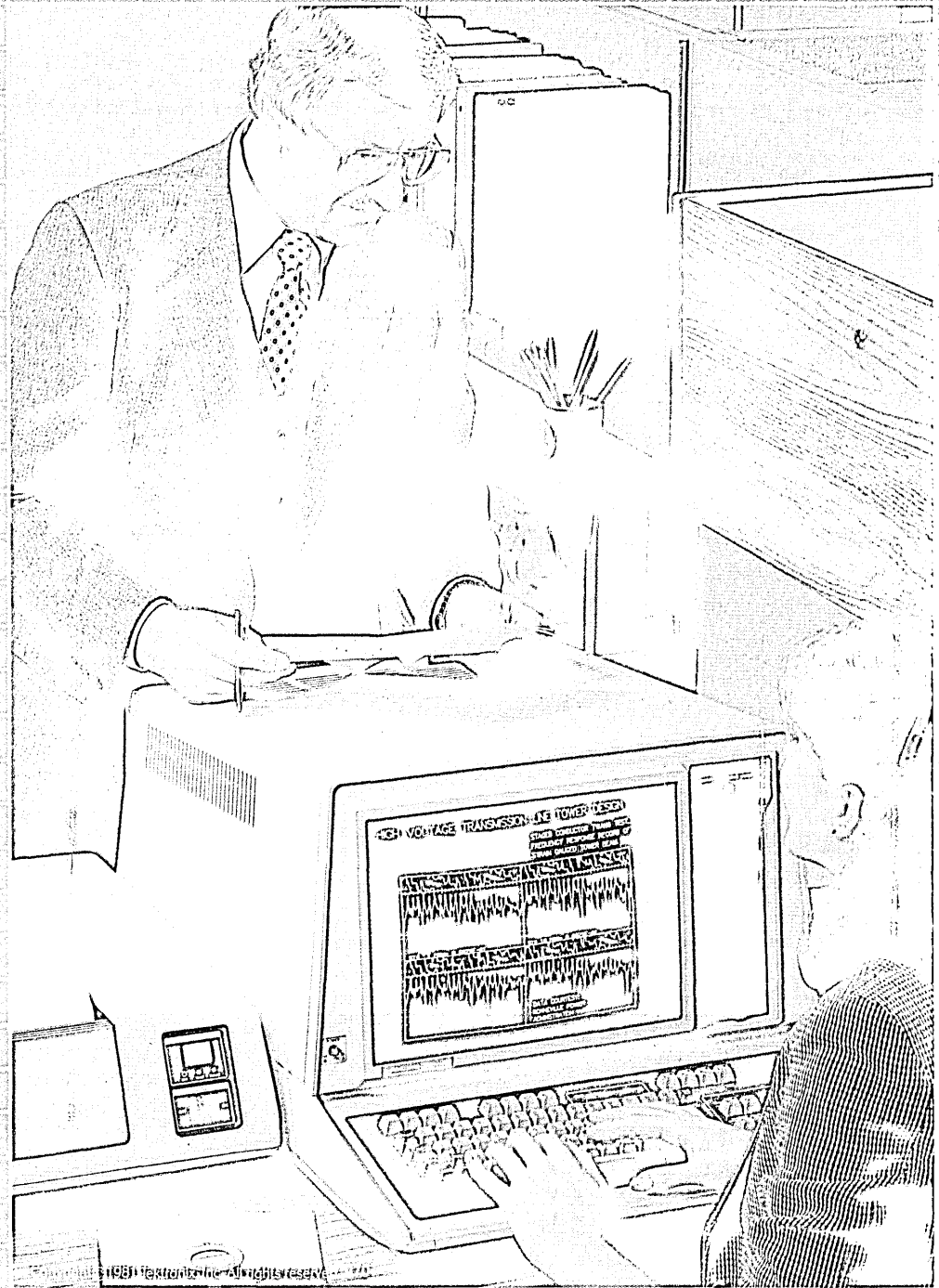
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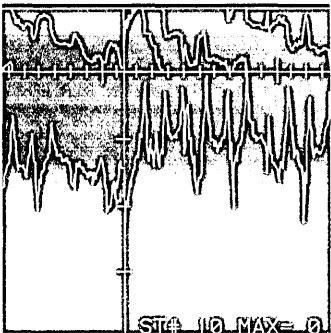
CIRCLE 13 ON READER CARD

The Information Management Company.

The Tektronix 4112 Computer Display Terminal



You can obtain from
one of our regional offices or
directly from the factory
display on the terminal
waveform and computer display
control and data entry by
positioning the cursor on the
desired data point. The
cursor can be moved
horizontally and vertically
by using the cursor keys. The
data point can be displayed



Zoom and pan. Overlays and gray scale. Retained segments and panel flooding.

What it does locally is international news.

The new 4112 not only reduces host connect charges and transmission traffic. It does things no raster terminal has ever done before. Zoom in on most other terminals, and all you see is the same information—only less of it. But with the 4112's 16 million point addressability, you can zoom in off-line to see many times more detail!

Or, pan at any magnification across the entire display. At any time, define a scrollable dialog area anywhere on screen, to keep alphanumeric commands from interfering with workspace.

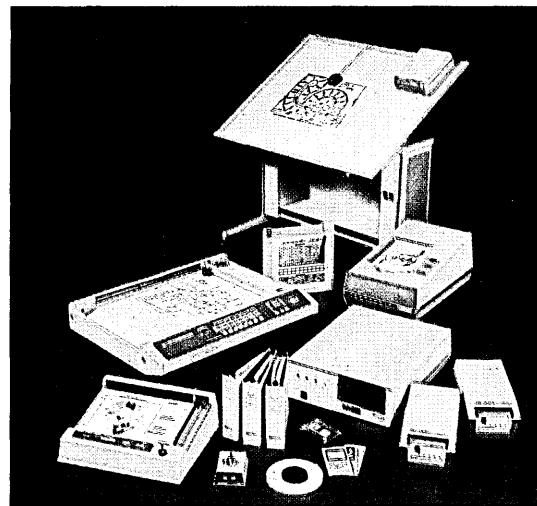
Local multiple bit plane capability is unprecedented, even by terminals under host control. You can build and store displays in as many as three layers, so you can recall the same outline, for example, for several displays. Or, you can enhance displays by

easily incorporating up to eight shades of gray!

Powerful local intelligence lets you retain picture segments, or design symbols and character sets, locally. You can create, then store and manipulate picture elements off-line. Store segments on expandable RAM or on optional integral flexible disk. Shade polygons quickly with an easy-to-use panel flooding feature.

Leave it to the graphics leader to offer the first raster terminal designed for high resolution graphics. Of course, Tektronix made the 4112 compatible with its entire family of terminals, including the new, intelligent 4114, so project teams can share software—such as the modular Tektronix Interactive Graphics Library—storage disks and peripherals, while building systems around individual needs.

Let your local Tektronix sales engineer show you the whole



story. Or call toll-free, 1-800-547-6711 (in Oregon, 1-800-452-6773) for product information or OEM quotations.

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CIRCLE 14 ON READER CARD

CALENDAR

AUGUST

National Small Computer Show, August 26-29, New York City.

Free lectures are presented daily, and this year there will be a five-hour seminar on the understanding, acquisition, and use of small computers in business. Contact National Small Computer Show, 110 Charlotte Place, Englewood Cliffs, NJ 07632, (201) 569-8542.

SEPTEMBER

Soft '81, September 2-4, London, England.

This is the third in the international Soft '81 series; each conference concentrates on the software market of the country in which it is held. Previous conferences were held in Paris and Munich, and the fourth (and last) in the series is scheduled for Stockholm in November. Contact Soft '81, Acorn Studios, Barnes, London SW13 9HP, United Kingdom, (01)748-0287.

Fifth International Conference on Computer Hardware Description Languages & Applications, September 8-9, Kaiserslautern, Germany.

Cosponsored by the ACM, IEEE, and others, this conference features discussions on Hardware Description Language issues, design methodologies and applications, CHDL in Education, and CHDL-based tools. Contact Will Sherwood, Digital Equipment Corp., 75 Reed Rd., MS HL1-1/Q05, Hudson, MA 01749, (617) 568-4316.

Compton Fall, September 14-17, Washington, D.C.

The IEEE's Computer Society has selected "Productivity—An Urgent Priority" as this year's theme. Contact Compton Fall '81, P.O. Box 639, Silver Spring, MD 20901, (301) 589-3386.

ISS '81, September 21-25, Montreal.

This is the 10th International Switching Symposium since 1957. This year, the symposium has three main themes: systems, networks, and technology. Contact General Secretariat, ISS '81, P.O. Box 56, Station "Ile des Soeurs," Verdun, Quebec, Canada H3E 1J8, (514) 761-5831.

OCTOBER

ECOMA-9, October 6-9, Copenhagen.

"Evaluation, Implementation, and Improvement of Contemporary Information Processing Systems" is the theme for this year's Ninth European Conference on Computer Measurement. Contact Scott Yasler, CDP, ECOMA-9 Conference, Scheuchzerstrasse 5, CH-8006 Zurich, 01-362-1268.

INFO '81, October 12-15, New York City.

"Increasing the Responsiveness of Information Systems" will be the theme of the Information Management Exposition and Conference. A special section will be devoted to prepackaged and customized software. Contact Clapp and Poliak, Inc., 245 Park Ave., New York, NY 10167, (212) 661-8410.

WPOE '81, October 13-15, San Jose.

This is the fourth annual Word Processing and Office/Business Equipment Trade Show and Conference featuring equipment, products, and sessions geared to the automated office. Contact Carlidge and Associates, Inc., 491 Macara Ave., Suite 1014, Sunnyvale, CA 94086, (408) 245-6870.

Systems '81, October 19-23, Munich.

Both the conference and exhibition at Systems '81 will strongly emphasize telecommunications. "Thinking in Systems" is the theme. Contact Kallman Associates, 30 Journal Sq., Jersey City, NJ 07306, (201) 653-3304.

CAD/CAM Graphics Users Expo, October 27-30, Fort Worth, Texas.

The expo is held in conjunction with Computer Aided Manufacturing-International, Inc.'s 10th annual meeting. The conference will focus on various graphics systems' capabilities relative to manufacturing users' needs. Contact CAM-I, Suite 1107, 611 Ryan Plaza Dr., Arlington, TX 76011, (817) 265-5329.

NOVEMBER

Federal Office Automation Conference, November 3-5, Washington.

The conference program provides coverage of issues including management, applications, technology, equipment, and systems and services. Contact Federal Office Institute, P.O. Box E, Wayland, MA 01778, (617) 358-5119.

ACM '81, November 8-11, Los Angeles.

Exhibits, tutorials, workshops, panels, plus a number of special events will be part of this year's ACM. Contact ACM '81, P.O. Box 24059, Village Station, Los Angeles, CA 90024, (213) 536-9735.

Western Educational Computer Conference, November 19-20, San Francisco.

Sponsored by the California Educational Computing Consortium, this is the CECC's fifth year. Contact Ron Langley, Director, Data Processing Services, California State University—Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840, (213) 498-4111.

One of the most important things to remember when you are using the C-100 is to be sure you are using the correct amount of power. If you are using too much power, the system will be damaged. If you are using too little power, the system will not work properly.

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C-100
ELECTRONICS, INC.
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Big. Better. Best. The Prime 50 Series includes the Prime 250-II, 550-II, 750, and the new Prime 850. The Series is so flexible, it can handle virtually any application you have. And so powerful, it can meet your most demanding needs.

If you're in a start-up mode, the perfect way to begin building your system is with the Prime 250-II. If you need more power, you'll find the solution in the Prime 850-II or the Prime 750. And if you're looking for maximum performance, the Prime 850 is the most powerful mini available today.

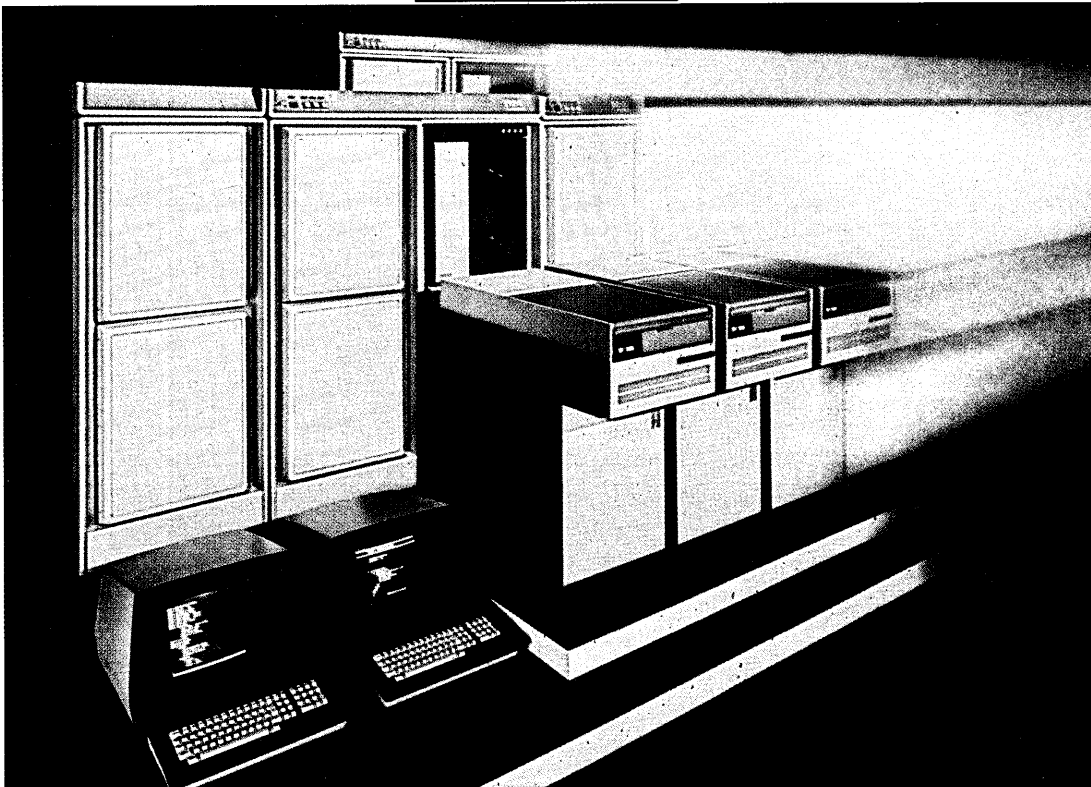
You should know too that any 50 Series system can be networked with any other. They can also communicate directly with mainframes. And all Prime systems support a broad band of industry-standard languages.

The economy of compatibility. The Prime 50 Series is designed around a single operating system, which makes all systems compatible with each other. So you can easily and economically move up to a larger system, or expand to any number of small, remote systems. And you'll have nothing new to learn because the same software goes with you.

A spectrum of solutions. The 50 Series was designed to provide a broad spectrum of solutions for just about any application you might have, including manufacturing, financial, education, utilities, engineering, energy, automated office, you name it.

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LETTERS

BASIC PRECEPTS

Re: "Watch Your Language" (May, p. 211), I should like to make readers aware of some developments in BASIC that bear on the problems mentioned.

The BASIC standards committee (ANSI X3J2) is nearing completion of a standard for a powerful version of the language. While I readily agree that Minimal BASIC (ANSI X3.60-1978) would not be much use if one wanted to "control anything," the new standard will have an optional module just for real-time applications. Other optional modules include graphics, editing, and enhanced file access.

Within the standard itself will be found the synthetic elements necessary to support a broad variety of applications with maximum user simplicity, while encouraging good programming practices. Included among these constructs are named subprograms, powerful control structures such as DO WHILE and DO UNTIL, and tail comments.

It is anticipated that the new BASIC standard will be available through CBEMA for public comment sometime in 1982.

DAVID S. MARTIN
(Member, ANSI X3J2)
Computer Coordinator
Jericho Public Schools
Jericho, New York

LOOK BEFORE ...

Re: Letters (May, p. 26), Eugene D. Goddess unfortunately got his rules reversed for leap years at the end of centuries. Quoting from the 1960 edition of *Webster's New Collegiate Dictionary*, "Every year exactly divisible by 4 is a leap year, except the years at the end of a century, which are leap years only when exactly divisible by 400."

Thus the year 2000 will be a leap year, while 1900 was not and 2100 will not be. Since very little software written today promises to be in use more than a century hence, the usual test of dividing by four seems adequate for most programs.

SAMUEL P. HOYLE
Systems Analyst
College of William and Mary
Williamsburg, Virginia

... The true solar year according to the modern astronomers is on the average

365.24220 days long. The average length of a year in the Gregorian calendar is 365.24250 days, and in Mr. Goddess' calendar it is 365.24750 days.

MARK PIVOVONSKY
Yorktown Heights, New York

... I wonder how many "time bugs" Mr. Goddess has "ticking away" in programs just waiting to appear in the year 2000?

ALLEN H. BRADY
University of Nevada
Reno, Nevada

... Our thanks also to the 68 others who wrote us on this point.—Ed.

A BETTER WAY

Re: "The Toll of Turnover" (April, p. 208), "... there's simply got to be a better way," says Merrill Cherlin, leaving readers hanging on a limb, panting to know what that better way might be.

I have presented that better way in several articles, somewhat as the harangues in Hyde Park or MacArthur Park in Los Angeles do. Listeners may stop but no one

much cares about reducing turnover.

Much as I hate to contradict a fellow writer, the fact is that study after study has shown that in terms of job satisfaction, money is way down on the list. First is the feeling of being a member of the team. For anyone earning more than \$15,000 a year, money becomes a status symbol. Why else does a tv star demand \$250,000 a week rather than her lousy \$20,000 a week? No matter how good a tax expert she has, Uncle Sam is going to get most of the increase.

In Japan, changing from one company to another is almost unheard of. In Germany, an upward mobile type might change twice or even three times during his career. In the U.S., three years on the same job is tantamount to decay.

And, of course, the employee leaving is not about to reveal his real reasons for leaving. He's given a short exit interview; he gives a bored clerk a euphemism to cover his real reason, and that's that. No one ever bothers to wait a few weeks, then invite the person to dinner and, over a few shots of bourbon and branch water, pump him for his real reason.



"True, Murchison, my door is always open ... but only for air circulation."

©DATAMATION

LETTERS

"What good will that do?" managers ask. "The guy has already left."

It won't do any good in any individual case, but over a period of time such a program would uncover the real reasons for the turnover of valued employees.

As every management consultant knows, having access to information doesn't necessarily mean it will be acted on. If a management style is to treat employees as if they are greedy, grasping dogs, no amount of information is likely to change the basic attitudes. The manager who is truly concerned can act on information to

make the working environment more conducive to longevity.

In a high technology environment, no one can guarantee an employee a long term. Nor is there any use kidding employees. They know when their employer is running into heavy weather.

But what can be fostered is a morale that makes the employee think of himself as more than an employee. He's in a game and by gosh and golly the point is to win. "If the ship must go down, I'll go down with it, but it won't be my fault."

It has been done; it is being done; but

the company experiencing higher than normal turnover is usually headed by executives who don't believe it can be done. There are still more than enough executives who sincerely believe that what the corporation does is no business of the underlings who fetch, tote, and carry.

Yes, Mr. Executive, there is a better way.

BOB LUNCH
Oxnard, California

Cherlin calculates that the hidden and visible costs of turnover are \$10,000 per person. She concludes, "When turnover reaches 25% to 35% productivity suffers so critically, there's simply got to be a better way." The cost may be way over \$10,000, but some of the "costs" listed in the article are imaginary.

Suppose a company accepts \$10,000 as the cost of turnover. It could try to reduce turnover from 30% to 10% by spending the anticipated savings to hold onto its employees. Unfortunately, the savings only come to \$3,000 per employee. Is that enough expenditure to solve a high turnover problem? Suppose that money went to employees in the form of bonuses, and none of it was used to solve the people-management problems that are usually present where there is high turnover. Would turnover drop to 10%? I doubt it.

Faced with these figures, a company would surely opt to live with turnover. Only by including the hidden costs of lost productivity, and unpredictable work schedules, can we arrive at a cost figure that might justify some action. Cherlin identifies lost productivity as a severe problem, but doesn't attempt to cost it out. The increased uncertainty of scheduling is not addressed at all.

Consider a really serious (and not uncommon) case, where a 20-person project slips six months because of the resignation of four people. After we count the wages and overhead of the other 16 people for six months, we can consider the effect of putting the sales force on hold waiting for the product, or the jolt caused to a large segment of the company by the failure of these people to start their next projects on time. In this type of case, is cost (we haven't counted the missed opportunities yet) \$250,000? \$5 million?

Some of the "turnover costs" listed by Cherlin come out of the Dark Ages. Anyone who seriously tries to control these "costs" will greatly accentuate his company's turnover:

1. When you replace someone from the inside, you shuffle not one, but many people, as each fills the job left by another. Cherlin mentions "the costs of shuffling a lot of people around," but this is really the cost of promoting people to positions of greater responsibility. Good promotions make people more valuable to the company

CASSSCAN

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When it comes to terminal glare on your IBM systems, Cass Marketing has the solution!

Cass Marketing has developed two products especially for you, the IBM system user. T.G. Shades, which easily attach to your IBM terminals to eliminate reflective glare and T.G. Solution, a special cleaner for your T.G. Shades, your 3278 terminal, or any terminal.

T.G. (terminal glare) Solution

T.G. Solution is a specially formulated cleaner for the optical coating on all T.G. Shades and all 3278 terminals. Unlike standard glass cleaners, T.G. Solution is made to withstand the heated surface of the screen so it cleans without streaking and leaves no residue.

T.G. Shades

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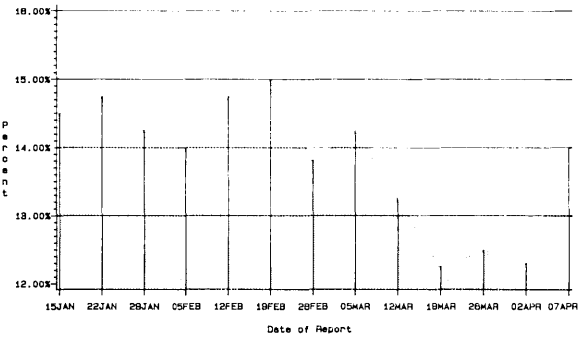
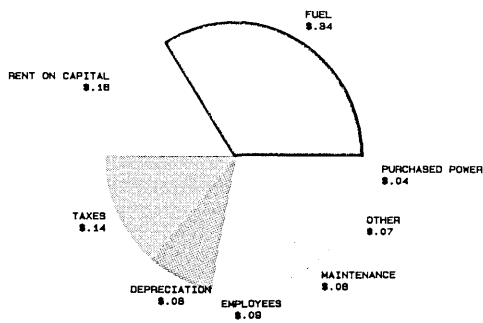


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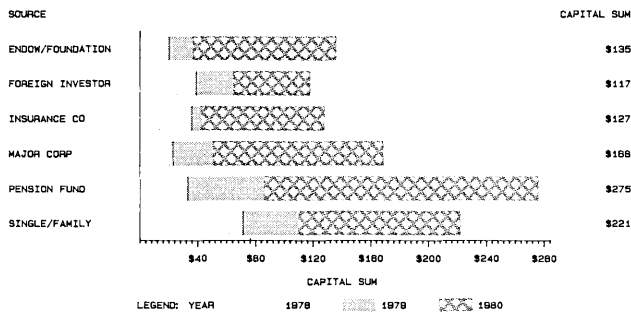
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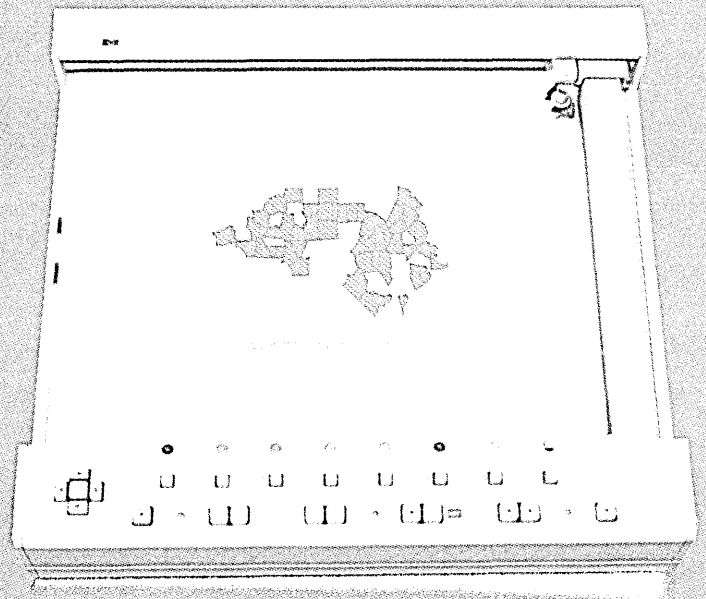


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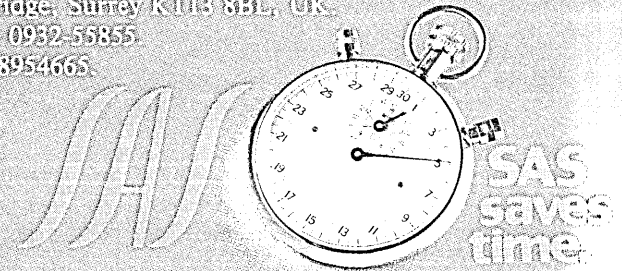
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Images produced by SAS/GRAPH on the Hewlett-Packard 7221C dithered plotter. For information on the HP 7221, contact Bill Fuhrer, Hewlett-Packard, 16399 West Bernardo Drive, San Diego, CA 92127. Phone 714/487-4100.



LETTERS

and increase productivity. No one seriously tries to save company money by keeping everyone in his current job. The correct cost to mention here was the cost of moving people around on an emergency, rather than planned, schedule.

2. As part of the cost of training people, Cherlin notes "the flowcharts are out of date but . . . he's got to learn it all." Obviously documentation should have been up-to-date. That it is not is a problem separable from staff turnover. Updating documentation, letting the new person ask basic questions of the old hands who have not

looked at their own environment from the outside, are benefits, not costs.

3. Cherlin is concerned about the time people spend talking to the person who is leaving, both before and after he changes jobs, about purely personal matters. The idea here seems to be that if nobody were quitting, the personal conversation time would have been spent on work. But in any productive work environment, some personal conversation among employees is expected and even encouraged. It's most likely that employees are just spending their usual budget of personal conversation time

on the topic of the departing employee. When turnover reaches 30%, it's hard to see how each new departure excites a great deal of interest.

TOBIAS D. ROBISON
Princeton, New Jersey

THANK YOU

Re: "The Top 100" (June, p. 91), my compliments to you and to Peter Wright for the excellent article and compilation. It's one of the best in breadth, clarity, and accessibility.

JOSH S. WESTON
Automatic Data Processing, Inc.
Clifton, New Jersey

CORRECTIONS

Re: "Getting Too Old to Fly" (News in Perspective, May, p. 58), the article states, "When IBM stopped making replacement parts for the 360, the FAA bought the remaining inventory, hardly an auspicious omen for those awaiting the next generation."

This statement is incorrect. IBM continues to supply spare parts to the FAA and other S/360 users.

DANIEL E. UDELL
Manager of External Information
Federal Systems Division
IBM Corporation
Bethesda, Maryland

Re: "The Top 100" (June, p. 91), we were very pleased to find Applicon in the list this year.

While the information in the writeup was compiled with a great deal of accuracy and technical competence, there was one error. A fully configured Applicon system is \$300,000, not \$3 million as stated in the article; an innocent oversight, but very embarrassing for Applicon.

STUART NEWMAN
Manager, Advertising & Promotion
Applicon Inc.
Burlington, Massachusetts

The following table was omitted from the article "Changing Patterns of Competition," by Frederic G. Withington (June, p. 82).

TABLE I

RECENT COMBINATIONS OF PUBLISHERS WITH NETWORK SERVICE FIRMS

Reader's Digest - The Source
Macmillan - American Broadcasting Co.
Dun & Bradstreet - National CSS
MCA - IBM
McGraw-Hill - DRI
TIME - American Television & Communications

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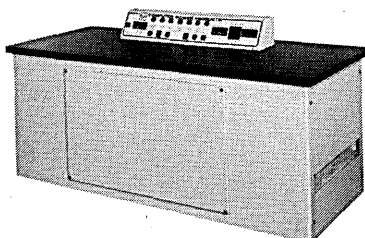
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	Isolation	Regulation		
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Undervoltages	0%	95%	100%	99%
Overvoltages	0%	95%	100%	99%
Transients-common	30%	0%	100%	100%
Transients-normal	80%	0%	100%	100%
Sags and surges	0%	95%	100%	100%
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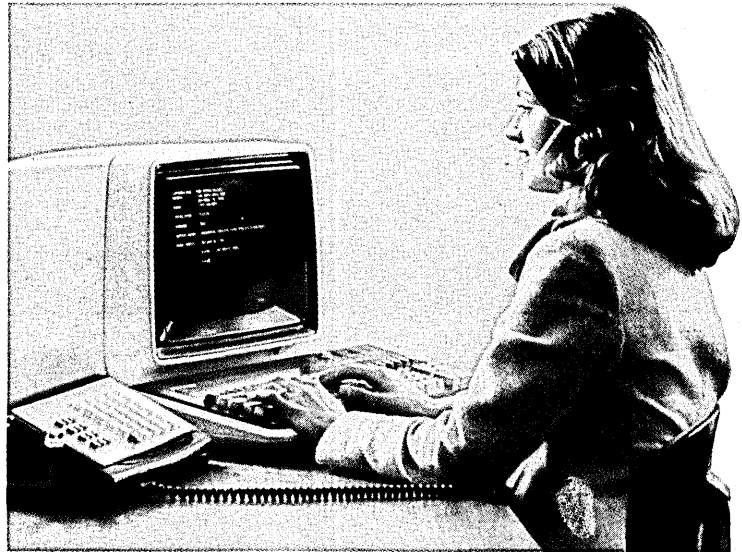
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INFOCUS

CHANGING THE SHAPE OF WORK

There's no pell-mell rush; companies are finding out what works, and putting it in place at a measured pace.

"The Office of the Future." Leaving aside any unintended associations with Spacely Space Sprockets, where George Jetson was employed, it sounds like a grand place. But how do you get there from here? And is there any chance that OOF will turn out to be, like Jetson's perpetually malfunctioning automatic chair, simply a more expensive and more complex way of spilling coffee?

John Connell's answer to the latter question is no, not if we proceed sensibly. As to the former, well, he's working on it. Connell is director of the Office Technology Research Group in Pasadena, Calif., an association of corporate managers who meet regularly to discuss their ongoing work in office automation. Many of the country's largest companies are represented. Whence comes their interest? Most obviously, there is the widely felt thirst for the beverage of the '80s—productivity tonic. Connell also allows that there's some faddism involved: people want to be on the leading edge, which (not incidentally) tends to cut new career paths. This is something we've seen before, says Connell, and it's not necessarily bad: "The desire to be first on the block,

first on the new order list, is part of the reason for the dp industry's growth."

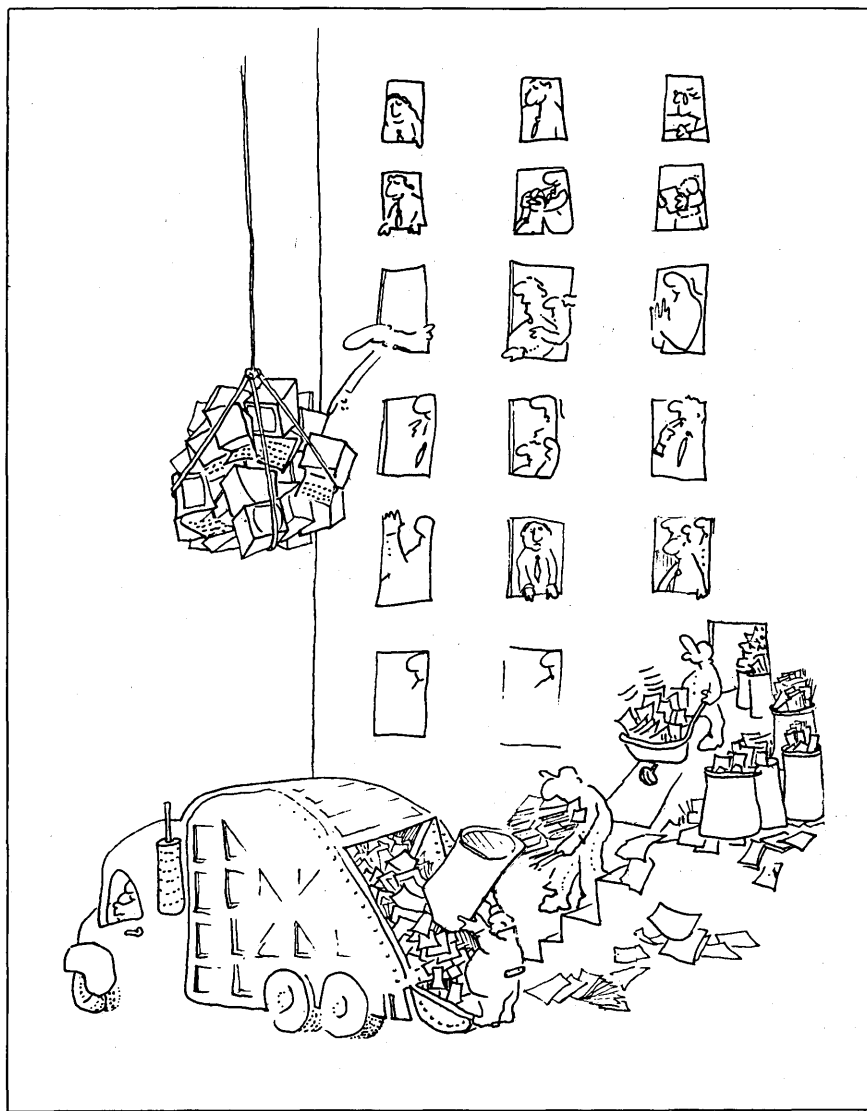
Another motivation for companies to make plans stems from the technology itself, which as everyone knows is getting cheaper. You can acquire a minicomputer and a couple of terminals for \$50,000, says Connell, and that means you don't have to go too high in the corporate hierarchy for approval to buy. Various brands of productivity tonic are already being imbibed in many different corporate departments, and top managers are becoming aware that, without some planning and controls, they're liable to wake up in a couple of years with technological hangovers.

More and more companies, therefore, employ someone with a title like "director of advanced office systems." Typically, says Connell, this is the leader of a group with a charter to discover, by means of pilot projects and studies, "how real it is. Management wants to know what it's letting itself in for." No visionary vendors, please; if office automation bosses have one eye on the horizon, the other's on the bottom line. Theirs is the art of the possible, and DATAMATION thought it might be interesting to find out what the possibilities look like from a couple of different corporate perspectives.

At Hercules, the \$2.5 billion, Wilmington, Del., based chemical company, the director of advanced office systems is R. L. Nurenberg, the company's former MIS director. Together with B.J. Kocher, technology manager of advanced office systems, he directs a group of 10 people whose goal is to "improve office productivity at Hercules by 20% over the next 10 years." Nurenberg has been working on automating his company's offices since August 1978, when he began potential studies. A few



ILLUSTRATION BY BRUCE CAYARD



months after that, management okayed a full-time group, and Kocher and others came on board.

Word processing was the first step at Hercules. Wp had been in place for a while in a few "isolated pockets," says Nurenberg, but it wasn't until 1979 that he began systematically introducing Wang shared logic systems. "We've tried to put the machines in place with as little dislocation as

People like to be on the leading edge, which tends to cut new career paths.

possible," he says. Hercules does have some wp pools, but Nurenberg believes in "putting the machine on the secretary's desk and not disturbing the relationship between secretary and principal." The logic is that, if a secretary's workload is lightened, the boss is able to offload some mundane tasks and spend that much more time on the pursuits the company pays him for.

Each shared logic system has about 30 workstations, divided among secretaries and principals. The president's secretary

has a terminal, as do secretaries of executives and vice presidents. Besides word processing the system is used for itineraries, calendars, determining conference room availability, and like chores. Wang terminals also support an electronic mail system between Wilmington and Atlanta, with other locations to be added soon. Hercules uses Wang's Mailway software, with some added features.

Hercules has a voice message system from Electronic Communications Systems, which takes and delivers phone messages for about 1,100 users. The company is following a five-year communications and networking plan, and in March 1982 plans to install the first three of 15 SBS earth stations, in Utah, Delaware, and Georgia.

Nurenberg reports good results with videoconferencing. Already functional are eight of 25 rooms planned for 20 locations, and the whole system is scheduled for completion early in 1982. Video equipment is freeze frame, made by Nippon Electric. Says Nurenberg: "We use it for a wide spectrum of meetings—use of slides and flipcharts enhances a presentation consider-

ably. It's still in its early stages, but it has been pretty well received."

At Control Data, by contrast, videoconferencing has not been a rousing success. CDC has two functional conference rooms in Minneapolis and Sunnyvale. Freeze frame and slow scan techniques are used, and this may be part of the problem. "Some of the engineers find it useful," says Ronald Manning, "but other people say the freeze frame is distracting."

Manning is general manager of office technologies for Control Data. A 25-year dp veteran, he has been concentrating on office technologies for the last two years. About 15 months ago, he says, the inhabitants of CDC's three-man corporate executive office decided that some companywide coordination for office automation was needed. The office technologies group was founded, and Manning was put in charge. CDC likes to think of itself as a people-pleasing company, and one of the aims of OA

The changing demographics of the work force will result in more managerial workstations in the future.

there, according to Manning, is to improve the quality of work life. Not incidentally, though, the company hopes to save a few dollars along the way.

If videoconferencing has disappointed, audio conferencing is another matter. There are 28 locations so far—most have been in use for a year or more—and Manning hopes to double that number within a year and a half. A corporate edict to cut down on travel is helping the project along. Audio equipment is Darome. Manning says it works well for informal conferences because it brings about a certain amount of regimentation. Participants must be well prepared, must take turns talking, and must be aware of the time they're using.

CDC has been using word processors for about seven years. Equipment is mostly Wang, and the traffic department uses Wangs for shipping and receiving. Wp devices are also doing duty in a project called Central Files, a document storage and retrieval system. Central Files currently serves 7% of the corporate staff, including all of the company's top executives. CDC's legal, personnel, and facilities departments also use the system. Data are stored both electronically and on microfiche, and individual operators can use floppy disks for personal storage.

Electronic mail exists in several forms at CDC. Says Manning, "We have no corporate standard yet on the direction we'll take; we're evaluating it now, in part by looking at what we're already doing." One of the things they're already doing involves the messaging capabilities of a large DBMS, based on CDC's Cyber 170 series. This keyword search information retrieval sys-

IN FOCUS

tem comprises 60 databases, 20 of which are used for a kind of electronic mail, serving 2,500 people. Messages can be sent and received from remote locations via CDC's worldwide data services network. Manning says employees also take advantage of the "good messaging capability" of the company's PLATO computer-based education terminals.

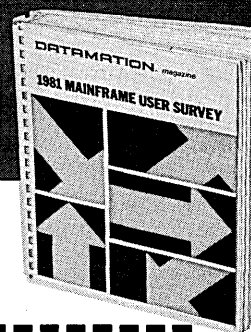
Bob Dickinson, manager of office systems technology for Exxon, the oil company, divides his time between a 45th floor office in Rockefeller Center and another workplace in Florham Park, N.J. The Manhattan office has no terminal, but the one in Jersey, he is quick to explain, does. Dickinson's background is nontechnical—"general business, with emphasis on finance and controls." He was working in MIS in 1975 when he started to see studies on OA and was "struck by the promise of the new technologies." He sponsored a survey of office needs at Exxon, and concluded that the company needed a focus. Management endorsed the idea, and the result was a full-time team consisting, at first, of Dickinson and an analyst.

Dickinson has a staff of 23, half of them with advanced degrees, and he believes that's probably the largest corporate OA staff around. Worldwide, Exxon has about 80 people working on office automation. Dickinson's group is a subunit of the



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department of communications and computer science; he and his people serve as consultants to regional communications, computer services, and administrative services managers. Funding comes both from the corporate coffers and from billings to the divisions the group serves.

Giant Exxon has 13 regional operating organizations, and each functions with a fair degree of autonomy. There are over a dozen major data centers that use mostly IBM equipment. Comten and other front-ends are used for data communications, which consist primarily of financial reporting and accounting. Exxon also boasts about 1,800 minicomputer systems worldwide.

To this pile of chips add 1,800 office system terminals, and you begin to get an idea of the scope of office automation at Exxon. About 20 kinds of terminals, including Vydec, Wang, and Datapoint, are used, primarily by secretaries and wp operators. IBM 3270 terminals offer remote access to mainframes. The office system terminals handle electronic messaging via a corporate message switching system; Telesystems protocol converters allow Vydecs to talk to Wangs. For a parallel electronic mail service, Exxon uses Computer Corp. of America's Comet service, via Telenet; 15 locations are served worldwide.

Exxon began introducing word

processing in 1974. It did this by simply going into typing pools and replacing typewriters with Vydecs. One problem with this technique, says Dickinson, is that these wp operators are specialists who do only that and consequently do not understand the needs of the division as well as workers more integrated into the operation. The emphasis these days is on giving the terminals to secretaries who can use them not only for wp but also for electronic mail and time-sharing.

Dickinson believes that the changing demographics of the work force will

Office automation bosses have one eye on the horizon and the other on the bottom line.

result in more managerial workstations in the future. Younger managers will be more familiar with the concepts, and as the devices spread a sort of bandwagon effect will take hold. A prerequisite for this is a convenient interface for the nontechnical user, and in this regard Dickinson says he is impressed with the Xerox approach.

Part of Dickinson's consulting service to regional managers is a list of preferred vendors. Various Exxon Enterprises products appear on the list and are expected to compete on an equal basis. If there's a tie, though, the Exxon product gets the nod. In

addition, Exxon divisions assist the Exxon Enterprises unit with information concerning new geographical markets, and with periodic discussions of user needs and perceptions. They also occasionally serve as guinea pigs for new products.

Probably the most advanced office system in the country, and also one of the best known, is that of Continental Bank in Chicago. The project is the brainchild of Louis Mertes, Continental's vice president and general manager of systems. He has responsibility for evaluating and recommending all office equipment in use at the bank, from typewriters and copiers to mainframes and voice and datacom systems. His office *looks* like the work place—one of the chief workplaces is actually a better way of putting it—of a man who believes in office automation. There is no desk. On a coffee table is a trapdoor from which emerges a terminal; another screen, for videoconferencing, is on the right.

Office automation at Continental, explains Mertes, got going in 1977 with a document that analyzed "the questions of centralization, decentralization, and minis. We had to sort out our philosophy." That philosophy is best summed up by Continental's decision to develop a central library, which Mertes described in a *Harvard Business Review* article as "a computerized stronghold of virtually every byte of infor-

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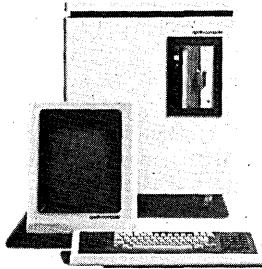
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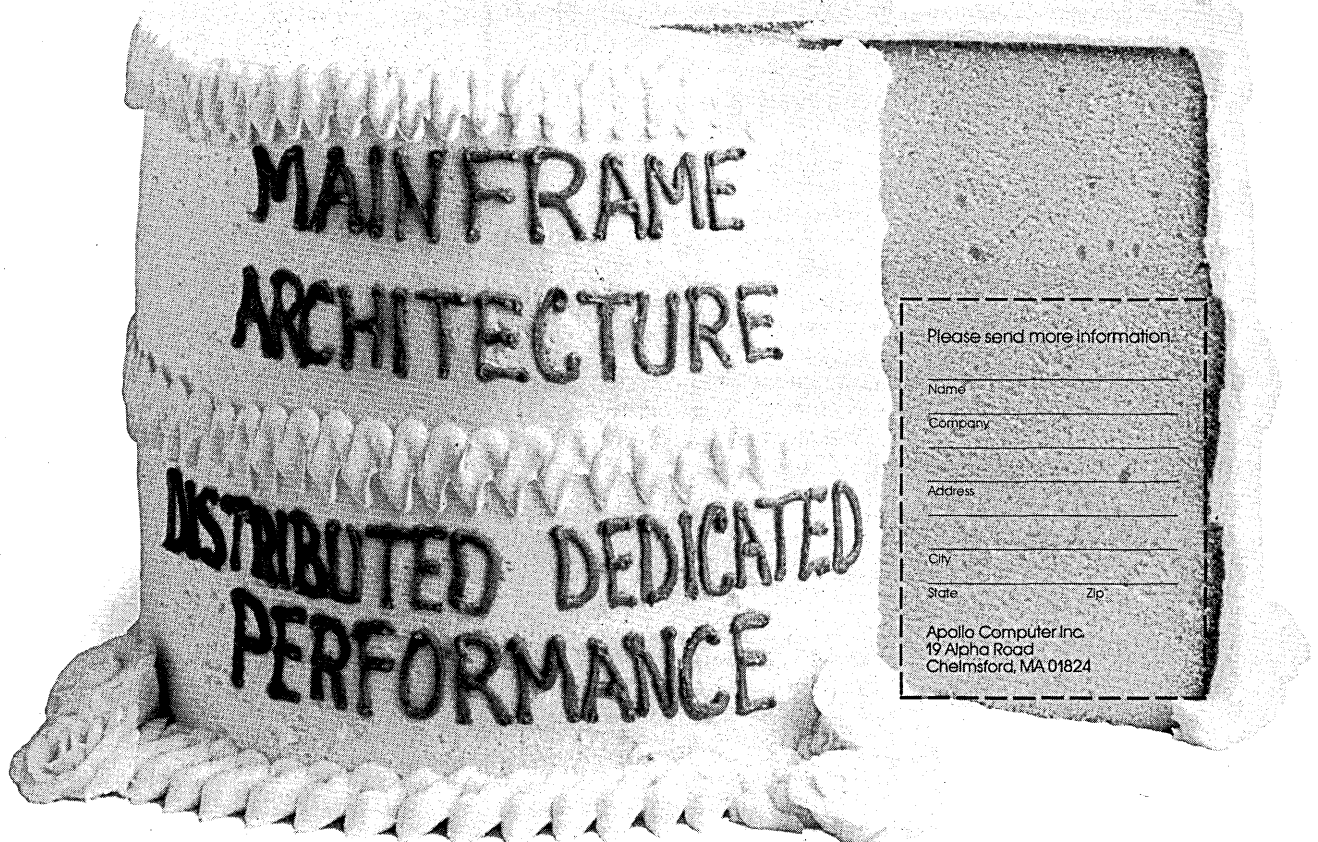
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IN FOCUS

information that had been captured and stored."

Continental's central computer system consists of IBM and Amdahl equipment; the office system uses a dial-up network with inexpensive terminals. Says Mertes: "Cheap is good because you want to put terminals everywhere. The executive workstation is not a good idea because it costs too much. We wanted a terminal that ideally could access verbal, text, and quantifiable data. Through levels of authorization, we have adequate security for the central library."

Continental employees make use of word processing and remote dictation, electronic mail, audio mail, and an "instantaneous retrieval information service" better known as IRIS. "The idea," says Mertes, "is to make managers location-independent."

Of Continental's 12,800 employees, 3,500 use electronic mail and IRIS, both of which are based on the central library concept. The latter service has proved quite a boon; loan officers, for example, can use it to review 40 days of activity in a customer's account.

Mertes believes in using technology that's immediately available. That's why one of his earlier projects consisted of simply giving executives conventional telephone answering devices. Mertes is not interested in "technology on the fringe of quality. We will not hinge our progress on the developmental progress of some ven-

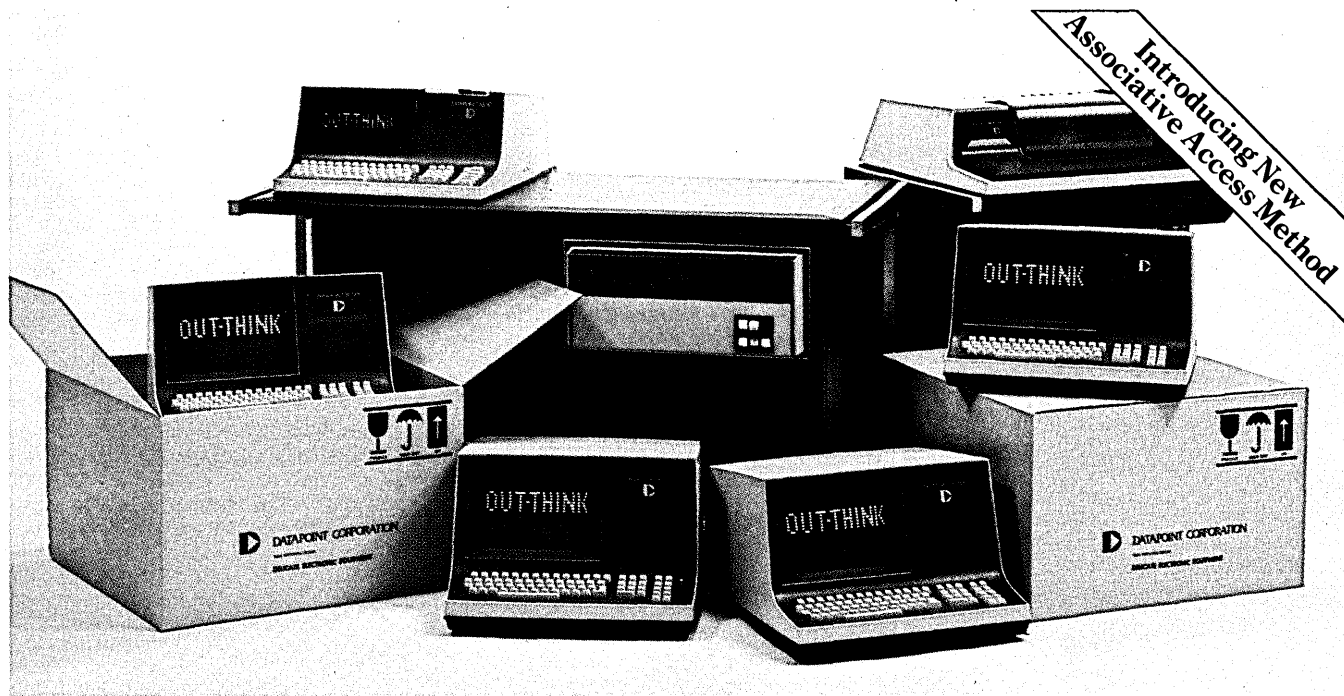
Some people, of course, are not quite so eager to throw their desks out the window.

dor. We will, however, use the most optimal technology as soon as it's available."

As workers become accustomed to doing things in new ways, they start to come up with further refinements. After all, they know their own jobs best. "The technology is ready," says Mertes, "and now the issue is the quality of work life. I want to move to deskless offices, take away all the old props. Best of all is a terminal in an attache case—you have the entire office with you all the time. You need no specific place to work. Why would I need an office?"

Some people, of course, aren't quite so eager to throw their desks out the window. As Mertes points out in his HBR piece, some managers will feel uncomfortable if they can't look out the door and see people laboring over assigned tasks. There are other possibilities, too, such as electronic junk mail: if it's no extra trouble to send a memo to 50 people rather than 11, why not let everyone know you've been working hard? As John Connell puts it, "What you come back to every time you start dealing with technology in the office is that the real problems are behavioral, not technological."

—Ken Klee, with Deborah Sojka and Wendy Crisp



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NEWS

IN PERSPECTIVE

DISTRIBUTED PROCESSING

HYDRA VERSUS KANGAROO

A battle between Hydra and Kangaroo appears to be shaping up as IBM and newcomer Spartacus Computers ready their respective shots at the ddp market.

No longer will the 8100 serve as IBM's first line of attack in distributed processing markets, informed sources claim.

Instead, they reveal, the company will shortly announce a revolutionary new approach to distributed machines known within IBM as "the Hydra" and based on the 4300 processor.

The Hydra features are expected to be offered with a new release of the company's VM/370 operating system and with associated microcode enhancements to 4300 machines, sources explain.

The software would make it possible for IBM customers to run their 4300s completely unattended at remote sites. The Hydra 4300s, known as "drones," would be able to power themselves on and off, and monitor and supervise their local environments.

All program loading, systems programming, and maintenance could be car-

IBM's Hydra could herald the dawn of a new era of "people-less" computers.

ried out remotely by a 370 (and later, H Series) host at the central site, say insiders. With Hydra working at optimum levels, there would be no need for human intervention at the user site—except for someone to replace the printing paper periodically.

While Hydra would represent a major strategic shift in IBM's approach to the distributed processing market—from an intelligent controller (the 8100) to a remote processor—the move also could herald the dawn of a new era of "people-less" computers, sources emphasize.

The potential sale of large volumes of remote 4300s also opens up one other major possibility for IBM. According to one well-placed source, the company is hatching a plan to use Hydra/VM software as the basis for service bureau and facilities management offerings.

Because of the Hydra host's ability to program, upgrade, and maintain remote

operatorless 4300s, IBM could run a customer's whole dp business for him at his own site—without sending its own people there, said the source.

Insiders say that Hydra, which was developed at IBM's Cambridge Scientific Center, has already slipped a June announcement date and may even slip again because of continuing problems with backup and recovery facilities.

Against the hoopla that IBM would generate if a September announcement does come, the birth of tiny Spartacus Computers in Burlington, Mass., would normally pass unnoticed—but for one thing. Its founder, George McQuilken, was the man who came up with the idea of Hydra and, as project leader of the development team, developed the concept for IBM. This past January, he struck out on his own.

Now McQuilken intends to do battle with his former employer by offering his own distributed machine, the "Kangaroo" or K102. In an unprecedented move by a "PCM," McQuilken will not only design and build the hardware, but he'll also create a new operating system so that the "Hydra" features can run on a small \$30,000 mini.

"That's why Spartacus should be known as an alternative vendor rather than a PCM," McQuilken explained.

McQuilken pointed out that other PCMs such as Amdahl and Nixdorf were working towards their own operating systems. "But so far they have used IBM's," he notes.

"IBM's users want all the modern features," argued McQuilken. "They want VLSI, Winchester disks, and powerful *small* computers at low cost. And they don't want to be denied the benefits of miniaturization."

Like other influential engineers at IBM's Cambridge Scientific Center, McQuilken has long been an advocate of the VM/370 operating system the center designed. But he pointed out that many of the functions that IBM had added to optimize VM at a higher level were irrelevant to the needs of small users.

"With a requirement of up to 100K of disk and in excess of one-quarter megabyte of real memory, you can't even put VM on small computers," McQuilken said.

"What users really need is a virtual machine operating system that will run on a \$30,000 "drone" rather than a \$150,000 "drone" (i.e., a 4300).

"This is what Spartacus will give them to use in Hydra networks," he added.

Fighting words. What's more, his timetable calls for first shipments late next year. According to one expert who has made a detailed study of the area, McQuilken's reasoning is sound—at least over the short term. Says Yankee Group's Dale Kutnick, "For the next couple of years, VM will become more bloated as IBM adds Hydra-like functions, and memory requirements



ILLUSTRATION BY RON LOGAN

will soar.”

As they do, IBM's VM users, who in any case are more aggressive and less conservative than users of the company's other operating systems, could flock to Spartacus and open a new window on the market, Kutnick contended.

“But the price of memory is falling so rapidly that after a while it won't matter how much of it you need for VM,” he added. “All it means is that IBM's customers will pay a high price now for ease of use later.”

For most of its four-year development at the Cambridge Center, Hydra has been rumored to be a counterstrategic ploy by IBM—another, though lesser, option in case the 8100 wasn't to everybody's liking.

Insiders say that IBM knew prior to the release of the 8100 that it must get into the distributed processing business. But how should it go about doing it? Smaller 370s? Distributed minis? Minis lashed together?

What eventually won out, say sources, was a proposal from IBM's Systems Communications Division for an intelligent controller, rather than a standard processor. And instead of the traditional 370 processor operating systems, the 8100 was given a totally different operating system requiring extra programming costs.

While the 8100 became IBM's front line of attack, the ever-cautious strategists

at Big Blue also decided that the company should look for a way to distribute machines while retaining the 370 architecture, said one well-placed observer.

As a result, McQuilken's many-headed Hydra concept was adopted, and the Cambridge development was funded as a “second string” to the 8100.

Like VM before it, Hydra could only look forward, it seemed, to a soft sell from IBM, with a little help from a small but devoted band of IBM users who discovered it for themselves.

Things might have remained that

Though IBM is aggressively marketing the 4300s under the DOS/VS operating systems, users are increasingly buying them for VS use.

way but for one thing: the 8100 has not met with the success IBM envisioned. According to Yankee Group estimates, IBM will ship some 5,000 of the controllers worldwide this year—a sizable volume but only about half the number it had hoped to place.

“IBM will probably tell you that they are meeting their estimates. But they keep lowering them,” claimed Kutnick.

Rumors persist that IBM is cutting back on its 8100 development staff—originally the company used some 400 program-

mers on the machine, says one source—and that the remaining staff spends more time in the field correcting software faults than working on new developments.

Kutnick says that what IBM's users need today is a true remote processor, *not* a controller. “[Users] can't control spiraling communications costs and personnel costs, so they're looking to do more remote processing and send fewer messages down the line to central hosts.”

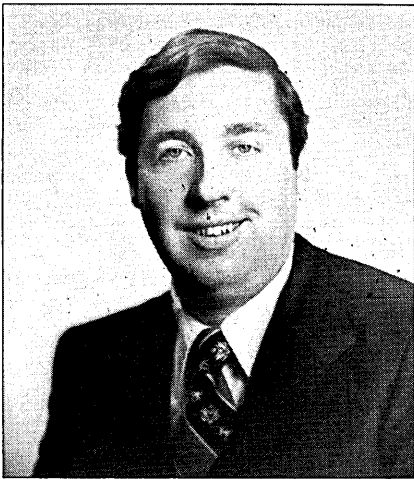
He said that in addition, IBM's 8100 users also face an uncertain future with further massive price hikes on leased lines expected from Ma Bell.

But according to Kutnick, the 8100 also has one inherent strategic weakness. “IBM's one great strength is the huge applications software base that has evolved around its 370 architecture. These users have an enormous investment tied up in this software and are trying to consolidate programming costs.”

Another source commented that users would rather build new applications at remote sites using the 370 architecture. That can't be done with the 8100.

Other commentators have pointed out that the 8100's big drawback is its lack of processing power and an inadequate file management system.

So what will happen to the 8100? Several experts agree that the product will



GEORGE MCQUILKEN: "Spartacus should be known as an alternative vendor rather than a PCM."

continue to evolve. "IBM never really has a failure," one consultant stressed. "They'll play around, experiment, and add features until they get something they can use. Then they'll put out a new model." His guess was that the company would use the 8100 as a word processing and electronic mail system for its MVS users.

Another source commented: "There are forces inside Raleigh [N.C.] that are trying hard to turn the 8100 into a gateway controller for SNA users to get in and out of other networks."

"Though IBM has, and will, plod on with the 8100," said still another consultant, "it's been clear to the company for some time that this system could never be the remote processor users are crying for."

"The signs have been clear for some time," said another observer. "Users of 370s have been pressuring IBM for 4300s that they can use for remote distributed processing, but the company's been coming up empty."

According to one source, the lead time on IBM's smallest 4300—the 4331—is now an incredibly fast 30 days. Big users want more power and speed than the 4331 offers; they would rather use 4341s as distributed machines.

A study being prepared by the Yankee Group indicates that though IBM is aggressively marketing the 4300s under the DOS/VS operating systems—"usually as replacements or upgrades for machines like the 370/138"—users are increasingly buying them for VM use. Applications mostly include interactive program development and operating system development and maintenance, the study shows.

It would appear that IBM has finally gotten the message: VM is good for business. IBM watchers point to the recent VM upgrades—"people love the editors on it," said one—and to the sophisticated new office automation package, PROS, which runs under VM on a 4300.

All of this came about because of IBM's strong VM user base—now believed to be in excess of 4,000 users worldwide—rather than through IBM's own efforts, surmised one observer who uses VM in the timesharing business.

So now, the Hydra/4300 looks like more than a "counterstrategy"; it's suddenly "where it's at" for IBM.

Some sources now feel that IBM will attempt to integrate VM more closely with MVS and other operating systems for a more versatile environment. "Then the user won't even know, or care, *what* operating system he uses."

McQuilken greets such information with a smile. "The only thing that IBM could do which might concern me would be to kill VM altogether. For the more they focus on VM and Hydra, the more they focus on Spartacus."

Faced with such awesome potential, didn't McQuilken shudder at the thought? Wasn't his Kangaroo with boxing gloves just an aggressive bit of posturing to mask a real fear?

"It takes a certain amount of courage to venture out on your own, to just throw up your job and step into the un-

Sources say IBM is planning to enter the service bureau and facilities management business in a big way using the Hydra/VM software.

known. At the beginning of the year the venture capitalists told me that I had a great idea but that they'd rather put in their own ceo and take more than half my company before funding me.

"They reasoned that technical people don't make good businessmen. But they said they'd be glad to see me again if I could raise \$100,000 from private investors, get a couple of employees, and demonstrate that I could get started.

"I suppose that if I were going to give up it would have been then."

McQuilken wouldn't say exactly how much seed money he has raised since then, but the figure is close to \$500,000, said one associate. The former-IBMer said that he's already started to staff up and could have a dozen or so people by year's end.

Also in the offing is a possible development deal with one big VM user and a licensing agreement with a 370-compatible PCM for Spartacus's initial hardware configuration.

"The venture capital people said the most difficult thing for me to do would be to build the operating system," says McQuilken. "The next most difficult job would be to design a networking interface. The easiest task (relatively) would be to build the cpu, they said.

"So what I'm going to do is show how well the new software can work on a

370 machine, and then use a first round of venture capital to build a miniaturized cpu," he explained.

McQuilken said that he and his two private investors could keep control of Spartacus over one or two rounds of venture capital. Other notable startups in Massachusetts such as Apollo Computer and Stratus Computer haven't managed to do this, he added. "There is a great temptation to get on the map as quickly as possible by getting big bucks from the venture people. Running a startup isn't like running a business. It doesn't have revenues, just expenses!"

Several well-informed observers think that McQuilken might have found himself the perfect niche. "IBM is always leaving little holes for those that are alert enough," said one.

Another added that if Spartacus got an early development contract, it could "take off like a rocket."

"We're financed well into next year," said McQuilken, "so even if we have to wait a while we should get the type of user we need."

"But whatever happens, good or bad, I'll build my machine," vowed McQuilken. "It's my one overriding motivation."

Though he no longer works for IBM, McQuilken's destiny would seem to be intertwined with the giant for as far ahead as he can see. When McQuilken left IBM, one of his friends jokingly reminded him of what had happened to Spartacus: "Remember, he got nailed."

"Yes," McQuilken quipped, "but look what happened to Rome!"

—Ralph Emmett

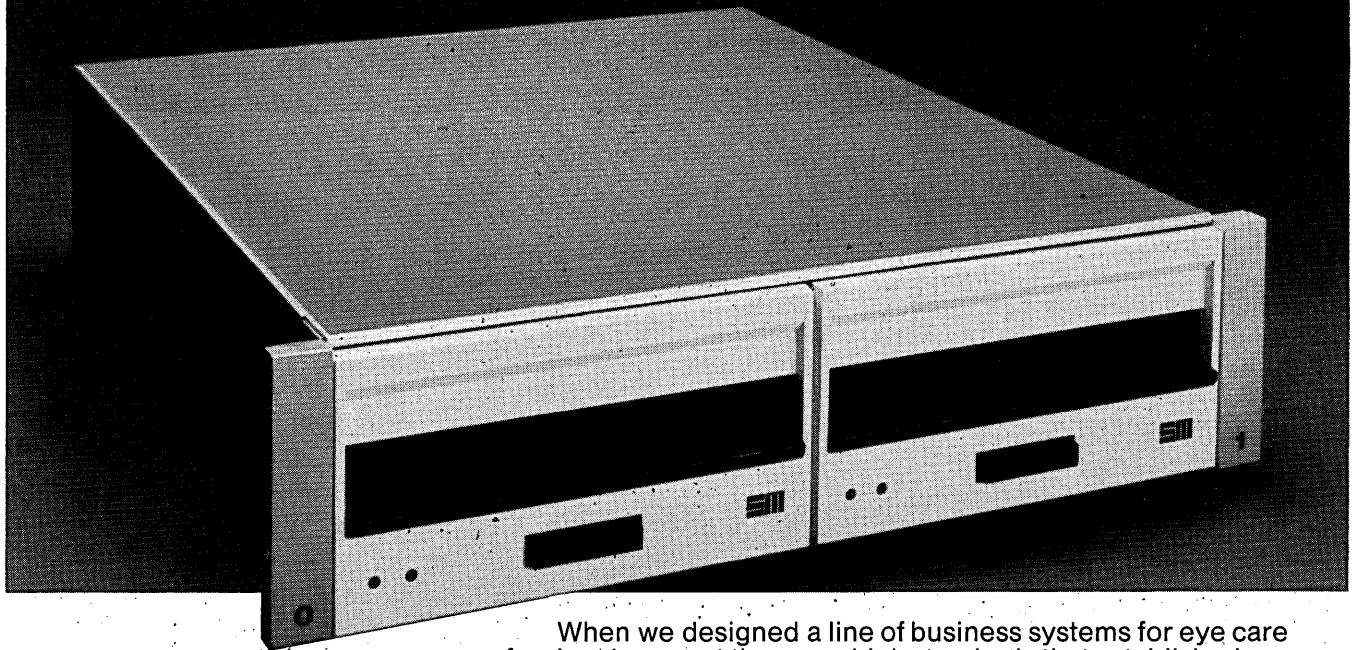
TECHNOLOGY

JAPAN GOES FOR THE GUSTO

For the first time in its history, Japan is inviting other nations to participate and share in the results of an R&D project on computer systems of the '90s.

Hitching its wagon to a star is Japan Inc., which in October is holding an international conference on fifth generation computer systems. The four-day meeting in Tokyo, chaired by Professor Tohru Moto-oka of Tokyo University, is expected to draw computer science researchers from around the world to discuss desirable features and potential capabilities of computer systems of the 1990s.

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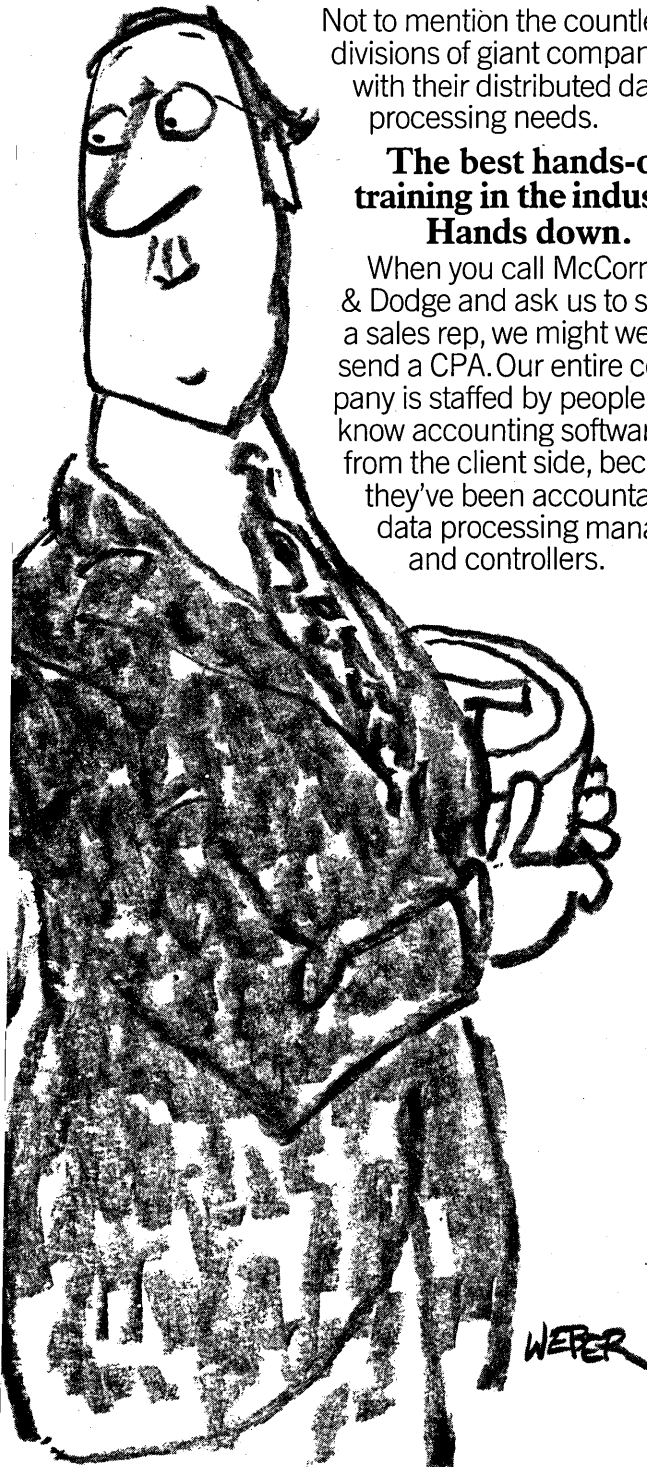
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CIRCLE 32 ON READER CARD

NEWS IN PERSPECTIVE

Stanford's Ed Feigenbaum says he will be there and will give his "normal talk" about symbolic computation and symbolic reasoning and applications of artificial intelligence. Ex-Burroughs designer Bob Barton was supposed to have been invited but says he never heard from the committee, and wouldn't go anyway. "I'd like to help those people," says Elliott Organick of the University of Utah, but there's a VLSI conference that same week at Carnegie-Mellon University and another one in New Hamp-

Japanese survey teams have been beating the bushes to see what's currently available or will be usable in the 1990 time frame.

shire on languages and architecture, and what's a fellow to do? The British government is said to be highly interested, was scheduled to have sent an industrial mission to Tokyo earlier this summer to begin work on the fifth generation computer project.

"The fifth generation computer is [conceptualized] as a group of computers, not just one," explains Sozaburo Okamoto, director of the Electronics Policy Division of the Ministry of International Trade and Industry (MITI). "It is like a nebula. It looks like one star from far away, but as we get closer to it we find that it consists of many stars . . ." Some of them are very large, he continues, some very small. "And maybe some stardust."

In some Japanese circles, people are critical of the name applied to the project. No one seems to know what generation we're now in, they say, so who's to know when the fifth generation is upon us? But Okamoto argues that the fifth generation computer being envisioned will not be on a continuum with previous generations. "It is a totally new system," he says, different from computers that now exist. "So the fifth generation computer is just a name, not something that follows the concept of the third and fourth generations." The name given this project stems from the timing they selected—a system for the '90s. They foresee the fourth generation showing up in the '80s, allow 10 years for each generation, and figure the system of the '90s could be termed the fifth generation.

But Okamoto's deputy, Eiji Sakuta, takes it a step further. He thinks the systems emerging from this project will be called the second generation, being so different from anything that will have preceded them. Their one major characteristic, he adds, will be that they will be something other than von Neumann machines.

At this stage, no one else would venture to predict what the systems will or will not be. The Japanese for the last two years have had survey teams beating the bushes to see what's currently available or will be usable in the 1990 time frame. Dr. Kazuhiro

Fuchi of the government's Electrotechnical Laboratory has been looking into basic technology and software issues. Professor Hideo Aiso of Keio University heads the architecture committee.

Another committee, headed by Hajime Karatsu of Matsushita Communications, has been trying to define society's needs for the '90s, based on such foreseeable changes as an aging population, new energy sources, and lagging productivity in some segments of the economy. The kinds of capabilities being considered include the input and processing of natural languages, pictures, and speech, language translation, and ease of use by a non-dper, whether in an office or laboratory environment.

"If we succeed in developing Josephson junction or gallium arsenide devices," says MITI's Sakuta, "they will be used in the fifth generation computer." But also in the running, he adds, is HEMT, Fujitsu's high electron mobility transistor.

Thus, once again Japan Inc. goes for the gusto. But for the first time it is inviting other nations to participate and share in the results. In the Japanese computer industry's history of joint R&D projects, this has never occurred.

MITI's organizational efforts date back to the early 1960s. These efforts relied on legislation passed in 1957 that provided for the exemption of the electronics industry from the antimonopoly law. The law also provided for financial assistance from the government in the form of direct R&D subsidies to computer makers. Thus MITI has been able to organize and finance a series of national R&D projects designed to foster a strong domestic computer industry.

The first of these projects, to develop a large-scale computer capability, ran from 1962 to 1966 and led to the develop-

Another Japanese committee has been trying to define society's needs for the '90s.

ment of the FONTAC. The first three letters in the acronym come from the three participants, Fujitsu, Oki, and NEC. Fujitsu worked on the design and development of the cpu, Oki on mechanical peripherals, and Nippon Electric on magnetic peripherals. The project was funded to the tune of more than 338 million yen, half of it provided by the government. At the then-current exchange rate of 360 yen to the dollar, that's less than \$1 million. But from the knowledge gained, Fujitsu was able to develop and announce its medium-scale Facom 230 model 30 computer in 1964, shortly after IBM announced the System/360. That same year NEC came out with the NEAC 2200, its improved version of the Honeywell 200.

This was followed by another MITI project, funded totally by the government with some 10 billion yen, or almost \$30 million. The goal this time was to develop a

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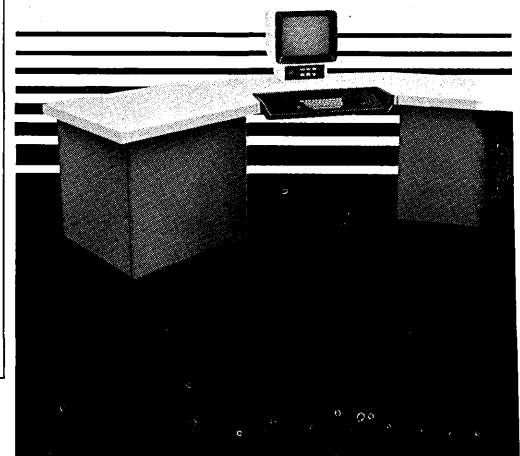
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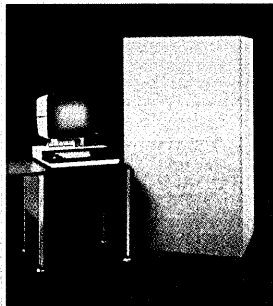
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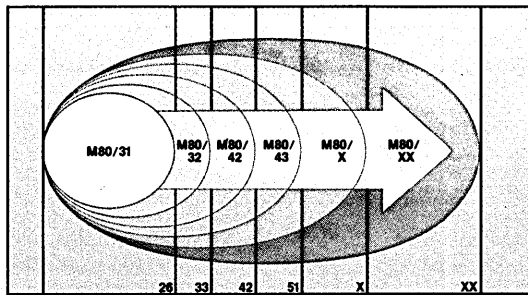


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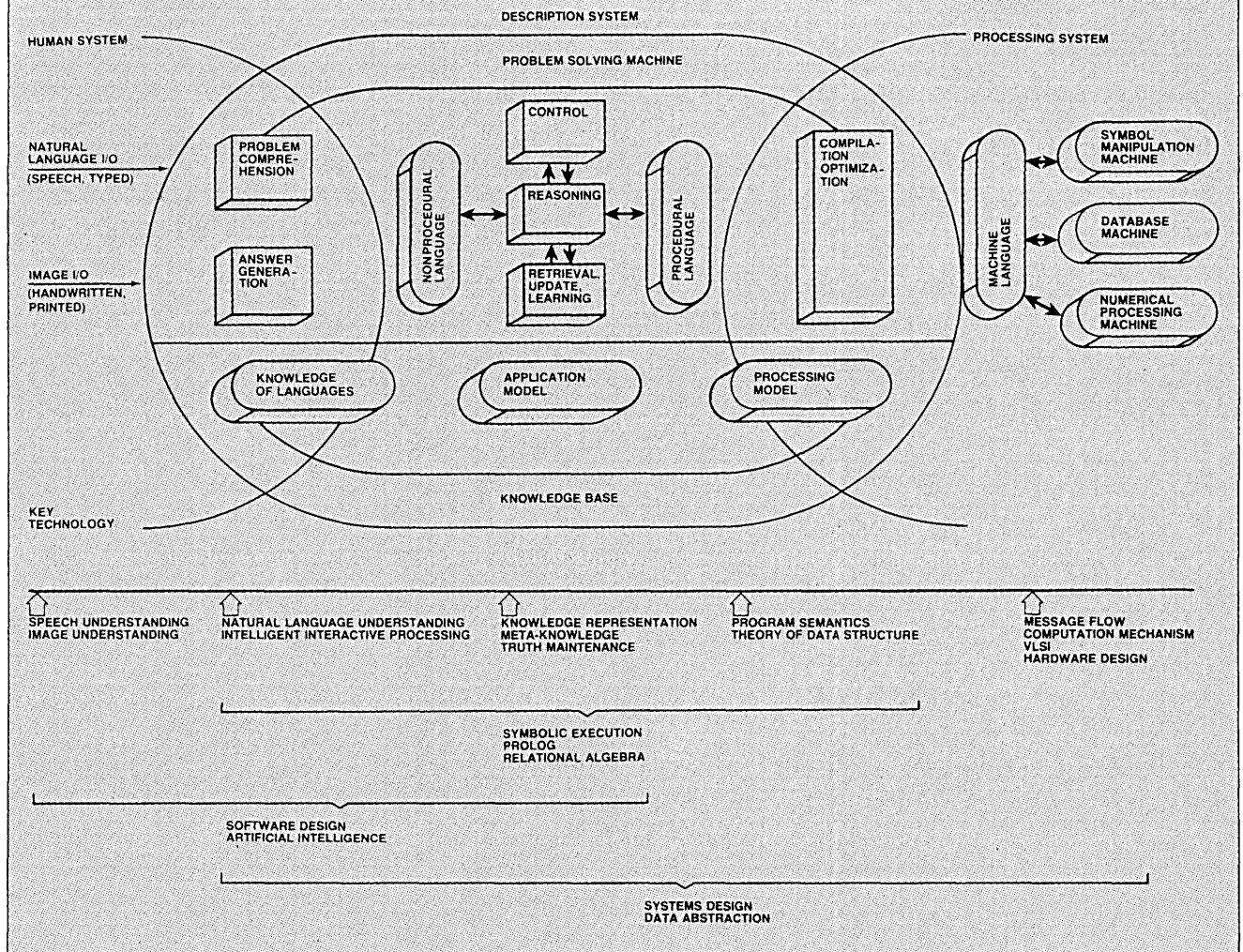
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**SYSTEM DESIGN CONCEPT:
FIFTH GENERATION COMPUTER**



FIFTH GENERATION: A very functional system, incorporating artificial intelligence components, is evident in this provocative system design idea for the fifth generation computer.

higher performance machine, and the participants included not only the same three companies but also Hitachi, Toshiba, and Mitsubishi Electric. Toshiba undertook research in OCR, a technology where it remains strong today, while Hitachi, NEC, and Fujitsu attacked the cpu. Oki worked on kanji (Chinese character) displays, Mitsubishi on image processing, and a company called Toko on wire memories. The project ran from 1966 to 1972.

It was followed by MITI's attempt to reduce the number of domestic mainframe manufacturers. Six vendors in a market as small as Japan just seemed to be a bit much. So the government managed to couple them into three groups, again resorting to financial grants for motivation. Fujitsu and Hitachi agreed to form a team to develop jointly a family of computers called the M Series. NEC and Toshiba consented to do likewise and came up with the Acos family, and

Mitsubishi and Oki with the Cosmo series. Some 70 billion yen were expended for this reorganization, half of it from the government, the other half from the participants.

As if to illustrate that you can lead a horse to water but fail to make it drink, none of these couplings was to last. The competi-

From the inception of computing in Japan, only IBM was a successful vendor of large-scale machines.

tiveness among the companies was just too strong. Neither Fujitsu nor Hitachi, for example, was willing to sell computers designed and manufactured by the other party; those two companies, unable to come to any agreement, even designed their own separate operating systems. The other two pairings were even less successful, for Toshiba (NEC's partner) and Oki (Mitsubishi's ally)

are now ostensibly out of the mainframe business. About all that can be said for this project is that Fujitsu and Hitachi formed a joint venture peripherals company, although even this relationship is highly platonic.

These three national projects, running consecutively from 1962 to 1976, were clearly designed to bring the domestic manufacturers up to speed on the technology. But just as clearly, there were attempts to get them to catch up to IBM—or at least to fund such a race. From the inception of computing in Japan, only IBM was a successful vendor of large-scale machines; the domestic vendors were pretty much restricted to the markets for medium-scale and small-scale processors. Using import tariffs and nontariff barriers, the government was able to preserve enough of a market for domestic vendors to survive in, believing that a few would remain to someday make it

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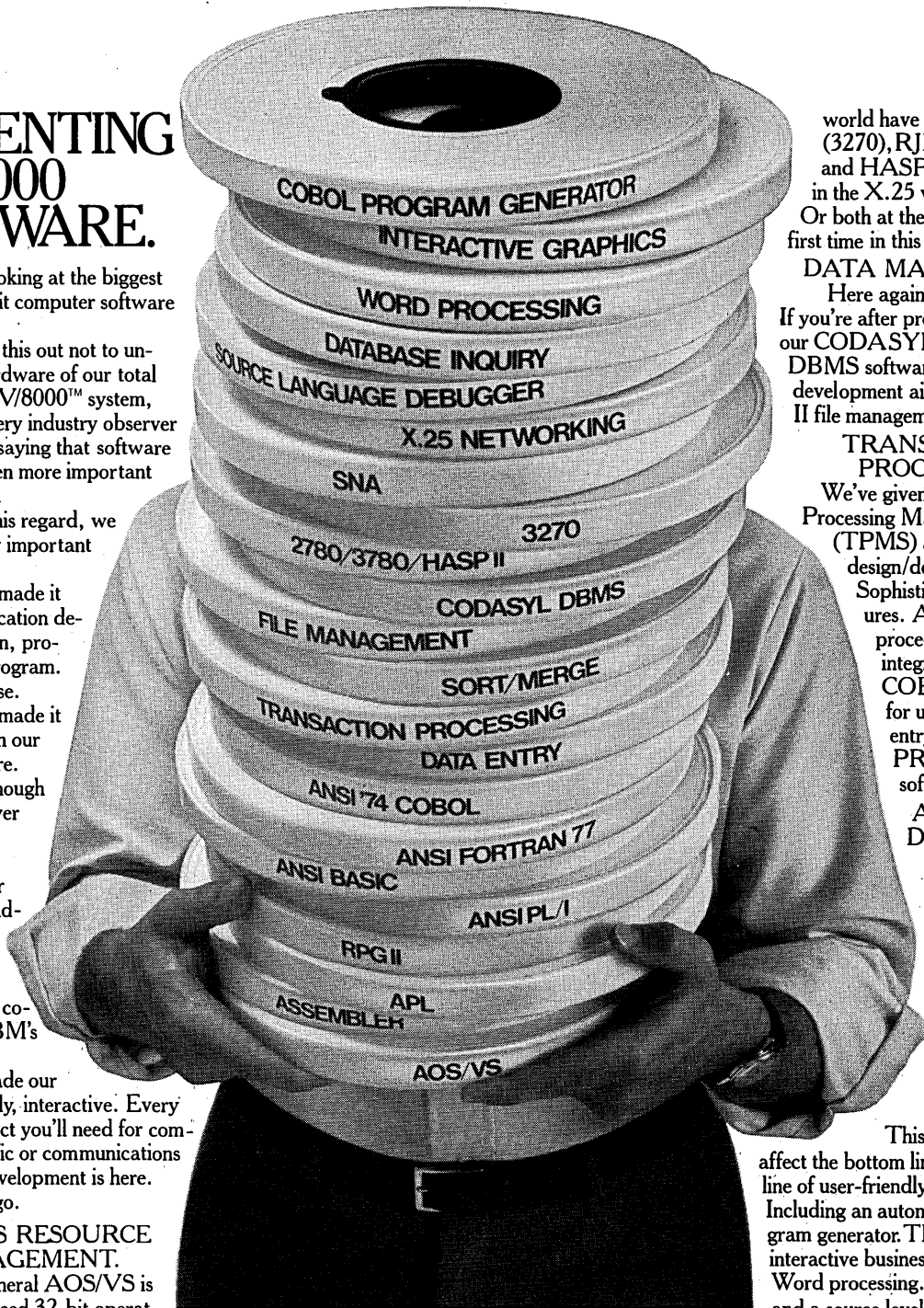
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NEWS IN PERSPECTIVE

a good footrace. And today, sure enough, the Japanese manufacturers have developed a strong mainframe product line from small to large—and they haven't stopped yet.

In the mid-'70s, about the time the three combinations of companies began introducing mainframe families with names like the M Series, Acos, and Cosmo, the Japanese had to face the prospect of someday competing with the strongly rumored IBM FS (for Future System). While FS never surfaced, it nonetheless existed as a target for the Japanese, who eventually redirected their sights on the IBM E Series (which became the 4300s) and the later H Series.

The national project to develop a capability in semiconductors beyond the LSI became known as VLSI. This project, which ran from 1976 to 1980, was an attempt to develop advanced circuitry believed necessary for the Japanese response to the new IBM E and H Series processors.

As far as the Japanese are concerned, the IBM 360s could be considered third generation mainframes, the 370s are an interim 3.5 generation, and whatever comes next would be the fourth generation. So one could say that the current so-called operating system project, slated to run from 1979 to 1983, is the fourth generation project. A national endeavor funded 50% by MITI, it brings the mainframers together again to develop one family of machines with appropriate operating system(s). Expected to emerge first is a small machine in '83 or '84, followed by larger processors—all expected to be competitive with whatever IBM announces in the mid-'80s.

Possibly the last of the machines rolling out of the research labs will be a supercomputer, which the Japanese hope will be a thousand times faster than a Cray-1 or the CDC Cyber 205, today's fastest commercially available computers. They see a need for such machines in meteorological studies and in atomic energy research. Although no budget exists for this computer, it is thought that it might cost some 30 billion yen, or the equivalent today of under \$150 million.

In the '70s, too, there was an enormous and ambitious undertaking to develop a pattern information processing system. Again, it involved all the domestic mainframers. And again its goal was not to build a system that could be set up under one roof; rather, it encompassed hardware and software research and ranged from basic research in such things as the generation of vocal sounds to semiconductors (this program preceded the VLSI project) to image processing. The so-called PIPS project ran from 1971 to 1980 and consumed some \$100 million, all provided by the government. While government funding for the project has ended, research continues in pattern recognition and such complex specialty fields such as scene analysis.

"Many problems remain in the field

of pattern recognition," explains Dr. Hiroji Nishino of Tsukuba University. Nishino, now retired from the Electrotechnical Laboratory, headed this project for MITI while he was at ETL. During the 10 years of the project, he adds, they were able to accomplish a 100-time speed improvement in voice recognition.

He says the PIPS project acted as a stimulus to the participating companies. At the inception of the project, NEC had a voice processing capability, but Hitachi had none. Now Hitachi has a voice output chip and its Central Research Laboratory in Tokyo is working on voice recognition. As a result of the research conducted by the participants, Nishino adds, a number of products are now commercially available.

Ten years ago there were no commercial products that could scan and read the Japanese kana syllabary. Five years later every computer maker had one that could read handwritten kana characters. And now some of them can also demonstrate the recognition of a few handwritten kanji characters, the ideograms adopted from the Chinese language.

In the latest endeavor, the Japanese have undertaken to define the information processing needs of the '90s. With the idea that no nation has, much less should have, a

The international conference on fifth generation computer systems, to be held in Tokyo, is scheduled for Oct. 19 to 22.

monopoly on smarts, they say they want to share their ideas with researchers from abroad. Thus the seminar in Tokyo from Oct. 19 to 22.

"The stage of Japanese technological development, we think, has reached [a par with] the international level in some areas," explains MITI's Okamatsu. "So we think we have to cooperate with other countries in some fields." He adds that this cooperation in the past has consisted of Japan being assisted by others. "We introduced technologies from other countries. But now the cooperation has entered a new stage, and we can cooperate with each other as equals."

Further, he adds, the goal or target of Japanese companies was to achieve the levels of technology possessed by IBM, "and we had to chase that target. We had to catch up. In some cases we did." But in trying to determine what the systems of the 1990s should look like, there is no model, no target to shoot for. "We have to develop the target by ourselves." The Japanese feel they need the participation of others to set goals and devise means of meeting them.

But in another respect, Okamatsu also notes that Japan's GNP is about 10% of the world's economy. "That means we have an international responsibility to do something" to benefit the world, to benefit other countries. He cites cooperative re-

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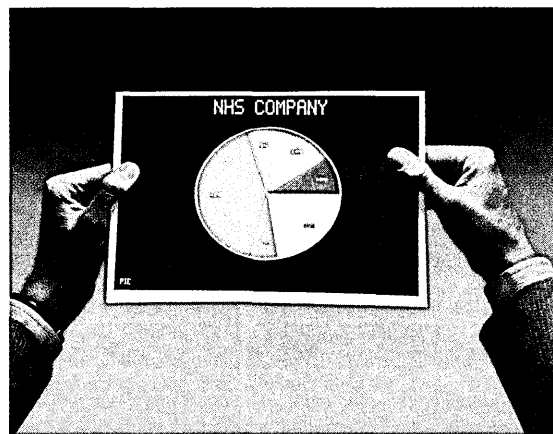
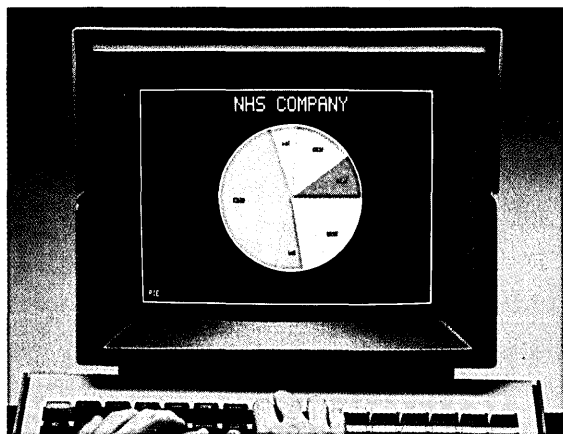
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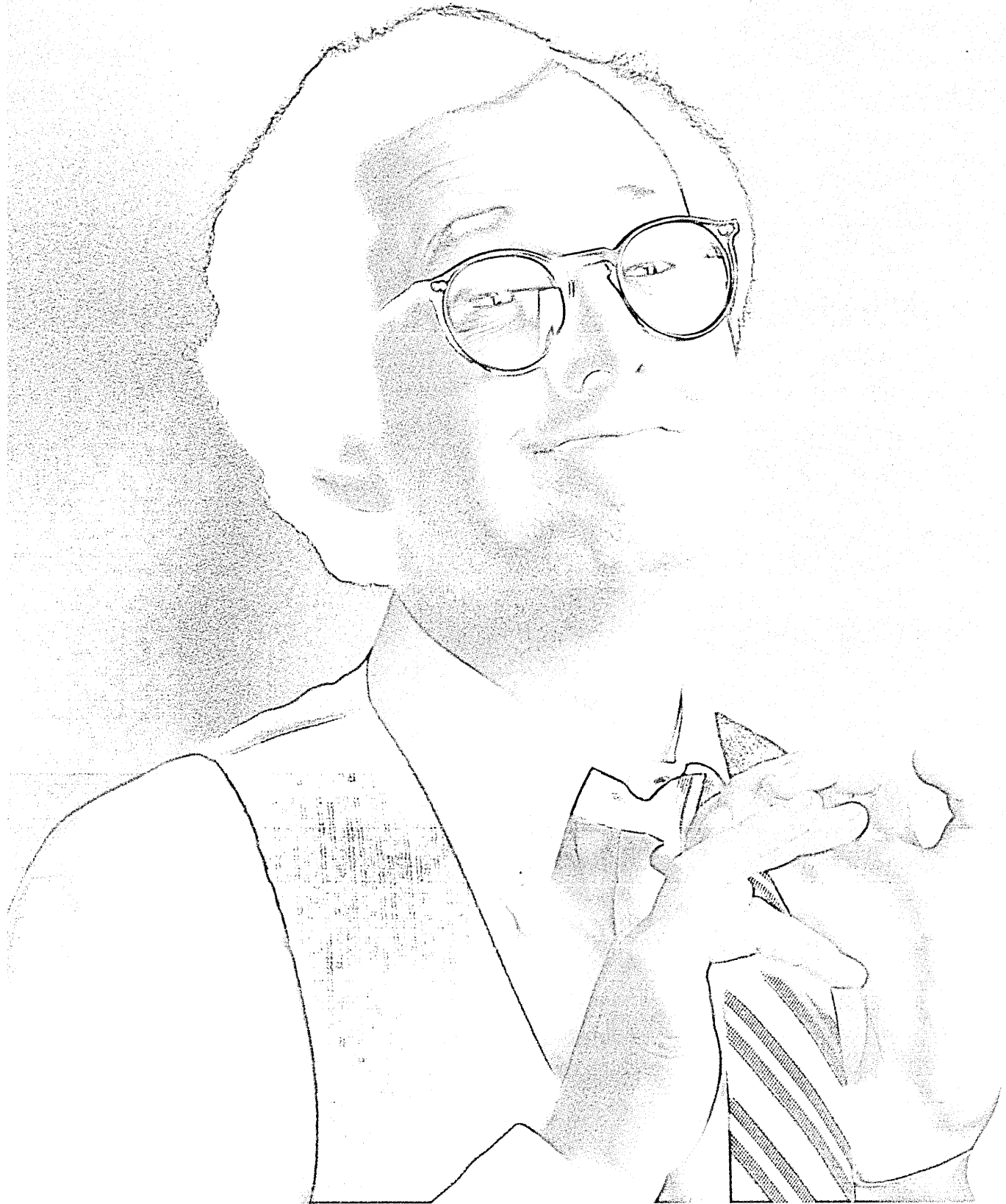
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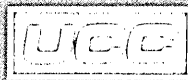
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search in energy, such as coal gasification, and implies the same can exist in computer systems.

For example, he says, the ability to translate from one language to another would best be developed by a joint effort. He says the Japanese know their language better than anyone else, and "we don't know much about English or French."

Okamoto sees the Tokyo seminar as the first stage of international cooperation. The second stage would be the arrival of researchers from abroad to join in the design activity. The third would be the joint development of such facilities as language translation. While the several parties might at that point go their separate ways, he also sees the possibility of a joint manufacturing agreement. Parts of the system could be made in one country, other parts in other countries. Or, he adds, there could be a common patent position and the same product could be produced in more than one country.

Throughout all this, no mention is made of the role, if any, of IBM. Never was it said that IBM is not welcome. Nor was there any indication that IBM would be invited to participate. That part, apparently, remains to be seen. But it's early yet. Many things have not been hammered out. Even the budget is being played by ear (less than \$75,000 this fiscal year). So some things are subject to change. Some things. But not the Japanese imperative to excel at this information business.

—Edward K. Yasaki

COMPUTER GRAPHICS

SAY IT WITH PICTURES

Computer graphics sales last year were \$1.3 billion. By 1990, sales are expected to reach \$14.5 billion.

The first computer graphics system was nearly the last.

Sixteen years ago IBM was performing development work for General Motors. The research eventually begat the IBM 2250, the first system to test the theory that a picture is worth a thousand words.

It was no contest. The 2250 flunked.

"Sales were very disappointing, to say the least," IBM's Harry Richter recalls. "We never quite pulled it off the market, but we came close several times. I think the 2250 was way ahead of its time. It had powerful hardware, but there was no readily available software to drive it. Only very

large companies, like GM, used it because the software cost \$10 million. At that price, the broad spectrum of American industry wasn't ready to make a commitment.

"Our original estimates were very optimistic but quickly became pessimistic. There were a number of people, however, who continued to be positive and insisted they saw potential and growth for both the 2250 and computer graphics. They were

"The financial community has a strong, positive feeling about computer graphics companies."

looked upon with great skepticism."

It is always thus with seers and prophets. But all that changed in the ensuing decade and a half.

"Once hardware and software came together," Richter says, "the market absolutely took off."

And it continues to pick up speed. According to the research firm of Frost & Sullivan, computer graphics sales last year were \$1.3 billion, with projections of a \$4.5 billion market by 1984 and \$14.5 billion by 1990. Business graphics applications accounted for 28% of the 1980 sales and its market share is expected to increase to 40% by the end of the decade.

"Within the last two years the mar-

ket has really boomed," says Frost & Sullivan's Joe Savino. "This year should be the turning point. Business people are familiarizing themselves with the equipment, and that's obviously going to further the upward trend."

"The emergence of graphics will be as important to business productivity as the computer itself," Comshare's Peter Berg told a session at the recent National Computer Graphics Association Conference in Baltimore, Md. "The higher up one climbs in an organization, the less sophisticated is the information equipment. A specialized workstation for the executive is the riskiest change yet. The executive needs a small, dedicated system that's easy to use. He or she doesn't have time to pore over reams of statistics. That's why graphics systems are addictive. By giving their users so much more time, they increase personal productivity. That, in turn, increases organizational productivity."

Much of computer graphics is still restricted to sophisticated, highly technical manufacturing and design. The technique, which can be defined as "automating the picture process," is often employed in medicine, space science, geology and cartography. As with plain, old-fashioned, down-to-earth computers, the wonders of technology never cease.

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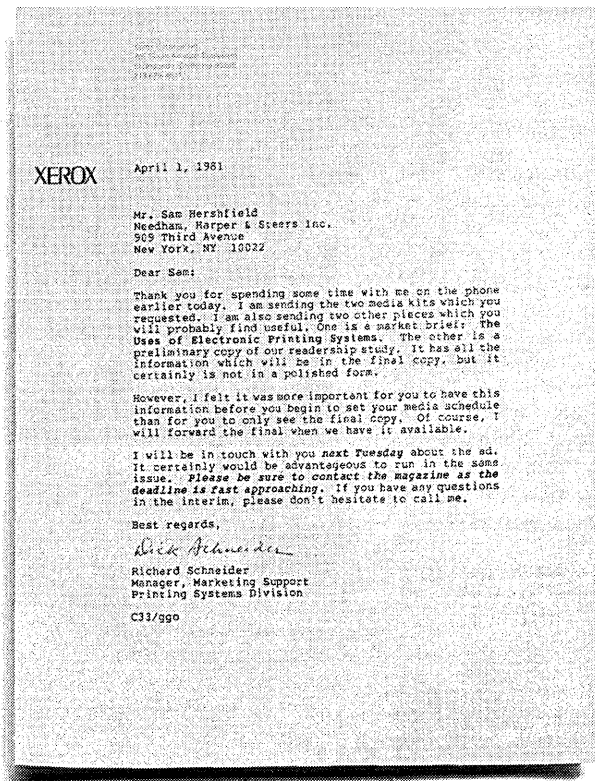
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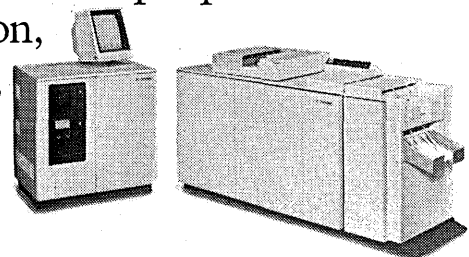
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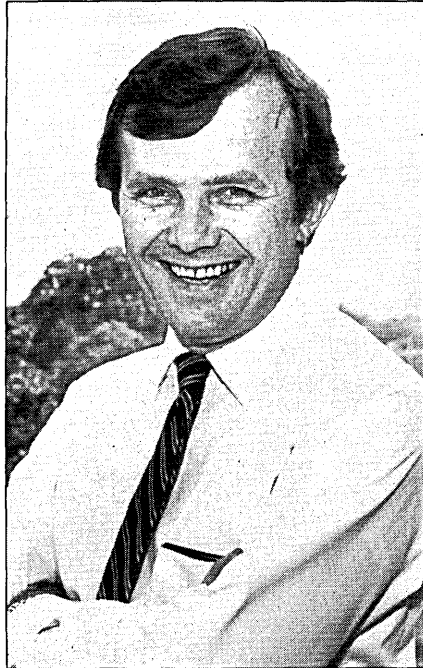
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NEWS IN PERSPECTIVE



EDWARD ZIMMERMAN: "We want to broaden the definition of computer graphics."

physiology, and drug design. It is possible, with the right system, to call up a computer simulation of outer space, surely less enjoyable but more informative than "Asteroids" or "Space Invaders." Local governments, if they have the money, can have their computer draw maps of highways and interchanges, and predict potential problems resulting from the construction thereof. Graphics are also becoming increasingly effective in military applications, which can range from nuclear weapons research to designing microelectronics.

The most popular approach appears to be CAD/CAM—computer aided design/computer aided manufacture. Gone are the days when it was necessary for engineers to labor over drawings requiring minute detail and hours at the drafting table. Now CAD (using computers to assist in conceptualizing, analyzing, and documenting designs) and CAM (using computers to convert design information into the actual product) can do the work of hundreds in thousandths of the time. Most major industries are leaping into CAD/CAM, anticipating increased productivity and profitability. The converts are becoming legion.

"We're driving toward an integrated CAD/CAM system that will ultimately eliminate the need for paper work in the design process," IBM's Richter says of his employer's latest efforts. "We've already achieved productivity gains in the range of 10 or 15 to 1, and up to 50 to 1 in specialized cases."

Nevertheless, that ancient rule of economics — *caveat emptor* — reigns supreme. These are not the kinds of systems one should rush out and be first on the block

to possess. Nor are they necessarily for the business of business.

"You can do 50,000 times as much communication by pictures as by words," independent consultant Joel Orr says. "There is an obvious need to condense all the information pouring forth today, and computer graphics certainly does that. But it is not a panacea, and it will not immediately solve every one of your organization's needs and problems. It's a very good cure—if you've got the right disease."

More and more folks seem willing to be exposed. Venture capitalists and other investors, notably tight-fisted in many areas during these times of economic uncertainty, are prowling with open checkbooks. All the right client need do is sign on the dotted line.

"Money is pouring out of older industries into the industries of tomorrow," contends investment analyst Alfred Berkeley of Alex Brown & Sons. "Nobody has staked out a dominant market share in the computer graphics business yet. The hardware and software are attracting a large number of buyers to the products, accelerating the vendors' growth. This is creating significant capital needs, giving investors a chance to participate. They are willing to pay extraordinarily high prices for offerings in this industry because of the growth they offer."

"There's a tremendous opportunity there," agrees Frost & Sullivan's Savino. "The financial community has a strong, positive feeling about computer graphics companies. It's easy to get capital."

One who found it precisely so is James Warner. Eighteen months ago he and two associates decided to form their own company, Precision Visuals. They sought financial assistance from private sources and were practically bowled over by the ensuing stampede.

"We had absolutely no problem getting money," the 31-year-old Warner says. "If you've got a good business plan and the

The most popular use of graphics is in CAD/CAM.

necessary technical expertise, money is easy to get."

So, apparently, is business. President Warner and cohorts shared a six-by-six-foot office and didn't make their first sale until May 1980. In the next six months, Precision, which manufactures a business graphics subroutine package that is both machine and device independent, sold \$250,000 worth of products. Warner forecasts sales of \$1.2 million this year and \$5 million by 1983. The six-by-six-foot office is long gone, replaced by 4,000 square feet. The number of employees has quintupled.

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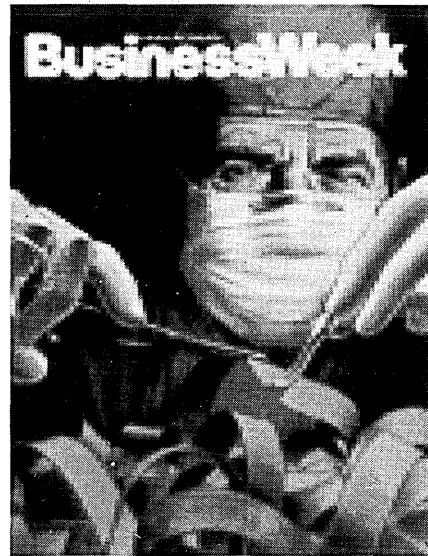
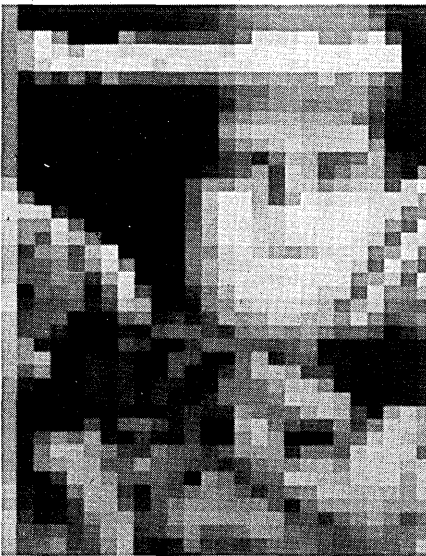
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Sources: BW Profile '81. MRI (Spring 1981)

BusinessWeek 

CIRCLE 43 ON READER CARD

NEWS IN PERSPECTIVE

A NEW VOICE AT NCGA

Perhaps Ed Zimmerman will now discover whether the grass truly is greener on the other side.

On Aug. 17, two weeks shy of the 10th anniversary of his marriage to Uncle Sam, Zimmerman becomes executive director of the National Computer Graphics Association. He will retain the position for at least two years, with an option for more if he so desires.

Zimmerman's departure from the White House, where until July 1 he served as a consultant for long-range planning of Executive Branch information handling capabilities, was not entirely voluntary. Given his druthers, he'd have kept his old address.

"I would have liked to keep going, but they never offered me a job," Zimmerman explained at the NCGA conference. "In the entire time I was in government, I was never offered [Senior Executive Service] career status. The government just doesn't do enough to keep its good people. Tenure is a real problem. And with the cap on compensation, taxpayers are beginning to get what they're paying for."

The public lost no money on Zimmerman. He helped develop the Decision Information Display System, a tool for graphic display of socioeconomic and demographic statistics. Prior to his White House stint, he was Deputy Assistant Secre-

tary of Commerce for Communications and Information and Deputy Administrator of the National Telecommunications and Information Administration (NTIA). One of his final tasks there was coauthoring a chapter on "National Planning for Data Communications" for the *Annual Review of Information Science and Technology*.

"[Former NCGA president] Coby Smith made up his mind he was going to hire me," Zimmerman said with a smile, "and he's a very persuasive fellow."

"We hired him for three reasons," said Bill Howard, Smith's successor. "His personal quality and reputation; a need, because of the association's rapid growth, to change from an entrepreneurial to a management style; and a desire to have a professional with a graphics background working for us full time."

Zimmerman brings more than knowledge of pretty pictures to his new line of work. He is quite familiar with the information and telecommunications industries, possibly more so than many of those attempting to set policy therein. Going private will surely not still his voice, and may well make it more noticeable. His contract with NCGA permits him to serve independently on other boards and anywhere else he can have a say in the information process.

"There's a telecommunications bottleneck that's throttling us," Zimmerman

said. "The computer industry can't continue to oppose a rational telecommunications policy. If we don't clear it up soon, the Germans and Japanese will kill us."

In between acts, he will put his imprimatur on NCGA. The group was formed two years, when 80 members gathered in San Diego and emerged determined to address applications and user issues. It now has 4,500 members, 39 state directors and a million-dollar budget.

"To most people, graphics is still a fun thing," Zimmerman admitted. "There's a sort of ode-to-joy feeling about them. We've got to demonstrate that this is a serious business and we are a serious professional organization. We want to broaden the definition of computer graphics. We want to increase understanding of the problems between the manufacturing and professional members. The last thing we want now is to go after Mr. Consumer."

"At some point, of course, we will want to do that. I hope to convince organizations like NBC, CBS and ABC to join us. They should, because this is where their future is. In 10 years you won't be able to buy a television that won't have 8086 capability. It will have the same options. But it will only happen if we overcome the telecommunications problem."

Zimmerman plans to be part of the solution. —W.S.

"I knew we'd do some business, but I never expected to do this well," Warner admits. "There's so much out there that there's room for everybody. It makes no sense to cut throats."

"Right now hardware is the hottest thing because people understand it and costs are low enough that they can afford it. They see the final machinations, but they don't understand what it takes to get there. A few years from now software will be hot. It's going to follow the pattern of the general

There were four times more exhibitors and attendees at this year's NCGA conference than in 1980.

industry. The lag time will still be two years."

By then many of the current products may be outdated, if not obsolete. With only imagination as the boundary, the industry has hardly tested its capabilities. There were four times more exhibitors and attendees at this year's NCGA conference than in 1980, and what they saw and heard undoubtedly affected them a thousandfold more. The users are no longer being used.

"We're seeing good, smart, educated users," says Dan Traxler, marketing manager of Computervision, which claims to be the world's largest supplier of turnkey systems for CAD/CAM and had sales of \$201 million last year.

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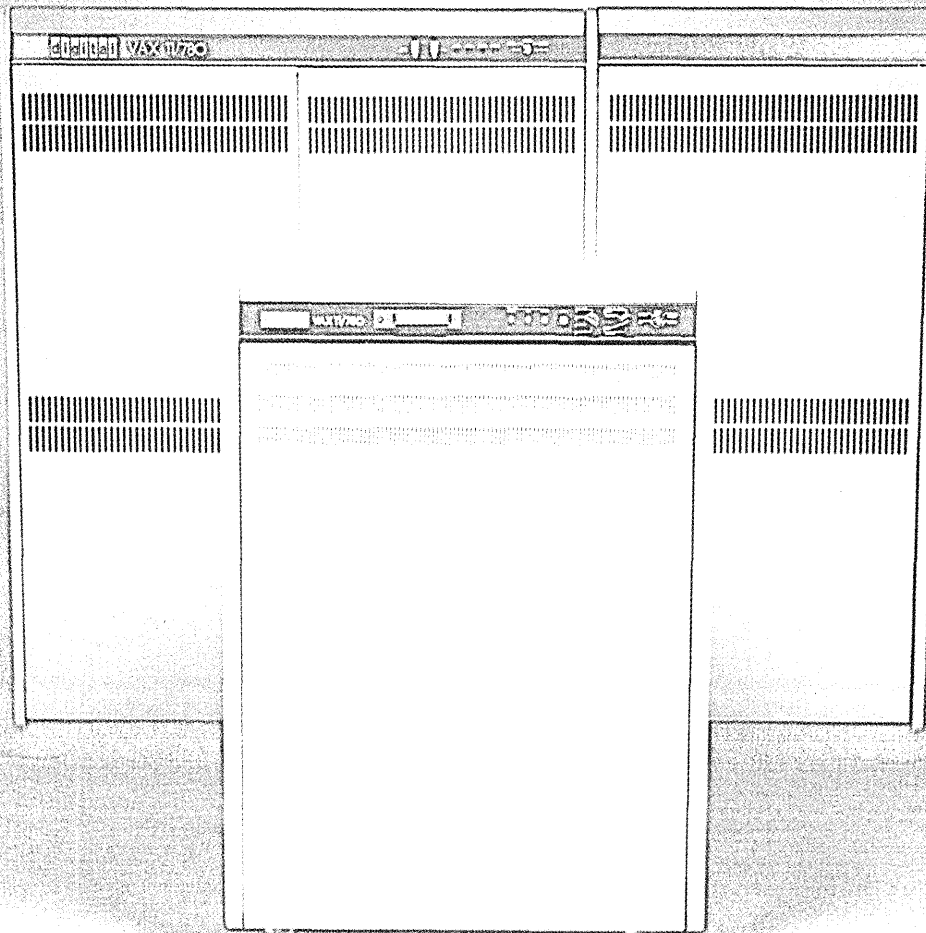
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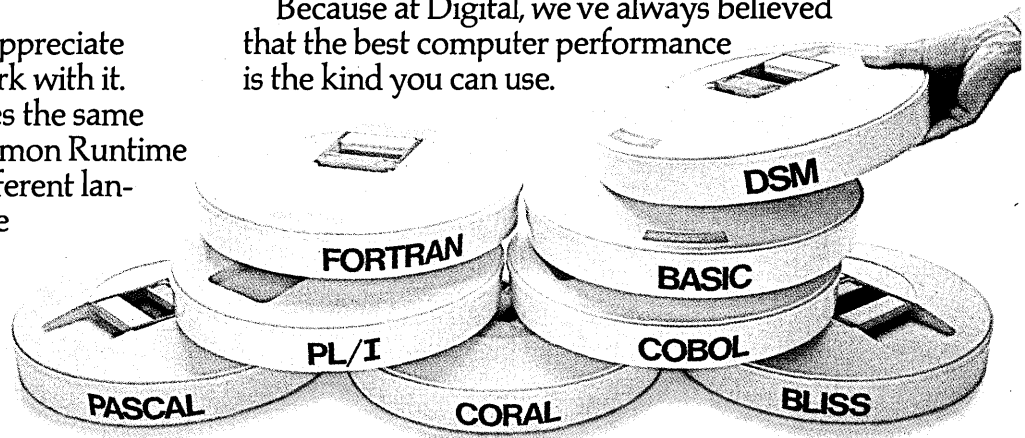
That network, in turn, can be linked to other computers you may already be using, through 2780, 3780, and MUX200 batch bisync, as well as 3271 interactive bisync.

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NEWS IN PERSPECTIVE

"They know what they want. They ask tough questions, and you can't fool them so easily anymore. The literacy is increasing tremendously. The whole industry is just exploding. The marketplace is growing faster than we can keep up with."

"Two years ago, a potential user would say 'tell me about computer graphics,'" says NCGA president Bill Howard. "Now it's 'I need a graphics system that will do this, this, and this.' The availability of user-friendly software, the lower cost of hardware, and the maturation of users are behind this tremendous explosion. There was a broader market for graphics in the last three years of the '70s than in all the preceding years.

"That's not to say everything is smooth sailing from here. We've got some problems, just like any other new industry. Our biggest difficulty right now is educating middle management and users about the benefits of graphics."

But the educators won't waste words on that group. They'll say it with pictures.

—Willie Schatz

APPLICATIONS

SYSTEMS BIZ: AN EASY STEP

International Harvester's offering of the IH System One to its U.S. dealers puts the farm machinery company squarely in the systems business.

International Harvester has gone into the systems business.

The big farm machinery company, headquartered in Chicago, has put together what it calls the IH System One, which it will offer to its 3,700 U.S. dealers on a lease arrangement through Harco Leasing, an IH subsidiary.

Heart of the system is a 5000 SX microcomputer built by IMS International, Carson City, Nev. In a sense, the IH order put this small computer company, which started out in the industrial controls market, in the systems business too.

Seven years ago, International Harvester equipped the majority of its dealers with a Texas Instruments TI-742, an intelligent terminal without crt, which communicated to the dealers using a 30 cps printer on International Harvester forms.

Since then, the TI-742 has been in general use at IH for inventory control and

accounting. It feeds messages over telephone lines and standard modems to central host computers at IH headquarters. Printed reports are returned to dealers by mail.

When IH decided to develop its System One, it had certain criteria firmly fixed. "We wanted an S-100 bus," said Tom Dunne of IH, "and a true MPM (a multi-user version of Digital Research's popular CP/M operating system)."

In addition to IMS' 5000 SX, which is a Z-80 based micro with up to three 5¼-in. mini-floppy disks, IH initially considered a Cromenco microcomputer. But "their operating system was not a real MPM," said Dunne. The IMS 5000 SX is expandable to include a 5¼-in. Winchester drive. IMS is committed to supply up to 100 units per month to IH over the next two years.

The IH System One, in addition to the IMS 5000 SX, features a communicating crt and any one of several printer options. Communications between the System One and IH regional computers will be over phone lines, using a PPMI internal modem which IH will install in the 5000 SX.

The new system will perform more than three times the work of its predecessor, an IH spokesman said. It will have the advantage of full crt display and vastly greater computer power. Word processing and concurrent tasks are available extras.

The spokesman said the system will embody IEEE standards for maximum flexibility and future expansion capabilities. Versatility and expandability, along with very high reliability, were the criteria stressed in evaluations, he said.

For IMS, the IH order positions its computer systems right where the company wants them to be—"in the forefront of office automation," says Donald A. Lehr, IMS president. But office automation wasn't what Lehr and his cofounder, Allan G. Fiegehen, had in mind in 1975, when they left General Automation to found what then was called Industrial Micro Systems. They were in the controls business then.

"It was good for seed capital," recalls Lehr. Controls was what Lehr and Fie-

The new system is expected to perform more than three times the work of its predecessor.

gehen, who became acquainted when both were working for General Electric, wanted to be in. What changed their direction was the proximity of their first shop in California's Orange County to one of the first retail computer stores. It was Computermart of Orange, run by John French.

French hounded Lehr and Fiegehen to make him a reliable memory board for the computers he was selling to hobbyists. "It got to the point where it was easier to do it than to listen to him," said Lehr.

So they built 10 boards. "They were

industrial quality stuff," said Fiegehen. It was a quick step from boards to systems, and an even quicker step out of California's Orange County to Carson City, Nev. "We've got a good life style here and a cost of living and labor pool that would be attractive to any small company," both men agreed.

They're still pushing industrial quality and offer a two-year warranty on all their products.

And now they're into tractors.

—Edith Myers

INTERNATIONAL

A HOT DATE IN HAVANA

At IBI's meeting in Mexico, plans were laid for Third World informatics issues that will be aired at SPIN 83 in Havana.

It was a press agent's delight: the seaside setting, the floodlit room crowded with reporters and film crews, the celebrity-studded attendance list, and, to top it all off, the dramatically staged presidential signing ceremony at a distant mountain retreat. The result was a three-page statement challenging the Third World to computerize, but not to compromise.

Acapulco's Princess Hotel seemed a long way from underdevelopment, but it was there in June that the Rome-based Intergovernmental Bureau for Informatics (IBI) kicked off a vigorous drive towards SPIN II, a world conference slated for Havana in 1983. Some 35 persons, ranging from Nobel laureate Abdus Salam to Alvin "Future Shock" Toffler, met to formulate the "Declaration of Mexico on Informatics, Development and Peace," a document that will be IBI's rallying cry as it strives to make SPIN II the forum for Third World thinking on informatics.

(While the term "informatics" is used generically in most countries, in the U.S. it is the registered trademark of Informatics Inc., Woodland Hills, Calif. Its use in this story does not refer to the company.)

While the 35 didn't always agree on what informatics promises, they generally concurred that it embodies powerful social, cultural, economic, and political forces which must be reckoned with at national and worldwide levels—"Wisely used with humanistic understanding, it can contribute greatly to the solution of critical problems and hence to the establishment of peace.



LIGHTS, CAMERAS, ACTION: Film crews zoom in on Fermin Bernasconi as he maps out plans for a hot date in Havana—SPIN 83.

Applied in a technocratic and excessively centralized manner, it can render the complex of problems still more intractable."

And, while no new philosophical ground was broken, the meeting was if nothing else a triumph for Fermin Bernasconi, IBI's dynamic director general, whose stylish flare sparked the meeting and sent the delegates home enthusiastic about the forthcoming SPIN conference. SPIN (for Strategies and Policies for Informatics) will provide the framework for a five-year program for the "informatization" of developing countries to the tune of \$1 billion, according to Bernasconi, an Argentinean professor who is credited with developing IBI into the organization it is today.

"We expect to shape the Third World market," says Bernasconi confidently. Where does he plan to find a billion dollars? About a third each is to be contributed by developed countries, oil producing states, and developing countries, he states, noting that equipment and expertise will be bought only from those developed countries willing to contribute monetary aid.

His plans for SPIN 83, which will follow by three years the first SPIN held in Spain with some 400 persons attending, are nothing short of grand. He claims the Havana conference will draw delegations from no less than 100 countries and will star "at least 10" heads of state, including Cuba's Fidel Castro, India's Indira Gandhi, France's François Mitterrand and King Juan Carlos of Spain.

The Acapulco declaration is only the first step in preparing for Havana, he indicates, showing a complex plan of regional IBI meetings, half a dozen working groups, and, scheduled for Italy next year, a preliminary meeting open to all—vendors, national delegations, and anyone interested.

He let it be known in Acapulco that hardware and software vendors from around the world will be invited to a March 1982 meeting to hear of IBI's plans and to provide input for SPIN II. The vendor meeting's location hasn't been determined, but Bernasconi hopes it will draw interest from "the IBMs of the world," software houses, telecom vendors, and small computer vendors offering micro-based products.

IBI, which has been criticized for being overly French-dominated, fully intends to invite U.S. and Japanese vendors to participate in its planning—but not yet. Bernasconi says his membership wants to investigate informatics from the point of view of its own needs, not of what systems are available.

In fact, he recently finished touring the U.S., visiting high-level officials at IBM, Univac, and Control Data, and has had contacts with Japanese companies as well. While the exact nature of these talks is not publicly known, he hints that he expects due cooperation.

As for participation by the U.S., Soviet Union, and Japanese governments, which were conspicuous by their absence from Acapulco, the IBI chief says his organization "is too young" and is sticking to a "think small" attitude for the meantime. The U.S. and Soviet Union obviously have strong political motivations vis-a-vis each other which could needlessly disrupt small nations' planning for informatics systems, IBI officials comment privately.

"We now have some European members," Bernasconi says. "We don't

HOW THE U.S. VIEWS IBI

From the U.S. computer industry's point of view, IBI's plans to bring the gospel of computers to the developing nations of the world would be doomed without support of U.S. companies and their lead in technology, systems experience, and financial muscle. An official delegation from the U.S. government and representation by IBM were conspicuous by their absence in Acapulco, but it seems that U.S. parties are interested in the Rome organization's plans, if only from a respectful distance.

The U.S. industry has been approached quietly by Fermin Bernasconi, the IBI leader, with little in the way of concrete results. Sources in New York, Washington, and the European continent point to heavy French financing of IBI as showing an ulterior motive: getting business for the aggressive French telecom industry. But U.S. firms do expect to get a piece of the action, small as it is, in the Third World.

State Department sources say the U.S. government has chosen to "observe" IBI's dealings because "we're not convinced it's in our interest or IBI's interest for us to participate." It is expected that U.S. computer firms, rather than government officials, will take the lead in dealing with IBI,

want big countries yet, but next year we will show our plans to the big countries. We are still developing our personality, and that would be changed substantially if we involved them."

Clearly, Bernasconi has his mind set on making IBI a recognized voice for the large number of developing countries, many of which have little in the way of telephone networks, much less computers or data links. With SPIN II on the horizon, the stage is set for possible showdowns between any number of forces within the computer community.

As relative newcomers to informatics (a nebulous term finally agreed upon by the Acapulco delegates to mean "the general field concerned with the collection, storage, processing, retrieval, and transmission of information by electronic, optical, and other means"), Third World nations will be able to choose between distributed and centralized systems, between off-the-shelf and homegrown software, and between copper wire and optical fibers, among other options.

In short, there will be the possibility of avoiding many growing pains experienced by societies that have pioneered the use of computers, according to observers.

Of course, they point out, the implementation of informatics will be far from simple, even if no wheels are reinvented. The implications of the technology are nothing short of frightening to some Third World officials. Indeed, the real showdown may be between established vendors wishing to sell highly developed systems and

sources claim, noting that a small part of U.S. foreign aid goes to help developing nations with communications technology.

As a dominant force in the world computer industry, IBM's presence or absence at any type of so-called world meeting would be significant. The firm's corporate spokesman in Armonk says no decision has been made about attending the planned IBI conference in Havana in 1983. The company confirms that it met with Bernasconi and other IBI officials last February for "an exchange of views" concerning Latin American and Far Eastern markets.

Asked what IBM's stance towards the Third World is, a spokesman replied, "Developing nations represent a market for our products and services, and information handling products and skills will help their development."

The Reagan Administration's anti-Communist position prompts Washington observers to suggest that the Havana SPIN II conference will not be high on its list of priorities, but by 1983 when the conference rolls around there may well be a shift in attitude. In the meantime, U.S. and Japanese computer companies can be expected to reconnoiter the Third World markets.

—J.W.V.

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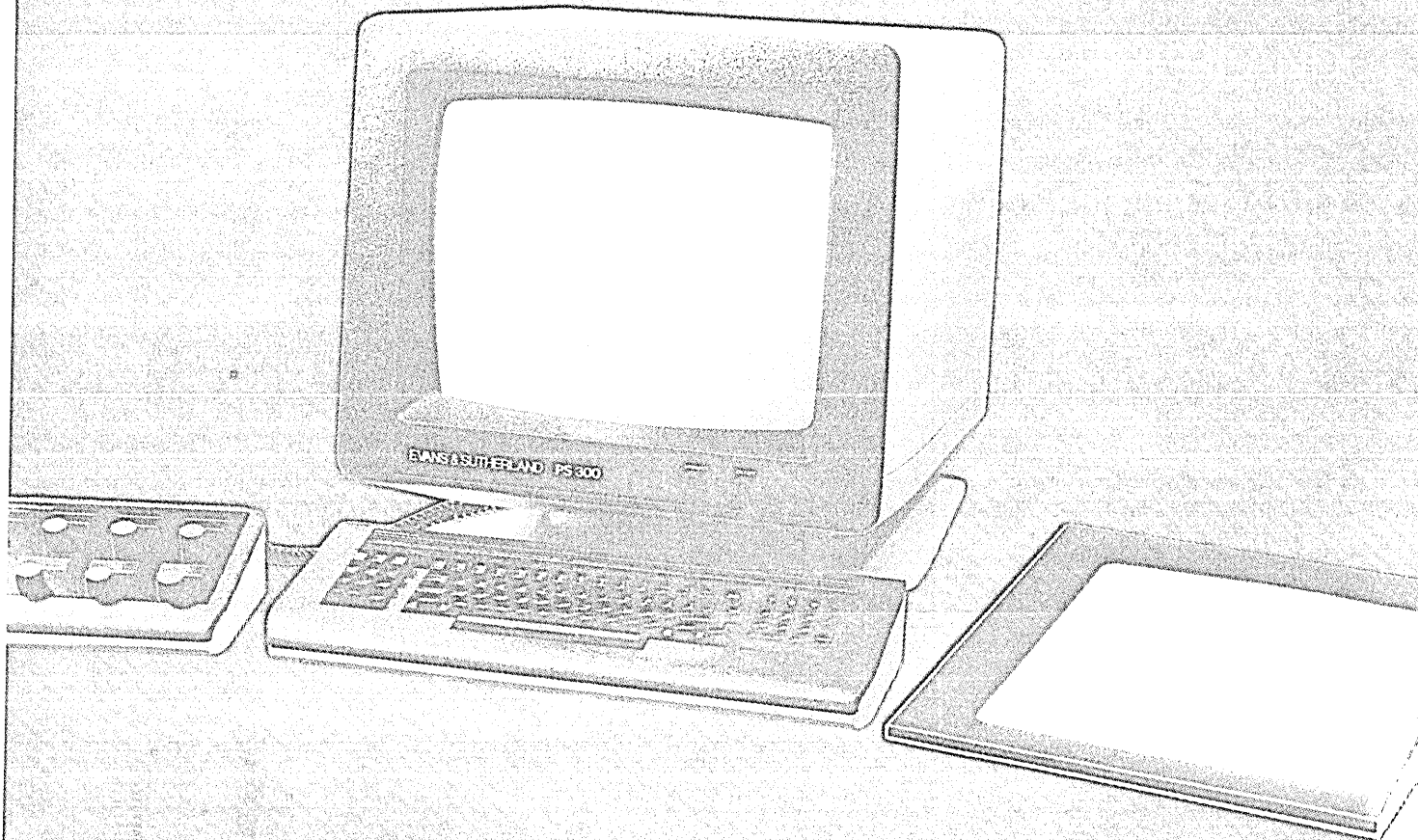
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NEWS IN PERSPECTIVE

Third World interests striving to retain cultural identities and economic self-reliance. Will the North force its square pegs into the round holes of the South?

Judging by the commentary heard by the sea in Acapulco, Third World officials are concerned that computers be "a tool of freedom, not a mechanism of subordination." Information must remain a "public service," they proclaimed.

"The price of informatics is very high for the Third World today," said Deonatus Mbilima, former adviser to the Prime Minister of Tanzania and now senior lecturer and economist in the Ministry of Manpower Development. "Informatics is first a political problem. We must redefine the goals of informatics for our own needs. Information and news equal power."

His views were echoed by Mahdi Elmandjra, former Deputy Director of UNESCO and former President of the World Federation of Future Studies.

Noting the confrontation between "North and South", a metaphor often used to describe so-called developed and developing countries, Elmandjra stated that "informatics gives us a unique chance for a better international order. Information is the highest form of energy."

Considered by many to be one of the most articulate "spokesmen" for Third World interests and co-author with James Botkin of "No Limits to Learning," the Moroccan said the Third World doesn't "want to face technological dictatorship. I am amazed at the use of informatics for police and control purposes. Sometimes I think the measure of underdevelopment in a state is proportional to the amount of money spent by the government on informatics for the control of population."

He also raised what may become a key issue in the development of informatics in Third World countries, that of cooperative systems necessitated by the relatively small gross national products of many countries which may prevent any one of them from funding its own informatics system. African countries in particular, he noted, are vulnerable to "getting sold equipment they can't use." He called for "South-South" cooperation in financing shared informatics networks to benefit whole regions of the continent, or else "we will see more exploitation by developed countries."

If on occasion the delegates veered towards what some attendees thought was overly nationalistic gripes or sought to fuel North-South antagonism, it didn't appear to disappoint Bernasconi. He privately stated in midsession that he was happy with whatever debates arose because they would generate constructive dialog and move IBI forward towards making SPIN II a momentous event.

Having been hastily written by committee, IBI's final declaration won't win any prizes for eloquence, but it does manage to

touch upon many issues raised by informatics applied on a global scale. The document gives precedence to social, political, and economic aspects over specific technologies, and there is a strong underlying faith throughout the paper that computers and telecommunications can help greatly in solving such world problems as hunger, poverty, nuclear arms proliferation, and economic disparity.

Perhaps the most sensitive issue raised is that of transborder data flow and the "right to information" as recognized by the Universal Declaration of Human Rights. The Acapulco group decided that the "concept of the 'right to information' needs to be reinterpreted in the light of changes due to informatics." That kind of language may raise the hackles of those in the West who have been so sensitive in recent months to the moves by UNESCO to accredit foreign journalists, according to observers at the IBI meeting. Nonetheless, Bernasconi was pleased with the outcome of his meeting. After a late-night session in which the declaration was finally approved, the delegates had a night's sleep and were off early the next day to Los Pinos, the summer retreat of Lopez Portillo, the Mexican President. There, with typical ceremony, the President signed the document and pledged his commitment to informatics as a way of peace.

Paper in hand, the IBI chief hopes to collect the signatures and support of as many heads of state as he can over the next few months, pitching SPIN II to vendors, nations, and computer gurus.

You can be sure we haven't seen or heard the last of the spunky Bernasconi. He's getting ready for a hot date in Havana.

—John W. Verity

COMPANIES

AMI SHIFTS DIRECTION

AM International has a new president, a new headquarters location, and a new corporate strategy.

It's back to the Midwest for AM International. The company's corporate headquarters should be relocated into leased space in downtown Chicago by Sept. 1.

Roy L. Ash, deposed chairman and chief executive who moved the company's headquarters from Cleveland to Los Angeles in 1978, doesn't think the return to the Midwest is a bad idea.

"When we moved here it was to be



RICHARD B. BLACK: He imposed a lid of silence on himself and other corporate officers pending an internal review of the company's operations and finances.

close to a bigger concentration of high technology." Ash took the reins of AM (then Addressograph-Multigraph) in September 1976. He characterized the company at that time as one "designed for oblivion." His antidote was a change in direction from a mechanical-based product line to products geared to office and business electronics.

Ash, the one-time budget chief under former President Richard Nixon, had been a founder of Litton Industries, a high technology company based on the West Coast. When he took over AM he brought in another former Litton exec, James Mellor, as president and chief operating officer. Mellor remains with AM International and will be one who'll make the move east.

Ash put the company on an acquisition route into high technology arenas and changed its name in 1978 to AM International when he moved it west. Sales rose during his tenure from \$596 million in 1977 to \$909.6 million in 1980. But earnings were erratic. After a net loss of \$19 million in 1977, earnings rose to \$21 million in 1978 then dipped to \$11.6 million in 1979. In 1980, earnings went down another 50% to \$5.8 million.

In its latest reported quarter, ended April 30, AM announced a record \$82.8 million loss. Contributing to the loss for the quarter, said a spokesman, was \$67.2 million worth of "adjustments" stemming from a continuing, extensive financial review of company operations begun in April by new chairman and ceo Richard B. Black.

In the same period a year ago, AM earned \$4.8 million. Revenues declined to \$206 million from the 1980 quarter's \$239 million. AM said a previously announced plan to sell off certain operations is expected to produce up to \$70 million in cash that will primarily be used to reduce debt.

The company also expects an operating loss for its current fourth quarter, re-

vising an earlier forecast of an operating profit in the period.

Ash, who says he still owns "\$4 million worth of AM stock," is optimistic for the company's financial future. He plans to hold on to his stock. "I think I know what their objectives are and I think they will accomplish them. I think the next fiscal year should be a very good one."

Ash's hasty departure from AM followed a year in which the company showed a loss of \$1.5 million on revenues of \$909.6 million. It was a dramatic exit, alleged to have been the result of a secret coup spearheaded by an outside director, John P. Birkelund, who was the one responsible for bringing Ash to AM.

Ash resigned during a Feb. 20 board meeting, following a three-hour defense of his tenure prompted by early warnings that his ouster was imminent. His successor, Black, 47, was named the same day.

Black had been with Maremont Corp. since 1967 where he served as chairman and chief executive officer until the merger of Maremont with Swiss Aluminum A.G. in 1979. After that he served as president and chief executive officer of Swiss Aluminum's wholly owned U.S. subsidiary (Alsuisse of America), which, in addition to Maremont Corp., includes other industrial companies.

Black has a reputation as a "turn-

In its latest reported quarter, AM announced a record \$82.8 million loss.

around" artist among Wall Street analysts. He has some help in doing this kind of job with AM in the form of new cash. On the same day Ash left AM, Madison Fund Inc., a \$570 million New York-based mutual fund, agreed to provide the company with major new capital. Ash had favored an alternate funding scheme.

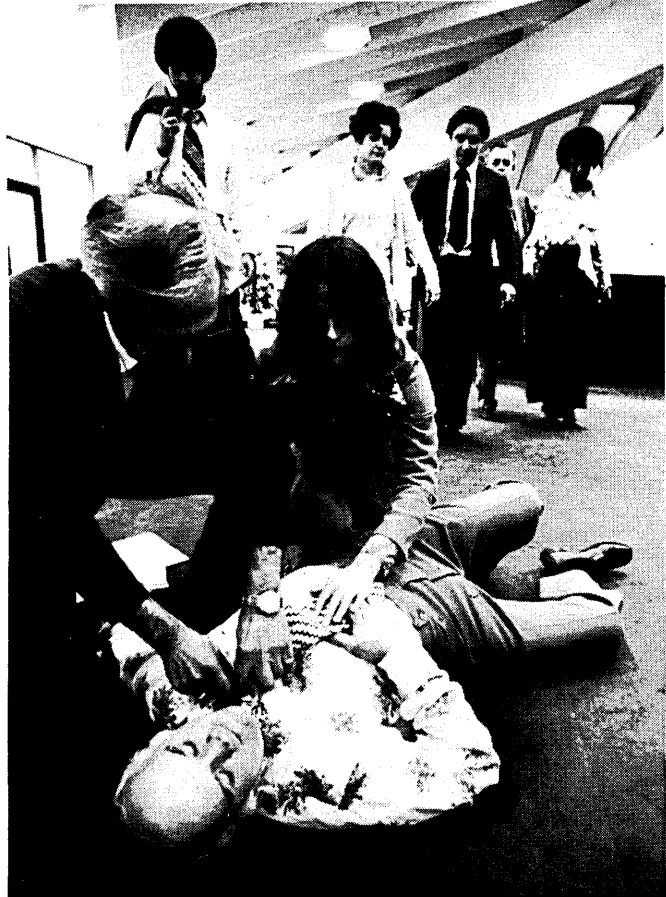
When Black took over AM, he ordered an extensive review of the company's operations, financial affairs, and internal controls. He also imposed a lid of silence on himself and other corporate officers pending the results of the review, which had not yet been completed when the planned move to Chicago was announced in late June.

Since the Black ascension, two high corporate posts at AM have been filled with former employees of Alsuisse of America. Joe B. Freeman was named senior vice president and chief financial officer, replacing James H. Combes, who resigned last October. Jerry O. Williams was named vice president of corporate planning, a new position. Both men report to Black.

The company also has expanded its board to nine directors from seven with the election of three new members and the resignation of another.

The company also, since Black took over, has announced plans to sell operating

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WE'RE FIGHTING FOR YOUR LIFE

NEWS IN PERSPECTIVE

units with revenues of \$125 million in fiscal 1980 and with a book value of about \$55 million. They include the micrographics operation, which makes microfilm and microfiche equipment; the Documentor Div., which makes management control systems for restaurants; the general office supplies product line; the Infotext management control system for graphics and copying equipment; and Emeloid, which produces credit cards and plastic specialties. Black said at the time the sales plans were announced, "I don't consider these businesses to be in the mainstream of AM's future." None of the operations had been sold by mid-July.

Ash said the decisions to sell all but Documentor had been made before he left. Of the decision to sell Documentor he said, "It's six of one and half a dozen of the other. You could keep it and collect money, or sell it and take the money."

Documentor, an entrepreneurial operation founded in Santa Ana, Calif., in 1968, has had a checkered history. It began making terminals and special-purpose computers and was almost acquired by Electronic Memories and Magnetics in 1970. It was one of the first point-of-sale equipment manufacturers to be tested by MacDonalds Hamburgers. The company was purchased by AM in 1972.

Another Southern California division acquired by AM in 1979, AM Jacquard Systems, is one the company will keep—but in a trimmed-down state. AM Jacquard was formed as Jacquard Systems in 1970 by Edgar Bolten and Mike Rogers, both of whom came from TRW.

Under a new president, George Vosatka, who joined AM Jacquard in September 1980 from Tymshare, Inc. where he had been a vice president, the division pared the work force by about 150 people, leaving some 700. Then in June it closed its word processing equipment plant in Newberry Park, Calif., transferring all word processing manufacturing to East Hanover, N.J., to the Varityper Div. Varityper's standalone word processor line, the 425, was acquired by Jacquard when it became part of AM.

Vosatka is enthusiastic about AM Jacquard's prospects. "We're going heavily after vertical markets now and beefing up our software activities." He said an electronic mail package for the J500 and J100 word processing systems is the company's next new offering.

It's been estimated that only a handful of the corporate people affected by the headquarters move (less than 100) will actually leave Los Angeles for Chicago.

Ash remembered that "maybe 20 people" made the move west with him in 1978, and he guesses very few would be interested in making a return trip. As one corporate staffer who won't make the move said, "I don't mind snow if it's under my skis."

—Edith Myers

BENCHMARKS

UNEXPECTED: It was just at a point when the company was in its prime, so to speak, when the top man resigned. Kenneth G. Fisher left abruptly as president and chief executive of Prime Computer in early July, leaving both posts unfilled and causing industry analysts to wonder what happened. Fisher, who is generally credited with making Prime the \$300 million company it is today, said he was leaving with "reluctance" and said he would go into education, charity, or politics. Speculation that he was forced out was only slightly damped by denials from Fisher and David Dunn, chairman. John Buckner, who joined the Natick, Mass., mini maker last year as vice president and chief financial officer, took over the helm as acting president and ceo.

GUILTY: Burroughs was hit last year by a rash of user suits charging it with misrepresenting its low-end computers, the B80, B700 and B800, in particular. Two of those suits have resulted in verdicts of guilty, with the combined damages to the Detroit mainframer totaling \$750,000. A quarter of a million was awarded to Natural Organic, Inc., a Farmingdale, N.Y., distributor of vitamins, while the rest went to Hall Affiliates, a floral company in Mobile, Ala. Appeals are in the works at Burroughs, which has sought to keep the issue at a low profile. Meanwhile, competitors are keeping a close watch on what happens—they may be the next to catch the wrath of such disgruntled users.

UNVEILED: The new Xerox 820, a word processor/personal computer, was introduced to much acclaim as a further piece of Xerox's office automation product line. The machine, which sells in its computer version for as little as \$2,995, runs the CP/M operating system and is expected to compete with such machines as the Apple, IBM 5120 and Data General's new \$8,000 desktop unit.

Able to tie into Ethernet, the 820 comes in under the Star workstation and is aimed to help Xerox get its foot in the door of accounts which might not be able to justify a full-blown Star system. It will be sold through Xerox computer stores, the Computerland chain of retail stores, and other nontraditional outlets. The system runs on a Z80 microprocessor and is software-driven, making it highly competitive with IBM's Displaywriter word processor, which is expected to gain data processing capabilities soon (Look Ahead, June, p. 13).

DELAY: Post-trial procedures in the government's antitrust suit against IBM have been delayed by two months to enable Assistant Attorney General William Baxter to familiarize himself with the issues of the case. The mid-July development came just

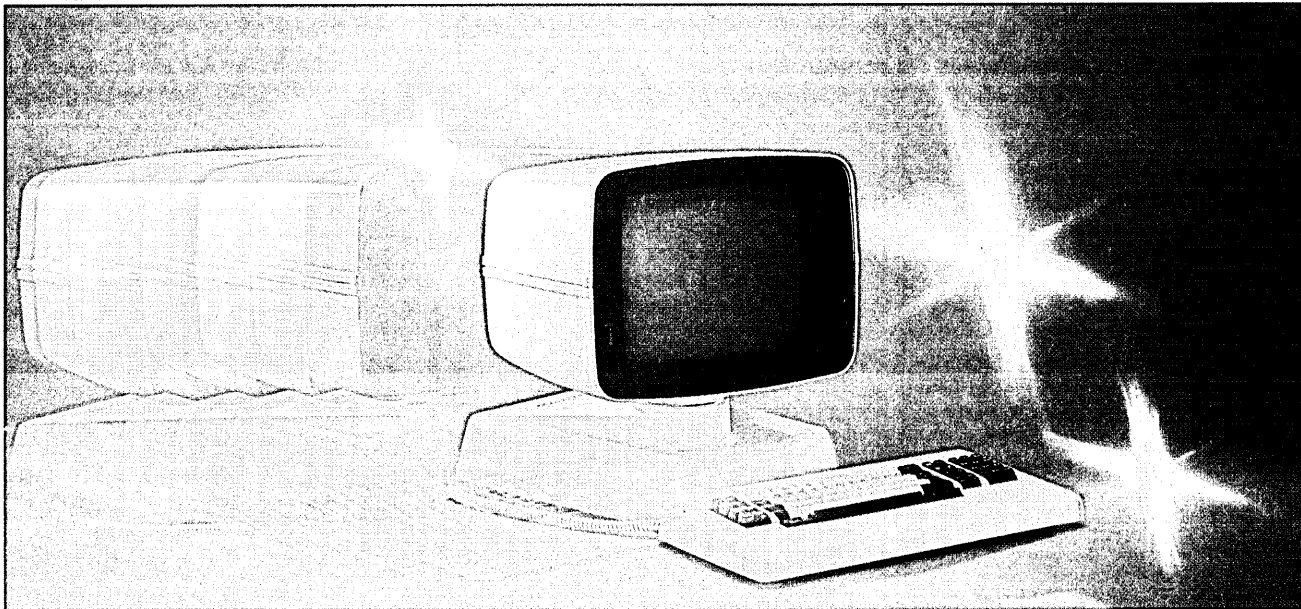
two weeks after Judge David Edelstein heard the last of IBM's testimony and scheduled findings of fact to be presented over the next six months. Court observers suggested that Baxter's interest in the case may be a sign that the government is considering an out-of-court settlement or at least a narrowing of the issues, especially in light of appeals court rulings in recent antitrust trials. Baxter has requested that each side in the case present its findings on a segment-by-segment basis. Meanwhile, the judge again offered his full cooperation in reaching a settlement.

UPPITY: IBM's three main marketing divisions, Data Processing, Office Products, and General Systems, have raised prices almost across the board. DPD upped rental and lease rates on certain products by 7%, GSD raised monthly charges by 8% on some machines, and OPD raised rental and lease charges by 10% on almost all its products. Some purchase prices at GSD and DPD were also raised by 5%. Two major items ignored in the latest round of IBM price increases were the Displaywriter word processor, which in recent months has come under sharp price attack by a number of vendors, and the 6670 laser printer/information distributor. GSD also came out with new discount schedules for its Series/1 small computer.

ONSHORE: Japanese electronics giant NEC has announced plans for a \$100 million semiconductor manufacturing plant to be built in Roseville, Calif. The plant, which is said to represent the largest investment by a Japanese company in U.S. semiconductor manufacturing, will produce 64K RAMs, 128K ROMs, and microprocessors. It is hoped the plant will supply NEC with about half the parts it will sell in the U.S. Officials said the Roseville operation will come on-line in two years, helping to boost the firm's share of the U.S. semiconductor market from 2% to about 8%. The plant will be run by Electronic Arrays, a U.S. firm NEC bought three years ago for \$8.5 million.

THE END: The U.S. Supreme Court has refused to hear Memorex's antitrust case against IBM, ending what has been one of the longest private cases faced by IBM since the early '70s, when close to a dozen cases were filed. Memorex, which lost district court and appellate court cases, was seeking some \$919 million in damages. It had accused IBM of violating the Sherman Act by reducing prices unfairly in response to lower prices of its competitors and exercising monopoly power in certain markets. The firm had originally sued for \$3.15 billion on a variety of claims and in 1978 was ruled against by a directed verdict in favor of IBM at the district level. The jury in that trial had been deadlocked 9 to 2 in favor of Memorex.

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CIRCLE 50 ON READER CARD

Voice output is starting to make sense in a variety of applications.

TALK IS GETTING CHEAPER

by Paul Masters

As voice output experiences the cost reductions and capability increases we've come to expect in computing, people with an interest in using voice may find themselves wondering: "Why do it now if I can do it cheaper later?" But a better question is: "Do I have any applications in which current voice techniques would be useful?"

In general, there are two good reasons for using voice output. First, it opens up a whole new channel for the human-machine interface, thus improving the effectiveness and efficiency of the overall system. Second, it turns all telephones into rudimentary computer terminals that are entirely adequate for a large number of applications.

Consider that of the five senses (touch, smell, sight, sound, taste), we now rely almost exclusively on touch and sight to operate computers. The addition of voice substantially increases the interaction intensity. So far, voice output has found relatively few applications because of the amount of computer memory and other resources required. However, major voice technology bit rate and quality thresholds that make a voice output terminal just another computer peripheral device have been crossed.

There are several ways to integrate voice output. One is to interpose a voice output terminal between the computer and the display terminal. The voice then overlays whatever is on the screen, providing training, explanation of error messages, and suggestions for possible actions.

Via telephone, users can receive messages that include up-to-date information from the database. With a touch tone detector added, the computer can get rudimentary responses from the caller. These telephone and voice-out systems make every telephone a limited but easily accessible terminal.

Time waveform of utterance "voice output," synthetically produced from text input. Prepared by Joe Olive and Mark Liberman, courtesy Bell Labs.

The parameterized waveform method shows promise of producing high quality speech at low bit rates with direct recording in real time.

A voice output terminal standing alone can provide instructions for complex procedures, ensuring that all steps are completed in the proper sequence. Adding a voice recognition terminal completes the voice loop for applications like quality control, data entry where the hands are busy, and inventory control. Because voice input is not yet as well developed as voice output, however, voice-in/voice-out will continue to be used in more limited applications.

Although voice processing is software-intensive, the requisite software is almost always included in the terminal on microcomputer chips. This is in keeping with the concept of distributed data processing; it makes little sense to load up the host computer with such tasks. Thus we are seeing stand-alone terminals with RS232 interfaces.

The host software needed to drive voice output hardware is in short supply. It would make the most sense to build voice I/O software modules in the common computer languages. COBOL needs a TALK verb for voice output and a LISTEN verb for voice input.

Use of currently available voice output equipment will require that software utility and subroutine programs be built. The first class of necessary utility programs loads the voice library files to the host computer disk file from the tape provided by the voice I/O manufacturer. The second set of programs writes the disk file records from the disk to the voice terminal. Finally, minor programs are needed to command the terminal to speak.

Although writing these programs is well within the capabilities of any systems programmer, so are most high-level language functions. As always, why reinvent the wheel? In the next five years it is likely that voice I/O growth will be such that manufacturers will develop LISTEN and TALK commands in COBOL, Pascal, Ada, FORTRAN, PL/1 and other high-level languages.

HOW MUCH SPEECH NEEDED?

In some cases, users will need only a limited vocabulary. For example, an elevator might say "Third floor" and "This elevator will leave in just a moment." Commercial dp applications are generally more complex, however, requiring huge vocabularies of part names, status responses, account types, course titles, etc. Libraries, rather than vocabularies, are essential in data processing. In a typical training application, 20 or more minutes of speech may be required. Voice output of only a few hundred words would not be adequate.

Speech quality can also vary according to context. A computer room console voice that says, "Printer number two is jammed" need not speak as beautifully as Orson Welles, because with any luck the printer will not jam with great regularity.

LOQUACIOUS DEVICES

A visitor to a general store near Lebanon, Pa., watched a taciturn, fiftyish woman total his purchases on an old-fashioned mechanical cash register: charcoal, potato chips, a couple of those tasty Pennsylvania Dutch Fruit Sticks . . .

"Play me again," came a siren's voice.

"I beg your pardon?"

"It's *that* darn thing," explained the grocer. She pointed to a gaudy, state-of-the-art pinball machine that stood flashing and gurgling in a corner.

Current applications for voice output range from meretricious arcade games to mundane intercept devices ("The number you have dialed . . .") used by the phone companies. Via touch-tone telephone, voice is used for remote data entry ("Enter part number . . .") and access to frequently updated databases ("Customer account balance is \$206 . . ."). The Kurzweil Reading Machine, one of the better-known voice output products, combines optical character recognition and speech synthesis to make printed materials available to the blind. And manufacturers apply voice in process control. A Votrax system, for example, makes use of bar codes placed on parts moving down an assembly line; a scanner reads the code and identifies the part, and a voice output device describes the operation to be performed on the part. Workers are able to keep their eyes on the machinery.

A number of companies offer voice output products nowadays. They use varying voice generation techniques and sell in various parts of the market. The most familiar products are probably the various talking boxes offered by TI, Tandy, Votrax, and others for use with personal computers. Semiconductor companies (TI and National Semi, for example) make chips and boards and sell them to OEMs, toymakers, and manufacturers of industrial equipment, appliances, and cars. Some companies, like Telesensory of Palo Alto, Calif., offer only boards; they tend to sell to OEMs and large end users with the expertise to handle instal-

lations. Then there are the companies that offer large telecommunications-oriented systems like Periphonics' Bank-From-Home. Besides the Bohemia, N.Y.-based Periphonics, this category includes Cognitronics, of Stamford, Conn.; the Votrax division of Federal Screw Works in Troy, Mich.; and ASI of Watertown, Conn.

Finally, there are the manufacturers of voice output peripherals which use standard interfaces to hook up to common computers. These products range from relatively simple voice-out devices with touch-tone recognition options to full-fledged front-end processors, and prices vary accordingly. Periphonics, Cognitronics, and Votrax have pieces of this business, and Votrax also participates in the chip-and-board end of the market. Other players in the peripherals game are Centigram of Sunnyvale, Calif.; Perception Technology of Winchester, Mass.; and Infolink (formerly Wavetech) of San Diego, Calif.

The size of the market for chips, boards, and peripherals is difficult to judge. A Frost & Sullivan report puts it at \$23.5 million for 1981; that figure includes TI's popular Speak and Spell. By contrast, Kenneth Bosomworth of International Resource Development, a market research and consulting firm, reckons the market was \$35.6 million in 1980, and he says that TI, including Speak and Spell, accounted for about two-thirds of that. Some of the confusion may result from the difficulty in separating one market tier from the next, and from the fact that many voice output companies are also involved in voice recognition.

All the forecasters do seem to agree that voice output is in for fairly rapid growth, and as the market gets bigger the uses of voice will presumably become better known. That will make Joe Scally, for one, very happy. Says the president of Perception Technology: "A lot of potential users look at the voice output market and get confused, and for them it becomes another long-term study project. We're trying to tell people that voice is easy to use right now."

—Ken Klee

Simple intelligibility is what's wanted. In an application like training, however, extended exposure to unnatural voice will cause fatigue and frustration.

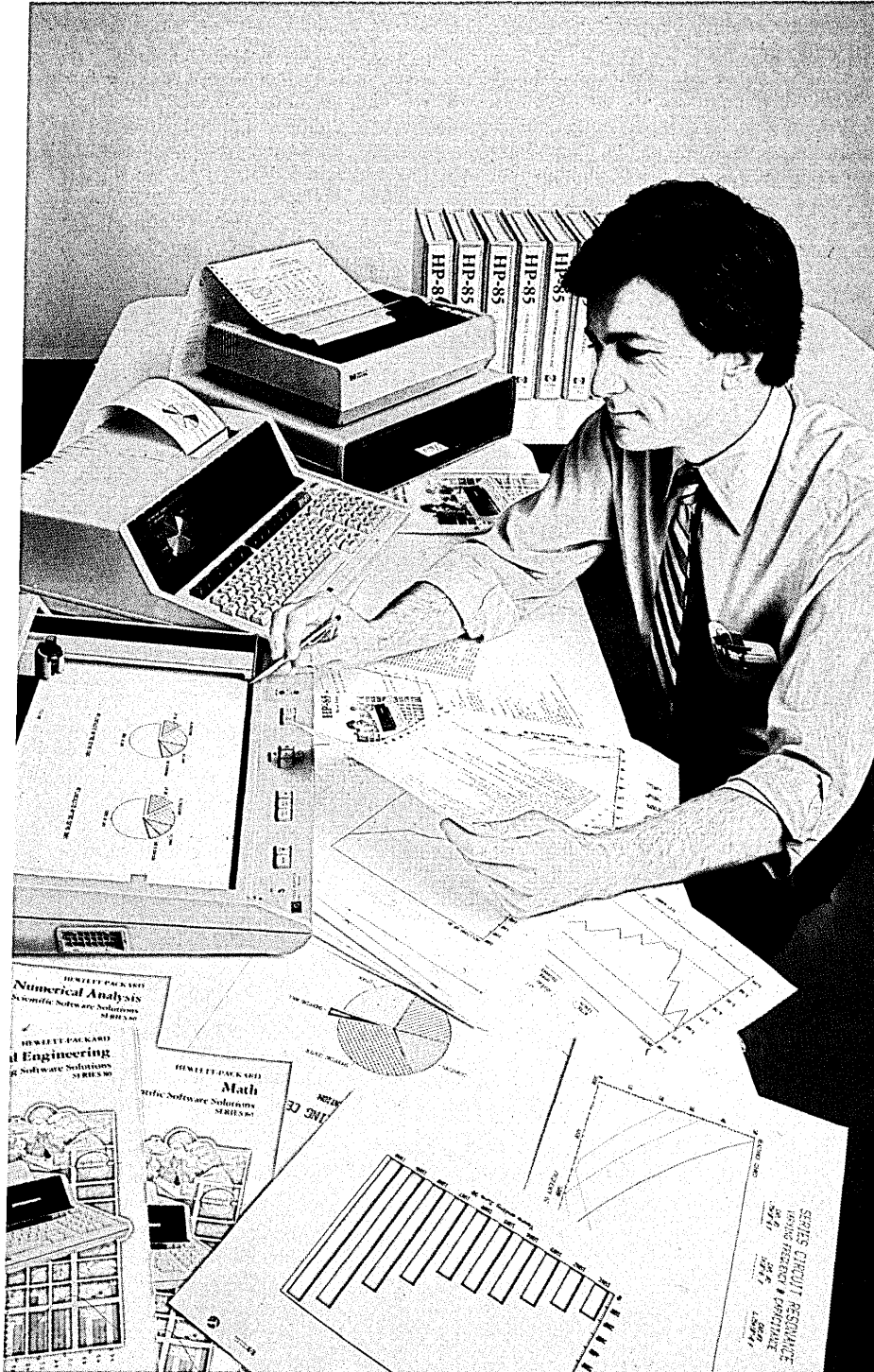
Finally, the perception of the system's quality is important. The best system in the world is no better than its user interface. In this regard, whose voice is output can be important. An automatic bank teller should address customers in well-modulated, bankerly tones. In a hypothetical Fotomat "Are my pictures ready yet" inquiry system, the

voice from the Fotomat radio commercials might be appropriate.

The test for voice quality is transparency. Transparent computer voice is digitized and reconstructed, and can be defined as voice that 80% of uncued listeners would not recognize as having come from a computer. Transparent speech is now available; given the cost reductions under way, it is unlikely that low quality computer voice will be used in future dp applications.

Modern voice output devices are driv-

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CIRCLE 55 ON READER CARD

The best test for whether information is transient, and thus a good candidate for voice output, is whether it can easily be conveyed over the telephone.

en by a stream of bits and bytes—just like any computer peripheral. The digital voice must be prepared beforehand and stored in memory for later playback. There are several ways to do this.

By far the easiest way is digital recording and compressions. The oldest and simplest techniques are various waveform digitizing techniques. These methods generally result in very high bit rates (in the 30,000 to 60,000 bps range) and reasonable quality.

Another method is linear predictive coding (LPC), which involves construction of a mathematical model of the throat. Although this results in acceptably low bit rates, the quality is poor because of pitch insensitivity.

The phoneme approaches use libraries of all possible sounds in language, which are combined to produce words. The advantage of phonemes is that unlimited speech can be produced by text-to-synthesis rules. Unfortunately, the quality is low, and with improvements in the digital recording and compressions techniques, phoneme systems are unlikely to be used in most applications.

Finally, the new parameterized waveform method, which combines the best of both LPC and waveform encoding, shows

promise of producing high quality speech at low bit rates with direct recording in real time. A parameterized waveform machine would work just like a tape recorder.

Voice recording is done either by staff on site or by the manufacturer at a factory location. Experience has shown that data processing user interfaces are the stickiest part of system design and development. Four iterations on a screen design are not unusual; voice output will require at least that many. Thus, in-house voice library development will be needed to avoid the cost and delay of sending scripts out for processing.

Voice output is now available in several forms. At the bottom of the ladder are chips like the Texas Instruments "Speak and Spell." These chips are inexpensive (\$10 to \$200), and some have reasonable speech quality. Unfortunately, the typical dp shop does not have the expertise to integrate chips.

The next level is boards. These make sense where a shop knows how to integrate them, and the voice is sent out from the computer in analog form. Some boards offer better speech quality than chips because more memory and computer power are available. Often, however, the board consists of just the

chip itself and some interfaces.

Finally, we come to the voice output terminal. Prices range from \$2,000 to \$50,000 and more. These terminals are designed to connect directly to computers via RS232 interfaces and usually rely on the host computer's disk memory for vocabulary storage. It is the terminals that are of primary interest in data processing applications.

WHEN TO USE VOICE

Not all output lends itself to voice. For example, a profit and loss statement recited verbally would be crazy. For purposes of discussion, we can divide output into three categories: permanent, temporary, and transient.

Permanent output lends itself to printed hardcopy of some sort, which can be viewed again in the future. Voice is usually inappropriate here.

Temporary output needn't be stored for long periods of time, but must be available for a few minutes. The most popular medium for temporary output is, of course, the crt. In the case of, say, a status inquiry screen, voice may or may not be an appropriate substitute.

Transient output is information that needs to be conveyed once. Stock quotations, course grades, and product availability are examples. The best test for whether information is transient, and thus a good candidate for voice output, is whether it can easily be conveyed over the telephone.

Determining the feasibility of voice output in a particular application can be difficult. One way is to develop a prototype and test it where you hope to use it, but this is expensive and time consuming.

Here is an easy, inexpensive way to test voice output feasibility:

1. Identify the application where voice appears to be of greatest benefit.
2. Develop the script. Decide what the computer should say and when. Write it down.
3. Use a person as a substitute for the voice output terminal. This person reads the script on cue as the computer would.

The people who are going to be listening to the machine should participate; they will provide valuable suggestions and help determine the feasibility long before many dollars are invested. If the project is feasible, the groundwork for good user acceptance will already be in place.

Paul Masters is national sales manager for Centigram Corp. Prior to joining Centigram he was senior data processing analyst at the University of California at Berkeley. He graduated from Berkeley with an AB in computer science and an MBA in management.

CARTOON BY CHUCK VADUIN



©DATAMATION

The SLC-II is a microprocessor—first can speak. That's right, its vocabulary runs well over 300 words. And what it can't say, it will spell for you in English.

The SLC-II intercepts messages from your computer, and takes specific actions. Just hook up the SLC-II between your CPU and your terminal with its standard RS-232 or 20mA serial loop interface, and you're set. With no software changes needed.

It automatically dials a pre-set telephone number and delivers any given message in an electronically synthesized voice. So if trouble comes up, the SLC-II can make the necessary phone calls to have it fixed. That's why it's so

much better than just a simple monitor, which can only helplessly record events. The SLC-II can act on them.

It can call and tell you when credit is over-drawn, when security needs tightening, when danger drops up—even when to get up in the morning.

Find out today how little it costs to add a voice to your computer. Call or write for more information about the SLC-II from Digital Pathways today, at 1260 L'Avenida, Mountain View, CA 94043. Telephone (415) 969-7600. TWX 910-379-5034.

**DIGITAL
PATHWAYS**

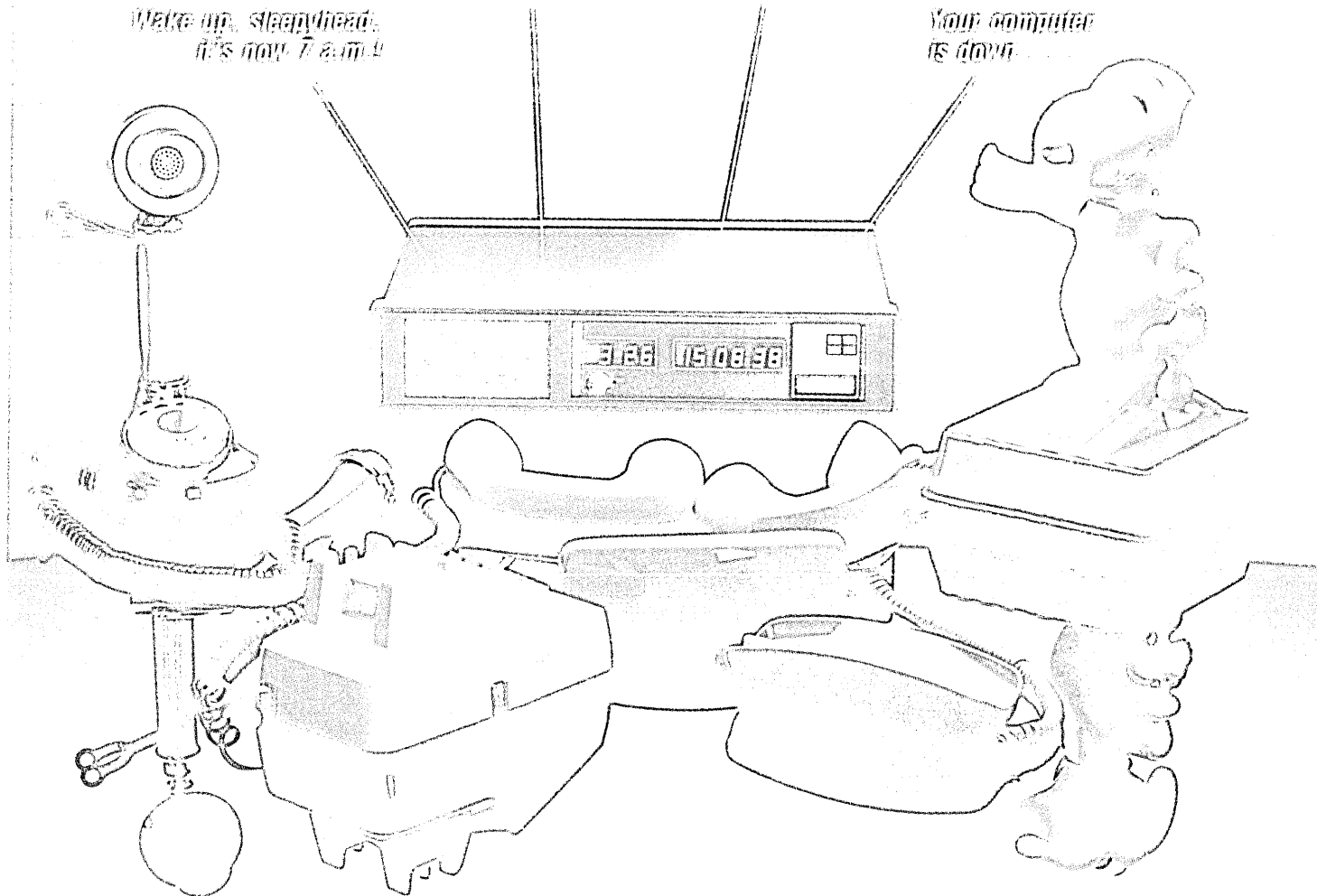
MEET THE SLC-II. IT TALKS TO SIMPLY EVERYBODY.

*Sorry, credit
for account #321-7332
is overdrawn.*

*Help. Alarm
fire in building 31.
Send assistance.*

*Wake up, sleepyhead.
It's now 7 a.m.!*

*Your computer
is down.*



by Ewing S. Walker

The cost and difficulty in designing, programming, and implementing an application is constantly increasing, despite the efficient design techniques and programming aids that are

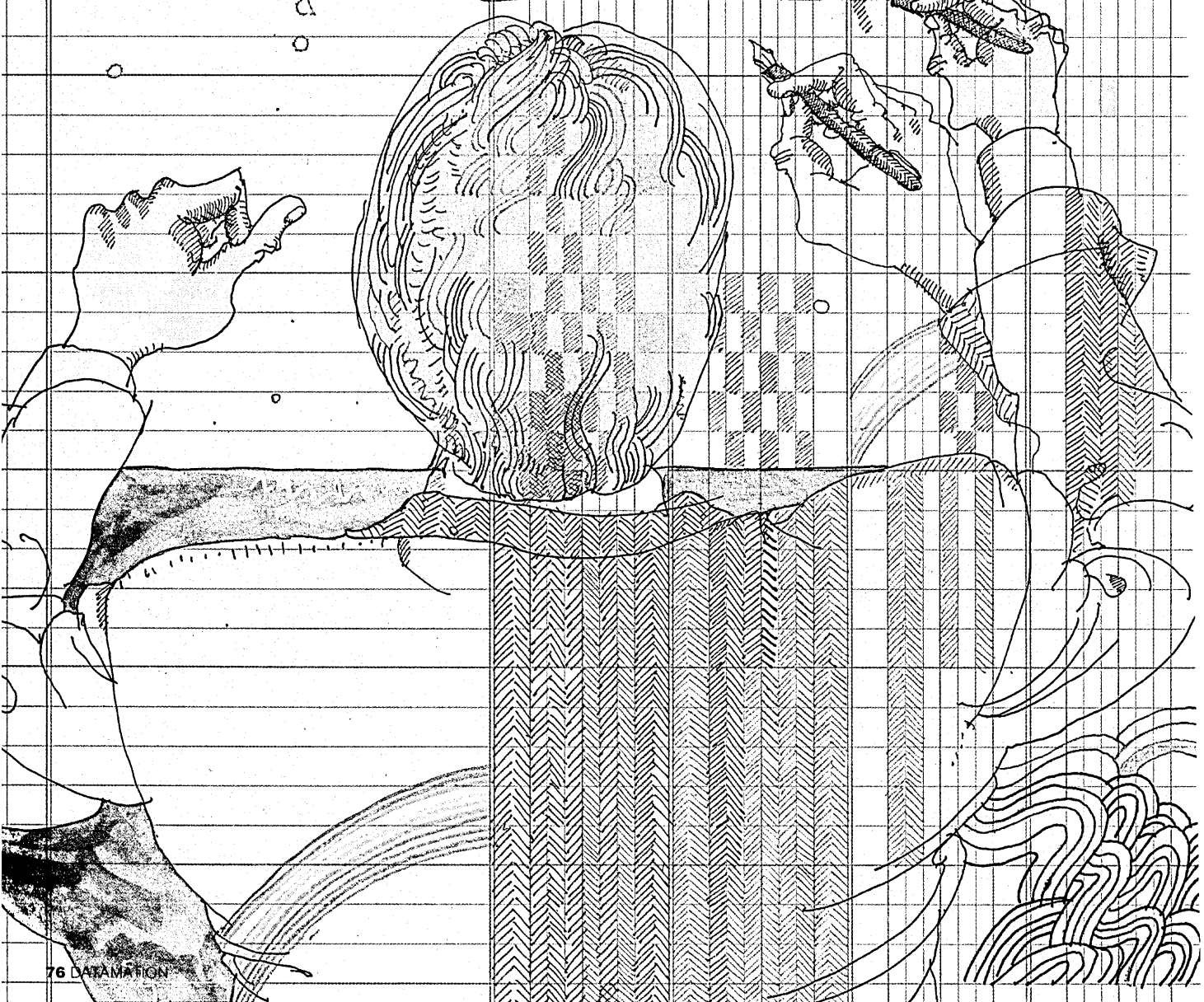
available. Consequently, it behooves all dp managers to use purchased application software packages whenever possible.

Packaged software also contributes to the solution of the programmer/

system analyst shortage by allowing these professionals to concentrate on applications where no packages are available or suitable.

From a corporate management viewpoint these other applications

5000	7	6430	
2800	4	2300	7873.00
1600	3	4600	6429.00
5340	6	7450	5231.00
7890	9	8320	4948.00
8243	2	6110	3654.00
1000	0	5530	2367.00
3468	0	2680	1070.00
		1840	3381.00



The dp manager guides the installation of a financial package
from selection through conversion.

ACCOUNTING PACKAGES: SELECTION AND MANAGEMENT

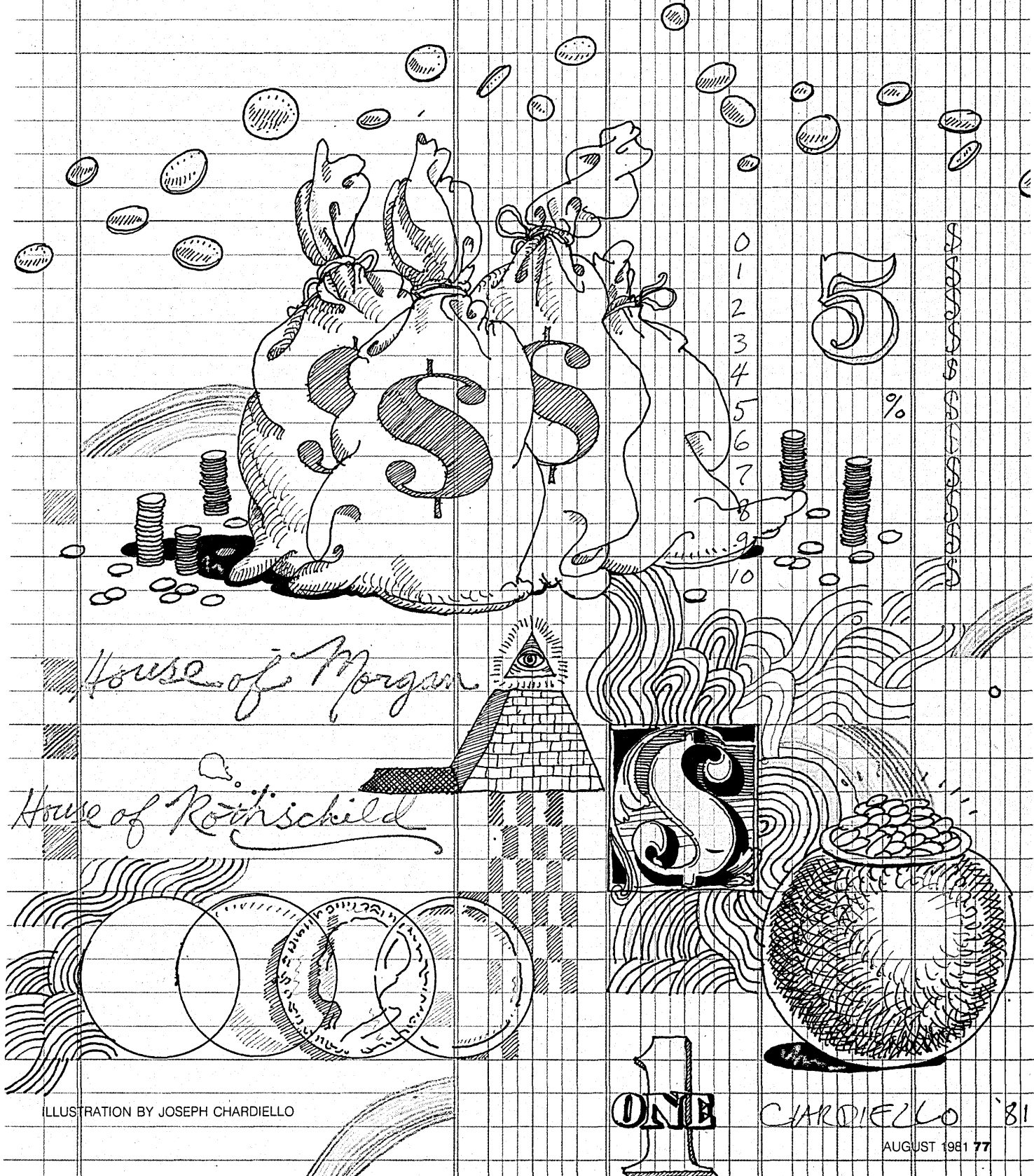


ILLUSTRATION BY JOSEPH CHARDIELLO

ONE

CHARDIELLO '81

AUGUST 1981 77

The flexibility and extension of current packages make them highly desirable for almost any business enterprise.

probably contribute in a greater way to the success of the business enterprise. The problems of inventory management, product distribution, or sales/marketing analysis unique to a particular organization clearly deserve the attention of the dp staff in preference to solving payroll, ledger, or payables problems where good solutions are already available.

The flexibility and extension of current packages make them highly desirable for almost any business enterprise. When one calculates the cost of setting up one's own general ledger or payroll system, packages become increasingly attractive. By the time programmers and analysts have designed, written, and tested a general ledger system, for example, costs can run anywhere from \$100,000 to \$500,000, depending on the size and the complexity of the installation.

What then is the role played by the dp manager in the selection and implementation of a software package?

Because a manager is held responsible for a system, package or not, until it is up and running, the dp manager's role covers four phases.

The first is selecting the package.

With the assistance of the user, who may or may not have a dp background, the manager must identify the package that fits the application. If dealing with non-dp users, a manager should encourage them to learn about the dp parts of the application or be prepared to educate them himself. Users with little or no dp background, such as a financial analyst or an economist, often approach a software package with a mixture of apprehension and unrealistic expectations. If a user knows something about dp, he can assist the dp manager in sifting through the products the market has to offer. A software customer must determine how long a little-known software company has been in business, what kind of documentation a package includes, and exactly what services are offered and in what geographic regions.

Selecting a package could take a considerable amount of time, as the many and varied listings compiled by Data Decisions (p. 88) indicate.

A second task of the dp manager is guiding the user in avoiding changes to the application source code.

Even if a package is purchased after careful research, it is rarely perfectly suited to every user requirement. However, if at all possible, it is extremely important for the dp analyst involved in the installation of the package to avoid changes in the existing package. An application package that has undergone minor changes in several aspects is a nightmare to keep updated with vendor-supplied enhancements. With no changes to application source code, vendor-supplied enhancements can be readily installed.

The installation of an unmodified package is important for several reasons: ease of installing vendor enhancements, the integrity of controls established for the package, and the knowledge that no hidden user bugs have been introduced. Changes made to a general ledger software package could affect, for example, controls designed to comply with auditing guidelines. These controls have most likely been well thought out by the vendor and are critical to any good application package.

To minimize or eliminate changes, it may be necessary to make procedural changes in existing operations. As difficult as this sounds within a corporate framework, it is desirable from the corporate viewpoint. It is also in the dp manager's selfish interest to keep the package functioning smoothly. If the duties of certain people in the payroll department could be changed, for example, to conform to the package, change the duties rather than the package. Of course, this reasoning has its limits. (At first glance, the idea of changing the operation to fit the program sounds unprofessional—similar to the programmer trainee who demands the company procedures be changed rather than his program.) However, the software that the operation is accommodating was professionally designed and written. The clerical methodology designed to support it just might be better than the methodology in current use by the purchaser.

MORE STANDARD REPORTS

If the user department balks at no changes or minimal changes, point out to them that reporting standardization is becoming more and more prevalent. In the receivables and payables environment of large companies such as J. C. Penney, with over 100,000 vendors submitting statements, vendors are encouraged to submit standard, machine-readable statements or invoices to the payables department.

Unfortunately, there will always be situations where it is desirable to make modifications for additional validation of input, and the like. If a dp manager decides to avoid changing package source code, the following solutions for modifying can be considered.

1. Design a new program, written in-house, to perform simple tasks such as prevalent (perhaps bringing in the master file in a "ready-only" mode). Validation of input programs frequently contain complex, inter-related logic. Changes to them should be avoided.

2. Write additional programs for new or modified reporting.

3. Defer the implementation of the needed change and encourage the vendor to consider that it be included in a future package enhancement (most vendors supply en-

hancements on a frequent basis). A users' group may agree with this needed change, and assist you in convincing the vendor.

Remember, the cost of hardware relative to software is cheap and getting cheaper. Introducing inefficiencies as a result of avoiding changes to purchased software, and therefore reducing software costs over the life of the new system, is generally the correct course of action.

A third responsibility of the dp manager in the installation of an application package is to provide a smooth interface among all personnel and the new system.

It is extremely important that the clerical and operations people who will support the new system be thoroughly familiar with the parts of the system they will use, and that they have a positive attitude toward it.

This group must be kept in mind when questions of training, facilities space, and extras, such as user manuals, arise. If neglected, this group can cause a great deal of otherwise avoidable frustration during transition.

Consideration should also be given to having clerical support personnel visit another user, or attend a user seminar or a vendor presentation. Assist these people in feeling positive about the new package and bring them in as part of the installation team.

The dp manager should also define the conversion from the existing system. The detailed plan of conversion is a critical part of the installation of a package. It is frequently overlooked in an otherwise carefully planned installation. Conversion planning includes the following:

1. Master file conversion.
2. Acquisition and encoding of newly required data fields.
3. Testing the package in your environment, even if unmodified (assurance testing is comforting, to say the least).
4. Timetable of actual cutover.
5. Control checklist to assure data integrity is maintained during cutover.

A parallel run of the new system with a concurrent run of the old system is sometimes desirable, but not always practical if heavy user clerical interface is required.

In short, when managing the installation of an applications software package, the following considerations are critical to the dp manager:

- Select a package that is a good fit.
- Avoid or minimize changes to the software.
- Make the package "user-friendly" by providing training to the user.
- Carefully plan cutover and acceptance.

Ewing S. Walker, an engineering graduate of Cornell Univ., has spent 20 years in the computer industry.

BUSINESS APPLICATIONS SOFTWARE OUTLINE

COMPANY

COMPANY	General Accounting Packages	Purchase Accounting Packages	Management Control Packages	Payroll & Personnel Packages	Burroughs Computers	Control Data Computers	Data General Computers	Dalapoint Computers	DEC Computers	Hewlett-Packard Computers	Honeywell Computers	IBM 360/370/3030/4300	IBM GSD & Other Computers	Modular Computers	NCR Computers	Perkin-Elmer Computers	Prime Computers	Sherry Univac Computers	Other Make Computers	BASIC Source Language	COBOL Source Language	FORTRAN Source Language	RPG Source Language	Assembler/Other Source
ABC Management Systems																								
Accurate Data Processing																								
Adata Corp.																								
Administrative Data																								
Advanced Data Systems																								
AIS Data Systems																								
Alltax																								
Alpha Systems																								
Amcor Computer																								
American Appraisal Associates																								
American Business Computers																								
American Computer Sciences																								
American Management Systems																								
American Software																								
American Valuation Consultants																								
Applied Business Systems																								
Applied Computer Services																								
Applied Data Processing																								
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CMC Associates																								
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Compute Inc.																								
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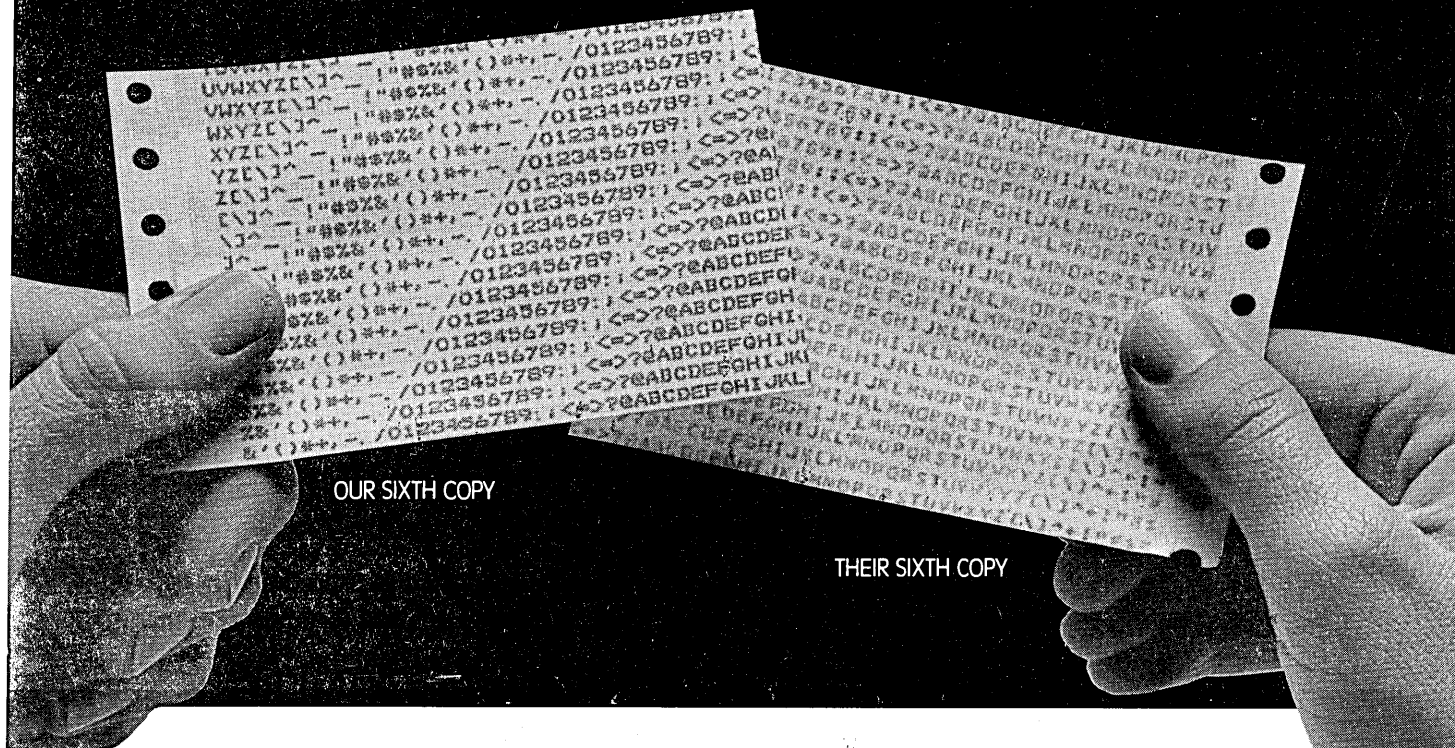
BUSINESS APPLICATIONS SOFTWARE OUTLINE

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- General Accounting Packages
- Purchase Accounting Packages
- Management Control Packages
- Payroll & Personnel Packages
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- Data General Computers
- Datapoint Computers
- DEC Computers
- Hewlett-Packard Computers
- Honeywell Computers
- IBM 360/370/3030/4300
- IBM GSD & Other Computers
- Modular Computers
- NCR Computers
- Perkin-Elmer Computers
- Prime Computers
- Sperry Univac Computers
- Other Make Computers
- BASIC Source Language
- COBOL Source Language
- FORTRAN Source Language
- RPG Source Language
- Assembler/Other Source

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Computerm Corp.																									
Computron Systems																									
Comserv Corp.																									
Condata Inc.																									
Consco Enterprises																									
Cosmic/University of Georgia																									
Country Programmers																									
Ctrac Computer Services																									
Cyborg Systems																									
Data 3 Systems																									
Data Communications																									
The Data Companies																									
Data Design Associates																									
Data Directions																									
Data Index																									
Data Lab																									
Data Management Systems																									
Data Processing Design																									
Data-Tek Corp.																									
Data Train																									
Datamatics Management Serv.																									
Digital Solutions																									
Digital Systems House of IL																									
Diversifiedata Services																									
DPS Inc.																									
Educational Data Systems																									
Efax Corp.																									
Efficient Management Systems																									
Electronic Data Systems																									
Escom/Div. Anacomp																									
Evaluation & Planning Systems																									
Evansville Data Processing																									
Exact Systems & Programming																									
Execucom Systems																									
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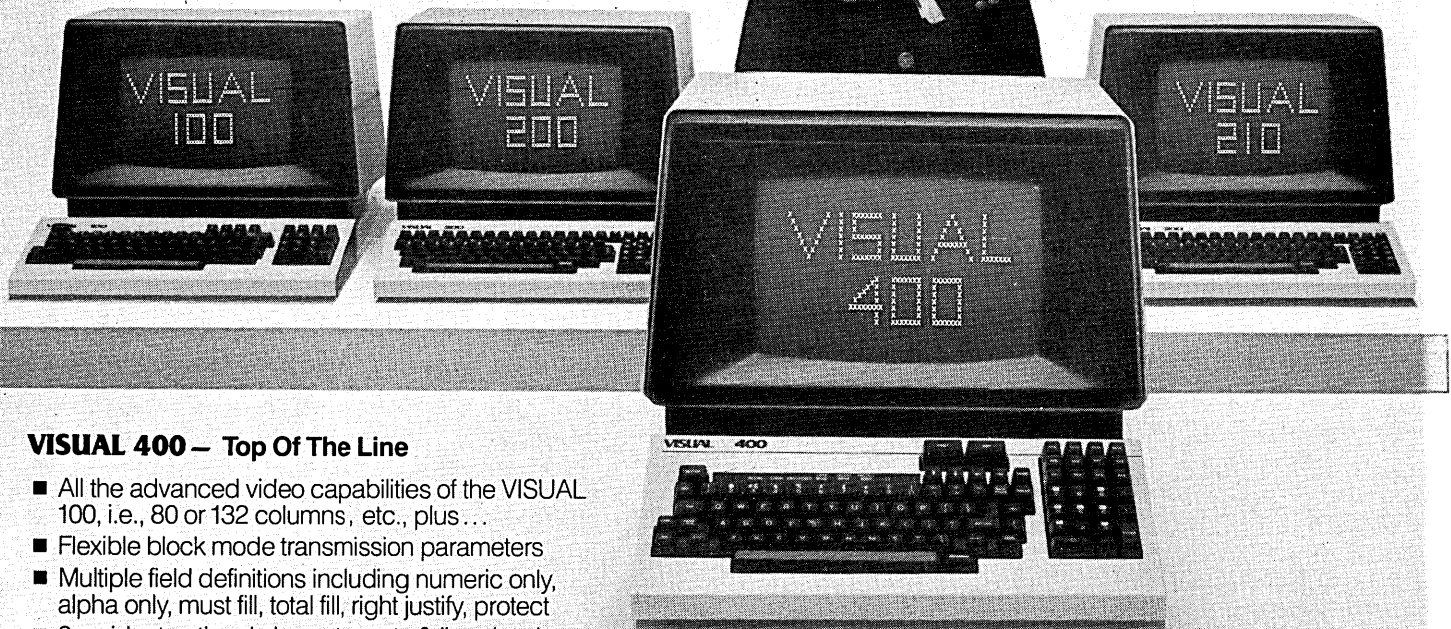
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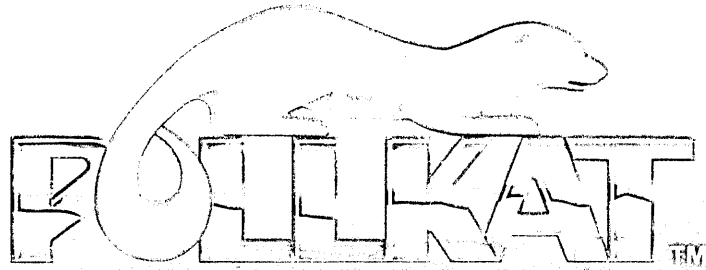
COMPANY	General Accounting Packages	Purchase Accounting Packages	Management Control Packages	Payroll & Personnel Packages	Burroughs Computers	Control Data Computers	Data General Computers	Datapoint Computers	DEC Computers	Hewlett-Packard Computers	Honeywell Computers	IBM 360/370/3030/4300	IBM GSD & Other Computers	Modular Computers	NCR Computers	Perkin-Elmer Computers	Prime Computers	Sperry Univac Computers	Other Make Computers	BASIC Source Language	COBOL Source Language	FORTRAN Source Language	RPG Source Language	Assembler/Other Source
International Computer Tech.																								
International Management Sys.																								
International Systems																								
J & S Associates																								
K & H Computer Systems																								
Keith Associates																								
Kirby Computer Systems																								
Thomas Laguban & Associates																								
Lavan Systems																								
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Logical Design																								
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Management Information Tech.																								
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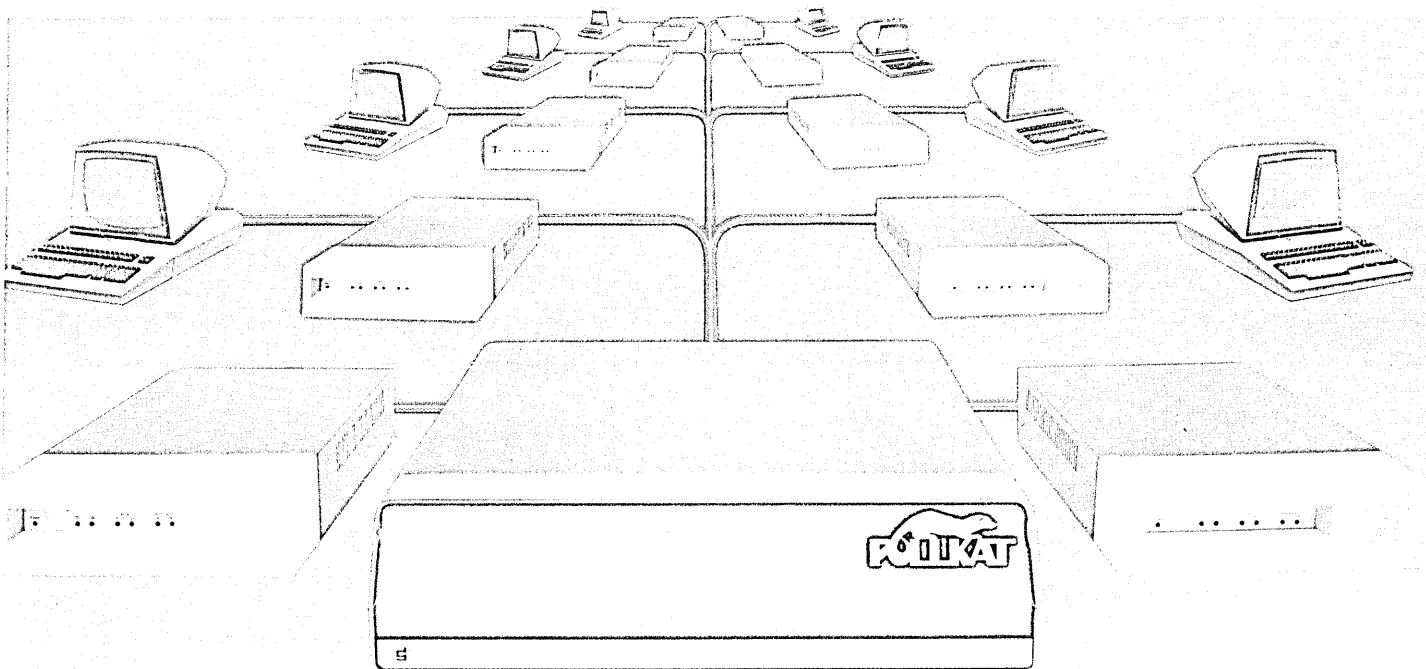
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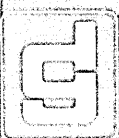
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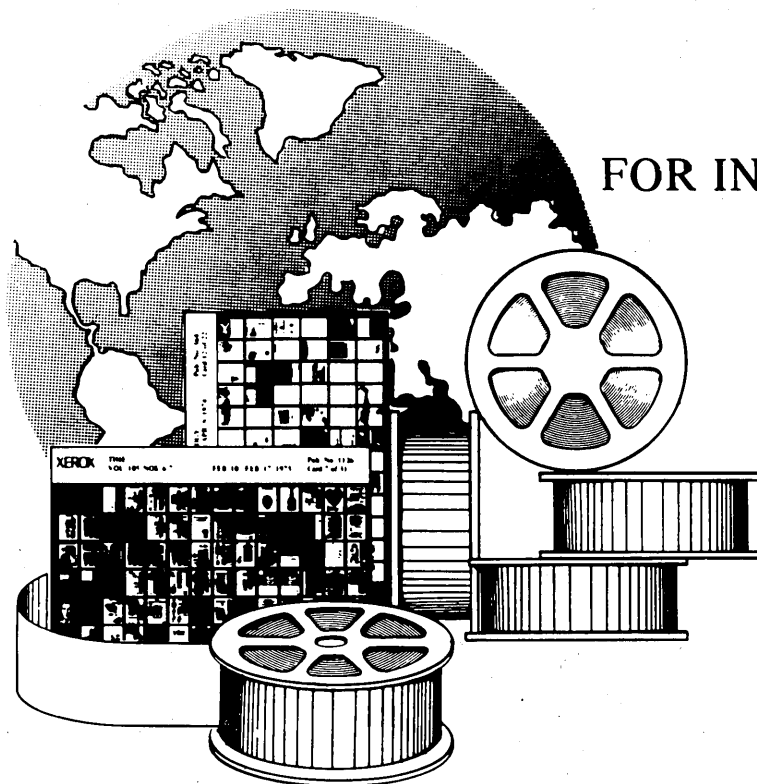
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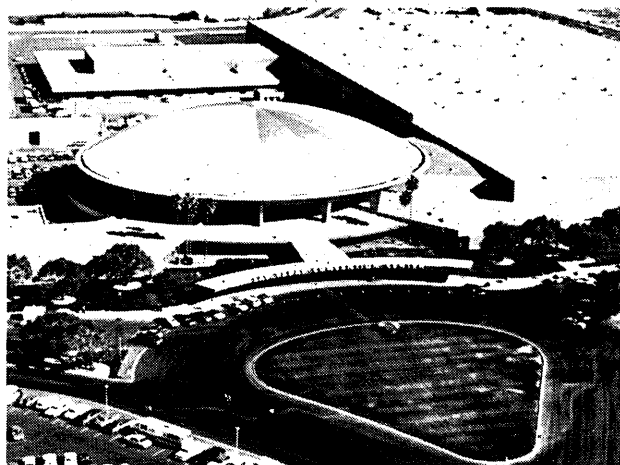
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COMDEX is a unique conference and exposition in its third year that has defined and brought together the world of the ISO -- the key marketing channel for the computer industry in this decade. Dealers, distributors, commercial OEMs, systems houses, software packagers, turnkey vendors, manufacturers' reps, computer retailers and office machines/product dealers - they make COMDEX '81 the nation's second largest computer event!



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SURVEY OF FINANCIAL APPLICATIONS VENDORS & PACKAGES

In the list of companies that follows, the software offered by each firm is bulleted. Each package is then described, including applications, hardware requirements, languages, and date introduced. In most cases prices and number of users are also given.

ABC MANAGEMENT SYSTEMS, INC. Bellingham Legal Center 805 Dupont Street, Suite 3 Bellingham, WA 98225 (206) 734-9622

- *ABC Analyst*
Management: strategic/long term planning and simulations and modeling; any computer with COBOL; twenty-five users; introduced 1979; \$10,000 purchase.

- *ABC Maintenance Management*
Management: manufacturing process/production control; any computer with COBOL; one user; introduced 1980; \$20,000 to \$35,000 purchase.

ACCURATE DATA PROCESSING P.O. Box 1865 Plant City, FL 33566 (813) 754-3034

- *General Inventory 3 (GI3)*
Purchase accounting: purchase orders and purchasing; order fulfillment and inventory control: inventory control and warehouse/stockroom control; Modcomp 2, 3, 4, or Classic; FORTRAN, Assembler; five users; introduced 1975; \$1,500 to \$2,500 purchase.

- *General Ledger 2 (GL2)*
General accounting: general ledger; Modcomp 2, 3, 4, or Classic; FORTRAN, Assembler; one user; introduced 1976; \$1,500 to \$2,500 purchase.

- *Payroll 2 (PR2)*
Payroll and personnel: payroll, withholding taxes, special compensation, and personnel records; Modcomp 2, 3, 4 or Classic; FORTRAN, Assembler; three users; introduced 1974; \$1,500 to \$2,500 purchase.

ADATA CORP. P. O. Box 55184 Indianapolis, IN 46220 (317) 257-5658

- *Fixed Asset Accounting (Equipment)*
General accounting: fixed asset/capital equipment and depreciation; NCR 8150 and 8200 series; COBOL; introduced 1980; \$1,750 initial license.

ADMINISTRATIVE DATA CORP. (ADC) P.O. Box 2344 Oakland, CA 94621 (415) 522-2400

- *General Ledger*
General accounting: auditing, financial reporting, and general ledger; IBM System/34; RPG; 18 to 20 users; introduced 1979; \$1,500 purchase.

- *General Payables*

Purchase accounting: purchase analysis; management budgeting; IBM System/34; RPG; three users; intro 1978; \$1,500 purchase.

ADVANCED DATA SYSTEMS, INC. 4010 Long Beach Boulevard Long Beach, CA 90807 (213) 426-8155

- *Avanti*
General accounting: general ledger; purchase accounting: accounts payable; sales accounting: sales invoices and accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; IBM System 32/34; RPG; 100 users; intro 1970.

AIS DATA SYSTEMS, INC. 5511 Parkcrest Suite 101 Austin, TX 78731 (512) 454-2585

- *AIS-10*
General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable and job cost; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; Perkin-Elmer 1610, 3220; COBOL; 30 users; introduced 1976; \$13,000 purchase.

ALLTAX, Div. of MSA 3445 Peachtree Road N.E. Atlanta, GA 30326 (404) 262-2261

- *ALLTAX*
Payroll and personnel: payroll taxes; any computer with COBOL; 2,500 users; introduced 1966; \$4,300 purchase.

ALPHA SYSTEMS, INC. 1329 Old Worcester Road Framingham, MA 01701 (617) 620-0983

- *BSC*
Payroll and personnel: special compensation and commissions; trusts and financial management: financial planning and analysis; IBM System 360/370/3030/4300, S/3, System 32/34; Honeywell Level 6; NCR Criterion series; Univac 90 series; COBOL, RPG; 20 users; intro 1978; \$2,000 to \$6,000 one-time license.

- *COMPLY/79*
Payroll and personnel: personnel records and affirmative action reporting; IBM System 360/370/3030/4300, S/3, System 32/34; Honeywell Level 6; NCR Criterion series; Univac 90 series; COBOL, RPG; 20 users; introduced 1978; \$2,000 to \$3,500 one-time license.

- *erisa/3*
Payroll and personnel: personnel records; trusts and financial management: retirement accounts and employee benefit fund management; IBM System 360/370/3030/4300, S/3, System 32/34; Honeywell Level 6; NCR Criterion series; Univac 90 series; RPG2; 40 users; introduced 1977; \$5,500 one-time license.

- *SSBENS*
Payroll and personnel: social security benefits; trusts and financial management: retire-

ment accounts and employee benefit fund management; IBM System 360/370/3030/4300, S/3, System 32/34; Honeywell Level 6; NCR Criterion series; Univac 90 series; COBOL; 40 users; introduced 1977; \$2,000 to \$3,500 license, 10% annual renewal fee.

AMCOR COMPUTER CORP. 1900 Plantside Drive Louisville, KY 40299 (502) 491-9820

- *Accounts Payable*
Purchase accounting: accounts payable; DEC PDP-11; BASIC; 50 users; introduced 1975; \$6,000 purchase.

- *Accounts Receivable*
Sales accounting: accounts receivable; DEC PDP-11; BASIC; 43 users; introduced 1976; \$6,000 purchase.

- *Business Control Systems*
Sales accounting: billings and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; DEC PDP-11; BASIC; 44 users; introduced 1975; \$18,500 purchase.

- *General Ledger/Financial Management*
General accounting: general ledger; management: financial planning and analysis; DEC PDP-11; BASIC; 49 users; introduced 1975; over \$5,000 purchase.

- *Payroll*
Payroll and personnel: payroll; DEC PDP-11; BASIC; 39 users; intro 1975; \$6,000 purchase.

AMERICAN APPRAISAL ASSOCIATES, INC. 525 East Michigan Street, P.O. Box 664 Milwaukee, WI 53201 (414) 271-7240

- *Asset Information Program (AIP)*
General accounting: fixed asset; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs 3000-4000 series; Honeywell 6000; COBOL; 22 users; introduced 1978.

AMERICAN BUSINESS COMPUTERS TRADING CORP. 3600 Standish Avenue Santa Rosa, CA 95401 (707) 585-1174

- *Accounts Payable*
Purchase accounting: accounts payable; Perkin-Elmer 16 series; FORTRAN; 35 users; \$1,800 purchase.

- *Accounts Receivable*
Sales accounting: accounts receivable; Perkin-Elmer 16 series; FORTRAN; 35 users; introduced 1980; \$3,000 purchase.

- *Payroll*
Payroll & personnel: payroll; Perkin-Elmer 16 series; FORTRAN; 35 users; introduced 1979; \$1,800 purchase.

AMERICAN COMPUTER SCIENCES 333 Sylvan Avenue Englewood Cliffs, NJ 07632 (201) 569-0530

- *PRISMS*
General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: accounts receivable and sales analysis; order

fulfillment & inventory control: order processing, inventory control, warehouse/stockroom control, and mail order; management: mail order, any minicomputer with COBOL; 348 users; intro 1977; \$50,000 purchase.

AMERICAN MANAGEMENT SYSTEMS, INC.
1515 Wilson Boulevard
Arlington, VA 22209
(703) 841-6000

- *Corporate Financial Systems (CFS)*
General accounting: financial reporting; management: financial planning and analysis; DEC PDP-11, 11/34 through 11/70; introduced 1980; \$60,000 to \$75,000 purchase.
- *Corporate General Ledger (CGL)*
General accounting: general ledger; introduced 1980; \$45,000 to \$60,000 purchase.
- *Generation Five*
General accounting: financial reporting; DEC PDP-11, 11/34 through 11/70; introduced 1980; \$30,000 to \$60,000 purchase.

AMERICAN SOFTWARE, INC.
443 East Paces Ferry Road
Atlanta, GA 30305
(404) 261-4381

- *Property Accounting*
General accounting: financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and lease accounting; IBM System 360/370/3030/4300; COBOL; 50 users; introduced 1974; \$16,000 to \$40,000 purchase.

AMERICAN VALUATION CONSULTANTS, INC.

2200 East Devon Avenue, Suite 247
Des Plaines, IL 60018
(312) 297-6100

- *BIT-FACS*
General accounting: fixed asset/capital equipment and depreciation; any computer with COBOL; 300 users; introduced 1971; \$16,000 to \$26,000 purchase.
- *TAX-FACS*
General accounting: local, state and Federal taxes; Burroughs 1800, 2700, 3700, 4700, 6700, 6800; Honeywell 2000, 6000 series; COBOL; 37 users; introduced 1977; \$17,000 to \$39,000 purchase.

APPLIED BUSINESS SYSTEMS
4350 Upper Soda Road
Dunsmuir, CA 96025
(916) 235-4551

- *Accounts Payable*
Purchase accounting: accounts payable; all Data General computers; FORTRAN; 34 users; introduced 1978; \$2,500 one-time license.
- *Accounts Receivable*
Sales accounting: accounts receivable; all Data General computers; FORTRAN; 34 users; introduced 1978; \$2,500 one-time license.
- *General Ledger*
General accounting: general ledger; all Data General computers; FORTRAN; 34 users; introduced 1978; \$2,500 one-time license.
- *Payroll*
Payroll and personnel: payroll; all Data General computers; FORTRAN; 34 users; intro-

duced 1978; \$2,500 one-time license.

- *Recruiter Pak*
Payroll and personnel: personnel records; all Data General computers; FORTRAN; one user; introduced in 1980; \$9,000 for a one-time license.

APPLIED COMPUTER SERVICES, INC.
16600 Sherman Way
Van Nuys, CA 91406
(213) 988-2220

- *Series I Business System*
General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable and billings; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; IBM Series/1 4955; Assembler; two users; introduced 1978.

APPLIED DATA PROCESSING
33 Bernhard Road
North Haven, CT 06473
(203) 787-4107

- *Accounts Payable*
Purchase accounting: accounts payable; IBM System 360/370/3030/4300; COBOL; 50 users; introduced 1975; \$15,000 purchase.
- *Accounts Receivable*
Sales accounting: accounts receivable; IBM System 360/370/3030/4300; COBOL; 60 users; introduced 1976; \$20,000 purchase.
- *Payroll*
Payroll and personnel: payroll; IBM System 360/370/3030/4300; COBOL, Assembler; 350 users; introduced 1974; \$20,000 purchase.

APPLIED DATA RESEARCH, INC.
Route 206 Center, CN-8
Princeton, NJ 08540
(201) 874-9000

- *Empire*
Management operations planning and control; IBM System 360/370/3030/4300, TSO, CMS; DEC 10, 20, VAX 11/780; FORTRAN, Assembler; 80 users; introduced 1978; \$36,000 to \$52,800 purchase.

APPLIED MANAGEMENT METHODS
201 N. Broad Street
Doylestown, PA 18901
(215) 348-1200

- *Total Planning & Management (TOPMAN)*
Management operations planning and control; IBM System 360/370/3030/4300; Honeywell Level 6; DEC PDP-11/34 and up; CDC 6600 and up, Cyber 175; Univac 1108; FORTRAN; five users; introduced 1975; \$30,000 to \$50,000 purchase.

APPLIED REALTIME SYSTEMS, INC.
1908 Clearview Pkwy.
Metairie, LA 70001
(504) 466-0287

- *CMAP*
General accounting: general ledger; purchase accounting: accounts payable; management: job costing; payroll and personnel: payroll; IBM Series/1; EDX; eight users; introduced 1979; \$15,000 purchase.

ARGONAUT INFORMATION SYSTEMS, INC.
383 Grand Avenue, Suite 6
Oakland, CA 94610
(415) 444-5954

- *AIS Accounts Payable*
Purchase accounting: accounts payable; IBM System 360/370/3030/4300, System 32/34; Burroughs; Honeywell; DEC; Data General; General Automation; Hewlett-Packard; Tandem; Univac; COBOL; over 60 users; introduced 1971.
- *AIS Accounts Receivable*
Sales accounting: accounts receivable; IBM System 360/370/3030/4300, System 32/34; Burroughs; Honeywell; DEC; Data General; General Automation; Hewlett-Packard; Tandem; Univac; COBOL; 15 users; intro. 1979.
- *AIS General Ledger*
General accounting: general ledger; IBM System 360/370/3030/4300, System 32/34; Burroughs; Honeywell; DEC; Data General; General Automation; Hewlett-Packard; Tandem; Univac; COBOL; 30 users; introduced 1978.

ATLANTIC SOFTWARE, INC.
320 Walnut Street
Philadelphia, PA 19106
(215) 922-7500

- *Project Control/70*
Management: operations planning and control; IBM System 360/370/3030/4300; Burroughs 900 series; Honeywell 6000 series; DEC System 20; Univac 1100 series; Hewlett-Packard HP 3000; Prime; COBOL; over 650 users; introduced 1967; \$25,000 one-time license.

A-T-O SYSTEMS MANAGEMENT GRP., INC.
4420 Sherwin Road
Willoughby, OH 44094
(216) 946-9000

- *Accounts Payable*
Purchase accounting: accounts payable; Honeywell Level 6; COBOL; nine users; introduced 1977; \$4,000 purchase.
- *Accounts Receivable*
Sales accounting: accounts receivable; Honeywell Level 6; COBOL; six users; introduced 1977; \$6,000 purchase.
- *General Ledger*
General accounting: general ledger; Honeywell Level 6; COBOL; six users; introduced 1977; \$5,000 purchase.

A V PRODUCTS INC.
237 Washington Street
Marblehead, MA 01945
(617) 598-2716

- *The Sales/Use Tax System*
General accounting: local, state and Federal taxes; any computer with COBOL; 25 users; introduced 1978; \$2,800 first year lease, \$1,800 each year after.

BABCOCK & WILCOX CO.
3315 Old Forrest Street
Lynchburg, VA 24501
(804) 384-5111

- *FUPAC*
Management: financial planning & analysis;

CDC 7600; FORTRAN.

● **MODEL/IMAGES**

Management: geometric modeling systems; CDC Cyber; FORTRAN.

J. BAKER & ASSOCIATES, INC.

300 Marquardt Drive

Wheeling, IL 60090

(312) 459-3900

● **Accounts Payable Cash Management**

Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; DEC PDP-11, (CTS 300/500); Hewlett-Packard HP 3000 series; COBOL, DIBOL II; 50 users; introduced 1973; \$3,800 to \$5,800 purchase.

● **General Ledger**

General accounting: general ledger; management: budgeting; DEC PDP-11, (CTS 300/500); Hewlett-Packard HP 3000 series; COBOL, DIBOL II; 15 users; introduced 1977; \$6,250 to \$12,500 purchase.

● **Payroll**

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; DEC PDP-11, (CTS 300/500); Hewlett-Packard HP 3000 series; COBOL 74, DIBOL II; 50 users; introduced 1973; \$3,800 to \$5,800 purchase.

BANCOHIO CORP.

770 West Broad Street

Columbus, OH 43265

(614) 463-8357

● **DIRECT**

General accounting: database access for any application; Honeywell Level 66; GMAP; two users; introduced 1975; \$14,400 purchase.

BANGROFT COMPUTER SYSTEMS, INC.

715 Trenton Street, P.O. Box 1533

West Monroe, LA 71291

(318) 388-2236

● **MCOFRS**

General accounting: financial reporting, general ledger; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs 1000 family; Honeywell Level 62; HP 3000; RPG; 120 users; \$2,300 to \$2,700 purchase.

● **MCOPRL**

Payroll and personnel: payroll; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs 1000 family; Honeywell Level 62; Hewlett-Packard HP 3000; RPG; 175 users; \$1,900 purchase.

IRWIN BRENDLER & ASSOCIATES

12 Library Street

Framingham, MA 01701

(617) 875-1100

● **Accounts Payable System**

Purchase accounting: accounts payable and cash disbursements; IBM System 360/370/3030/4300; Hewlett-Packard HP 3000; Wang VS 2200; COBOL; four users; introduced 1977; \$45,000 to \$50,000 purchase.

BRISTOL INFORMATION SYSTEMS, INC.

84 N. Main Street

Fall River, MA 02720

(617) 679-1051

● **Accounts Payable**

General accounting: auditing and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, and cash disbursements; Datapoint; DATABUS; over 100 users; introduced 1972; \$2,000 purchase.

● **Accounts Receivable**

Sales accounting: sales invoices, accounts receivable, and billings; Datapoint; DATABUS; 100+ users; intro. 1975; \$2,000 purchase.

● **Fixed Assets**

General accounting: fixed asset/capital equipment and depreciation; Datapoint; DATABUS; 20+ users; intro. 1976; \$1,200 purchase.

● **General Ledger**

General accounting: general ledger; Datapoint; DATABUS; over 100 users; introduced 1972; \$2,000 purchase.

● **Payroll System**

General accounting: general ledger; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Datapoint 16K processor only; DATABUS; 150 users; introduced 1972; \$2,500 purchase.

M. BRYCE & ASSOCIATES, INC.

1248 Springfield Pike

Cincinnati, OH 45215

(513) 761-8400

● **PRIDE-ASDM**

Management: time methodology systems design; IBM System 360/370/3030/4300; Burroughs 2500 and up; Honeywell 66 series to 6000 series; Univac 1100; ICL 1903; DEC 10 and 20; Hewlett-Packard HP 3000; CDC 6600; COBOL; 200 users; introduced 1970; \$40,000 purchase.

BUSINESS EDP SERVICES, INC.

110 Wall Street, 16th Floor

New York, NY 10005

(212) 269-0770

● **MIDAS-MARK II**

General accounting: general ledger; banking operations: commercial and construction loan management, bank-to-bank transfers, letters-of-credit, electronic funds transfers, "tellerless" terminals, foreign exchange, and money market; IBM System 32/34/38; RPG; 240 users; introduced 1976.

CACI

12011 San Vicente Boulevard

Los Angeles, CA 90049

(213) 476-6511

● **SIMSCRIPT II.5**

Management: operations planning and control, strategic/long-term planning, and simulations and modeling; IBM System 360/370/3030/4300; Honeywell 6000; DEC PDP-11, CDC Cyber; Univac 1100; Perkin-Elmer; Prime; Simscript; 2,000 users; introduced 1970; \$16,000 to \$20,000 purchase.

CALL COMPUTER

1961 Old Middlefield Way

Mountain View, CA 94043

(415) 964-5331

● **MGR**

General accounting: general ledger; purchase

accounting: accounts payable; sales accounting: sales invoices, accounts payable; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management budgeting, cost accounting, cash flow analysis, operations planning and control, strategic/long-term planning, and simulations and modeling; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; BTI-4000 and 5000; BASIC; 150 users; introduced 1973; \$2,000 one-time license.

CAMBRIDGE COMPUTER ASSOC., INC.

222 Alewife Brook Parkway

Cambridge, MA 02138

(617) 868-1111

● **CROSS-TABS**

Management: operations planning and control and statistical analysis; IBM System 360/370/3030/4300; Assembler; 150 users; introduced 1968; \$800/mo.

CAPEX CORP.

4125 North 14th Street

Phoenix, AZ 85014

(602) 264-7241

● **Auto Tab II**

Management: financial planning and analysis; IBM System 360/370/3030/4300; COBOL; 400 users; introduced 1970; contact vendor for pricing.

CARLETON CORP.

44 Broomfield Street

Boston, MA 02108

(617) 482-9870

● **AUDITEC**

General accounting: auditing; any computer with COBOL; three users; introduced 1979; \$16,500 one-year license.

CBAS COMPANY

2615 Bainbridge

Fort Collins, CO 80521

(303) 493-9345

● **Accounting Control System**

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and local, state and Federal taxes; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; management: budgeting; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM 5100; BASIC; 41 users; introduced 1979; \$7,000 one-time license.

CINCOM SYSTEMS, INC.

2300 Montana Avenue

Cincinnati, OH 45211

(513) 662-2300

● **Financial Management (EPOCH-FMS)**

At last.



**A new
system**

**that does everything the
Tandem NonStopTM system
does,
and then some..**



NonStop II.™ An enormous

The original NonStop™ System:

The original system set a whole series of breakthrough standards for high availability in a transaction processing system. With a level of up-time never before experienced in computer systems because no single module failure will stop the system, plus modular expandability which allows a system to increase processing power when needed, without changing any of the original hardware and without any software modification.

All this and more:

NonStop II is a brand-new system which builds on the original design and includes an enormous expansion of the system's potentials.

The keys are flexibility, for now and for the future; ease of support and service; and compatibility that puts other system evolutions to shame.

The new system utilizes 32 bit addresses, to give the user access to virtually unlimited data space. Up to one BILLION bytes of data per processor under the direct control of the Operating System.

With this extended addressability, Tandem NonStop II systems easily provide both hardware and software support for very large applications. NonStop II can handle many hundreds of terminals and communications lines interactively. With remarkable efficiency. With no down time because of a module failure.

Full serviceability:

Fault isolation and error detection have been enhanced in NonStop II as well. A new Operations and Service Processor, the OSP, is a separate, self-contained processor which can reduce hardware mean-time-to-repair by detecting and reporting problems on-line, plus providing service personnel with local and remote on-line system diagnostic capability.

A memory for the future:

Recognizing the potential user needs for larger memories, NonStop II has been designed so that each of the 2 to 16 processors per system is ultimately capable of addressing 16 megabytes of physical memory, eight times the current limit.



expansion of the system's potentials.

It was a powerful memory to begin with. The architecture can now handle even the largest, most demanding business and communications requirements.

The flexibility to offer additional capabilities in the future is provided by the new loadable control store, which allows the addition of functions to micro-code as part of continuing standard software updates.

Full compatibility with existing installations:

This is not the tongue in cheek compatibility systems users are accustomed to. NonStop II is application software compatible with existing Tandem NonStop system installations and can be integrated into a Tandem

EXPAND communications network without any software modification. And customers will be able to upgrade to a NonStop II system without any application software changes.

For high volume on-line transaction processing, there isn't a system out there to touch the Tandem NonStop II system.

In terms of continuous system availability, data base integrity, protection against loss or duplication of transactions in process, expandability without penalty in hardware and without reprogramming or recompiling software, and a level of on-line performance that rivals the cost effectiveness of any other machine on the market—in all of these considerations, no one else even comes close.

You'll want the complete story.

For full information and a demonstration of our unique capabilities, call or write Tandem Computers Incorporated, World Headquarters, 19333 Vallco Parkway, Cupertino, California 95014 U. S. A. Offices throughout the U. S. A., Canada, Europe, United Kingdom, Hong Kong, Mexico and Japan. Distributors in Australia, Finland, Greece, Korea, Taiwan and Venezuela.
TOLL FREE: 800-538-3107 or (408) 725-6000 in California.

TANDEM

A whole generation ahead.

CIRCLE 61 ON READER CARD

General accounting: auditing and financial reporting; management: financial planning and analysis; IBM System 370/3030/4300; COBOL; 40 users; introduced 1977; \$65,000 to \$100,000 purchase.

CITIBANK

**153 E. 53rd Street, Box 1127
New York, NY 10043
(212) 559-4421**

● *Probe-Five*

General accounting: auditing and financial reporting; any computer with COBOL; 100 users; intro. 1970; \$15,000 one-time license.

CLYDE DIGITAL COMPANY

**P.O. Box 348
Bedford, MA 01730
(617) 275-6642**

● *Accounts Payable Facility (APF)*

Purchase accounting: accounts payable, cash disbursements, and purchase analysis; DEC PDP-11 series including VAX under RSTS/E or VMS-11; BASICPLUS 2; 20 users; \$3,600 purchase.

● *Accounts Receivable Facility (ARF)*

Sales accounting: sales invoices, accounts receivable, billings, and sales analysis; DEC PDP-11 series including VAX under RSTS/E or VMS-11; BASICPLUS 2; 20 users; \$3,600 purchase.

● *GAP*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and local, state and Federal taxes; purchase accounting: accounts payable; sales accounting: accounts receivable; Management: budgeting, cost accounting, cash flow analysis, and sales/order forecasting and market analysis; payroll and personnel: payroll, withholding taxes, and personnel records; DEC PDP-11, VAX; BASIC; 50 users; introduced 1974; \$12,000 one-time license.

● *General Ledger Facility (GLF)*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and general ledger; Purchase Accounting: accounts payable; management: cash flow analysis; DEC PDP-11 series including VAX under RSTS/E or VMS-11; BASICPLUS 2; 20 users; \$3,600 purchase.

CMC ASSOCIATES

**755 Boylston Street
Boston, MA 02116
(617) 266-4933**

● *FDB-3000*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; management: budgeting; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Hewlett-Packard HP 3000; COBOL; nine users; introduced 1977; \$30,000 one-time license.

COLLIER-JACKSON & ASSOCIATES, INC.

**1805 N. Westshore Boulevard, Suite 121
Tampa, FL 33607
(813) 885-6621**

● *Integrated Financial Package*

General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and shipping and receiving; management: financial planning and analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Data General C/S; COBOL; introduced 1980; \$18,500 one-time license.

● *Ledger/3000*

General accounting: general ledger; Hewlett-Packard HP 3000 II and III, 33; COBOL; 20 users; introduced 1978; \$9,500 one-time license.

● *PAYPLUS/3000*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Hewlett-Packard HP 3000 II and III, 33; COBOL; 50 users; introduced 1978; \$12,500 one-time license.

COMMERCIAL ONLINE SYSTEMS CORP.

**355 Lexington Avenue
New York, NY 10017
(212) 564-3730**

● *Accounts Payable*

Purchase accounting: accounts payable, cash disbursements, and purchase analysis; IBM System 360/370/3030/4300; COBOL; 150 users; introduced 1976.

● *Accounts Receivable*

General accounting: general ledger; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; IBM System 360/370/3030/4300; COBOL; 150 users; introduced 1972.

COMPUTE, INC.

**104 Lyman Road
West Hartford, CT 06117
(203) 236-6250**

● *General Ledger*

General accounting: financial reporting, fixed asset/capital equipment and depreciation, and general ledger; payroll and personnel: payroll; trusts and financial management: stock and securities portfolio management and financial planning and analysis; IBM System 32/34, 5120; BASIC, RPG, APL; \$1,500 to \$7,500 purchase.

COMPUTER INDUSTRIES CORP.

**1501 Euclid Avenue
Cleveland, OH 44115
(216) 579-0200**

● *FA/TEC*

General accounting: fixed asset/capital equipment and depreciation; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll, withholding taxes, and personnel records; IBM System 360/370/3030/4300; Hewlett-Packard HP 3000; COBOL; 11 users; introduced 1978.

● *GL/TEC*

General accounting: general ledger; management: budgeting; IBM System 360/370/3030/

4300; Hewlett-Packard HP 3000; COBOL; 16 users; introduced 1978.

COMPUTER MANAGEMENT CORP.

**4909 Waters Edge Drive
Raleigh, NC 27609
(919) 851-7300**

● *CMC Accounts Receivable*

Sales accounting: accounts receivable; any computer with COBOL; 250 users; introduced 1978; \$8,800 one-time license.

● *CMC Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; any computer with COBOL; 250 users; introduced 1977; \$14,500 one-time license.

COMPUTER METHODS

**9401 West Beloit Road
Milwaukee, WI 53227
(414) 327-4471**

● *Profit System*

General accounting: auditing, financial reporting, and fixed asset/capital equipment and depreciation; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; management: budgeting, cost accounting, cash flow analysis, manufacturing process/production control, and bills of material; payroll and personnel: payroll, withholding taxes, special compensation, and commissions; IBM Series/1; BASIC FOUR; BASIC; over 200 users; introduced 1975; \$25,000 purchase.

COMPUTER METHODS CANADA, LTD.

**2300 Young Street, Suite 906
Toronto, Canada, M4P 1E4
(416) 482-5100**

● *CMS*

General accounting: general ledger; purchase accounting: accounts payable; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; management: cost accounting; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM 5100; BASIC; 15 users; 1979; \$11,000 one-time license.

● *General accounting*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, and cash disbursements; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: budgeting, cost accounting, and cash flow analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 32/34; RPG; one user; introduced 1980; \$25,000 one-time license.

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● *Temporary Employment SVC*

General accounting: general ledger; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM Series/1; EDL; two users; introduced 1980; \$30,000 one-time license.

COMPUTER PRODUCTS INTERNATIONAL

**3225 Danny Park
Metairie, LA 70002
(504) 455-5330**

● General Nova; Randal; General Automation; Point 4; FORTRAN, BASIC; introduced 1979; \$1,000 one-time license.

● *GLAPPR*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; purchase accounting: accounts payable, cash disbursements, and purchase analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Data General Nova; BASIC; \$5,000 one-time license.

COMPUTER SERVICE CONSULTANTS, INC.

**37 Jefferson Boulevard
Warwick, RI 02888
(401) 785-0300**

● *Accounts Payable*

Purchase accounting: accounts payable; trusts and financial management; retirement accounts and employee benefit fund management; Prime; FORTRAN; 8 users; introduced 1978; \$3,000 purchase.

● *Accounts Receivable*

Sales accounting: accounts receivable; Prime; FORTRAN; 8 users; introduced 1978; \$3,000 purchase.

● *General Ledger*

General accounting: general ledger; Prime; FORTRAN; 8 users; introduced 1978; \$3,000 purchase.

COMPUTER SYNERGY, INC.

**2201 Broadway, Suite 419
Oakland, CA 94612
(415) 444-3434**

● *Accounts Payable*

Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; DEC PDP-11 and 8; DIBOL; \$1,500 one-time license.

● *Accounts Receivable/Sales Analysis*

Sales accounting: sales invoice, accounts receivable, billings, and sales analysis; DEC PDP-11 and 8; DIBOL; \$1,500 one-time license.

● *General Ledger*

General accounting: auditing, financial reporting, and general ledger; DEC PDP-11 and 8; DIBOL; \$1,500 one-time license.

● *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; DEC PDP-11 and 8; DIBOL; \$1,500 one-time license.

COMPUTERISTICS, INC.

**2 Skiff Street
Hamden, CT 06514
(203) 288-4885**

● *Custom Control*

General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: accounts receivable and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management: manufacturing process/production control and bills of material; DG Eclipse; COBOL; intro. 1979.

COMPUTERM CORP.

**10420 S.W. Hawthorne Lane
Portland, OR 97225
(503) 292-3340**

● *Accounts Payable*

Purchase accounting: accounts payable, cash disbursements, purchase analysis, and check reconciliation; DEC PDP-11 and 8; Data General Nova; DIBOL.

● *Accounts Receivable*

Purchase accounting: accounts receivable, billings, and sales analysis; DEC PDP-11 and 8; Data General Nova; DIBOL.

● *General Ledger*

General accounting: financial reporting and general ledger; DEC PDP-11 and 8; Data General Nova; DIBOL.

● *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; DEC PDP-11 and 8; Data General Nova; DIBOL.

COMPUTRON SYSTEMS CO. INC.

**810 7th Avenue, 21st Floor
New York, NY 10019
(212) 246-6990**

● *CAS/IV*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; purchase accounting: accounts payable and cash disbursements; sales accounting: accounts receivable and billings; management: budgeting, cost accounting, cash flow analysis; payroll/personnel: payroll; DEC PDP-11; Wang VS; COBOL, BASIC; 25 users; intro. 1978; \$27,000 one-time license.

COMSERV CORP.

**1385 Mendota Heights Road
Mendota Heights, MN 55120
(612) 452-7770**

● *CAS III Extended*

General accounting: financial reporting and general ledger; IBM System 360/370/3030/4300; COBOL, Assembler; 1500 users; introduced 1977; \$18,000 to \$50,000 purchase.

CONDATA, INC.

**1809 Walnut Street
Philadelphia, PA 19103
(215) 569-4240**

● *PAS-RYTE*

Payroll and personnel: personnel records; any computer with COBOL; 25 users; introduced

1978; \$11,900 one-time license.

● *PAY-RYTE*

Payroll and personnel: payroll; any computer with ANSI COBOL; 100 users; introduced 1968; \$14,300 one-time license.

● *PAY-RYTE - PAS-RYTE*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions and personnel records; any computer with COBOL; 15 users; introduced 1979; \$23,700 one-time license.

CONSCO ENTERPRISES, INC.

**1700 Broadway
New York, NY 10019
(212) 586-8701**

● *Consco Accounting Information System*

General accounting: general ledger; purchase accounting: accounts payable; management: cost accounting, operations planning and control, project accounting, manage accounting database allocations, and report writing; IBM System 360/370/3030/4300; COBOL; 10 users; introduced 1972; \$85,000 to \$250,000 purchase.

● *Management Reporting System*

Management: financial planning and analysis; IBM System 360/370/3030/4300; COBOL; introduced 1980; \$35,000 purchase.

COSMIC

**University of Georgia
112 Barrow Hall
Athens, GA 30602
(404) 542-3265**

● *Critical Path Method*

Management: operations planning and control; Univac 1100 series; FORTRAN Assembler; \$1,440 purchase.

● *GREMEX*

Management: strategic/long-term planning and simulations and modeling; IBM System 360/370/3030/4300; FORTRAN; \$810 purchase.

● *LRC/NASA Pert Time III - LAR-1187/LEN-13145*

Management: operations planning and control; IBM System 360/370/3030/4300; CDC 6000; FORTRAN Assembler; \$930 purchase.

● *NASA Interactive Planning System (NIPS)-HQN-10920*

Management: operations planning and control; CDC 6000; FORTRAN, Assembler; \$2,100 purchase.

COUNTRY PROGRAMMERS, INC.

**Holiday Inn Drive
White River Junction, VT 05001
(802) 295-9100**

● *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM S/3, System 32/34, Series/1; Data General MicroNova, Nova; Univac V77; FORTRAN; six users; introduced 1979; \$5,000 one-time license.

CTRAC COMPUTER SERVICES

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(216) 676-9000**

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● *Accounts Payable*

Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; IBM System 360/370/3030/4300; COBOL; intro. 1978.

● *General Ledger*

General accounting: financial reporting and general ledger; IBM System 360/370/3030/4300; COBOL; introduced 1978.

● *General Ledger*

General accounting: financial reporting and general ledger; IBM System 360/370/3030/4300; COBOL; introduced 1978.

CYBORG SYSTEMS, INC.

2 North Riverside Plaza, Suite 2160

Chicago, IL 60606

(312) 454-1865

● *Cyborg Payroll/Personnel System*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions and personnel records; IBM System 360/370/3030/4300; Burroughs 3800; DEC 10 and 20; Univac 90/30, 60, 80, 1100 series; COBOL; 130 users; introduced 1974; \$45,000 one-time license.

DATA 3 SYSTEMS, INC.

P.O. Box 441

Santa Rosa, CA 95402

(707) 528-6560

● *MRPS 34/38*

Purchase accounting: purchase orders and purchasing and purchase analysis; sales accounting: sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; management: sales/order forecasting and market analysis, manufacturing process/production control, bills of material, and operations planning and control; IBM System 34/38; RPG II; four users; introduced 1980; \$70,000 to \$150,000 purchase.

DATA COMMUNICATIONS CORP.

3000 Directors Row

Memphis, TN 38131

(901) 345-3544

● *The Financials*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and payroll; purchase accounting, purchase orders and purchasing and accounts payable; Data General; COBOL; 12 users; intro 1978.

THE DATA COMPANIES

11777 Katy Freeway, Suite 5005

Houston, TX 77079

(713) 493-4281

● *Financial Analysis and Statistical Techniques (FAST)*

General accounting: fixed asset/capital equipment and depreciation.

DATA CONSULTANTS, INC. (PA)

1724 Lyter Drive

Johnstown, PA 15905

(814) 255-4137

● *Accounts Payable*

Purchase accounting: accounts payable, cash

disbursements, and purchase analysis; Burroughs (all models); COBOL; introduced 1979.

● *Accounts Receivable (Retail)*

Sales accounting: accounts receivable and billings; Burroughs (all models)

● *Fixed Asset*

General accounting: fixed asset/capital equipment and depreciation; Burroughs (all models); COBOL; introduced 1979.

● *G/L (Retail)*

General accounting: auditing, financial reporting, and general ledger; Burroughs (all models); COBOL; introduced 1979.

● *On-Order*

Purchase accounting: purchase orders and purchasing; Burroughs (all models); COBOL; introduced 1979.

● *Payroll (Retail)*

Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; Burroughs (all models); COBOL; introduced 1979.

● *Perpetual Unit and Dollar Inventory*

Order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; Burroughs (all models); COBOL; introduced 1979.

● *Sales Audit and Analysis*

Sales accounting: sales analysis; Burroughs (all models); COBOL; introduced 1979.

● *SKU Sales and Inventory*

Sales accounting: sales analysis; order fulfillment and inventory control: inventory control, warehouse/stockroom control, and reordering; Burroughs (all models); COBOL; introduced 1979.

DATA DESIGN ASSOCIATES, INC..

1250 Oakmead Parkway, Suite 310

Sunnyvale, CA 94086

(408) 985-2570

● *Accounts Payable*

General accounting: auditing and generalized report writer; purchase accounting purchase orders and purchasing accounts payable, cash disbursements, and purchase analysis; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs (all models); Honeywell (all models); DEC System 10, System 20, PDP-11/70; Sperry Univac; Hewlett-Packard HP 3000; Data General; Prime; Tandem; Wang; COBOL; 65 users; introduced 1978; \$26,000 purchase, \$41,000 with purchase control.

● *Fixed Assets Accounting*

General accounting: fixed asset/capital equipment and depreciation, local, state and Federal taxes, and generalized report writer general ledger interlace; order fulfillment and inventory control: inventory control; management; financial planning and analysis, ADR accounting, FASB-13 lease accounting, and FASB-33 current cost accounting; IBM System 360/370/3030/4300; Burroughs (all models); Honeywell (all models); DEC System 10, System 20, PDP-11/70; Sperry Univac 90 and 1100; Hewlett-Packard HP 300; COBOL; 160 users; introduced 1973; \$17,000 purchase.

DATA DIRECTIONS

7700 Edgewater Drive

Oakland, CA 94621

(415) 632-4303

● *Minicomputer Business Applications*

General accounting: general ledger; purchase accounting: purchase orders and purchasing invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; payroll and personnel: payroll, withholding taxes, special compensation, and commissions; Data General Eclipse; Wang vs; COBOL; five users; introduced 1979; \$12,000 purchase.

● *Payroll System*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/3030/4300; Wang vs; COBOL; two users; introduced 1979; \$8,000 to \$10,000 purchase.

DATA INDEX INC.

4390 Alpha Road

Dallas, TX 75243

(214) 386-3929

● *System General Ledger International*

General accounting: fixed asset/capital equipment and depreciation and general ledger; purchase accounting: accounts payable and purchase analysis; sales accounting: accounts receivable; payroll and personnel; payroll; IBM Series/1; EDL; four users; introduced 1979; \$15,000 to \$25,000 purchase.

DATA LAB CORP.

200 W. Monroe

Chicago, IL 60606

(312) 236-8162

● *Integrated Accounting System*

Purchase accounting: accounts payable, purchase analysis, and general ledger; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/3030/4300; Data General Eclipse; FORTRAN; 10 users; introduced 1974; \$15,000 purchase.

DATA MANAGEMENT SYSTEMS (DAMAS)

3131 N.E. Broadway

Portland, OR 97232

(503) 284-9677

● *Accounts Payable*

Purchase accounting: accounts payable; Data General; Point four; BASIC; \$1,750 one-time license.

● *Accounts Receivable*

Sales accounting: accounts receivable; Data General; Point 4; BASIC; \$1,750 one-time license.

● *Administration*

General accounting: general ledger; purchase accounting: purchase orders and purchasing; management: budgeting; payroll and personnel: payroll; \$12,500 one-time license.

● *General Business Package*

General accounting: general ledger; purchase accounting: accounts payable; sales accounting; accounts receivable; payroll and personnel: payroll; Data General; BASIC; \$1,750 one-time license.

● *General Ledger*

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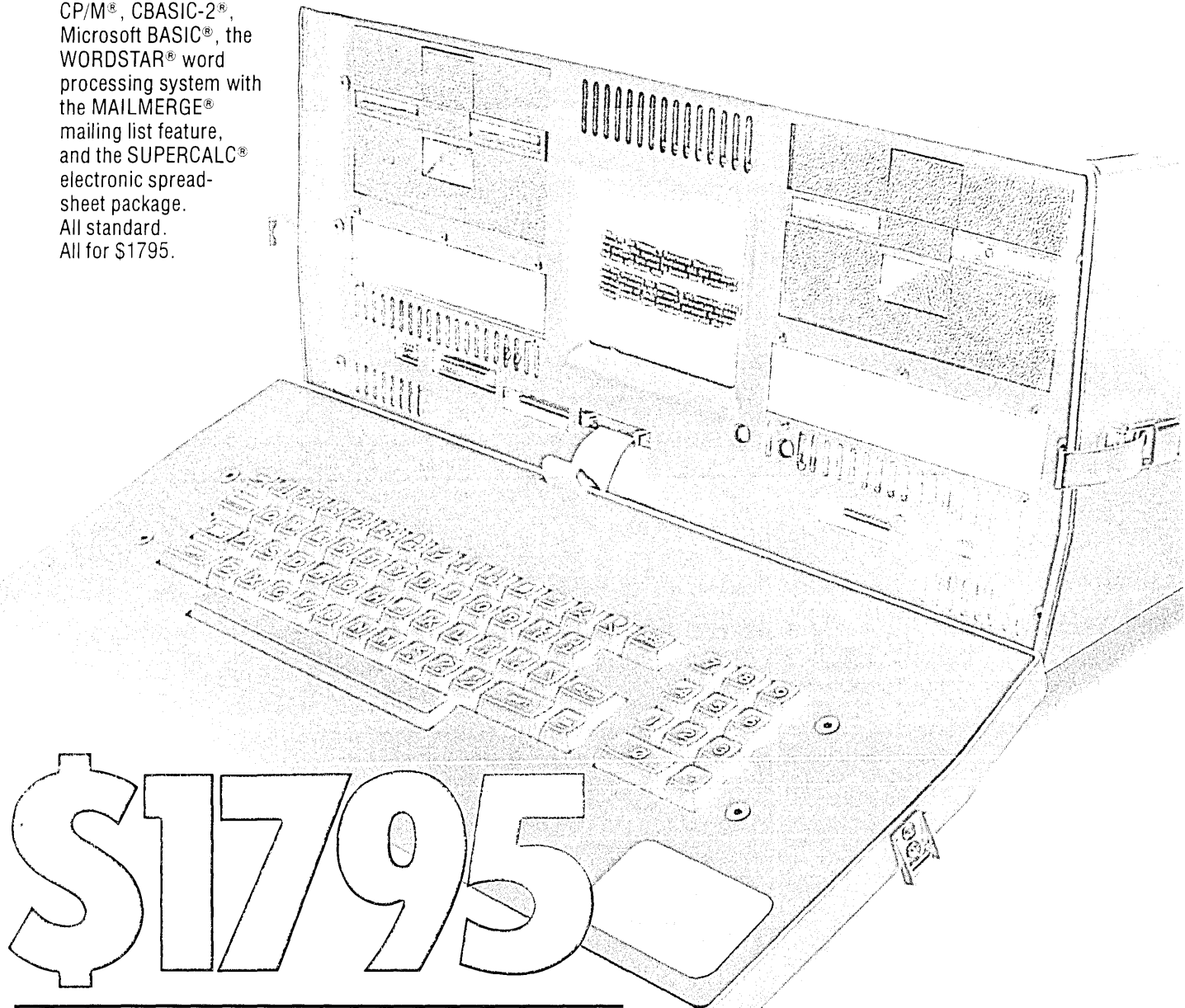
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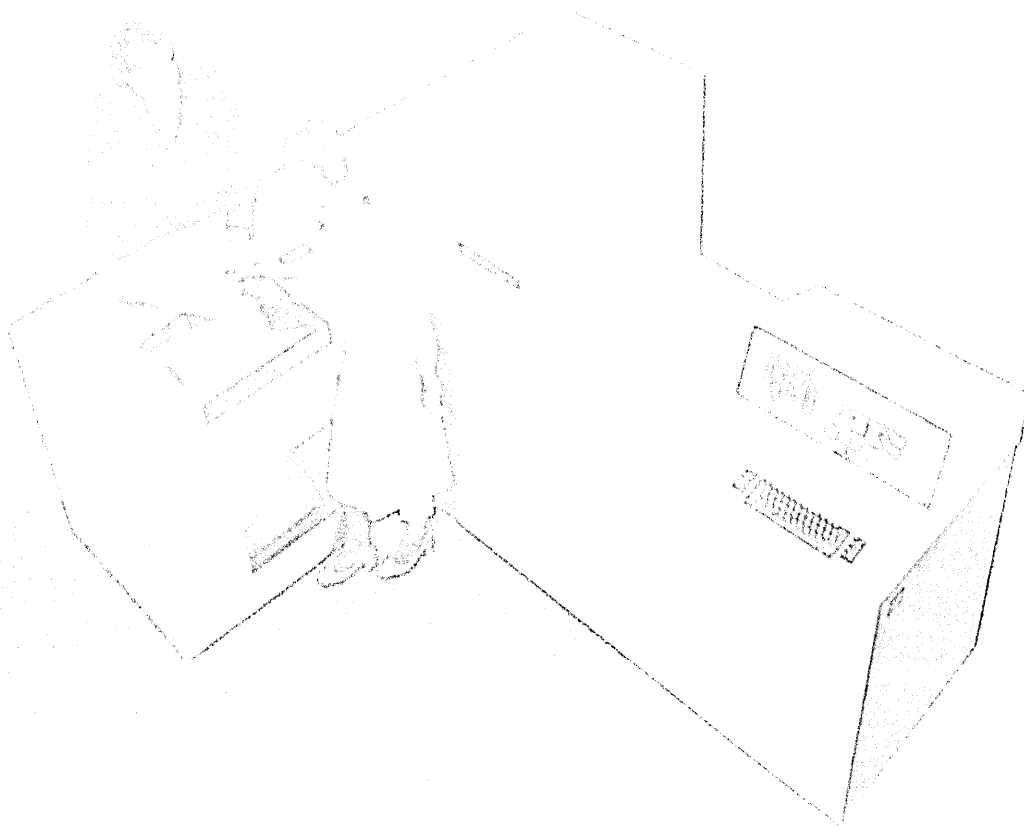
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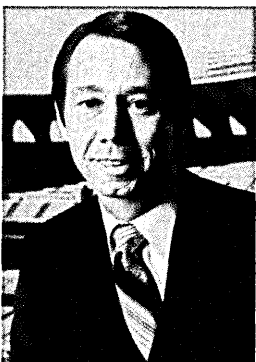
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CIRCLE 65 ON READER CARD

General accounting: general ledger; Data General; Point 4; BASIC; \$1,750 one-time license.

● *Order Entry*

Order fulfillment and inventory control: order processing; inventory control, and warehouse/stockroom control; Data General; Point 4; BASIC; \$9,500 one-time license.

DATA PROCESSING DESIGN, INC.
181 West Orange Thorpe, Suite F
Placentia, CA 92670
(714) 993-4160

● *Accounts Payable*

Purchase accounting: accounts payable; DEC PDP-11; BASIC; six users; introduced 1978; \$3,500 purchase.

● *Accounts Receivable*

Sales accounting: accounts receivable; DEC PDP-11; BASIC; six users; introduced 1978; \$3,500 purchase.

● *General Accounting*

General accounting: financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; management: cost accounting; payroll and personnel: payroll, withholding taxes, special compensation, commissions, personnel records and others; DEC PDP-11; BASIC; over 15 users; introduced 1976; \$20,000 purchase.

● *General Ledger*

General accounting: general ledger; DEC PDP-11; BASIC; six users; introduced 1978; \$3,500 purchase.

● *Payroll*

Payroll and personnel: payroll; DEC PDP-11; BASIC; six users; introduced 1978; \$3,500 purchase.

DATA-TEK CORP.

1211 Chestnut Street, Suite 400
Philadelphia, PA 19107
(215) 564-4133

● *Accounts Payable*

Purchase accounting: accounts payable; Hewlett-Packard HP 3000; Univac V77; COBOL, FORTRAN; 15 users; introduced 1978; \$5,000 purchase.

● *Accounts Receivable*

Sales accounting: accounts receivable; Hewlett-Packard HP 3000; Univac V77; COBOL, FORTRAN; 15 users; introduced 1978; \$5,000 purchase.

● *General Ledger*

General accounting: accounts receivable; Hewlett-Packard HP 3000; Univac V77; COBOL, FORTRAN; 15 users; introduced 1978; \$5,000 purchase.

● *Inventory*

Order fulfillment and inventory control: inventory control and warehouse/stockroom control; Hewlett Packard HP 3000; Univac V77; COBOL; 15 users; introduced 1976; \$25,000 purchase.

● *Job Cost Accounting*

Management: cost accounting; Hewlett-Packard HP 3000; Univac V77; COBOL, FORTRAN; eight users; introduced 1979; \$25,000 purchase.

● *Order Entry*

Order fulfillment and inventory control: order

processing; Hewlett-Packard HP 3000; Univac V77; COBOL; 15 users; introduced 1976; \$15,000 purchase.

● *Payroll*

Payroll and personnel: payroll; Hewlett-Packard HP 3000; Univac V77; COBOL, FORTRAN; 10 users; introduced 1976; \$5,000 purchase.

DATA TRAIN, INC.
840 N.W. 6th Street, Suite 3
Grants Pass, OR 97526
(503) 476-1467

● *Accounts Payable 301*

Purchase accounting: accounts payable, cash disbursements, and purchase analysis; Wang 2200; BASIC; introduced 1978; \$600 one-time license.

● *Accounts Payable 305*

Purchase accounting: accounts payable and cash disbursements; NCR 7500 series; BASIC; introduced 1975; \$600 one-time license.

● *Accounts Receivable 201*

Sales accounting: sales invoices and accounts receivable; Wang 2200; BASIC; introduced 1978; \$900 one-time license.

● *Accounts Receivable 205*

Sales accounting: sales invoices and accounts receivable; NCR 7500 series; BASIC; introduced 1975; \$600 one-time license.

● *Fixed Asset 501*

General accounting: fixed asset/capital equipment and depreciation and local, state and Federal taxes; Wang 2200; BASIC; introduced 1978; \$400 one-time license.

● *Fixed Asset/Depreciation*

General accounting: fixed asset/capital equipment and depreciation and local, state and Federal taxes; NCR 7500 series; BASIC; introduced 1975; \$400 one-time license.

● *General Ledger 101*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; Wang 2200; BASIC; introduced 1978; \$850 one-time license.

● *General Ledger Financial Statements 105*

General accounting: general ledger; NCR 7500 series; BASIC; introduced 1975; \$600 one-time license.

● *Payroll 401 and 402*

Management: labor distribution; payroll and personnel: payroll, withholding taxes, special compensation, and commissions; Wang 2200; BASIC; introduced 1978; \$750 to \$900 one-time license.

● *Payroll 405*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; NCR 7500 series; BASIC; introduced 1975; \$600 one-time license.

DATAMATICS MANAGEMENT SERVICES, INC.

140 Route 9W
Englewood Cliffs, NJ 07632
(201) 947-6100

● *Accounts Receivable 225*

Sales accounting: accounts receivable; Datapoint 1134; DATABUS; three users; introduced 1978; \$525 purchase.

● *Accounts Receivable 363*

Sales accounting: accounts receivable; Datapoint 2200, 6500, 6600; DATABUS; four users; introduced 1978; \$475 purchase.

● *Billing System 362*

Sales accounting: billings; Datapoint 2200, 6500, 6600; DATABUS; five users; introduced 1978; \$700 purchase.

● *General Ledger Package 114*

General accounting: general ledger; Datapoint 2200, 6500, 6600; DATABUS; five users; introduced 1978; \$525 purchase.

● *General Ledger 329*

General accounting: general ledger; Datapoint 1134; DATABUS; four users; introduced 1978; \$525 purchase.

DIGITAL SOLUTIONS, INC.

100 Menlo Park
Edison, NJ 08817
(201) 549-1700

● *CAIS*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: accounts receivable; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Prime 400; FORTRAN; 70 users; introduced 1973.

DIGITAL SYSTEMS HOUSE OF ILLINOIS, INC.

143 First Street
Batavia, IL 60510
(312) 879-1008

● *General Business—Accounts Payable*

Purchase accounting: purchase orders and purchasing, accounts payable cash disbursements and purchase analysis; DEC PDP-8, PDP-11; DIBOL; \$1,750 to \$3,500 purchase.

● *General Business—Accounts Receivable*

Sales accounting: sales invoices, accounts receivable, billings, and sales analysis; DEC PDP-8, PDP-11; DIBOL; \$1,750 to \$4,000 purchase.

● *General Business—General Ledger*

General accounting: financial reporting and general ledger; DEC PDP-8, PDP-11; DIBOL; \$1,750 to \$4,000 purchase.

● *General Business—Order Entry/Inventory Control*

Order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; DEC PDP-8, PDP-11; DIBOL; \$2,250 to \$4,500 purchase.

● *General Business—Payroll*

Payroll and personnel: payroll; DEC PDP-8, PDP-11; DIBOL; \$1,750 to \$4,000 purchase.

DIVERSIFIEDATA SERVICES

1950 Gervais Street
Columbia, SC 29202
(803) 799-0424

● *Integrated Business Accounting System (IBAS)*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and local, state and Federal taxes; purchase accounting: accounts payable and

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INSTITUTE**

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cash disbursements; sales accounting: sales invoices, accounts receivable, billings and sales analysis; management: budgeting, cost accounting, cash flow analysis, and sales/order forecasting and market analysis; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Perkin-Elmer 16- or 32-bit; COBOL; 25 users; introduced 1978; \$23,000 purchase.

● **Summit**

Purchase accounting: purchase orders and purchasing and purchase analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management: manufacturing process/production control, bills of material, operations planning and control, strategic/long-term planning, and simulations and modeling; Perkin-Elmer 16- or 32-bit; COBOL; 19 users; introduced 1978; \$69,500 purchase.

DPS, INC.

**350 South 400 East
Suite 114
Salt Lake City, UT 84111
(801) 532-3567**

● **Accounts Payable**

Purchase accounting: accounts payable, cash disbursements, and purchase analysis; Hewlett-Packard HP 3000; BASIC, RPG; five users; introduced 1980; \$5,000 one-time license.

● **Accounts Receivable**

Sales accounting: sales invoices, accounts receivable, billings, and sales analysis; Hewlett-Packard HP 3000; BASIC, RPG; introduced 1981; \$6,000 one-time license.

● **General Ledger**

General accounting: auditing, financial reporting, and general ledger; management: budgeting, cost accounting, and cash flow analysis; Hewlett-Packard HP 3000; BASIC, RPG; 20 users; introduced 1975; \$5,000 one-time license.

● **Payroll**

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Hewlett-Packard HP 3000; COBOL; 20 users; introduced 1975; \$5,000 one-time license.

EDUCATIONAL DATA SYSTEMS

**2569 McCabe Way
Irvine, CA 92714
(714) 754-4114**

● **MAC**

General accounting: general ledger; purchase accounting: purchase orders and purchasing, accounts payable, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; payroll and personnel: payroll, withholding taxes, special compensation, and commissions; Data General Nova; BASIC; 20 users; introduced 1978.

● **Readinet**

Management operations planning and control, strategic/long-term planning, and simulations and modeling; Data General Nova;

BASIC; 100 users; introduced 1978.

EFAX CORP.

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● **Positive Results through Online Business Evaluation (PROBE)**

General accounting: auditing, financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; payroll and personnel: payroll, withholding taxes, and personnel records; Datapoint, Computer Automation; DATABUS; 15 users; introduced 1979; \$1,500 to \$7,500 purchase.

EFFICIENT MANAGEMENT SYSTEMS, INC.

**3645 Grand Avenue
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● **Business Accounting System**

General accounting: auditing, financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management: budgeting and cash flow analysis; payroll and personnel: payroll, withholding taxes, and personnel records; Texas Instruments; PASCAL; introduced 1980; \$10,000 to \$17,000 purchase.

ELECTRONIC DATA SYSTEMS CORP. (EDS)

**14580 Midway Road
Dallas, TX 75234
(214) 661-6000**

● **General Accounting**

General accounting: fixed asset/capital equipment and depreciation and general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: sales invoices, accounts receivable, and sales analysis; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; Data General Eclipse, MicroNova, Nova; BASIC; over 200 users; introduced 1975; \$17,500 purchase.

ESCOM INC/Division of Anacomp

**12838 SE 40th Place
Bellevue, WA 98006
(206) 641-4990**

● **MMC**

General accounting: general ledger purchase accounting: accounts payable; sales accounting: accounts receivable; management: com-

plete material MRP control and shop floor control; payroll and personnel: payroll; Honeywell Ultimate; Prime Information; Microdata Reality; BASIC; English; over 100 users; introduced 1975; \$30,000 purchase.

EVALUATION AND PLANNING SYSTEMS

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Management: budgeting, cash flow analysis, sales/order forecasting and market analysis, strategic/long-term planning, simulations and modeling, trend forecasting, and manpower planning; IBM System 360/370/3030/4300; FORTRAN, Assembler; 500 users; introduced 1973; \$20,000 to \$48,000 purchase.

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● **ABLE System Accounting Language (RT-report writer)**

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; sales accounting: sales analysis; management: budgeting; payroll and personnel: personnel records; IBM System 370, S/3; Honeywell Level 6/66; NCR Century; DEC PDP-11; Data General Nova Series and M600; Texas Instruments 990 Systems; Control Data; COBOL, DIBOL; 50 users; introduced 1965; \$8,000 initial license.

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● **General Accounting Systems**

General accounting: auditing, financial reporting and local, state and Federal taxes; purchase accounting: purchase orders and purchasing, accounts payable, and cash disbursements; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, reordering, and FDA tracking chemical products; payroll and personnel: piecework payroll; Data General Nova, Eclipse, Micronova; Assembler; two users; introduced 1980; \$4,000 to \$40,000 initial license.

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● **Interactive Financial Planning System**

Management: budgeting, cash flow analysis, sales/order forecasting and market analysis, manufacturing process/production control, operations planning and control, strategic/long-term planning, and simulations and modeling; IBM System 360/370/3030/4300; Burroughs B6700, B1800, B1900, 6800, 7700, 7800; Honeywell Level 60, 66; DEC 10,

20, VAX-11/780; Amdahl; HP 3000; Harris 550, 800; Prime 250, 350, 450, 750; UNIVAC 1100 Series; CDC Cyber Series.

FINAR SYSTEMS LIMITED

**6000 East Evans Street, Suite 2-300
Denver, CO 80222
(303) 758-7561**

● *FINAR*

Management: budgeting, cost accounting, cash flow analysis, sales/order forecasting and market analysis, operations planning, and control, strategic/long-term planning and simulations and modeling; DEC PDP-11, VAX; BASIC; 100 users; introduced 1976; \$18,000 initial license.

FRANKEL ENGINEERING LABS, INC.

**125 South Fifth Street
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(215) 373-5205**

● *General Accounting System*

General accounting: auditing, financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management: cost accounting, cash flow analysis, manufacturing process/production control, and bills of material; payroll and personnel; payroll, withholding taxes, special compensation and commissions; Hewlett-Packard HP 3000; BASIC; 25 users; introduced 1978; \$1,500 to \$9,000 initial license.

GEMINI INFORMATION SYSTEMS, INC.

**5500 South Syracuse Circle
Englewood, CO 80111
(303) 773-1805**

● *Asset*

General accounting: auditing, financial reporting, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Perkin-Elmer 16- and 32-bit systems, 16 series, 32 series; FORTRAN, Assembler; introduced 1980; \$30,000 to \$45,000 one-time license.

GENERAL SYSTEMS SCIENCES, INC.

**651 Little Wekiva Road
Altamonte Springs, FL 32701
(305) 869-6457**

● *Autopower*

General accounting: auditing, financial reporting, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and

purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, reordering, and order entry; payroll and personnel: payroll and withholding taxes; Microdata Series 2000, 4000, 6000, 8000; DATABASIC; introduced 1977.

GILBERT ASSOCIATES

**P.O. Box 1498
Reading, PA 19603
(215) 775-2600**

● *G-C CUE*

Management: operations planning and control; Hewlett-Packard HP 3000; Prime; FORTRAN; introduced 1980; \$80,000 purchase.

G.K. ENTERPRISES

**P.O. Box 264
Worthington, OH 43085
(614) 885-5426**

● *Accounting: Accounts Payable*

purchase accounting: accounts payable; DEC PDP-8, PDP-11; DIBOL-8-11; 25 users; introduced 1977; \$500 purchase.

● *Accounting: Accounts Receivable*

Sales accounting: accounts receivable; DEC DPD-8, PDP-11; DIBOL 8-11; 25 users; introduced 1977; \$500 purchase.

● *Accounting: General Ledger*

General accounting: general ledger; DEC PDP-8, PDP-11; DIBOL 8-11; 25 users; introduced 1977; \$500 purchase.

● *Inventory: Order Entry and Control*

Order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; DEC PDP-8, PDP-11; DIBOL 8-11; 25 users; introduced 1977; \$500 purchase.

● *Payroll*

Payroll: payroll withholding taxes, special compensation and commissions; DEC PDP-8, PDP-11; DIBOL 8-11; 25 users; introduced 1977; \$500 purchase.

GREAT LAKES INFORMATION SYSTEMS

**5 Research Drive
Ann Arbor, MI 48103
(313) 663-6533**

● *General Business Systems*

General accounting: auditing, financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; management: bills of material; payroll: payroll; withholding taxes, special compensation, and commissions; Texas Instruments 990 series; Sycor 445; COBOL; introduced 1977; \$999 or \$799 one-time license.

MITCHELL HUMPHREY & CO.

**7711 Carondelet Avenue, Suite 504
St. Louis, MO 63105
(314) 726-5666**

● *Financial Management System (FMS-80)*
General accounting: auditing, financial reporting, and general ledger; management: budgeting, cost accounting, sales/order forecasting and market analysis, strategic/long-term planning, and simulations and modeling; HP 3000; SPL; two users; introd. 1980.

**IDAHO FALLS SCHOOL DISTRICT NO. 91
690 John Adams Parkway
Idaho Falls, ID 83401
(208) 522-7490**

● *Consumable Inventory*

General accounting: general ledger; order fulfillment and inventory control: inventory control, warehouse/stockroom control, reordering, issues and receiving, and updates general ledger; DEC PDP-11; BASIC BASICPLUS; introduced 1979; \$500 purchase.

● *Fiscal Accounting*

General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; management: budgeting; DEC PDP-11; BASIC, BASICPLUS; five users; introduced 1975; \$600 purchase.

IMPLEFACTS, INC.

**1700 Broadway
New York, NY 10019
(212) 582-8030**

● *Implefacts System*

Payroll and personnel: employee benefit record keeping; trusts and financial management: retirement accounts, employee benefit fund management, and employee benefit record keeping; IBM System 360/370/3030/4300; COBOL; 12 users; introduced 1971.

INFORMATICS, INC.

**21050 Vanowen Street
Canoga Park, CA 91304
(213) 887-9121**

● *Accounts Payable*

Purchase accounting: accounts payable, cash disbursements, and project accounting interfaces; payroll and personnel: employee advance account and employee material/price variance; IBM System 3030/4300, S/3, System 32/34; DEC 11/70, VAX; Hewlett-Packard HP 3000; Wang 2200; COBOL; 175 to 200 users; introduced 1974; \$10,000 to \$30,000 one-time license.

● *General Ledger*

General accounting: auditing, financial reporting, and general ledger; IBM System 3030/4300, S/3, System 32/34; DEC 11/70, VAX; Hewlett-Packard HP 3000; Wang 2200; COBOL; 500 users; introduced 1973; \$12,500 to \$50,000 one-time license.

● *Purchase Order*

Purchase accounting: purchase orders and purchasing, purchase analysis, and interfaces with accounts payable; IBM System 3030/4300, S/3, System 32/34; DEC 11/70, VAX; HP 3000; Wang 2200; COBOL; 15 to 20 users; introduced 1977; \$12,500 one-time license.

INFORMATION ACCESS SYSTEMS, INC.

**P.O. Box 835
Sparta, NJ 07871
(201) 729-7581**

● *Biz System*

General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control; order processing, inventory control, and warehouse/stockroom control; DEC PDP-11; DIBOL; 25 users; introduced 1977; \$1,000 one-time license.

INFORMATION ASSOCIATES, INC.

**97 Humboldt Street
Rochester, NY 14609
(716) 288-6900**

● *IA Payroll/Personnel System*

Payroll and personnel: payroll, withholding taxes, and personnel records; IBM System 360/370/3030; Burroughs B3500 and 6700; Honeywell 66/60; DEC 10 and 20; Univac 11/10-90/70; Amdahl; ITEL; COBOL; 55 users; introduced 1974.

INFORMATION BUILDERS, INC.

**1250 Broadway
New York, NY 10001
(212) 736-4433**

● *PERS*

Payroll and personnel: personnel records; IBM System 370/4300; FORTRAN, Assembler; 25 users; introduced 1978; \$100,000 purchase.

INFORMATION SCIENCE, INC.

**95 Chestnut Ridge Road
Montvale, NJ 07645
(201) 391-1600**

● *EEO Compliance System*

Payroll and personnel: personnel records; IBM System 360/370/3030; COBOL; 90 users; introduced 1975.

● *ERISA Administration System*

Payroll and personnel: personnel records; IBM System 360/370/3030/4300; COBOL; over 60 users; introduced 1977.

● *Human Resource System (HRS-2)*

Payroll and personnel: personnel records; IBM System 360/370; Burroughs B2771; Hewlett-Packard HP 3000; COBOL; over 600 users; introduced 1972.

● *IMS Payroll/Personnel System*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 370/3030/4300; COBOL; 10 users; introduced 1979.

● *Inside Affirmative Action Planner*

Payroll and personnel: personnel records; IBM System 360/370; COBOL; 30 users; introduced 1977.

● *Inside Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions and personnel records; IBM System 360/370; COBOL; over 100 users; introduced 1976.

● *OSHA Health/Safety System*

Payroll and personnel: personnel records; IBM System 370/4300; COBOL; 10 users; introduced 1975.

INSURANCE SYSTEMS OF AMERICA

**P.O. Box 47975
Atlanta, GA 30362
(404) 441-8800**

● *ISA/Accounting Budget & Cost System*

General accounting: auditing, financial reporting, and financial control; management: budgeting and cost accounting; IBM System 370/4300; COBOL; 190 users; introduced 1974; \$77,500 20-year license.

● *ISA/Cash Disbursement System*

Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, purchase analysis, produces checks and bank account reconciliations, online entry editing, inquiry-remote disbursing; IBM System 370/4300; COBOL; 70 users; introduced 1976; \$41,500 20-year license.

● *ISA/Online Alpha System*

Banking operations: customer/client address and records management; IBM System 370/4300; Assembler; 75 users; introduced 1974; \$23,000 to \$44,000 20-year license.

INTEGRAL SYSTEMS, INC.

**39 Quail Court, Suite 201
Walnut Creek, CA 94596
(415) 938-7600**

● *Applicant Accounting*

Payroll and personnel: personnel records; IBM System 370/4800, Burroughs B6800, B1800; DEC 10 and 20; Hewlett-Packard HP 3000; Univac 1100, 90 series; COBOL; 15 users; introduced 1980.

● *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions and personnel records; IBM System 370/4300; Burroughs B6800, B1800; DEC 10 and 20; Hewlett-Packard HP 3000; CDC Cyber 170; Univac 1100, 90 series; COBOL; 150 users; introduced 1972.

● *Personnel Management*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 370/4300; Burroughs B6800, B1800; DEC 10 and 20; Hewlett-Packard HP 3000; Univac 1100, 90 series; COBOL; over 150 users; introduced 1972.

● *Position Control*

Management: budgeting; payroll and personnel: personnel records; IBM System 370/4300; Burroughs B6800, B1800, DEC 10 and 20; Hewlett-Packard HP 3000; Univac 1100, 90 series; COBOL; 15 users; introduced 1976.

INTERACTIVE ANALYSIS

**315 Morgan Hall
Soldiers Field
Boston, MA 02163
(617) 495-6313**

● *Analysis of Quantitative Data (AQD)*

Management: strategic/long-term planning and simulations and modeling; DEC 10 and 20, VAX; FORTRAN; Assembler; 25 users; introduced 1976.

● *Cash Flow (CSHFLO)*

Management: cash flow analysis; FORTRAN, Assembler; 25 users; introduced 1976; \$1,000 purchase.

INTERNATIONAL COMPUTER TECHNOLOGY CORP.

**321 Bush Street
San Francisco, CA 94104
(415) 788-5277**

● *Accounts Payable*

Purchase accounting: purchase orders and purchasing, accounts payable, and purchase analysis; NCR 82/50; Texas Instruments 990; 40 users; introduced 1976; \$1,500 one-time license.

● *Accounts Receivable*

Sales accounting: sales invoices, accounts receivable, and billings; NCR 82/50; Texas Instruments 990; COBOL; 40 users; introduced 1976; \$1,800 one-time license.

● *Fixed Assets*

General accounting: auditing, financial reporting, and fixed asset/capital equipment and depreciation; NCR 82/50; Texas Instruments 990; COBOL; 40 users; introduced 1976; \$1,000 one-time license.

● *General Ledger*

General accounting: auditing, financial reporting, local, state and Federal taxes, and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; NCR 82/50; Texas Instruments 990; COBOL; 40 users; introduced 1976; \$1,500 one-time license.

● *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; NCR 82/50; Texas Instruments 990; COBOL; 40 users; introduced 1976; \$2,000 one-time license.

INTERNATIONAL MANAGEMENT SYSTEMS CORP.

**4676 Admiralty Way
Suite 217
Marina Del Rey, CA 90291
(213) 822-2022**

● *Accounts Payable*

General accounting: financial reporting; purchase accounting: accounts payable, cash disbursements, and purchase analysis; IBM S/3, System 32/34, S/38; RPG 2 and 3; 35 users; introduced 1975; \$3,000 one-time license (batch) \$4,500 one-time license (online).

● *Accounts Receivable*

Sales accounting: sales invoices and accounts receivable; IBM S/3, System 32/34, S/38; RPG 2 and 3; 15 users; introduced 1975; \$5,000 one-time license (batch), \$7,500 one-time license (online).

● *Financial Operating & General Ledger (FRGL)*

General accounting: auditing, financial reporting, and general ledger; IBM S/3, System 34, S/38; RPG 2 and 3; 45 users; introduced 1975; \$5,000 one-time license (batch), \$7,500 one-time license (online).

● *Fixed Assets*

General accounting: auditing, financial reporting, and fixed asset/capital equipment and depreciation; IBM S/3, System/34, S/38; RPG 2 and 3; 20 users; introduced 1975; \$5,000 one-time license (batch), \$7,500 one-time license (online).

INTERNATIONAL SYSTEMS, INC.

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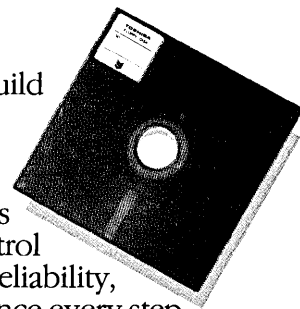
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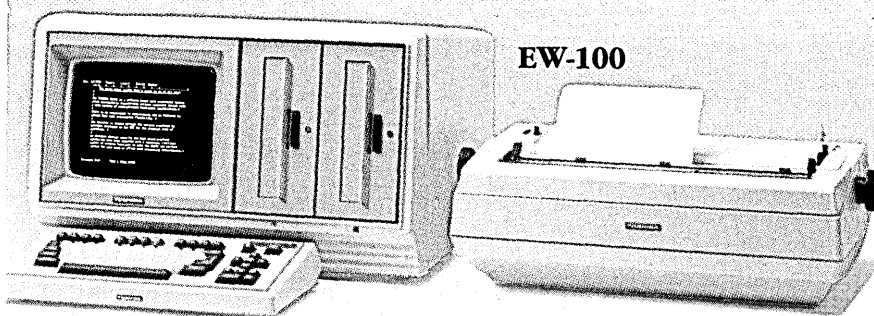


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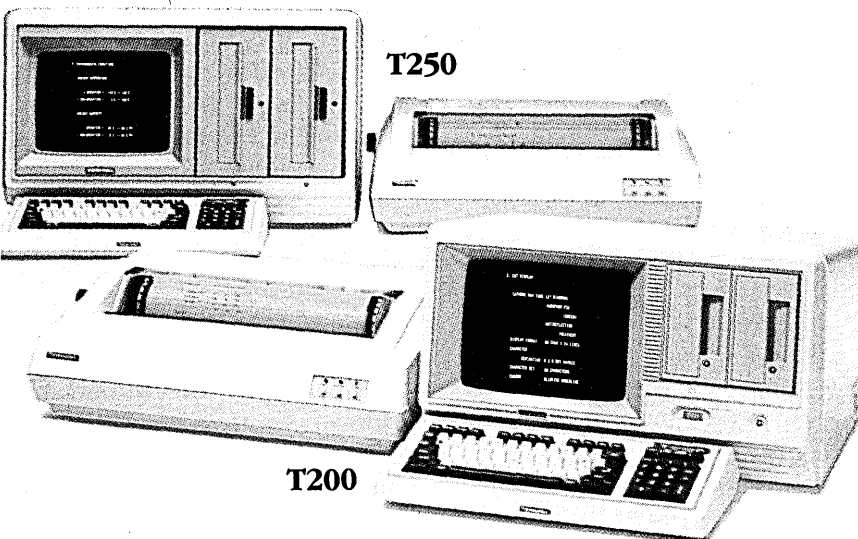


EW-100

EW-100

display capacity: 80 characters × 24 lines
floppy disk: 8"
storage capacity: 300KB × 2,
1MB × 2
type of printer: daisy-wheel printer
printing speed: 45 characters/sec.
print pitch: 10/12/proportional spacing

VSBC



T250

T200

T200/T250

Hardware
memory: 64KB
display capacity: 80 characters × 24 lines
floppy disk: T200: 5 1/4"
T250: 8"
storage capacity: T200: 280KB × 2
T250: 1MB × 2
printing speed: 125 characters/sec.
characters per line: 136 characters

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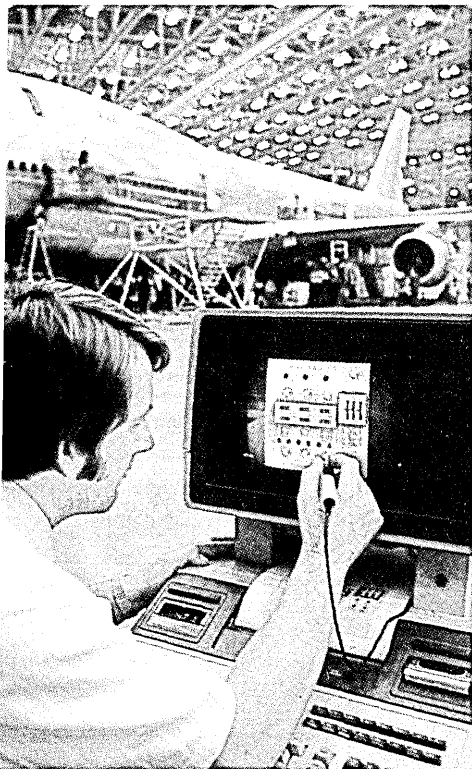
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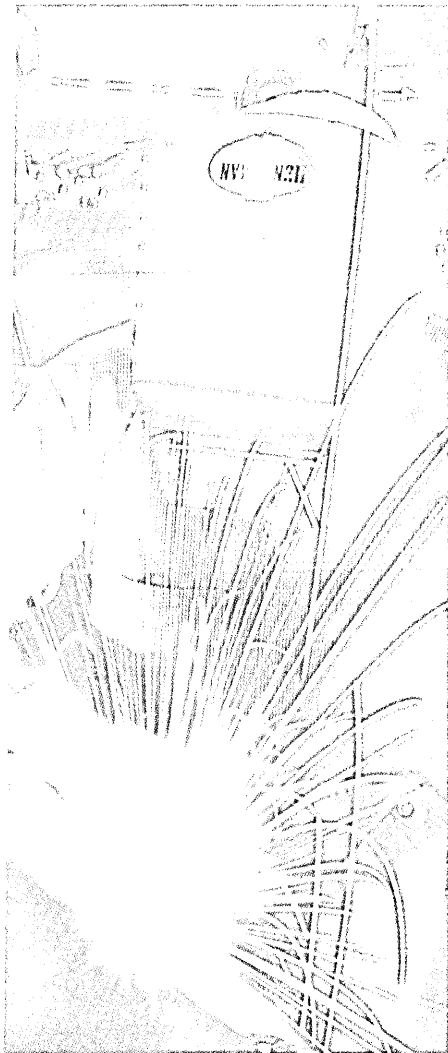
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Implementing a company-wide information system calls for a lot more than just the computers. You need a comprehensive plan that can tie together engineering, planning and control, factory automation and office systems.

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...the same person who was seen in the photograph above. The person is wearing a dark, long-sleeved garment and is working with a large bundle of reeds or bamboo strips. The person is looking down at the work. The background is a plain, light-colored wall.

The person in the photograph above is wearing a light-colored, short-sleeved shirt and dark trousers. The person is looking down at the work. The background shows a window with a grid pattern.

The person in the photograph above is wearing a light-colored, long-sleeved garment. The person is looking down at the work. The background is a plain, light-colored wall.

● **PAC I**

Management: operations, planning and control, strategic/long-term planning, and simulations and modeling; Honeywell Level 66; DEC System 10/20, PDP-11/70; FORTRAN; 50 users; introduced 1978; \$13,500 purchase.

● **PAC II**

Management: operations planning and control; any computer with COBOL; 750 users; introduced 1976; \$23,800 purchase.

J & S ASSOCIATES
4933 Omar Street
Fremont, CA 94538
(415) 657-8585

● **MLR**

Management: financial planning and analysis; IBM System 360/370/3030/4300; Burroughs 5500; Honeywell 6000; FORTRAN; three users; introduced 1977; \$175/mo license.

K & H COMPUTER SYSTEMS, INC.
P.O. Box 48
Sparta, NJ 07871
(201) 729-6142

● **Project Management & Control (PREMIS)**
Management: operations planning and control; IBM System 360/370/3030/4300; Assembler; over 100 users; introduced 1974; \$60,000 purchase.

● **PROMINI**

Management: operations planning and control; any minicomputer with FORTRAN; 30 users; introduced 1977; \$36,000 purchase.

KEITH ASSOCIATES
4225 Harvest Hill Road
Dallas, TX 75234
(702) 385-7211

● **EASYTROL**

Management: budgeting and operations planning and control; any computer with COBOL; over 100 users; introduced 1972; \$9,500 perpetual lease, \$350/mo for one-year license, or \$325/mo for two-year license.

KIRBY COMPUTER SYSTEM
314 U.S. Highway 22
Green Brook, NJ 08812
(201) 469-6000

● **KIBS**

Purchase accounting: accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; Prime; FORTRAN; 20 users; introduced 1979.

THOMAS LAGUBAN & ASSOCIATES, INC.
749 Orchard, Box 523
Barrington, IL 60010
(312) 381-3200

● **E-PICS**

General accounting: general ledger; purchase accounting: purchase orders and purchasing, accounts payable, and receiving; sales accounting: accounts receivable, and sales order entry; management: budgeting, cost accounting, manufacturing process/production

control, and bills of material; IBM System 360/370/3030/4300, 38; COBOL; RPG; 19 users; introduced 1974; \$100,000 to \$700,000 purchase.

LAVAN SYSTEMS, INC.
11 Hanover Square
New York, NY 10005
(212) 344-0202

● **FUTURE SCOPE**

Management: operations planning and control, strategic/long-term planning, and simulations and modeling; Wang VS; COBOL; introduced 1979.

● **General Accounting**

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and local, state and Federal taxes; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; Wang VS, 2200; COBOL, BASIC; introduced 1975.

LIBRA PROGRAMMING, INC.
7105 South Highland Drive
Suite 301
Salt Lake City, UT 84121
(800) 453-3827

● **Accounts Payable**

Purchase accounting: accounts payable; IBM 5110/5120; BASIC; 200 users; introduced 1976; \$1,650 one-time license.

● **Accounts Receivable**

Sales accounting: accounts receivable; IBM 5110/5120; BASIC; 300 users; introduced 1976; \$1,650 one-time license.

● **Billing**

Sales accounting: billings; IBM 5110/5120; BASIC; 75 users; introduced 1979; \$1,850 one-time license.

● **General Ledger**

General accounting: financial reporting and general ledger; IBM 5110/5120; BASIC; 500 users; introduced 1976; \$1,650 one-time license.

● **Payroll**

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM 5110/5120; BASIC; 400 users; introduced 1976; \$1,850 one-time license.

LIOCS CORP.
2100 Clearwater Drive
Oakbrook, IL 60521
(312) 887-0420

● **Accounts Payable**

Purchase accounting: accounts payable; DEC 500/700, PDP-11/34/44, 60/70 series, VAX-11/780; BASIC; 55 users; introduced 1976; \$2,000 purchase.

● **Accounts Receivable**

Sales accounting: accounts receivable; DEC 500/700, PDP-11/34/44, 60/70 series, VAX-11/780; BASIC; 55 users; introduced 1976; \$2,500 purchase.

● **General Ledger and Financial Reporting**

General accounting: general ledger; management: financial planning and analysis; DEC

500/700, PDP-11/34/44, 60/70 series, VAX-11/780; BASIC; 55 users; introduced 1976; \$4,000 purchase.

● **Purchase Control**

Purchase accounting: purchase orders and purchasing and purchase analysis; order fulfillment and inventory control: reordering; DEC 500/700, PDP-11/34/44, 60/70 series, VAX-11, 780; BASIC; 10 users, introduced 1976; \$6,500 purchase.

LOGICAL COMPUTING CORP.
3444 Olympic Drive
Metairie, LA 70003
(504) 455-5500

● **Accounts Payable**

Purchase accounting: accounts payable; Data General Eclipse series; NOVA 3/4; BASIC; 20 users; introduced 1978; \$4,000 purchase.

● **Accounts Receivable**

Sales accounting: accounts receivable; Data General Eclipse series; NOVA 3/4; BASIC; 20 users; introduced 1978; \$4,000 purchase.

● **General Ledger**

General accounting: general ledger; Data General Eclipse series; NOVA 3/4; BASIC; 20 users; introduced 1978; \$4,000 purchase.

● **Payroll**

Payroll and personnel: payroll and withholding taxes; Data General Eclipse series; NOVA 3/4; BASIC; 20 users; introduced 1978; \$4,000 purchase.

LOGICAL DESIGN CORP.
27777 Franklin Road, Suite 330
Southfield, MI 48034
(313) 354-9557

● **Financial Management System**

General accounting: general ledger; Burroughs B80/B1190; COBOL; six users; introduced 1980; \$2,500 one-time license.

● **Financial Management System AIP**

Purchase accounting: accounts payable; Burroughs B80/B1190; COBOL; five users; introduced 1980; \$2,500 one-time license.

● **Financial Management System AIR**

Sales accounting: accounts receivable; Burroughs B80/B1190; COBOL; four users; introduced 1980; \$3,000 one-time license.

● **Financial Management System PAY**

Payroll and personnel: payroll; Burroughs B80/B1190; COBOL; seven users; introduced 1980; \$3,500 one-time license.

LUPFER & LONG, INC.
P.O. Box A-57
Hanover, NH 03755
(603) 643-4503

● **Count GL**

General accounting: financial reporting and general ledger; sales accounting: accounts receivable; Honeywell 66; DEC 10, PDP-11/70; Hewlett-Packard HP 3000; BASIC; 20 users; introduced 1976; \$16,000 purchase.

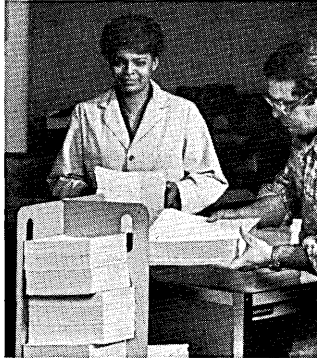
● **SPREAD**

Management: financial planning and analysis; IBM System 32/34; Honeywell 66; DEC PDP-11/34, 10, PDP-11/70; Wang VS, Sycor 70; Hewlett-Packard HP 3000; FORTRAN, BASIC; 20 users; introduced 1978; \$16,000 purchase.

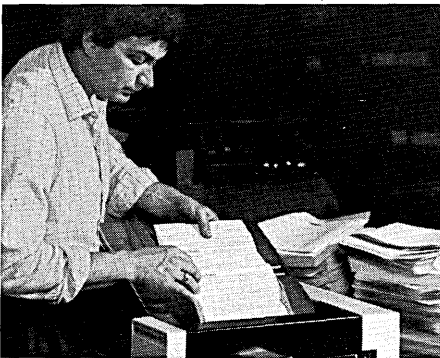
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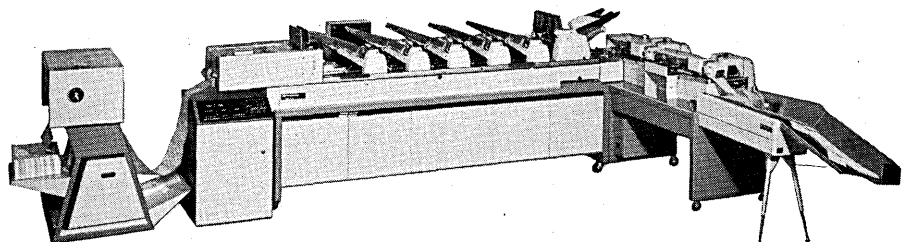
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CIRCLE 69 ON READER CARD

● **TK SYS**

Management: operations planning and control; Honeywell 66; BASIC; two users; introduced 1980; \$5,000 purchase.

● **Voucher**

Purchase accounting: accounts payable; Honeywell 66; DEC 10, PDP-11/70; Hewlett-Packard HP 3000; COBOL; four users; introduced 1980; \$10,000 purchase.

MANAGEMENT DECISION SYSTEMS

**200 Fifth Avenue
Waltham, MA 02154
(617) 890-1100**

● **EXPRESS**

Management: budgeting, market analysis, and strategic/long-term planning; IBM 4341 and up; Prime 550 and up; AED; 17 users; introduced 1976; \$150,000 to \$340,000 purchase.

**MANAGEMENT INFORMATION
TECHNOLOGY, INC.**

**1880 Howard, # 206
Vienna, VA 22180
(703) 442-8722**

● **ZERO-base**

Management: budgeting; IBM System 360/370/3030/4300, S/3, System 32/34; COBOL; two users; introduced 1979; \$16,000 purchase.

**MANAGEMENT SCIENCE AMERICA, INC.
(MSA)**

**3445 Peachtree Road, N.E.
Suite 1300
Atlanta, GA 30326
(404) 262-2376**

● **Alltax**

General accounting: local, state and Federal taxes; payroll and personnel: withholding taxes; most computers with COBOL; 2,500 users.

● **Alltax Reporter (Companion to Alltax Taxing System)**

General accounting: local, state and Federal taxes; payroll and personnel: withholding taxes; IBM System 360/370; COBOL; introduced 1981.

● **MSA Accounts Payable**

Purchase accounting: accounts payable; IBM System 360/370/3030/4300; Burroughs medium-large; Honeywell Level 66; COBOL; 397 users; introduced 1977.

● **MSA Accounts Receivable**

Sales accounting: accounts receivable; IBM System 360/370/3030/4300; COBOL; 241 users; introduced 1978.

● **MSA Financial Forecast and Modeling**

Management: financial forecast and modeling; IBM 360/370/4300; Burroughs medium-large; COBOL; 36 users; introduced 1978.

● **MSA Fixed Asset Accounting System**

General accounting: fixed asset/capital equipment and depreciation; IBM System 360/370/3030/4300; Burroughs medium-large; Honeywell Level 66, 6000; COBOL; 566 users; introduced 1969.

● **MSA General Ledger**

Purchase accounting: general ledger; IBM System 360/370/3030/4300; Burroughs medium-large; Honeywell Level 66; NCR Centry

201 and up, Criterion; DEC 10 and 20; Univac 1100; COBOL; 1100 users; introduced 1969.

● **MSA Payroll Accounting**

Payroll and personnel: payroll; IBM System 360/370/3030/4300; Burroughs medium-large; Honeywell 6000; Univac 1100; COBOL; 1091 users; introduced 1969.

● **MSA Personnel Management & Reporting**

Payroll and personnel: personnel records; IBM System 360/370/3030/4300; Burroughs medium-large; Honeywell Level 66; Univac 1100; COBOL; 488 users; introduced 1974.

MANAGEMENT SYSTEMS CORP.

**200 East South Temple
Salt Lake City, UT 84111
(801) 524-2000**

● **Control**

Purchase accounting: accounts payable and general ledger; sales accounting: accounts receivable; payroll and personnel: payroll; Prime; Microdata; BASIC; 30 users; introduced 1977; \$8,000 purchase.

MANDATE CORP.

**300 East Ohio Bldg.
1717 East Ninth Street
Cleveland, OH 44114
(216) 861-8100**

● **Accounts Payable and Accounts Receivable**

Purchase accounting: accounts payable; sales accounting: accounts receivable; management: manufacturing process/production control and bills of material; Hewlett-Packard HP 3000; any system with TOTAL database management package; COBOL.

● **General Ledger and Financial Reporting**

General accounting: financial reporting and general ledger; management: manufacturing process/production control and bills of material; Hewlett-Packard HP 3000; any system with TOTAL database management package; COBOL.

● **Inventory Management**

Order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: manufacturing process/production control and bills of material; Hewlett-Packard HP 3000; any system with TOTAL database management package; COBOL.

● **Invoicing and Backlog**

Sales accounting: sales invoices; management: manufacturing process/production control and bills of material; Hewlett-Packard HP 3000; any system with TOTAL database management package; COBOL.

MARCHBANKS & PARKER, INC.

**4538 Centerview Drive
San Antonio, TX 78228
(512) 736-1909**

● **Accounts Payable**

Purchase accounting: accounts payable; Burroughs 1800, 1900; COBOL; three users; introduced 1980; \$4,800 purchase.

● **General Ledger, Financial Accounting & Budgeting**

General accounting: general ledger; management: budgeting and cost accounting; Burroughs 1800, 1900; COBOL; five users; intro-

duced 1971; \$4,800 purchase.

MARTIN MARIETTA DATA SYSTEMS

**6301 Ivy Lane, Suite 300
Greenbelt, MD 20770
(301) 345-0100**

● **MAS-I**

Purchase accounting: purchase orders and purchasing; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; management: cost accounting, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; COBOL; 600 users; \$180,000 purchase.

● **MAS-II**

Purchase accounting: purchase orders and purchasing; order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: cost accounting, sales/order forecasting and market analysis, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; COBOL; 25 users; introduced 1978; \$225,000 purchase.

● **MAS Cost Control System**

Management: cost accounting, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; COBOL; introduced 1978.

● **MAS-E**

Purchase accounting: purchase orders and purchasing; management: cost accounting, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; COBOL; introduced 1980; \$179,000 purchase.

● **MAS-F**

General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; HP 3000; COBOL; introduced 1980.

● **MAS-H**

Purchase accounting: purchase orders and purchasing; management: cost accounting, manufacturing process/production control, and bills of material; Hewlett-Packard HP 3000; COBOL; 40 users; \$137,000 purchase.

MAS-SYS, INC.

**25901 West Ten Mile Road
Southfield, MI 48034
(313) 353-4370**

● **Accounting General Ledger**

General accounting: general ledger and multiusage ledger; IBM S/3, System 32/34; RPG; 55 users; introduced 1974; \$3,500 purchase.

GEORGE MATYJEWICZ & CO.

**247 North Plank Road
Newburgh, NY 12550
(914) 565-8540**

● **Accounts Payable**

Purchase accounting: accounts payable; IBM System 32/34, 5110, 5120; BASIC (5110, 5120), RPG (32/34).

● **Accounts Receivable**

Sales accounting: accounts receivable; IBM System 32/34, 5110, 5120; BASIC (5110, 5120), RPG (32/34).

● **Business Accounting Package**

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General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; payroll and personnel: payroll; IBM System 32/34, 5110, 5120; BASIC (5110, 5120), RPG (32/34); 125 users; intro 1970.

● **General Ledger**

General accounting: general ledger; IBM System 32/34, 5110, 5120; BASIC (5110, 5120), RPG (32/34).

● **Payroll**

Payroll and personnel: payroll; IBM System 32/34, 5110, 5120; BASIC (5110, 5120), RPG (32/34).

McCORMACK & DODGE CORP.

**560 Hillside Avenue
Needham Heights, MA 02194
(617) 449-4012**

● **Accounts Payable Information System (A/P Plus)**

Purchase accounting: accounts payable, and cash disbursements; IBM System 360/370/3030/4300; medium scale Burroughs; Honeywell Level 66; COBOL; over 325 users; introduced 1974.

● **Capital Project Analysis and Accounting System (CPA Plus)**

General accounting: fixed asset/capital equipment and depreciation; management: budgeting, and cash flow analysis; IBM System 360/370/3030/4300; COBOL; over 30 users; introduced 1979.

● **Fixed Asset Analysis & Accounting System (F/A Plus)**

General accounting: fixed asset/capital equipment and depreciation; IBM System 360/370/3030/4300; medium and large Burroughs; Honeywell Level 65, 62; COBOL; over 600 users; introduced 1970.

● **GIL Plus**

General accounting: general ledger; management: budgeting, operations, planning and control, modeling and financial planning and analysis; IBM System 360/370/3030/4300, System/34; medium and large Burroughs; Honeywell Level 64, 66; Hewlett-Packard HP-3000; NCSS 3200; COBOL; 250 users; introduced 1977.

● **Purchasing Information Management System (P/O Plus)**

Purchase accounting: purchase orders and purchasing, and purchase analysis; IBM System 360/370/3030/4300; COBOL; over 20 users; introduced 1980.

MDCR, INC.

**P.O. Box 29
Morganville, NJ 07751
(201) 536-9548**

● **IMPACT**

Management: financial planning and analysis; IBM System 370/3030/4300; Amdahl; ITEL; CDC 480; Formation 4000; Assembler, TA1; 500 users; intro 1976; \$48,000 purchase.

MEDICAL DATA RESEARCH

**6030 A Unity Drive
Norcross, GA 30071
(404) 447-9530**

● **Accounts Payable (Module)**

Purchase accounting: accounts payable; Burroughs 800, 900; Texas Instruments TI 990; COBOL, RPG; 10 users; introduced 1975; \$2,900 purchase.

● **General Ledger (Module)**

General accounting: general ledger; Burroughs 800, 900; Texas Instruments TI 990; COBOL, RPG; 10 users; introduced 1975; \$2,900 purchase.

● **Payroll (Module)**

Payroll and personnel: payroll; Burroughs 800, 900; Texas Instruments TI 990; COBOL, RPG; 10 users; introduced 1975; \$2,900 purchase.

MID-AMERICA COMPUTER CORP.

**7N 015 York Rd.
Bensenville, IL 60106
(312) 766-3400**

● **MACE Accounts Payable**

Purchase accounting: accounts payable; any minicomputer with COBOL; 14 users; introduced 1973.

● **MACE Accounts Receivable**

Sales accounting: accounts receivable; any minicomputer with COBOL; 14 users; introduced 1973.

● **MACE General Ledger**

General accounting: general ledger; any minicomputer with COBOL; 14 users; introduced 1973.

MID-AMERICAN CONTROL CORP.

**P.O. Box 57, U.S. 60 West
Shelbyville, KY 40065
(502) 633-5700**

● **Guide**

General accounting: general ledger; sales accounting: accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: manufacturing process/production control and bills of material; payroll: payroll; IBM 1130; DEC PDP-11; Assembler, EDL Macro-II; 200 users; introduced 1978; \$10,000 to \$15,000 purchase.

MINI-COMPUTER BUSINESS APPLICATIONS, INC.

**2441 Honolulu Ave.
Montrose, CA 91020
(213) 247-9050**

● **MCBA Accounts Payable**

Purchase accounting: accounts payable; Data General; DEC PDP-11; Hewlett-Packard HP 3000; Texas Instruments 990 model 4 or larger; Wang vs; COBOL, BASIC, DIBOL; 300 to 750 users; introduced 1974 to 1980; \$1,500 to \$2,000.

● **MCBA Accounts Receivable**

Sales accounting: accounts receivable; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$3,000.

● **MCBA Accounts Receivable with Sales Analysis**

Sales accounting: accounts receivable and sales analysis; Data General; DEC PDP-11; LSI-11 and look alike; Texas Instruments 990 models 4 and larger; Wang vs; COBOL, DIBOL; 300 to 1500 users; introduced 1974 to 1979; \$1,500 to \$2,000 purchase.

● **MCBA Fixed Assets and Depreciation**

General accounting: fixed asset/capital equipment and depreciation; DEC PDP-11; DIBOL-11; 100 users; introduced 1978; \$1,500 purchase.

● **MCBA General Ledger**

General accounting: general ledger; DEC PDP-11; Hewlett-Packard HP 3000; Texas Instruments 990 models 4 and larger; Wang vs; DIBOL, COBOL; 1100 users; introduced 1974 to 1980; \$1,500 to \$3,000 purchase.

● **MCBA General Ledger and Financing**

General accounting: general ledger; all Data General; COBOL, BASIC; 550 users; introduced 1977; \$2,000 purchase.

● **MCBA Inventory Control and Order Entry**

Order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; Data General; DEC PDP-11; Hewlett-Packard HP 3000; Texas Instruments 990 models 4 and larger; Wang vs; COBOL, BASIC, DIBOL; introduced 1975 to 1980; \$1,500 to \$3,000 purchase.

● **MCBA Payroll**

Payroll: payroll, withholding taxes, special compensation, and commissions; Data General; DEC PDP-11; Hewlett-Packard HP 3000; Wang vs; COBOL, BASIC, DIBOL; 800 users; introduced 1974 to 1980; \$1,500 to \$3,000 purchase.

● **MCBA Sales Analysis**

Management: sales analysis; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$2,000 purchase.

MINICOMPUTER MODELING, INC.

**Suite One
1222 Lakeview Boulevard East
Seattle, WA 98102
(206) 323-4201**

● **DATA MODEL**

Management: budgeting, cost projecting, cash flow analysis, sales/order forecasting and market analysis, operations planning and control, and strategic/long term planning and simulations and modeling; IBM System/34; DEC VAX-11/20; Hewlett-Packard HP 3000; Prime; Datapoint; any computer with FORTRAN 4 or BASIC; DATABUS; 134 users; introduced 1977; \$4,000 to \$24,000 purchase.

● **DATA MODEL/LEDGER**

General accounting: general ledger; IBM System 34; DEC VAX-11/20; Hewlett-Packard HP 3000; Prime; Datapoint; any computer with FORTRAN 4 or BASIC; six users; introduced 1979; \$6,000 to \$24,000 purchase.

MITCHELL & GAUTHIER ASSOCIATES, INC.

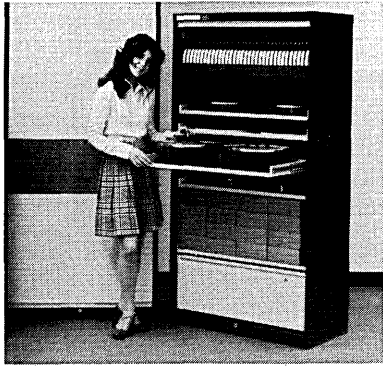
**P.O. Box 685
Concord, MA 01742
(617) 369-5115**

● **ACSL**

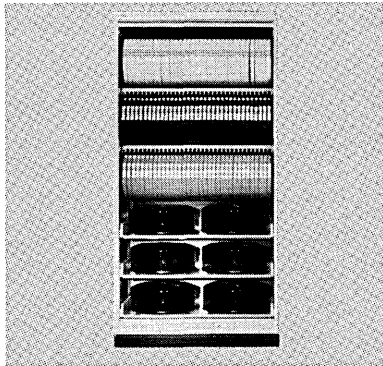
Management: strategic/long-term planning and simulations and modeling; any computer with FORTRAN; 103 users; introduced 1975; \$9,500 purchase.

MODULAR ONLINE SYSTEMS

**3220 SW First Ave.
Portland, OR 97201
(503) 220-0220**



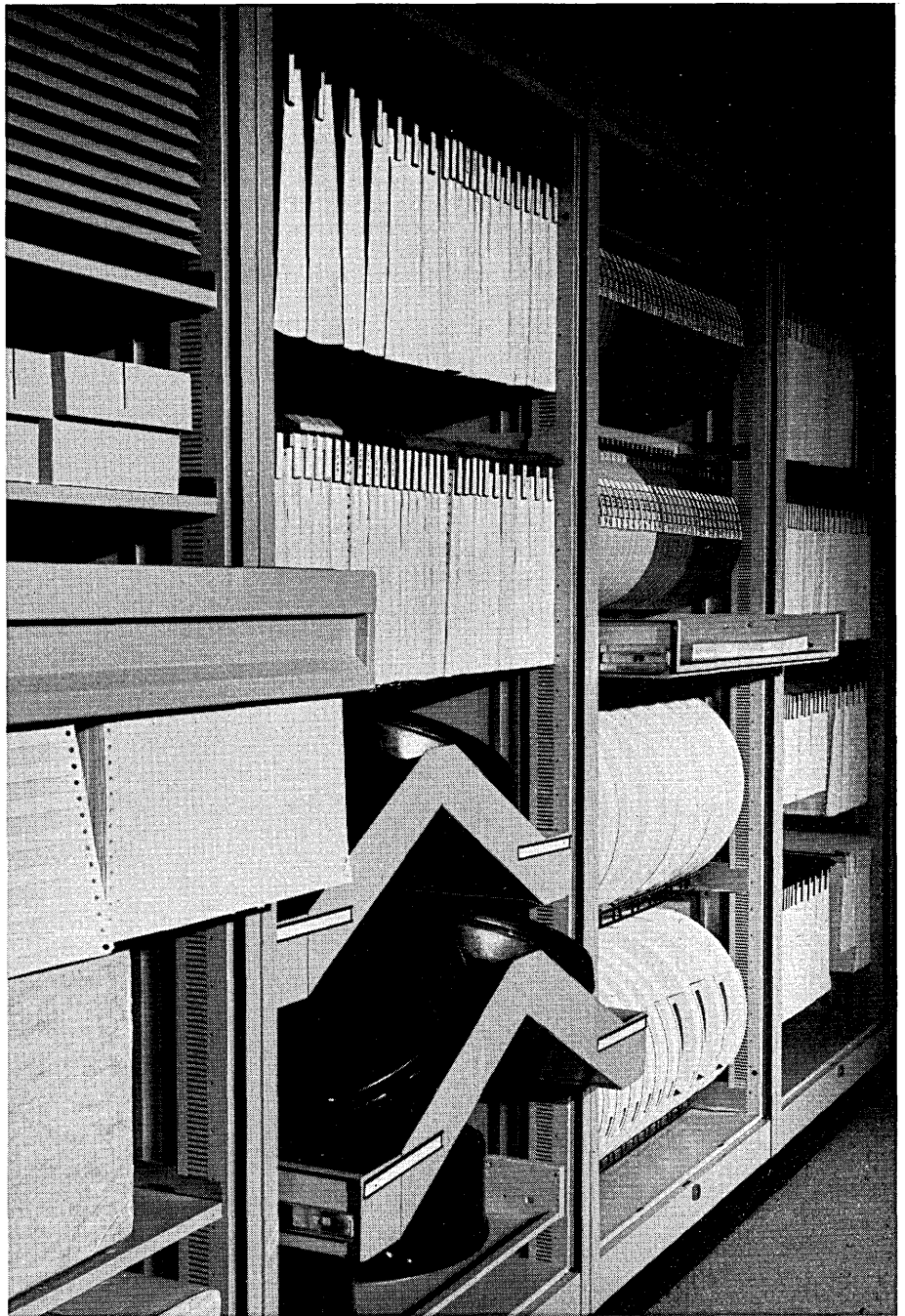
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CIRCLE 71 ON READER CARD

● **MOS Accounting: Accounts Payable**
Purchase accounting: accounts payable; Hewlett-Packard HP 3000; IBM System 34, 5110/5120; COBOL, BASIC, or RPG II depending on computer; 6 to 12 users; introduced 1977 to 1978; \$900 to \$8,000 purchase depending on computer.

● **MOS Accounting: Accounts Receivable**
Sales accounting: accounts receivable; Hewlett-Packard HP 3000; IBM System/34, 5110/5120; COBOL, BASIC, or RPG II depending on computer; 6 to 12 users; introduced 1977 to 1978; \$900 to \$8,000 purchase depending on computer.

● **MOS Accounting: General Ledger**
General accounting: general ledger; IBM System 34, 5110/5120; BASIC or RPG II depending on computer; four to six users; \$1,200 to \$2,500 purchase depending on computer.

● **MSAC Accounting:**
Sales accounting: order invoices, accounts receivable; order fulfillment and inventory control: inventory control, and warehouse/stockroom control; Hewlett-Packard HP 3000; COBOL; 12 users; introduced 1978.

MPS MANAGEMENT CONSULTANTS, LTD.
201 Consumers Road, Suite 208
Willowdale, Ontario M2J 4G8, Canada
(416) 491-4231

● **MPSF Financial Planning**
Management planning: budgeting, cost accounting, cash flow analysis, sales/order forecasting and market analysis, and financial planning and analysis; IBM System 360/370; Honeywell 6000/6040/6080; DEC VAX-11/780; Univac 1100; CDC Cyber 73; FORTRAN; 200 users; introduced 1974; \$35,000 purchase.

MSP, INC.
21 Worthen Road
Lexington, MA 02173
(617) 861-6130

● **PROJECTMANAGER**
Management: operations planning and control; any computer with COBOL; 60 users; introduced 1975; \$8,000 purchase.

MULTIPLE ACCESS COMPUTER GROUP
885 Don Mills Road
Don Mills, Ontario M3C 3H1
Toronto, Canada
(416) 443-3905

● **FIPAC**
Management: strategic/long-term planning, simulations modeling, and financial planning; CDC 6600, Cyber 70; FORTRAN, Compass; over 100 users; introduced 1970.

● **PMCS**
Management: operations planning and control; CDC 6600, Cyber 70; FORTRAN, Compass; over 50 users; introduced 1970; \$25,000 purchase.

NATIONAL INFORMATION SYSTEMS, INC.
20370 Town Center Lane, Suite 245
Cupertino, CA 95014
(408) 257-7700

● **BVE**
Purchase accounting: purchasing analysis;

management: operations planning and control; Honeywell Level 6; DEC 10/20, PDP-11; Hewlett-Packard HP 3000; FORTRAN; 10 users; introduced 1980; \$15,000 purchase.

● **Impire**
Management: financial planning and analysis; IBM System 360/370/3030/4300; Burroughs 6700; DEC 10/20, VAX-11/750 and 11/780; FORTRAN; 50 users; introduced 1978; \$38,000 purchase.

NCA CORPORATION
388 Oakmead Parkway
Sunnyvale, CA 94086
(408) 245-7990

● **Accounts Payable (Module, FS-II)**
Purchase accounting: accounts payable; DEC PDP-11; VAX-11/780; BASIC.

● **Accounts Receivable (Module, FS-II)**
Sales accounting: accounts receivable; DEC PDP-11, VAX-11/780; BASIC.

● **Fixed Assets (Module, FS-II)**
General accounting: fixed asset/capital equipment and depreciation; DEC PDP-11, VAX-11/780; BASIC.

● **FS-II**
General accounting: fixed asset/capital equipment and depreciation; purchase accounting: accounts payable and general ledger; sales accounting: sales invoices and accounts receivable; order fulfillment and inventory control: order processing; management: sales/order forecasting and market analysis; DEC PDP-11, VAX-11/780; BASIC; 50 users; introduced 1976; \$42,000 purchase.

● **General Ledger (Module, FS-II)**
Purchase accounting: general ledger; DEC PDP-11, VAX-11/780; BASIC.

NETWORK COMPUTING CORP.
5301 77 Center Drive, Suite 40
Charlotte, NC 28210
(704) 525-8810

● **EIS**
Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/3030/4300; COBOL, Assembler; 35 users; introduced 1975.

● **FIS**
General accounting: financial reporting; purchase accounting: accounts payable; management: budgeting; IBM System 360/370/3030/4300; COBOL, Assembler; 15 users; introduced 1976.

ROBERT E. NOLAN, CO.
90 Hopmeadow Street
Simsbury, CT 06070
(203) 658-1941

● **ASET**
Payroll and personnel: work measurement; IBM System 360/370/3030/4300; COBOL; 20 users; introduced 1980; \$15,000 purchase.

NUMERIL COMP, INC.
1330 East State Street
Rockford, IL 61108
(815) 963-2435

● **Auto Check Payroll Package**
Payroll and personnel: payroll, withholding

taxes, special compensation, commissions, and personnel records; any Data General computer with FORTRAN or BASIC; 20 users; introduced 1976; \$2,500 one-time license.

NUMETRIX, LTD.
3 Church Street, Suite 600
Toronto, Ontario M5E 1M2, Canada
(416) 868-6013

● **Analyst**
Management: budgeting, operations planning and control, strategic/long-term planning, and simulations and modeling; IBM System 360/370/3030/4300; DEC PDP 20; MCM; all large systems with APL; APL; eight users; introduced 1978; \$300 one-time license.

OCCIDENTAL COMPUTER SYSTEMS, INC.
6666 Valjean Avenue
Van Nuys, CA 91406
(213) 782-3005

● **Accounts Payable**
Purchase accounting: accounts payable; IBM System 360/370/3030/4300; COBOL; introduced 1978.

● **Accounts Receivable**
Sales accounting: accounts receivable; IBM System 360/370/3030/4300; COBOL; introduced 1978.

● **General Ledger**
General accounting: general ledger; IBM System 360/370/3030/4300; COBOL; introduced 1978.

● **Super Pay**
Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; IBM System 360/370/3030/4300; COBOL; 80 users; introduced 1972; \$960 purchase.

THE OFFICE MANAGER, INC.
P.O. Box 66596
127 Southwest 156th Street
Seattle, WA 98166
(206) 246-7022

● **GBMS**
General accounting: fixed asset/capital equipment and depreciation and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Wang 2200-vs; COBOL, BASIC; 500 users; introduced 1976.

ONLINE SYSTEMS, INC.
115 Evergreen Heights Drive
Pittsburgh, PA 15229
(412) 931-7600

● **Accounts Payable/Purchase Order**
Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; COBOL; 100 users.

● **Accounts Receivable/Sales Analysis**
Sales accounting: accounts receivable and sales analysis; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; COBOL.

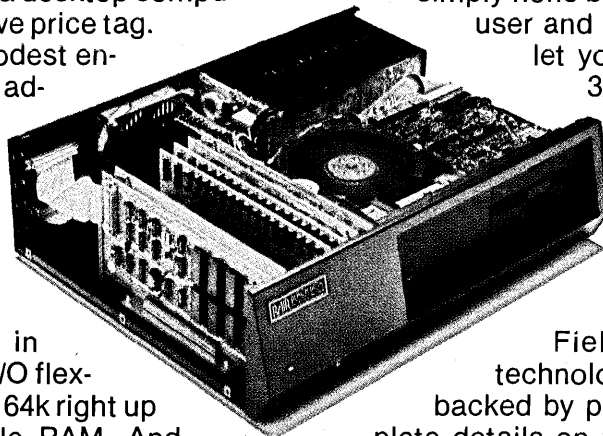
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West Germany: RAIR Computer GmbH
Clemensstrasse 5-7, 5000 Köln 1, Telephone: (0221) 219811 Telex: 8881915

United Kingdom: RAIR Ltd., Wellington House,
6-9 Upper St Martins Lane, London WC2H 9EQ Telephone: (01) 836 6921 Telex: 298452

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● **Fedtax**

Management: corporate tax planning; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; FORTRAN; 150 users.

● **Fixed Assets**

General accounting: fixed asset/capital equipment and depreciation; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; COBOL; 100 users.

● **Foresight**

Management: Federal tax compliance; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; FORTRAN; 600 users.

● **Foretax**

Management: budgeting, cash flow analysis, sales/order forecasting and market analysis, and financial planning and analysis; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; FORTRAN; 600 users.

● **Foregraph**

Management: strategic/long-term planning, simulations and modeling, and bar graphs; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; FORTRAN.

● **General Ledger**

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; IBM System 370/4300; DEC VAX; Prime 400-750; Hewlett-Packard HP 3000; Univac 1100, 90/60, 90/80; COBOL; 150 users.

● **OMAR**

Management: market analysis; DEC System 10, 20/60; FORTRAN, MACRO; introduced 1979.

● **OSCAR**

Management: operations planning and control; IBM 370, 3032; DEC System 10; Intel As/6; FORTRAN, MACRO-10; over 200 users; introduced 1972.

OPEN SYSTEMS, INC.

**430 Oak Grove, Suite 409
Minneapolis, MN 55403
(612) 870-3515**

● **Financial Account System**

Purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: sales invoices and accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; management: financial planning and analysis; NCR 8140/8400; COBOL; 300 users; introduced 1978; \$1,250 one-time license.

● **Financial Accounting System**

General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: sales invoices and accounts receivable; order fulfillment and inventory control: inventory control, warehouse/stockroom control, and mail list; payroll and personnel: payroll; management: financial planning and analysis; Cado 2028; Cadol; 3,800 users; introduced 1976; \$13,500 one-time license.

● **Fitness**

Purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: sales invoices and accounts receivable; order fulfillment and inventory control: inventory control and warehouse/stockroom control; payroll and personnel: payroll; management: financial planning and analysis; all REXON computers with BASIC; 50 users; introduced 1979; \$9,500 one-time license.

THE PALO ALTO GROUP

**790 Lucerne Drive
Sunnyvale, CA 94086
(408) 735-8490**

● **Dollar Flow**

General accounting: financial reporting, and fixed asset/capital equipment and depreciation; management: budgeting, cash flow analysis, sales/order forecasting and market analysis, strategic/long-term planning, and simulations and modeling; Hewlett-Packard HP 3000; BASIC, SPL; 50 users; introduced 1975; \$25,000 one-time license.

PATTERN SYSTEMS, INC.

**(Division of R. Shriver Associates)
1259 Route 46, Building 2
Parsippany, NJ 07054
(201) 335-7800**

● **Direct 3000 (General Ledger)**

General accounting: general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; Hewlett-Packard HP 3000; COBOL; 12 users; introduced 1980; \$30,000 purchase.

● **Direct 3000 (Personnel)**

Payroll and personnel: personnel records; Hewlett-Packard HP 3000; COBOL; three users; introduced 1980; \$30,000 purchase.

PERSONNEL DATA SYSTEMS, INC.

**15 East Ridge Pike
Conshohocken, PA 19428
(215) 828-4294**

● **ACCU PAY**

Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; any hardware with COBOL; 180 users; introduced 1974; \$34,500 purchase.

● **PASS**

Payroll and personnel: personnel records; any hardware with COBOL; 180 users; introduced 1974; \$49,000 purchase.

PK SYSTEMS, INC.

**113 North Center
Bloomington, IL 61701
(309) 828-6031**

● **PK Zenith**

Management: cost accounting, manufacturing process/production control, and bills of material; DEC PDP-11; DIBOL.

PLYCOM SERVICES, INC.

**P.O. Box 160
Plymouth, IN 46563
(219) 935-5121**

● **Plycom Core Accounting System-A/P**

Purchase accounting: accounts payable; DEC

PDP-11; BASIC; 70 users; introduced 1977; \$5,000 one-time license.

● **Plycom Core Accounting System-A/R**

Sales accounting: accounts receivable; DEC PDP-11; BASIC; 70 users; introduced 1977; \$7,000 one-time license.

● **Plycom Core Accounting System-Fixed Asset**

General accounting: fixed asset/capital equipment and depreciation; DEC PDP-11; BASIC; 70 users; introduced 1977; \$4,000 one-time license.

● **Plycom Core Accounting System-G/L**

General accounting: financial reporting and general ledger; DEC PDP-11; 70 users; introduced 1977; \$5,000 one-time license.

● **Plycom Core Accounting System-Pay**

Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; DEC PDP-11; 70 users; introduced 1977; \$5,000 one-time license.

PMS SYSTEMS CORP.

**2601 Ocean Park Boulevard
Suite 314
Santa Monica, CA 90405
(213) 450-1452**

● **Smart/Utilize**

General accounting: fixed asset/capital equipment and depreciation; IBM System 360/370/3030/4300; Univac 1100; COBOL, Assembler; 20 users; introduced 1972; \$20,000 purchase.

POINT 4 DATA CORP.

**2569 McCabe Way
Irvine, CA 92714
(714) 754-4114**

● **General Ledger Accounting System (GLAS)**

General accounting: general ledger; any Data General Nova under Iris; BASIC; introduced 1978; \$3,000 purchase.

● **Management Accounting and Control (MACS)**

General accounting: general ledger; purchase accounting: receivables; order fulfillment and inventory control: order processing, inventory control and warehouse/stockroom control; payroll and personnel: payroll, and personnel records; any Data General Nova under Iris; BASIC; 20 users; introduced 1978; \$8,000 purchase.

● **Order Entry, Inventory, and Receivables (ORIS)**

Sales accounting: accounts receivable; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; any Data General Nova under Iris; BASIC; introduced 1978; \$2,500 purchase.

● **PAYS**

Payroll and personnel: payroll, and personnel records; any Data General Nova under Iris; introduced 1978; \$2,500 purchase.

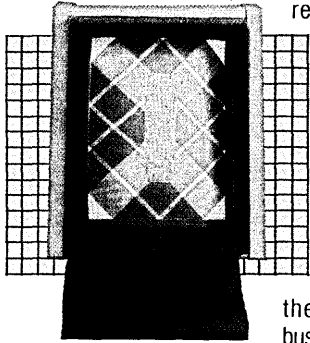
● **Purchase, Payable, In-house Inventory (PIPS)**

Purchase accounting: purchase orders and purchasing, and accounts payable; order fulfillment and inventory control: in-house inventory control; any Data General Nova under Iris; introduced 1978; \$1,500 purchase.

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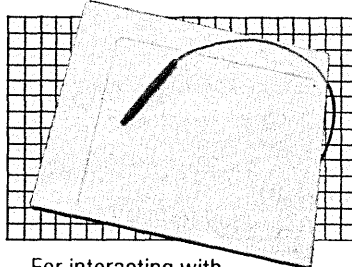
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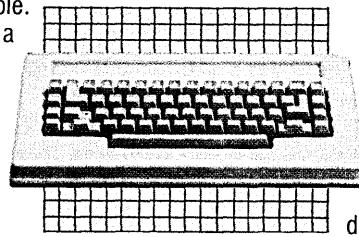
till you see how fast we can update it.

crisp, proportionally spaced, black on white text in a variety of fonts, and high resolution graphics. We think our picture is the best in the business, and wait



For interacting with the screen, a cursor positioning tablet is standard equipment. You point—PERQ performs. Check out the keyboard. It's compact, detachable, reliable.

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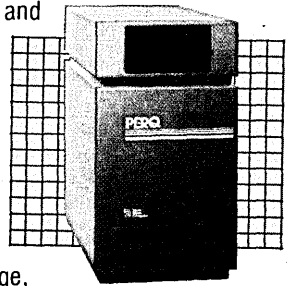


pascal compiler, a what you-

see-is-what-you-get text editor, and other software attractions too numerous to mention.

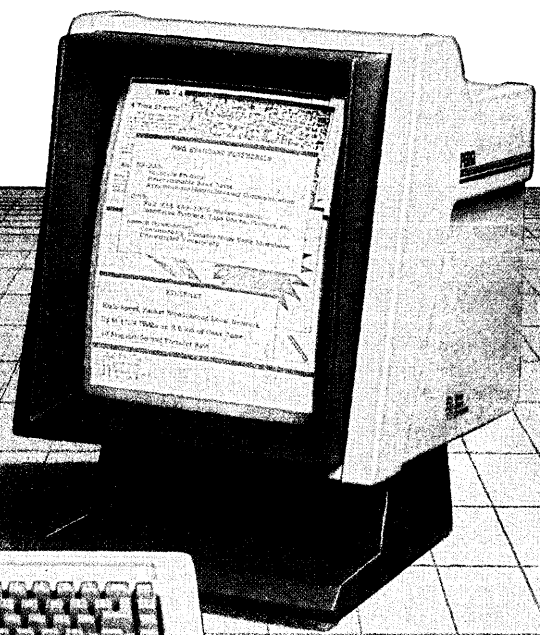
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(303) 750-8080

• *Accounts Payable*

Purchase accounting: accounts payable; IBM System 32/34; RPG; 12 users; introduced 1979.

• *Accounts Receivable*

Sales accounting: accounts receivable; IBM System 32/34; RPG; 12 users; introduced 1979.

• *General Ledger*

General accounting: general ledger; IBM System 32/34; RPG; 12 users; introduced 1979.

• *MBS*

Banking operations: mortgages; IBM System 32/34; RPG; three users; introduced 1979.

• *Payroll*

Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; IBM System 32/34; RPG; 12 users; introduced 1979.

POLICY MANAGEMENT SYSTEMS

Division of Seibels, Bruce & Co.

P.O. Box 1

Columbia, SC 29202

(803) 748-2000

• *Financial Management Systems*

General accounting: general ledger; management: budgeting; IBM System 360/370/3030/4300; COBOL; 30 users; introduced 1978.

PREDICTION SYSTEMS, INC.

P.O. Box 276

Manasquan, NJ 08736

(201) 223-4572

• *General Stochastic Analysis (GSA)*

Management: strategic/long-term planning, simulations and modeling, and statistical analysis; any computer with COBOL and FORTRAN; six users; \$300/mo.

• *General Stochastic Modeling (GSM)*

Management: strategic/long-term planning, simulations, modeling; any computer with COBOL and FORTRAN; six users; \$450/mo.

PRICE WATERHOUSE & CO.

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(212) 489-8900

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Management: budgeting; Hewlett-Packard HP 2000 series; Univac; Prime; COBOL; 45 to 50 users; introduced 1979; \$5,000 purchase.

• *Cost Allocation*

Management: cost accounting; Hewlett-Packard HP 2000 series; Microdata; Reality; Univac; Prime; COBOL; 45 to 50 users; introduced 1979; \$5,000 purchase.

• *FM/80*

General accounting: general ledger; Hewlett-Packard HP 2000 series; Microdata; Reality; Univac; Prime; COBOL; 45 to 50 users; introduced 1979; \$15,000 purchase.

• *FRS/80*

General accounting: financial reporting and general ledger; IBM System 360/370/3030/4300; COBOL; 20 users; introduced 1979; \$25,000 purchase.

PRITSKER & ASSOCIATES, INC.

P.O. Box 2413

West Lafayette, IN 47906

(317) 463-5557

• *GASP IV*

Management: simulation and modeling; any with FORTRAN; 465 users; introduced 1974; \$300 purchase.

• *GERT IIIZ*

Management: operations planning and control; any with FORTRAN; 35 users; introduced 1970; \$200 purchase.

• *Q-GERT Analysis Program*

Management: strategic/long-term planning and simulations and modeling; any with FORTRAN; 180 users; introduced 1976; \$1,000 purchase.

• *Simulation Language for Alternative Modeling (SLAM)*

Management: strategic/long-term planning and simulations and modeling; any with FORTRAN; 110 users; introduced 1979; \$2,000 purchase.

PROFESSIONAL COMPUTER RESOURCES, INC.

2021 Midwest Road

Oak Brook, IL 60651

(312) 932-2200

• *Accounts Payable*

Purchase accounting: accounts payable; IBM S/3, System/34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *Accounts Receivable*

Sales accounting: accounts receivable; IBM System 34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *DataPlan*

Management: financial planning and analysis; RPG, Assembler; 150 users; introduced 1979; \$12,000 purchase.

• *Forecasting*

Management: sales/order forecasting and market analysis; IBM System/34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *General Ledger*

General accounting: general ledger; IBM System/34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *Invoicing*

Sales accounting: sales invoices; IBM System/34.

• *Payroll*

Payroll and personnel: payroll; IBM System/34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *Purchasing*

Purchase accounting: purchase orders and purchasing and purchase analysis; IBM System/34; RPG; 75 users; introduced 1975; \$3,000 to \$5,000 purchase.

• *Resource Management System*

General accounting: general ledger; purchase accounting: purchasing, accounts payable, and order entry; sales accounting: accounts receivable and invoicing; order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: sales/order forecasting and market analysis, manufacturing process/production control, bills of material, and operations planning and

control; IBM System/34; RPG; over 100 users; introduced 1975; \$50,000 purchase.

PROFIT CONTROL SYSTEMS

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Clifton, NJ 07013

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• *Maxi Manager*

General accounting: general ledger.

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3550 North Lexington

St. Paul, MN 55112

(612) 484-8800

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General accounting: financial reporting and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable and sales analysis; DEC RT-11, RSX-11M; FORTRAN; 300 users; introduced 1972.

PROGRAM PRODUCTS, INC

95 Chestnut Ridge Road

Montvale, NJ 07654

(201) 391-9800

• *Audit-Analyze*

General accounting: auditing; IBM System 360/370/3030/4300; FORTRAN, Assembler, Program Generator; introduced 1974; \$18,500.

• *Data Analyzer*

Management: sales/order forecasting and market analysis; payroll and personnel: personnel records; IBM System 360/370/3030/4300; FORTRAN, Assembler; introduced 1971; \$22,000 one-time license.

PUGH-ROBERTS ASSOCIATES

5 Lee Street

Cambridge, MA 02139

(617) 864-8880

• *Dynamo*

Management: strategic/long-term planning, simulations and modeling, and simulation language; IBM System 360/370/3030/4300; any computer with FORTRAN; 1500 users; introduced 1959; \$9,000 one-time license.

• *General Purpose System Identifier and Evaluator (GPSIE)*

Management: strategic/long-term planning, simulations and modeling, and statistical analysis; IBM System 360/370/3030/4300; PL/1; 10 users; introduced 1973; \$1,000 purchase.

PYRAMID DATA LIMITED

P.O. Box 10116

Santa Ana, CA 92711

(714) 639-1527

• *Accounts Payable*

Purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements, and purchase analysis; DEC PDP-8; DIBOL; 46 users; introduced 1977; \$790 one-time license.

• *Accounts Receivable*

Sales accounting: accounts receivable, billings, and sales analysis; DEC PDP-8; DIBOL; 64



Dear Ma:

Now Racal-Vadic has an Originate/Answer Triple Modem with Multiline Dialing!

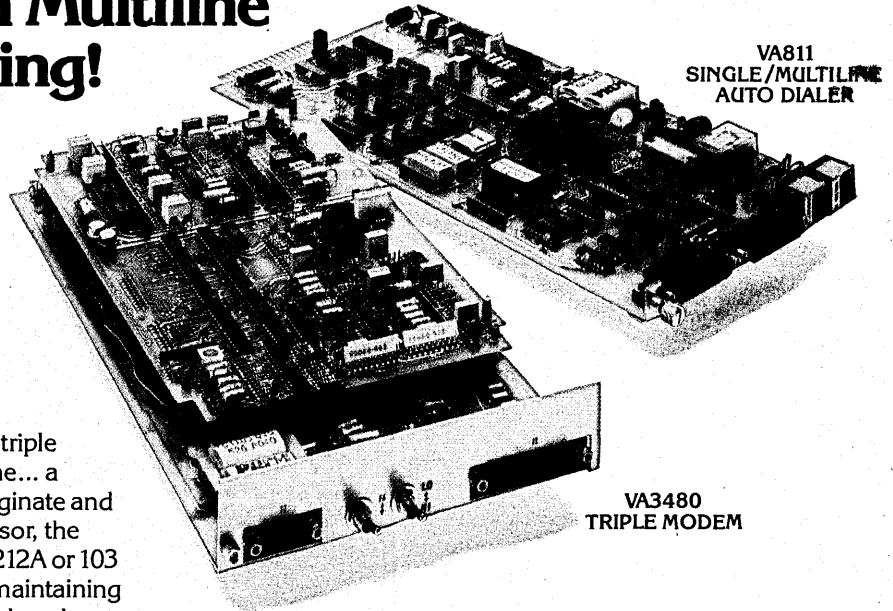
The two PC boards at the right are making it easy for computer sites to standardize on a single modem for all full duplex 1200 and 0-300 bps data transmission over your dial-up network.

Originate/Answer Triple Modem

First there's Racal-Vadic's new VA3480 triple modem. Actually, Ma, it's six modems in one... a VA3400, a 212A and a 103 with automatic originate and answer. Thanks to the built-in microprocessor, the VA3480 can automatically call any VA3400, 212A or 103 remote modem, with the central computer maintaining complete control, including selection of high or low speed modes, and modem ID. In the auto answer mode, the VA3480 changes into a VA3400, 212A or 103, depending on which type modem is calling. It's really a "do everything" modem, Ma.

Single/Multiline Automatic Dialer

The other card is the new VA811 Multiline Automatic Calling Unit. You can house one of these dialers and up to 7 triple modems in Racal-Vadic's VA1616 chassis, which takes up only 7 inches of rack height. 4 of these chassis mount in a 7-foot rack cabinet, making it possible to control 28 triple modems from a single RS366 dialing port or, via an RS232C interface, using the VA831 adapter. It would take 28 of your dialers, and many racks of equipment to do the same thing. Hardly a fair comparison, is it, Ma.



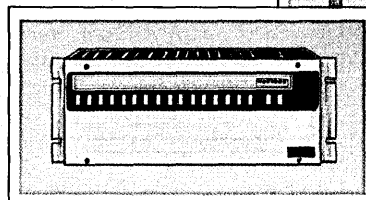
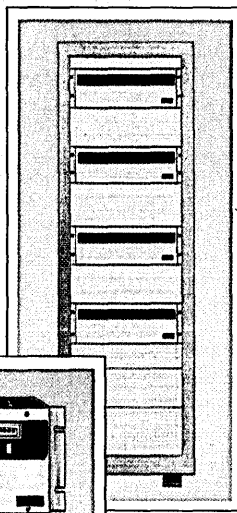
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VA1770 Rack Cabinet

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CIRCLE 75 ON READER CARD

users; intro 1977; \$920 one-time license.

● *Client Accounting Financial Reporting System*

General accounting; auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; DEC PDP-8 and 11; DIBOL; 350 users; introduced 1975; \$2,250 one-time license.

● *Payroll*

Payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; DEC PDP-8; DIBOL; 200 users; intro 1977; \$975 one-time license.

QUALITY SYSTEMS CORP.
875 North Michigan Avenue

Suite 2510
Chicago, IL 60611
(312) 266-6060

● *Rescue*

General accounting; auditing; IBM System 360/370/3030/4300; any computer with COBOL and/or Assembler; 25 users; introduced 1979; \$2,500 initial license.

QUODATA CORP.

196 Trumbull Street
Hartford, CT 06103
(203) 728-6777

● *FRS*

General accounting; auditing, financial reporting, and general ledger; purchase accounting; accounts payable, cash disbursements, and purchase analysis; DEC PDP-11 line; BASIC; 45 users; introduced 1977; \$7,500 initial license.

● *Payroll*

Payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; DEC PDP-11 line; BASIC; 25 users; introduced 1977; \$4,000 initial license.

R.A.I.R., INC.

465 Castro Street
Mountain View, CA 94041
(415) 964-0413

● *General accounting*

General accounting; general ledger; purchase accounting; accounts payable; sales accounting; accounts receivable; Hewlett-Packard HP 2000; BASIC; 50 users; introduced 1970; \$20,000 initial license.

● *MADIC*

Purchase accounting; purchase orders and purchasing and purchase analysis; sales accounting; sales invoices and sales analysis; order fulfillment and inventory control; inventory control and warehouse/stockroom control; management; manufacturing process/production control and bills of material; Hewlett-Packard HP 2000; BASIC; 30 users; introduced 1972; \$30,000 initial license.

RALEIGH SYSTEMS CORP.

P.O. Box 31428
Raleigh, NC 27622
(319) 876-0067

● *Audit*

General accounting; auditing, financial re-

porting, and general ledger; purchase accounting; accounts payable; sales accounting; accounts receivable; payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; Data General; COBOL; 15 users; introduced 1977; \$20,000 initial license.

RAPID DATA, INC.
215 North 5th Street

P.O. Box 349
Redlands, CA 92373
(714) 793-2855

● *Accounts Payable*

Purchase accounting; accounts payable; Datapoint; DATABUS; 50 users; introduced 1975; \$3,000 initial license.

● *Accounts Receivable*

Sales accounting; accounts receivable; Datapoint; DATABUS; 50 users; introduced 1975; \$3,000 initial license.

● *G/L*

General accounting; general ledger; Datapoint; DATABUS; 50 users, introduced 1975; \$3,000 initial license.

● *Inventory and Order Entry*

Order fulfillment and inventory control; order processing inventory control, and warehouse/stockroom control; Datapoint; DATABUS; 50 users; introduced 1975; \$3,000 initial license.

● *Payroll*

Payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; Datapoint; DATABUS; six users; introduced 1979; \$3,000 initial license.

RATH & STRONG, INC.

21 Worthen Road
Lexington, MA 02173
(617) 861-1700

● *PIOS*

Purchase accounting; purchase orders and purchasing; order fulfillment and inventory control; order processing; management; cost accounting, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; Honeywell 6000; Data General C/S and Eclipse; COBOL; 20 users; introduced 1971.

RECORDATA WEST, INC.

3030 Temple Street
Suite 206
Los Angeles, CA 90026
(213) 385-8895

● *Legal*

Sales accounting; accounts receivable and billings; management; time management; IBM Series I; Basic Four; Rexon; BASIC; 12 users; introduced 1976; \$9,400 initial license.

● *Plan Accounting*

General accounting; financial reporting; IBM Series I; Basic Four; Rexon; BASIC; 85 users; introduced 1972.

RETAIL INFORMATION SYSTEMS CORP.

7550 Lucerne, Suite 406
Middleburg Heights, OH 44130
(216) 234-8440

● *Accounts Payable*

Purchase accounting; accounts payable and retail; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$2,500 one-time license.

● *Credit and Accounts Receivable*

Sales accounting; accounts receivable and credit authorization; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$5,000 one-time license.

● *Financial Reporting*

General accounting; financial reporting and general ledger; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$5,000 one-time license.

● *Fixed Assets*

General accounting; fixed asset/capital equipment and depreciation; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; introduced 1980; \$5,000 one-time license.

● *Payroll and Personnel Management*

Purchase accounting; purchase orders and purchasing; payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; one user; introduced 1980; \$5,000 one-time license.

● *Purchase Order Management*

Purchase accounting; purchase orders and purchasing and retail; IBM System 360/370/3030/4300; Texas Instruments 990 Model 8 and up; Hewlett-Packard HP 3000; COBOL; one user; introduced 1980; \$5,000 one-time license.

RICHARDSON & ASSOCIATES, INC.

2140 South Walnut Street
Springfield, IL 62704
(217) 525-7272

● *PCA Organization Charting System*

Management; organization planning; any computer with COBOL; seven users; introduced 1979; \$20,000 one-time license.

RJ SOFTWARE SYSTEMS

7471 University Avenue
La Mesa, CA 92041
(800) 854-2751

● *Accounts Receivable*

Sales accounting; sales invoices; accounts receivable, billings, and sales analysis; All Burroughs minis; COBOL; 1000 users; introduced 1973; \$2,500 initial license.

● *Asset Depreciation*

General accounting; fixed asset/capital equipment and depreciation; All Burroughs minis; COBOL; 1,500 users; introduced 1972; \$900 initial license.

● *Payroll Check Writing*

Payroll and personnel; payroll, withholding taxes, special compensation, commissions, and personnel records; All Burroughs minis; COBOL; 700 users; introduced 1973; \$2,650 initial license.

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ROYAL INTERNATIONAL SYSTEMS

222 Fashion Lane, Suite 208

Tustin, CA 92680

(714) 731-4303

● General Ledger

General accounting: general ledger; IBM Series/1; COBOL; introduced 1980; \$4,500 initial license.

SAB, INC.

Box 173, FDR Station

New York, NY 10022

(212) 759-9855

● PLAN 10/40

General accounting: local, state and Federal taxes; trusts and financial management: tax planning tool; IBM System 32/34; Burroughs B800 and 900 series; RPG; 450 users; introduced 1975.

● Software 10/40

General accounting: state and Federal taxes; payroll and personnel: withholding taxes; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs B800, 1800, 80, 90, 91, 92; RPG; 520 users; introduced 1966.

SAVER COMPUTER SYSTEMS, INC.

1750 South Brentwood Boulevard

St Louis, MO 63144

(314) 962-0382

● Accounts Payable

Purchase accounting: purchase orders and purchasing, accounts payable, and cash disbursements; DEC PDP-11; BASIC; 200 users; introduced 1975; \$1,200 initial license.

● Accounts Receivable

Sales accounting: sales invoices, accounts receivable, billings, and sales analysis; DEC PDP-11; BASIC; 200 users; introduced 1975; \$1,200 initial license.

● General Ledger

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and general ledger; DEC PDP-11; BASIC; 200 users; introduced 1975; \$2,400 initial license.

● Inventory

Order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control; and reordering; DEC PDP-11; \$1,200 initial license.

SESA, INC.

89 State Street

Boston, MA 02109

(617) 742-6620

● SESAP

Purchase accounting: purchase orders and purchasing; order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: manufacturing process/production control and bills of material; Honeywell Level 6; Microdata; Prime; Microdata Reality; BASIC; 17 users; introduced 1976; \$85,000 purchase.

R. SHRIVER ASSOCIATES

1259 Route 46, Building 2

Parsippany, NJ 07054

(201) 335-7800

● Accounts Payable

Purchase accounting: accounts payable; Hewlett-Packard HP 3000; COBOL; 12 users; introduced 1979; \$15,000 purchase.

● Accounts Receivable

Sales accounting: accounts receivable; Hewlett-Packard HP 3000; COBOL; 12 users; introduced 1979; \$15,000 purchase.

● General Ledger

General accounting: general ledger; Hewlett-Packard HP 3000; COBOL; 12 users; introduced 1979; \$6,000 purchase.

● Order Processing

Order fulfillment and inventory control: order processing; Hewlett-Packard HP 3000; COBOL; four users; introduced 1980; \$15,000 purchase.

● Personnel

Payroll and personnel: personnel records; Hewlett-Packard HP 3000; COBOL; two users; introduced 1980; \$30,000 purchase.

SOFTWARE FACTORY LIMITED

TSF Center

Box 690

Valley Forge, PA 19481

(215) 783-0500

● Computer Match (CM)

Payroll and personnel: recruiting; IBM System 360/370/3030/4300; DEC PDP-11; Prime; COBOL, Assembler; one user; introduced 1980; \$20,000 purchase.

SOFTWARE INTERNATIONAL CORP.

2 Elm Square

Andover, MA 01810

(617) 475-5040

● Accounts Payable

Purchase accounting: accounts payable, cash disbursements; and purchase analysis; IBM System 360,370/3030/4300, S/3, System 32/34; DEC 10 and 20; Univac 90/30; Hewlett-Packard HP 3000; Wang 2200 vs; Perkin-Elmer 8/32; COBOL; 250 users; introduced 1972; \$20,000 one-time license.

● Accounts Receivable

Sales accounting: accounts receivable and billings; IBM System 360/370/3030/4300, S/3, System 32/34; Hewlett-Packard HP 3000; Wang vs; Perkin-Elmer 8/32; COBOL; 200 users; introduced 1972; \$25,000 one-time license.

● Fixed Asset

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and depreciation; IBM System 360/370/3030/4300, S/3, System 32/34; Hewlett-Packard HP 3000; Wang vs; Perkin-Elmer 8/32; COBOL; 75 users; introduced 1979; \$22,000 one-time license.

● General Ledger

General accounting: financial reporting and general ledger; management: budgeting cost accounting, and cash flow analysis; IBM System 360/370/3030/4300, S/3, System 32/34; Burroughs 1700, 1800, 1900; Honeywell Level 62; DEC 10 and 20, 11/780; Hewlett-Packard HP 3000; Wang 2200 vs; ICL (all models); Univac 90/30; Perkin-Elmer 8/32; COBOL; 2500 users; introduced 1972; \$35,000 one-time license.

● MRP-2

Purchase accounting: purchase orders and purchasing and purchase analysis; management: manufacturing process/production control and bills of material; Hewlett-Packard HP 3000; COBOL; 50 users; introduced 1976; \$50,000 one-time license.

● MRP-3

Purchase accounting: purchase orders and purchasing and purchase analysis; management: manufacturing process/production control and bills of material; Microdata Reality; BASIC; 50 users; introduced 1976; \$35,000 one-time license.

● Payroll Personnel

Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/3030,4300, S/3, System 32/34; Univac 90/30; Hewlett-Packard HP 3000; Wang vs; perkin-Elmer 8/32; COBOL; 60 users; introduced 1978; \$20,000 one-time license.

SOFTWARE MANAGEMENT CORP.

3350 Scott Boulevard

Santa Clara, CA 95051

(408) 496-1111

● CA 10 Cost Accounting and Inventory Valuation System

Order fulfillment and inventory control: inventory control and warehouse/stockroom control; management: cost accounting; IBM 4331; Burroughs B7700; DEC VAX-11/780; Hewlett-Packard HP 3000; COBOL; eight users; introduced 1978; \$90,000 to \$95,000 purchase.

SOURCE ONE

1480 South 11th Street

Kalamazoo, MI 49009

(616) 375-8860

● Source Distributor Management

Management: cost accounting and route accounting; IBM 5120; Burroughs B80, 90, 800-900; COBOL; 60 users; introduced 1975; \$15,000 one-time license.

● Source One Distributor Management (Soft Drinks)

Management: cost accounting and route accounting; Burroughs B80, 90, 800-900; COBOL; five users; introduced 1980; \$15,000 one-time license.

SSI, INC.

300 Eastowne Drive

Chapel Hill, NC 27514

(919) 493-2495

● SIMPLAN

Management: strategic/long-term planning and simulations and modeling; IBM System 360/370/3030/4300; PL/1; 175 users; introduced 1974.

STSC, INC.

462 Boylston Street

Boston, MA 02116

(617) 267-6864

● CMCS

Sales accounting: sales invoices; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom

control; management: sales/order forecasting and market analysis, manufacturing process/production control, and bills of material; IBM System 360/370/3030/4300; APL PLUS; 45 users; introduced 1972; \$200,000 one-time license.

● *FPS*

Management: strategic/long-term planning and simulations and modeling; trusts and financial management: financial planning and analysis and currency conversion acquisition analysis; IBM System 360/370/3030/4300; APL PLUS; 45 users; introduced 1972; \$20,000 one-time license.

● *Solution-33*

General accounting: financial reporting; IBM System 360/370/3030/4300; FPS; introduced 1980; \$6,250 one-time license.

SUN INFORMATION SERVICES

**680 East Swedesford Road
Building 7, 3rd Floor
Wayne, PA 19087
(215) 293-0660**

● *PICOM*

Management: operations planning and control and financial planning and analysis; IBM System 360/370/3030/4300; FORTRAN; \$40,000 purchase.

● *PREMIS*

Management: operations planning and control; IBM System 360/370/3030/4300; FORTRAN; 19 users; \$50,000 purchase.

SYNERGY, INC.

**2337 18th Street NW
Washington, DC 20009
(202) 232-6261**

● *Econometric Software Package (ESP)*

Management: strategic/long-term planning and simulations and modeling; IBM System 360/370/3030/4300; DEC 10, 20 series; FORTRAN, Assembler; 200 users; introduced 1976; \$2,500 to \$3,000 one-time license.

SYSTEMS MANAGEMENT, INC.

**10400 West Higgins Road
Des Plaines, IL 60018
(312) 298-3840**

● *Business Control Program (BCP)*

General accounting: general ledger; purchase accounting: purchase orders and purchasing and accounts payable; sales accounting: accounts receivable, billings, and sales analysis; management: cost accounting and direct mail; payroll and personnel: payroll and labor distribution; Honeywell Ultimate; Prime; Microdata; COBOL, RPG; 300 users; introduced 1969; \$24,500 to \$36,500 purchase.

SYSTEMS RESEARCH, INC.

**2400 Science Parkway
Okemos, MI 48864
(517) 349-0200**

● *FIS/EGL*

General accounting: auditing, financial reporting, and general ledger; Burroughs B2700-4900; COBOL; 14 users; introduced 1978; \$20,000 one-time license.

● *Payroll*

Payroll and personnel: payroll and withholding taxes; Burroughs B2700-4900; COBOL; four users; introduced 1978; \$15,000 one-time license.

SYSTEMS, SCIENCE & SOFTWARE, INC.

**P.O. Box 1620
La Jolla, CA 92038
(714) 453-0060**

● *General Accounting System*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and general ledger; purchase accounting: accounts payable and cash disbursements; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; management: cost accounting and MIS; payroll and personnel: payroll, withholding taxes, and personnel records; Wang vs introduced 1980.

SYSTONETICS, INC.

**600 North Euclid Street
Suite 570
Anaheim, CA 92801
(714) 778-1600**

● *EZPERT*

Management: operations planning and control and project management; Prime; any computer with FORTRAN; introduced 1969.

**TEALTROMA OF AMERICA, INC./
Subsidiary of National Unlimited
Business Systems**

**1 Penn Plaza
New York, NY 10001
(212) 594-7560**

● *Financial Gen. Ledger Accounting System*

General accounting: financial reporting and general ledger; management: budgeting and cash flow analysis; trusts and financial management: financial planning and analysis; IBM System 360/370/4300; NEC Astra; COBOL; introduced 1980.

TECHNALYSIS CORP.

**6700 France Avenue, South
Minneapolis, MN 55435
(612) 925-5900**

● *Corporate Support Systems*

General accounting: auditing, financial reporting, fixed asset/capital equipment and depreciation, and general ledger; purchase accounting: purchase orders and purchasing, accounts payable, cash disbursements; and purchase analysis; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing, inventory control, warehouse/stockroom control, and reordering; payroll and personnel: payroll, and withholding taxes; IBM System 145, 38; Hewlett-Packard HP 3000; COBOL; four users; introduced 1980; \$40,000 one-time license.

TECHNICAL ANALYSIS CORP.

**120 West Wiewca Road, NE
Atlanta, GA 30342
(404) 252-1045**

● *Business System*

General accounting: auditing, financial reporting, and general ledger; purchase accounting: accounts payable and cash disbursements; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; payroll and personnel: payroll and withholding taxes; Data General Nova, Eclipse; BASIC; introduced 1978.

TELEDATA, INC.

**Box 364
Hanover, NH 03755
(603) 448-5005**

● *Corpland*

Management: financial planning and analysis; IBM CMS; Honeywell 66 series; PLI; 30 users; introduced 1979; \$45,000 purchase.

THETA COMPUTER SYSTEMS

**6627 Valjean Avenue
Van Nuys, CA 91406
(213) 994-8894**

● *Theta Business Management System (TBMS)*

General accounting: auditing, financial reporting, and general ledger; purchase accounting: accounts payable and cash disbursements; sales accounting: accounts receivable, billings and statements, and sales analysis; management: job cost accounting; payroll and personnel: payroll, withholding taxes, special compensation, and commissions; any computer with ANS COBOL; introduced 1981; \$5,000 to \$27,500 purchase.

● *Theta Business Management System (TBMS)*

Sales accounting: sales invoices; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; Hewlett-Packard HP 1000; QBOL; introduced 1980; \$5,000 to \$27,000 purchase.

TIMESHARING CONSULTANTS, INC.

**6420 East Broadway
Suite C-300
Tucson, AZ 85710
(602) 881-8888**

● *Accounting: Accounts Payable AP-20*

Purchase accounting: accounts payable; DEC System 20; COBOL; 10 users; introduced 1979; \$30,000 purchase.

● *Accounting: Accounts Receivable*

Sales accounting: accounts receivable; DEC System 20; COBOL; six users; introduced 1979; \$20,000 purchase.

● *Accounting: Cost Accounting CA-20*

Management: cost accounting: DEC System 20; COBOL; six users; introduced 1980; \$15,000 purchase.

● *Accounting: General Ledger G/L-20*

General accounting: general ledger; DEC System 20; COBOL; 10 users; introduced 1979; \$30,000 purchase.

● *Payroll PR-2*

Payroll and personnel: payroll, withholding taxes, special compensation, and commis-

sions; DEC 20; COBOL; 10 users; introduced 1979; \$35,000 purchase.

TOMINY, INC.
4580 Beltway Drive
Dallas, TX 75234
(214) 238-0339

● *Accounting*
General accounting: general ledger; purchase accounting; accounts payable; IBM System 360/370/3030/4300, Series 1; Honeywell Level 6; Centennial 8086; CDCS; 10 users; introduced 1980; \$7,500 purchase.

TRADESTREET RESEARCH
3570 One NCNB Plaza
Charlotte, NC 28280
(704) 376-2736

● *Financial Fitness*
General accounting: local, state and Federal taxes; banking operations: "Now" accounts management, check processing and clearing-house operations, bank-to-bank transfers, and letters-of-credit; trusts and financial management: stock and securities portfolio management, retirement accounts, employee benefit fund management, and financial planning and analysis; IBM 5120; APL; introduced 1980; \$25,000 one-time license.

● *Forecasting Package*
Management: budgeting, cash flow analysis, sales/order forecasting and market analysis, operations planning and control, strategic/long-term planning and simulations and modeling; IBM 5120; APL; 30 users; introduced 1974.

TRANSCOMM DATA SYSTEMS, INC.
1380 Old Freeport Road
Pittsburgh, PA 15238
(412) 963-6770

● *FINAR*
Management: strategic/long-term planning, simulations and modeling, and financial planning and analysis; DEC 11/34, 11/70; BASIC; \$18,000 license.

● *TOLAS*
General accounting: financial reporting, fixed asset/capital equipment and depreciation, local, state and Federal taxes, and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable; order fulfillment and inventory control: order processing, inventory control, and warehouse/stockroom control; DEC 11/34, 11/70; BASIC; introduced 1972; \$6,000 to \$10,000 license.

TRES SYSTEMS, INC.
4255 LBJ Freeway
Dallas, TX 75234
(214) 233-4341

● *Accounts Payable*
Purchase accounting: accounts payable and cash disbursements; IBM System 360/370/3030/4300; COBOL; six users; introduced 1980.

● *Employee Information System*
Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; IBM System 360/370/

3030/4300; COBOL; 25 users; introduced 1978
● *Financial Management System*
General accounting: general ledger; management: budgeting; trust and financial.

TYMSHARE, INC.
11 West Oxmore Road
Birmingham, AL 35209
(205) 942-6700

● *Fringe Pay*
Payroll and personnel: payroll, withholding taxes, special compensation, commissions, and personnel records; Burroughs 3700; COBOL; 100 users; introduced 1977; \$12,000 purchase.

● *GLAS*
General accounting: general ledger; Burroughs 3700; COBOL; 40 users; introduced 1978; \$10,000 purchase.

● *Super Star*
Sales accounting: accounts receivable; Burroughs 3700; COBOL; 20 users; introduced 1979; \$24,000 purchase.

● *TAPS*
Purchase accounting: accounts payable; Burroughs 3700; COBOL; 25 users; introduced 1977; \$10,000 purchase.

UNITED COMPUTING SYSTEMS, INC.
2525 Washington Street
Kansas City, MO 64108
(816) 221-9700

● *Accounts Payable*
Purchase accounting: accounts payable; Hewlett-Packard HP 3000; Prime 750; Univac 940; COBOL; 300 users; introduced 1969; \$19,500 purchase.

● *Accounts Receivable*
Sales accounting: accounts receivable; Hewlett-Packard HP 3000; Prime 750; Univac 940; COBOL; 65 users; introduced 1969; \$26,500 purchase.

● *Fixed Asset*
General accounting: fixed asset/capital equipment and depreciation; IBM System 360/370/3030/4300; Hewlett-Packard HP 3000; Prime 750; Univac 940; COBOL; 100 users; introduced 1969; \$19,500 purchase.

● *Foretax*
General accounting: local, state and Federal taxes; Hewlett-Packard HP 3000; Prime 750; Univac 940; FORTRAN; 100 users; introduced 1972; \$30,000 purchase.

UNIVERSITY COMPUTING CO.
UCC Tower/Exchange Park
Dallas, TX 75235
(214) 353-7100

● *UCC Accounts Payable With Purchase Order Control (APS)*
Purchase accounting: purchase order control and accounts payable; IBM System 360/370/3030/4300; Burroughs medium-large; COBOL; introduced 1980.

UNIV. OF WINDSOR COMPUTER CENTER
401 Sunset
Windsor, Ontario, Canada N9B 3P4
(519) 253-4232

● *OASIS*
General accounting: general ledger; purchase

accounting: accounts payable; sales accounting: accounts receivable; management: budgeting; IBM System 360/370, System 32/34; COBOL; introduced 1977.

THE YARDLEY GROUP, INC.
215 South Broad Street
Suite 502
Philadelphia, PA 19107
(215) 545-7300

● *Y/G Business Systems Package-250*
General accounting: general ledger; purchase accounting: accounts payable; sales accounting: sales invoices, accounts receivable, billings, and sales analysis; management: cost accounting; Hewlett-Packard HP 250; BASIC; six users; introduced 1979.

● *Y/G Payroll-250*
Payroll and personnel: payroll, withholding taxes, special compensation, and commissions; Hewlett-Packard HP 250; BASIC; six users; introduced 1979.

ZIEGLER & COMPANY, INC.
1173 Boulevard N.E.
Orangeburg, SC 29115
(803) 534-3740

● *Accounting: Accounts Payable*
Purchase accounting: accounts payable; IBM System 32/34 5280, all Series/1; RPG; 45 users; introduced 1975; \$1,500 purchase.

● *Accounting: Accounts Receivable*
Sales accounting: accounts receivable; IBM System 32/34, 5280, all Series/1; RPG; 40 introduced 1975; \$1,500 purchase.

● *Accounting: Billings*
Sales accounting: billings; IBM System 32/34, 5280, all Series/1; RPG; 25 users; introduced 1975; \$1,500 purchase.

● *Accounting: Fixed Asset*
General accounting: fixed asset/capital equipment and depreciation; IBM System 32/34, 5280, all Series/1; RPG; 10 users; introduced 1975; \$1,500 purchase.

● *Accounting: General Ledger*
General accounting: general ledger; management: budgeting; IBM System 32/34, 5280, all Series/1; RPG; 40 users; introduced 1975; \$1,500 purchase.

● *Accounting, Inventory, Payroll*
General accounting: fixed asset/capital and general ledger; purchase accounting: accounts payable; sales accounting: accounts receivable, billings, and sales analysis; order fulfillment and inventory control: order processing and reordering; management: budgeting; payroll and personnel: payroll; IBM System 32/34, 5280, all Series/1; RPG; 50 users; introduced 1975.

● *Payroll Package*
Payroll and personnel: payroll; IBM System 32/34, 5280, all Series/1; RPG; 45 users; introduced 1975; \$1,500 purchase.

This article is based on a report in Data Decisions' *Computer Systems*, a looseleaf reference service covering computer hardware and software. A trial review is available from Data Decisions, 20 Brace Rd., Cherry Hill, NJ 08034, (609) 429-7100.



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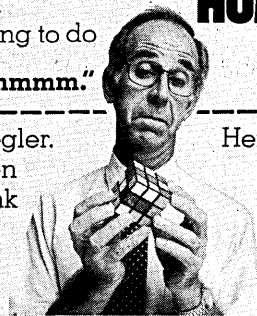
"Hummmm."

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HARDWARE

OFF-LINE

Building on its video disk technology, Philips has built 64 disk "juke box" that can store roughly one-and-a-half million monochrome images of typewriter pages. Using Digital Optical Recording (DOR), workers at the Project Center in Geldrop, a part of the Philips Research Laboratory in Eindhoven, the Netherlands, have built a minicomputer controlled system that can write a typed or handwritten document to a DOR disk in less than one second using a laser. Each stored document can be retrieved within five seconds, based on user-supplied index terms; the page is then displayed on a high-resolution screen. Documents are scanned using facsimile technology, resulting in nearly four million bits per page; each DOR disk can hold about 2,500 pages. If the scanned document goes through digital compression, Philips says a disk can hold up to 25,000 pages. Optionally, the document could be entered via a word processor, allowing half-a-million pages to be stored on a single disk.

Known as the Megadoc, the system consists of a mini controlling an optical recorder and player, one or more DOR juke boxes. Various input devices are supported, including a page scanner, word processor, high-resolution displays, and communications equipment.

The pricing information given in our June write-up of Matrox Electronic Systems' CTM-300 color terminal was incorrect. The actual prices are \$1,470 without monitor, and \$2,940 with monitor. The company is inviting inquiries from potential distributors.

TYPEWRITER INTELLIGENCE

Looks deceive. That triangular copy stand next to the IBM typewriter is actually IRIS (Intelligent Remote Input Stand), Northern Telecom's value-added accessory that enhances the text processing capabilities of IBM's electronic typewriters (models 50, 60, and 75). The IRIS copy stand includes a liquid crystal display for operator prompts and scanning through text in IRIS's 16KB to 48KB memory. Communications capabilities are standard using an external modem (at up to 9600bps) or an optional internal modem (to 300bps).

IRIS's text memory can be partitioned into as many as 99 variable-length files. Editing functions allow searching a file for a specified character string, adding and deleting text, and moving text. A basic

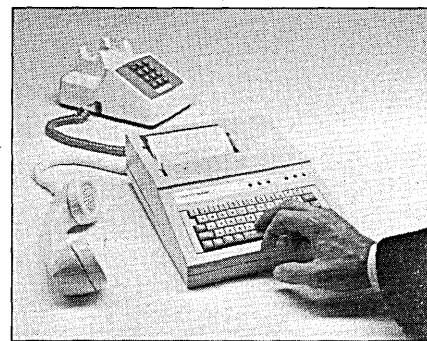


IRIS with 16KB sells for \$1,400; adding an integral 300bps modem adds \$200. NORTHERN TELECOM INC., Minneapolis, Minn.

FOR DATA CIRCLE 301 ON READER CARD

PORTABLE TERMINAL

Lexicon, the folks who brought you the handheld language translator, has come up with what it thinks is the world's smallest and lightest printing communications termi-



nal. The Lex-21 terminal—the size of a piece of typing paper and less than three inches deep—includes an integral, direct connect modem capable of full- or half-duplex operation at either 110bps or 300bps. The upper and lower case ASCII terminal has a full-featured keyboard and optional numeric keypad, along with 2KB of batter-backed memory for text composition and editing, a 1KB line buffer, and 40-column printer. Operating parameters such as line speed are entered from the keyboard, and held in nonvolatile memory. An acoustic coupler and a leather carrying case are offered as options. The Lex-21 carries a unit price of \$1,195. LEXICON CORP., Miami, Fla.

FOR DATA CIRCLE 302 ON READER CARD

DESKTOP COMPUTERS

Hewlett-Packard has come up with a number of additions and enhancements to its Desktop Computer Div. (Fort Collins, Colo.) product line. Leading off is the M6800-based HP 9826A, which is reportedly two to five times as fast as its predecessor, the 9825. The HP 9845 family now has additional members utilizing microprogrammed bit-slice processors. Additional firmware and software allow 9835 and 9845 desktop computers, when equipped with appropriate communications hardware, to communicate with HP-1000 and HP-3000 computers under HP's Distributed Systems Networking (DSN) architecture. The 9826A

HARDWARE

includes a communications interface for DSN as well as asynchronous communications.

Three languages are offered for the 9826A. They are HPL (compatible with that

used on the 9825), BASIC, and at a later date, Pascal. The 9826A has a 7-inch diagonal crt screen, 10 shiftable softkeys (with screen legends), graphics capability on a 400 × 300 point grid, and up to 512KB of user

memory. Three new thermal printers, using fanfolded paper, have been designed for the 9826; the printers sit atop the computer. The HP 2671A has a 128-character ASCII set, Roman Extension set for foreign alphabets,

HARDWARE SPOTLIGHT

BACK-END STORAGE SYSTEM

The wraps are finally off Storage Technology's back-end machine, the Virtual Storage System (it also has a number, the STC 7000). For large IBM and plug-compatible mainframe users running MVS, the VSS provides rapid access to sequential data sets with a hierarchical data management system that uses semiconductor memory as cache for disks which are further backed by mag tape.

If your figures jibe with STC's, you'll probably find that more than 60% of the data you process daily are sequentially organized, and that more than 70% of your named data sets are sequential. At the same time, you may find disk pack fragmentation, blocking size, and overallocation of data sets reducing disk utilization to 50% or even less.

VSS is intended to maximize DASD utilization, as well as insulate the user from details specific to given disk types. It also off-loads the host and provides faster access to data, typically 1.5 msec.

VSS uses a pair of IBM-compatible processors to manage its hierarchy of storage. These processors, termed VSS Control Processors (VCPs) attach to the host processor or processors via channel interfaces. Each VCP has its own set of disks and tapes; however, should one VCP fail, the other can still access the failed VCP's mass storage. The only potential for losing data is limited to that written to the failed processor's main memory being used as disk cache.

The VSS is essentially transparent to the applications programmer. Some JCL changes may be required; otherwise, the applications programmer accesses data at the GET/PUT or READ/WRITE level. The VSS handles data compression and expansion and buffers the transaction in "frames" in the VCP's memory. A full frame is called a "page," and corresponds in size to a full disk track.

User data blocks can span frames. DASD space is dynamically allocated a track at a time, so the only wasted space in a data set occurs when the last frame is partially full. Since the data are sequential, the VSS can anticipate read operations and prefetch additional pages; each VSS virtual volume open for reading is allocated a number of cache frames depending on current system loading. Each user's virtual volumes reside on disk in a DASD Frame Group (DFG). Each DFG is guaranteed a percentage of total DASD space specified by the installation's management. The user can set "migration thresholds" for his DFG. When the DFG

grows to exceed its maximum migration threshold, VSS automatically migrates virtual volumes to tape until the DFG reaches a lower threshold specified by the user. VSS keeps track of migrated data. If an application program issues an OPEN for a migrated volume, VSS will reload the volume before signaling completion of the OPEN. Migrating and reloading volumes can also be invoked by specific user requests. VSS has its own algorithm for deciding which volumes to migrate; critical volumes can be specified for indefinite retention on disk.

Cyclic backup is VSS's primary method of ensuring recovery from a device failure. Management can select the most appropriate overall backup schedule and cycle duration. Once each cycle, all pages of virtual volumes that have been created or modified are copied to tape. If any volumes require recovery, VSS will identify the appropriate backup tape for reloading.

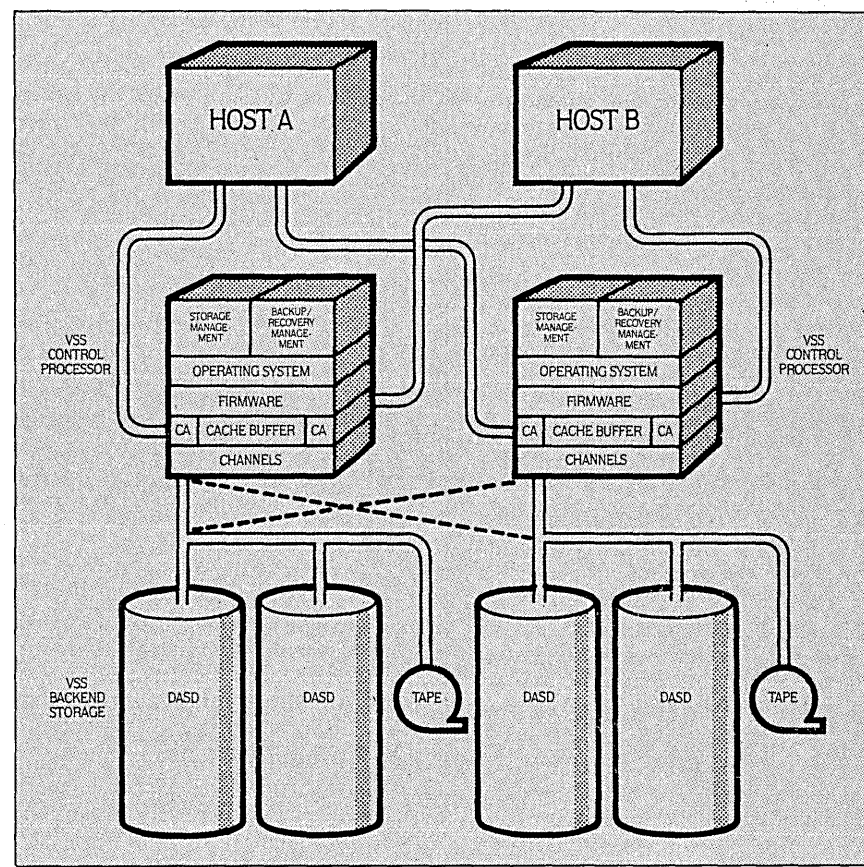
Shadow recording and data journaling are also available to protect data. Shadow recording creates duplicate pages or entire DFGs on separate disks, while data journaling writes each page of data to both disk and a back-end tape journal. Either method

can be invoked at the user's request. If the original data set can't be read, VSS will automatically reconstruct it from the shadow recording or journal tape.

VSS software for the host makes use of the subsystem interface facility of MVS, making the back-end appear as an I/O subsystem. Within the VCPs, a stripped-down IBM operating system acts as the SCP. VSS control functions within the VCPs are coded in Pascal.

A typical VSS configured for attachment to a pair of hosts will go for \$53,290 per month on a three-year lease. This system includes 4MB of memory in each of the two VCPs, necessary channels and adaptors, disk and tape controllers, half-a-dozen STC 3650 tape drives, and 16 STC 8650 disks (total raw capacity 20.3GB). STC calculates that the effective DASD capacity of this configuration is in excess of 27GB, due to data compression and more efficient space utilization. With 25 GB of migrated data in the system, the price per megabyte of total managed data in this VSS configuration would run slightly over \$1 per month. STORAGE TECHNOLOGY CORP., Louisville, Colo.

FOR DATA CIRCLE 300 ON READER CARD





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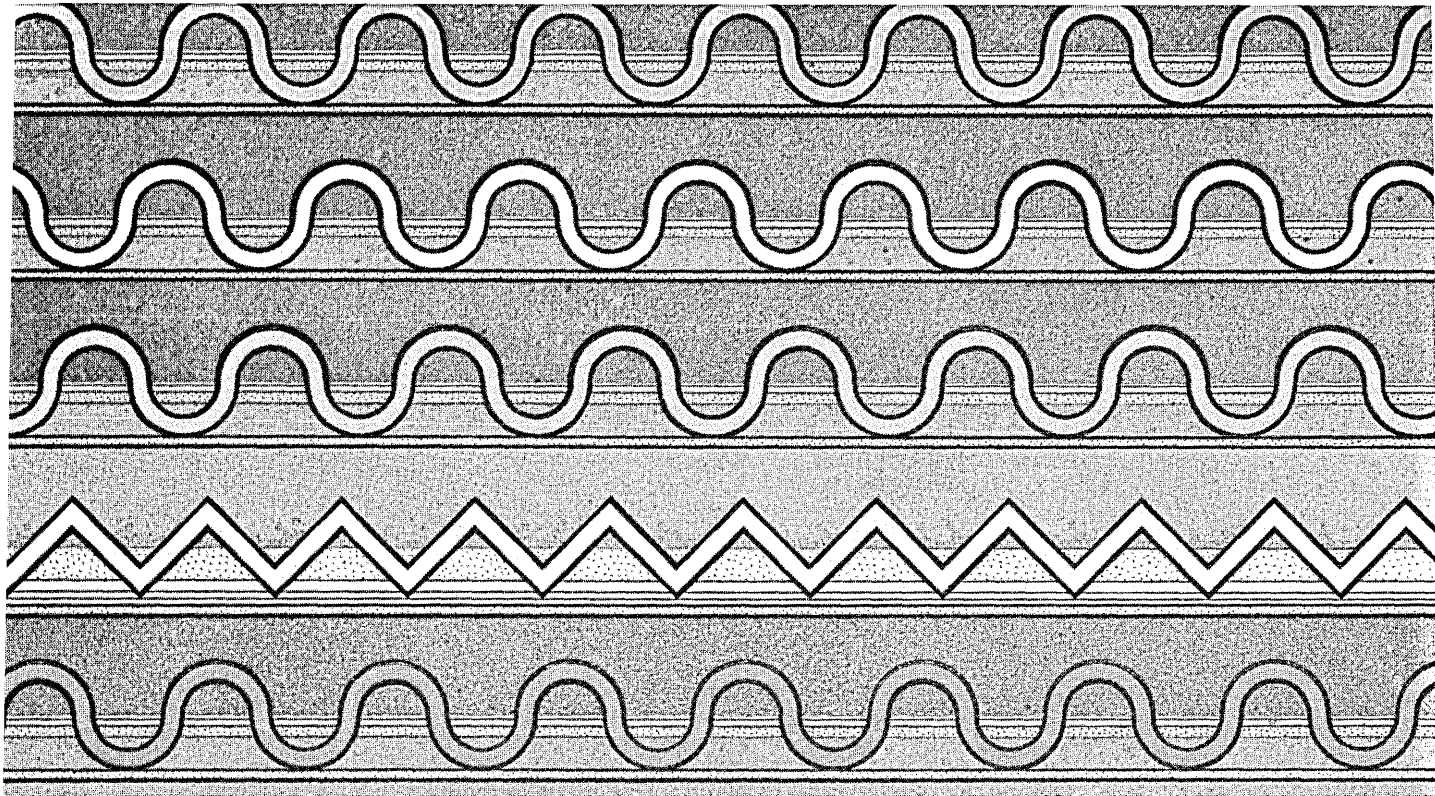


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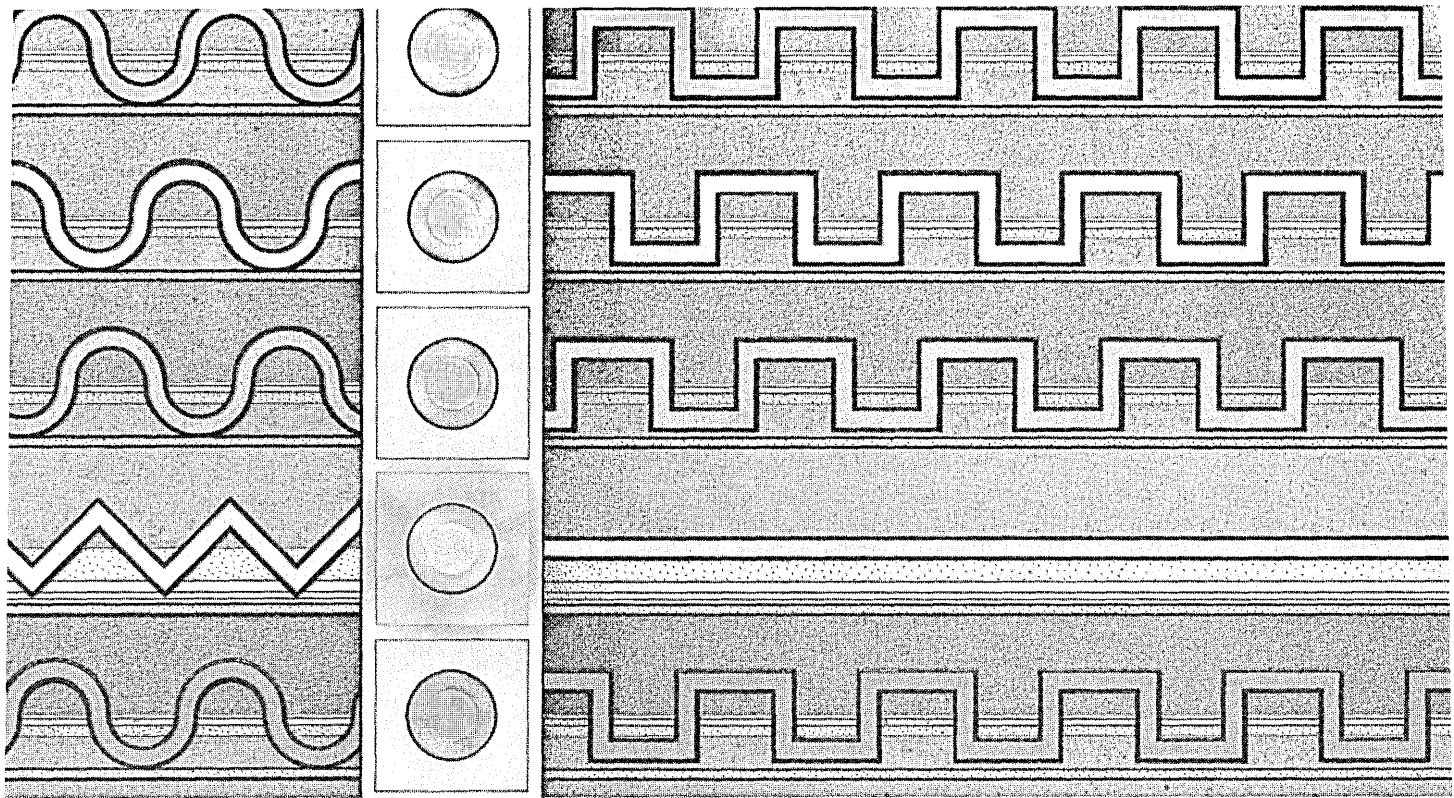
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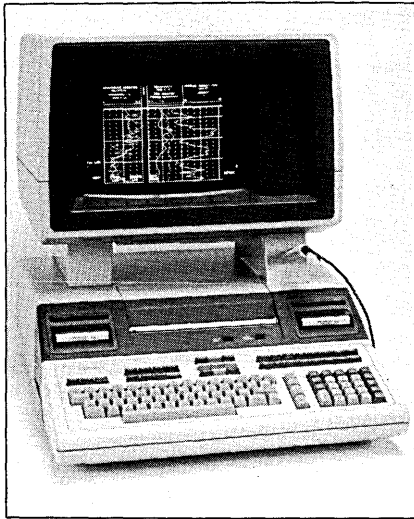
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HARDWARE



and line drawing graphics; it prints at 120cps bidirectionally, as do its companion printers the 2671G and 2673A. The 2671G adds 90 dot-per-inch graphics to the features of the 2671A, allowing it to make a dot-for-dot copy of a screen. The 2673A has all 2671G features, plus additional raster graphics functions and character set enhancements. The printers sell for \$1,095 (2671A), \$1,295 (2671G), and \$1,895 (2673A). HPL versions of the 9826A desktop computer, ROM or floppy-based, sell for \$8,950. A ROM-based BASIC speaking 9826A sells for \$8,950, while a disk-based version goes for \$11,950. Pascal and software supporting DSN communications are expected by year-end.

The 9845 line has several new members based on bit-slice microprocessors said to run anywhere from two to five times as fast as the original 9845s. Both color ("C" suffix) and monochrome ("B" suffix) can be had with the faster processor; additionally, the monochrome models now have graphics capabilities akin to those found in the 9845C. While the 9845B doesn't have the nearly 5,000 distinguishable colors (for fill) of the 9846C, it now can fill with any of up to 17 shades of grey. Light pens are available for most 9845s. User memory sizes range from 56KB to 449KB. The 9845B Model 250 and 9845C Model 250 include 187KB of user memory, dual cartridge tape drives, an enhanced BASIC language processor, interactive light pen, integral 80-column thermal printer, and appropriate crt (monochrome for the "B", color for the "C"). A 9845B Model 250 goes for \$28,000, and the 9845C Model 250 is \$43,500. HEWLETT-PACKARD CO., Palo Alto, Calif.

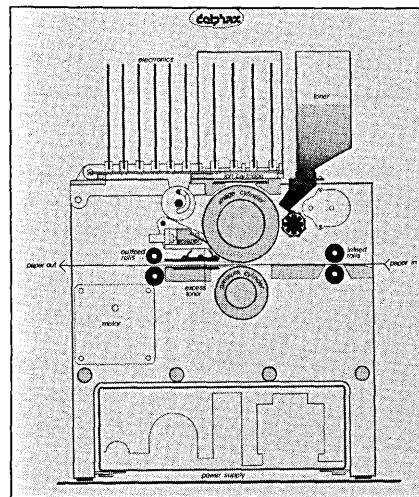
FOR DATA CIRCLE 303 ON READER CARD

PAGE PRINTER MECHANISM

Although it had initially planned to bring a page printer to market under its own nameplate, Delphax Systems' initial market research found most dp and office automation vendors attempting to develop their own

products. According to Delphax, most of these were running into difficulties involving laser-scanning xerographic print mechanisms. Delphax already had developed an alternative technology—ion deposition imaging—which it says is less expensive, less complicated, and hence, more reliable. So the firm changed its marketing plans, and has decided to market printing engines to oems who will add specific interfacing and character generation electronics, as well as packaging and paper handling (stackers and feeders) equipment.

The 2460 Image Output Module (IOM) is the company's first offering. Its ion deposition imaging technology is said to result in a print mechanism both simpler and more rugged than mechanisms using laser scanning. Delphax's technology reduces from six to four the number of basic steps required to image a page. It does away with the mechanical optics used in laser imaging by using an operator-replaceable ion projection cartridge that requires no moving parts to lay a charge on the dielectric imaging drum. The drum itself is hardened aluminum, and is said to be more durable than those used in existing page printers. Using a



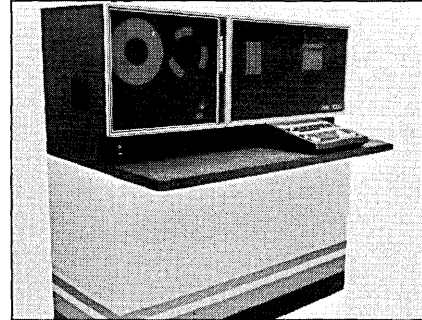
single-part toner, the 2460 IOM transfers the image to plain paper and fixes the image in a single step. Imaging has a resolution of 240 points per inch, horizontally and vertically. Up to sixty 8½ × 11 inch pages can be printed each minute. In oem quantities of 500 the 2460 IOM, with power supply, sells for \$8,000. Delphax says that end-user pricing should come in at under \$30,000 depending on the value added by the oem. DELPHAX SYSTEMS, Mississauga, Ontario, Canada.

FOR DATA CIRCLE 304 ON READER CARD

DISTRIBUTED PLOTTING

Gerber Scientific has developed a distributed plotting system that should help organizations where a number of individuals and groups create plots. Capable of operating linked to a host or in a standalone environment, the Plot Management System (PMS 7000) can control up to eight of Gerber's

pen plotters or photoplotters. Based on a minicomputer, PMS 7000 handles plot queuing, data conversion, job accounting, and data transmission. The plotters involved may be at separate locations. A user can preview his plot on a local, high-speed plotter, and if satisfied, can then send the output to a (perhaps centrally located) precision plotter. The controlling mini collects and converts data, allocates workload, handles priority scheduling, transmits output



streams to remote plotters, and performs control and monitoring functions. Priorities may be assigned to up to 32 plotting jobs, with the PMS 7000 sending data from specified plot queues to the next available appropriate plotter.

The basic PMS 7000 system is the Model 7100. Including two video displays, one keyboard, minicomputer with 256KB of memory, 19.6MB of disk, dual density mag tape transport, and one plotter interface. System options include RJE communications packages for linking to IBM and compatible hosts, inter-PMS 7000 communications packages, and more disk. The basic Model 7100 sells for \$75,000. GERBER SCIENTIFIC INSTRUMENT CO., Hartford, Conn.

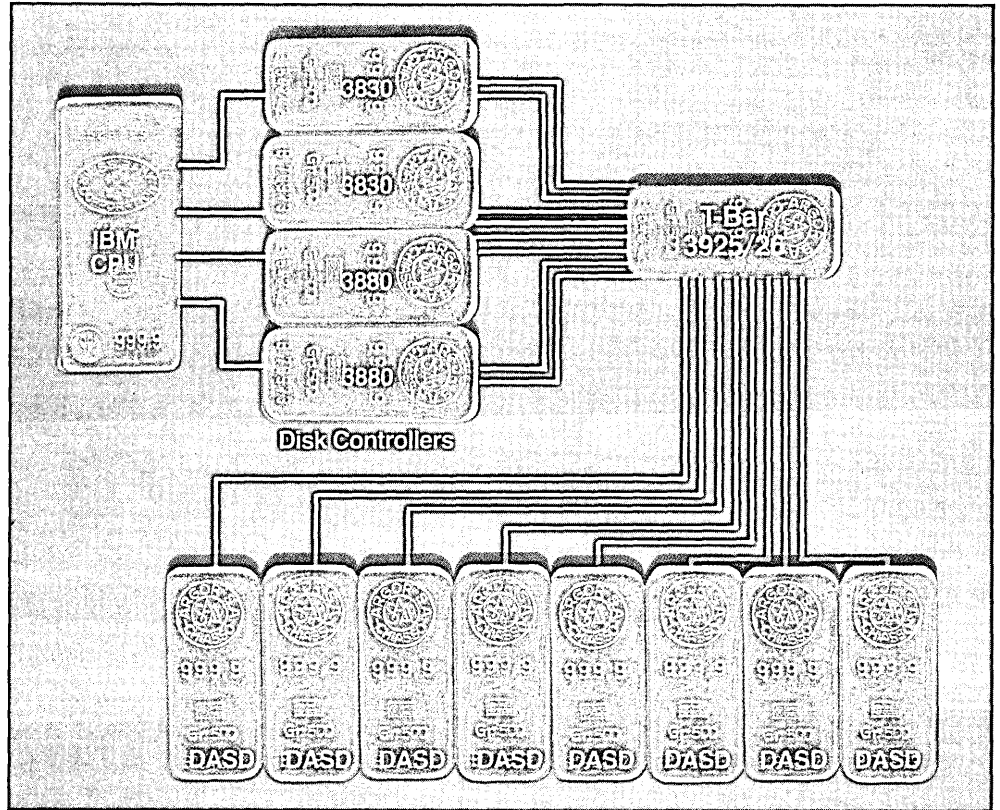
FOR DATA CIRCLE 305 ON READER CARD

MINICOMPUTER DISK CACHE

MiniComputer Technology has kicked off a new family of add-on modules for the company's line of emulating disk controllers. The Turbo-21 (MCT makes the analogy between a turbocharged automobile engine and a cache-backed disk controller) contains 128KB of dynamic RAM with transparent refresh; an onboard microprocessor implements a proprietary caching algorithm claimed to reduce seek time and rotational latency by up to 80%. Capable of holding up to 256 sectors of data in its cache, the Turbo-21 works in parallel with the EDC21 disk controller for PDP-11s and VAX computers. (Future models will be offered as companions to the vendor's controllers for LSI-11, Perkin-Elmer, and Data General computers.) The Turbo-21 occupies a chassis slot adjacent to the controller. The host still talks to the disks through the controller, with cached data being returned without actually wasting the time it takes for head positioning and rotational latency. The Turbo-21 can be used without modifying host software. Additional functions can be

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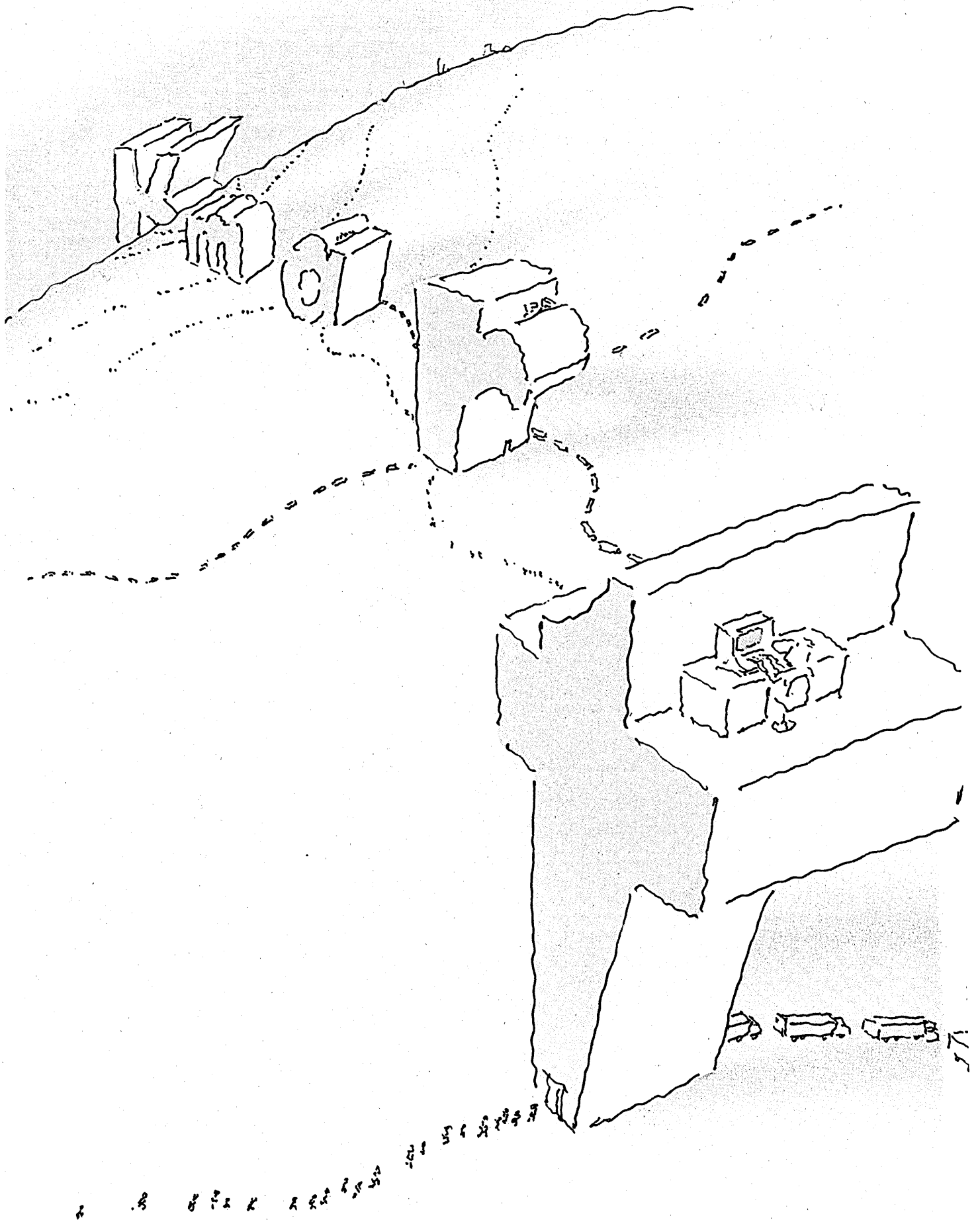
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Even a big business can use a little IBM.



Gerry Fletcher, V.P. Of Corporate Information Systems, K mart.

K mart is one of the world's largest retailers. But that doesn't mean they use only the largest computers.

In fact, K mart has bought hundreds of IBM's smaller computers, the Series/1. And they've ordered more.

And that shouldn't surprise anyone.

Gerry Fletcher, K mart's V.P. Of Corporate Information Systems, explains. "We needed to have processing capabilities available at local stores similar to those we have at headquarters. Series/1 has more than met our needs."

One need was freeing central management from long waits for local data.

"Now local stores can forward orders electronically to headquarters and on from there directly to the vendors."

And K mart's store managers needed freedom to do their own processing locally.

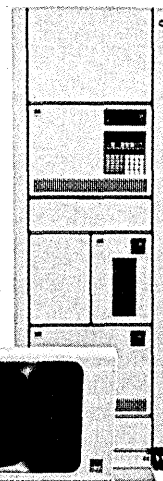
"Series/1 has greatly reduced clerical effort by handling many local management applications such as payroll, accounts payable and inventory control."

As K mart has discovered, Series/1 is one of IBM's most versatile computers.

Because it's modular, a wide variety of Series/1 components can be used as building blocks, to custom tailor a solution to many different requirements, ranging from distributed data processing to energy management to industrial automation.

For more information about Series/1, call your IBM General Systems Division representative or write us at P.O. Box 2068, Atlanta, GA 30055.

"Series/1 is helping free K mart to be more productive," says Gerry Fletcher. "In a company like ours, small systems can produce big results."



A little IBM can mean a lot of freedom.

IBM
General Systems Division

CIRCLE 82 ON READER CARD

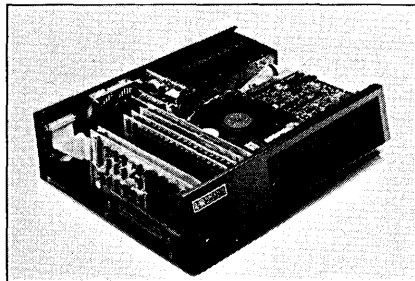
HARDWARE

exploited by users with the expertise to make host software modifications. These features allow locking (and subsequent unlocking) of up to 254 sectors for permanent retention in the Turbo's memory. A "no cache" function also can be made available through host software alterations. In this case, data will not be cached (unless it is already in memory), allowing lengthy one-time file transfers without altering the contents of the cache. A single Turbo-21 sells for \$6,750. MINICOMPUTER TECHNOLOGY, Palo Alto, Calif.

FOR DATA CIRCLE 312 ON READER CARD

MICROCOMPUTER

The seven year old British firm, Rair Ltd., is moving into the U.S. market with the formation of Rair Microcomputer Corp. and the introduction of its Black Box III microcomputer. Already available to the European market, the Black Box III Model 3/30 is

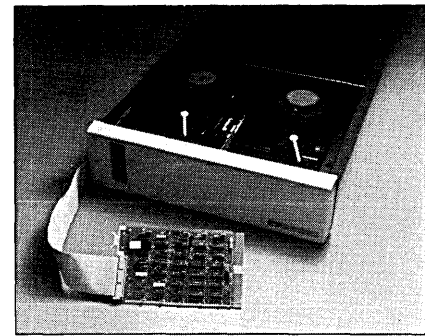


the first of a series to be introduced here. Aimed at oems and system integrators, the Model 3/30 comprises an 8085A microprocessor, from 64KB of RAM, an integral 6.9MB micro-Winchester disk, and a pair of double-sided, double-density floppies, each capable of storing 500KB. Up to 16 serial devices may be connected to the 3/30 via RS232 interfacing. An IEEE-488 parallel bus is standard, allowing connection of a wide variety of peripherals and instruments; this bus also can provide a high-speed computer-to-computer link. Operating system support is available in the form of CP/M, MP/M, and CP/Net. Available languages include BASIC, COBOL, FORTRAN, Pascal, and PL/1. A basic Black Box III Model 3/30 sells for \$7,500, with discounts available for quantity purchases. RAIR MICROCOMPUTER CORP., Santa Clara, Calif.

FOR DATA CIRCLE 306 ON READER CARD

WINCHESTER DISK

For LSI-11 and PDP-11 users, Advanced Electronics Design has developed a 5 1/4-inch high rack-mountable alternative to DEC's RL02 cartridge disk. The Winc-08 can be configured with either one or two 8-inch Winchester disk drives, each with a formatted capacity of 20.8MB. Each drive is partitioned into two logical sections, appearing as a pair of RL02s to DEC operating software. In addition to the drive(s), the Winc-08 in-



cludes a single-board formatter/controller and a second pc board host interface adaptor. For LSI-11s, the adaptor board is dual-width; for PDP-11s it's a quad-width card. A Winc-08 system with one drive, power supply, controller, and interface, sells for \$8,445. ADVANCED ELECTRONICS DESIGN, INC., Sunnyvale, Calif.

FOR DATA CIRCLE 307 ON READER CARD

PRINTER

Burroughs' oem marketing has expanded its line with the introduction of the SP210 serial printer. The 132-column dot-matrix printer comes with a parallel interface (similar to but not exactly the same as the widely known Centronics interface). It features bi-directional printing at 230 cps, 7 x 9 dot-matrix cells capable of forming descenders and underlining, 6 or 8 lines per inch verti-

MTI will sell you two graphics terminals for the price of one.

Our Retro-Graphics enhanced ADM-3A and VT100 together cost less than one Tektronix 4010 Series terminal.

The Tektronix 4010-1 graphics terminal sells for about \$5200. MTI will sell you the ADM-3A Retro-Graphics enhanced terminal for \$2025, or the VT100 for \$3160. Or both. Two graphics terminals for the price of one. Both are completely compatible with Tektronix Plot 10* and most other existing graphics software.

Retro-Graphics are retro-fitted graphics boards manufactured by Digital Engineering, Inc. that fit neatly into Lear Siegler's ADM-3A and 3A+ and DEC's VT 100. They give full graphics capability while maintaining the original high performance features of each individual terminal.

If you already have an ADM-3A, 3A+ or VT100, and want to enhance it with Retro-Graphics, MTI can supply you with a retro-fitted board at a low, low price. MTI is the one source for all the terminals, peripherals, applications expertise and service you'll ever need at truly great purchase and lease prices. Call us today: 516/482-3500, 212/895-7177, 518/449-5959, outside N.Y.S. at 800/645-8016, and in Ohio: 216/464-6688.



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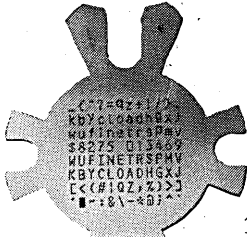
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CIRCLE 83 ON READER CARD

DATAGRAPHIX 132-COLUMN DISPLAYS GIVE YOU NOT ONLY BETTER QUALITY, BUT LETTER QUALITY.

It's the CHARACTRON
that makes the difference!

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Why suffer with display terminals that show only part of your output? Or if you do get a 132-column display, why suffer eyestrain trying to read it?

The innovation that makes all other 80- and 132-column display terminals and their dot matrix characters seem primitive is the DatagraphiX CHARACTRON® CRT. A DatagraphiX exclusive that literally stencils letter-perfect characters on the screen with an electron beam. Sharp, clear, fully-formed characters that are even easier to read than most hard-copy computer printout pages.

No more wasted time and money on programming to reformat the computer output to 80 columns. No more lost computer time and wasted paper running hard-copy printouts to see the complete 132-column picture.

The DatagraphiX 132-X series has a model with just those features you want. From the simple character mode 132-1, to the DEC-compatible 132-1D, to the advanced editing, block mode 132-2.

You don't have to spend a fortune either. The DatagraphiX 132-X series of display terminals feature a surprisingly low factory price, or liberal terms if you prefer to lease. Also there are more than 100 convenient locations for factory-direct service. It is a combination unmatched by any other manufacturer.

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Delivery is from stock for most orders. But don't just take our word for DatagraphiX display superiority. Send us the coupon today and we'll arrange a live demonstration right in your facility. You have to see it to believe it.

Yes, I want to see your letter quality display terminals.

- Please call me to make arrangements for a demonstration of the low-cost 132-1 132-1D 132-2 .
- I am interested in receiving information on the 132-1 132-1D 132-2 .
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CIRCLE 84 ON READER CARD

HARDWARE

cal spacing, and soft vertical format control. The SP210 prints 96 ASCII characters and 13 jumper-selectable 96-character national sets. Optional character sets include Japanese, Hebrew, and Korean (with from 128 to 196 characters). Condensed printing also is possible with the SP210. The SP210 sells for \$1,710 in quantities of 500; evaluation units are available now. BURROUGHS OEM MARKETING, Detroit, Mich.

FOR DATA CIRCLE 308 ON READER CARD

VOICE DIGITIZER

Still working with speech, Centigram—makers of voice input and output devices—has adapted its technology to produce the VOPAC, a voice digitizer that converts spoken input into a 4800bps bit stream for full-duplex transmission over a digital link. A second VOPAC unit at the receiving end reconstructs the original spoken input from the digital data stream. Centigram says that its use of Parametric Waveform Coding (PWC) results in speech quality on a par with the average quality of a U.S. telephone network toll conversation.

Centigram has initially targeted users of transatlantic leased lines as its first market. Noting that multiplexing a high-speed line will allow several voice conversations (or a combination of voice and other digital traffic), the company sees an opportunity for potential users to save money on

their communications bills. The company is now in the process of getting British Telecommunications approval for the VOPAC. Other potential applications include voice store-and-forward. The VOPAC sells for \$15,000 in unit quantity. Deliveries are quoted at 60 to 90 days ARO, starting in September. CENTIGRAM CORP., Sunnyvale, Calif.

FOR DATA CIRCLE 309 ON READER CARD

COLOR OUTPUT

A few years ago, Xerox announced that its 6500 color copier could make hardcopy from the screens of color graphics displays. Recognizing that there is no standard among color display manufacturers, Xerox decided to tell other vendors what signals were required to interface a tube to the 6500; converting from the display's internal representation of colors to those used by the 6500 was left to graphics manufacturers and oems. Intron Corp. took up the job of developing such an interface for Intelligent Systems Corp.'s Intelcolor 8001G, H, and I units. The first Intron Model 6580 interface was delivered to the Army at Fort Belvoir; subsequently Intron added enhancements and released the interface to the general marketplace. Packaged in a tabletop enclosure, the 6580 accepts a print image from the ISC display, performs the necessary reformatting, and generates the output signals

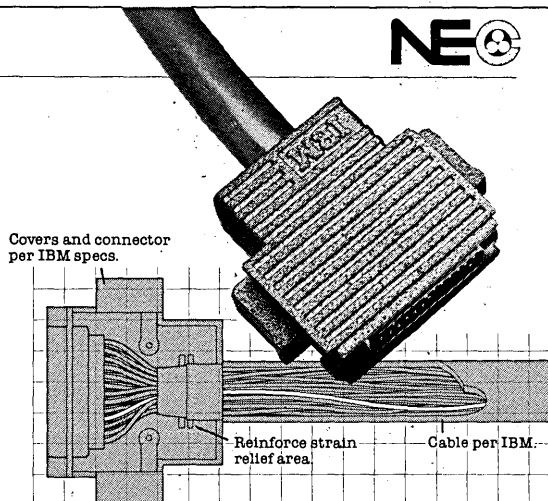
required by the 6500. Output can be either 4 × 5 or full page, with seven colors. Two aspect ratios are available, and printing may be formatted horizontally or vertically. The Model 6580 Xerox/Intelcolor display interface unit sells for \$5,500. INTRON CORP., Springfield, Va.

FOR DATA CIRCLE 311 ON READER CARD

PRINTER

Epson's MX-100 is a 136-column dot-matrix printer that complements the firm's current 80-column MX-80 printer. The MX-100 can generate 12 different character weights and sizes using dot-matrices ranging from 9 × 9 to 18 × 18. An upper and lower case ASCII printer, the MX-100 is rated at 80cps, with bidirectional logic-seeking printing for text and unidirectional bit-image printing for graphics (with a maximum horizontal resolution of 1/120 inch). At 10cpi, the MX-100 prints from 1056pm (20 character lines) to 29 lpm (136 character lines). In compressed printing mode, as many as 233 characters can be printed across a 15.5-inch-wide page. Both adjustable snap-off tractors and friction feed are standard for paper handling. The MX-100 comes with an eight-bit parallel (Centronics-compatible) interface; RS232 and IEEE-488 interfaces are optional. The MX-100 sells for \$995. EPSON AMERICA, INC., Torrance, Calif.

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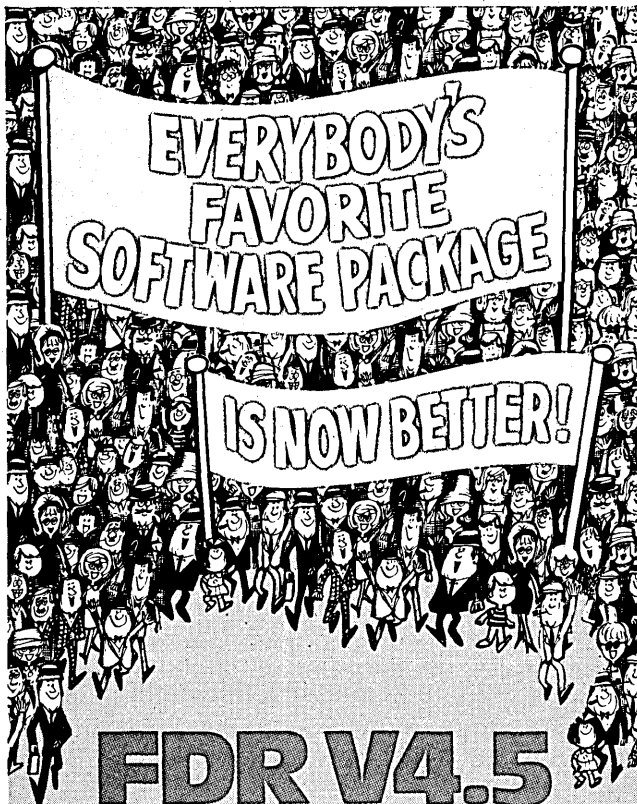
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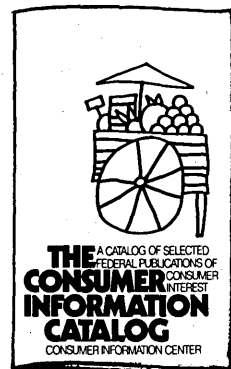
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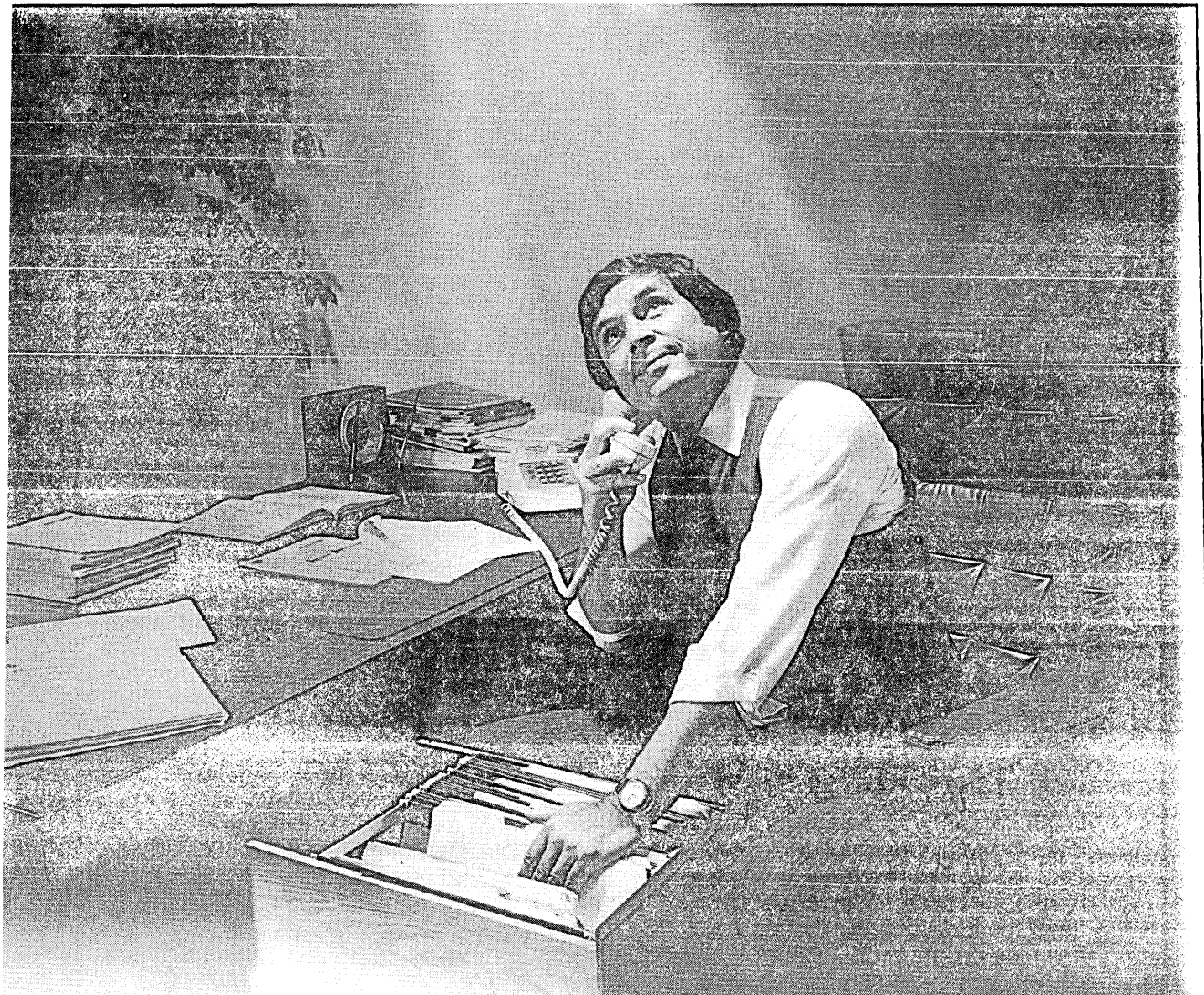
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SOFTWARE AND SERVICES

UPDATES

Sometime this month, Peat, Marwick and Mitchell should wind up a three-phase study of the 25-year-old MICR (Magnetic Ink Character Recognition) code; the research is being conducted for the American Bankers Association. Surveying a national cross-section of banks, Peat, Marwick and Mitchell identified a number of key issues that pertain to MICR line enhancement. The consensus seems to hold that enhancements to aid in handling rejects and return items are of primary concern to most bankers. Interestingly, it seems that the addition of a check-digit in the routing number field of the MICR line at the bottom of each check has had little impact on the number of rejects or misreads for most banks, including many Federal Reserve Banks. The final report should be completed this month.

A friend tells us of a story he heard from a source within an artificial intelligence research facility. During a tour, a VIP was allowed a hands-on demo of the group's latest achievement. Sitting at a terminal, the VIP typed in a hotly debated inquiry: "Can machines think?" After a pause of several minutes, during which other system users noted serious response time degradation, the machine responded, "Funny you should ask."

Cincom Systems reports that since its Feb. 1 introduction of Series 80 Mantis (see Software & Services, March p. 242), more than 120 new installations have been made.

COMMUNICATIONS & LANGUAGES

Wang Labs bolstered the software offerings for its 2200 series of computers with the addition of IBM 3274 emulation (both bisync and SNA/SDLC), and "Option C," which includes COBOL and an enhanced version of BASIC, dubbed BASIC III.

The 3274 emulator runs on 2200 MVP or LVP systems equipped with a 2228D Data Communications Controller. The software supports BSC and SDLC protocols; the devices emulated are the 3274 Model IC cluster controller, 3278 Model 2 display stations, and 3289 Model 2 printers. Two functional levels are provided: Supervisor, allowing access to all system capabilities,

including configuration; and Operator (limited to data entry and manipulation of spooler files). Scheduled for delivery in January of next year, 3274 BSC has a one-time charge of \$1,000, while 3274 SDLC is priced at \$1,250.

FOR DATA CIRCLE 326 ON READER CARD

Wang's 2200 COBOL is an interactive version of the ubiquitous business language. Based on ANSI-74/Level 1 specs, 2200 COBOL features compatibility with Wang VS COBOL, and special features including incremental compilation. The 2200 series now can support BASIC and COBOL on the same system. Option C, which includes both BASIC and COBOL, carries a one-time charge of \$2,000; the programs are slated

SOFTWARE SPOTLIGHT

16-BIT MICRO CROSS-COMPILER

PasPort is a PDP-11-based Pascal cross-compiler and development environment for applications ultimately targeted for Intel's 16-bit 8086 microprocessor. It's likely that there will be subsequent versions for other 16-bit micros, and possible that different host environments will be supported.

Running under bell Labs UNIX or DEC's RSX-11M operating system, PasPort accepts Pascal source programs compliant with the language definition proposed by the International Standards Organization. But PasPort is more than a cross compiler as it provides host-resident debugging aids. On the host, PasPort compiles Pascal into an intermediate language akin to the P-code familiar to users of UCSD Pascal. For program checkout, this intermediate language can be interpreted on the host. (Under UNIX, this code actually can be compiled into native PDP-11 object code.) It's this same inter-

mediate language that feeds PasPort's code generator, producing assembler code for the target machine, in this case the 8086. Additionally, there is an interpreter package for the 8086. Additionally, there is an interpreter package for the 8086, allowing it to interpretively execute the PasPort intermediate code.

PasPort allows separate compilation of procedures. On the target, both interpretive and object code can coexist within an application, and PasPort-produced programs can link with other programs assembled on the target. Putting the interpreter on the target brings two advantages: it simplifies debugging on the target and it allows users to save memory because the intermediate code is more compact than object code. The interpreter itself is said to require at most 8KB. PasPort carries a \$15,000 price tag.

INTERMETRICS INC., Cambridge, Mass.

FOR DATA CIRCLE 325 ON READER CARD

SOFTWARE AND SERVICES

for October deliveries. WANG LABORATORIES, INC., Lowell, Mass.

FOR DATA CIRCLE 327 ON READER CARD

ECONOMIC DATABASE

The Conference Board's proprietary macroeconomic database is now available to users of Rapidata's remote computer services. Containing about 800 numerical time series, the Conference Board Data Base is segmented into topics such as diffusion indexes, automobile sales, help wanted advertising indexes, capital investment and supply conditions, financial indicators, and both summary and consensus forecasts from the Conference Board and other prominent forecasting services. Subscriptions to the database are priced at \$450 annually for Conference Board Associates, and \$600 per year for nonassociates. RAPIDATA, INC., Fairfield, N.J.

FOR DATA CIRCLE 330 ON READER CARD

PRODUCTION CONTROL

APEX, Johnson Systems' Automated Planning and Execution Control System, now is in Release 4.0, sporting what the vendor calls "virtual paper": the ability to review and modify, on-line, the job input, output, and other active queues. Users can preview output (and cancel printing if desired), as well as review and revise APEX user messages, logs, and JCL before the job runs.

Also with Release 4.0, a new routing system allows switching jobs to any destination or purging jobs. A new spooler allows unloading APEX data to tape, disk, or printers.

Initially introduced in 1977, APEX is intended to automate production control and workload management in IBM and compatible main frame shops running OS. APEX handles preprocessing requirements, error recovery and restart, and postprocessing. In its four years on the market, APEX has been installed in more than 60 sites worldwide. APEX Release 4.0 is priced at \$32,000, with a \$2,000 nonrefundable installation fee. Lease-purchase, rental plans, and discounts for multiple sites are available. JOHNSON SYSTEMS, INC. McLean, Va.

FOR DATA CIRCLE 328 ON READER CARD

CP/M UTILITY

Conflict is a companion product for Elliam Associates' UNERA utility (UNERA allows recovery of ERASED CP/M files). If the diskette containing files for recovery has not been written to, UNERA should have no problems; however, if there have been write operations, part of the old file's disk space may have been allocated to an active file. UNERASING in this case may clobber files by creating a conflict in space allocation. That's where Conflict comes in: it goes through any directory identifying any potential conflicts in space assignments. Both active and

erased file entries in the directory are checked, letting the user know if using UNERA may create problems. Available on either standard 8-inch CP/M diskette, or 5¼-inch format for North Star CP/M users, Conflict sells for \$35, plus \$1.50 shipping and handling. Both UNERA and Conflict can be ordered as a pair for \$60 (plus \$1.50 handling fee). ELLIAM ASSOCIATES, Woodland Hills, Calif.

FOR DATA CIRCLE 329 ON READER CARD

COLOR WORD PROCESSING

Intelligent Systems Corp., the Georgia-based color graphics computer maker, has released a word processing package called Spectra-Text. ISC describes Spectra-Text as being "color-enhanced," meaning that special character attributes, such as super- and sub-scripts, underlining, etc., are displayed on the screen in readily identifiable colors. Standard text appears in green, bold face in yellow, underscored characters have a red background, etc. Color also helps during editing, with blocks to be moved identified by a blue background.

Spectra-Text divides the ISC display screen into two regions: a 40-line by 80 character text section, and an eight-line region for user prompts. The package uses menus and prompts to guide the user. Eight cursor control keys allow moving the cursor to the top or bottom of a document or page,

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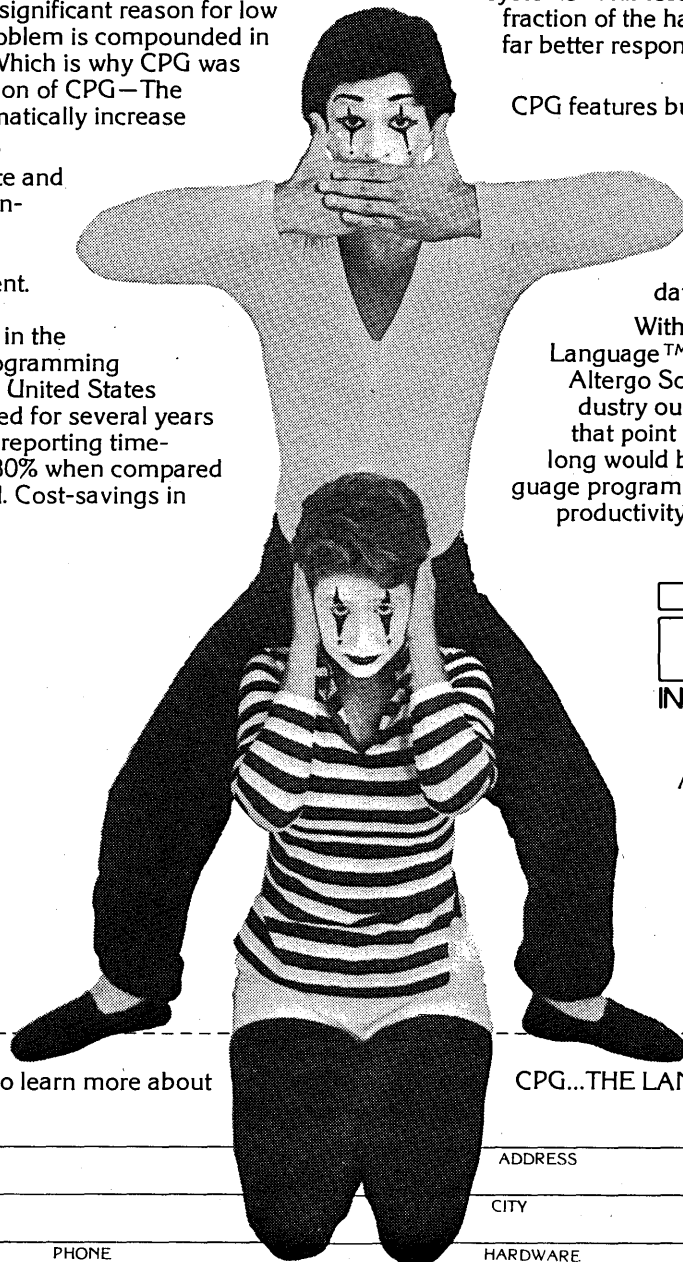
the areas of data-processing budgets, CPU and memory upgrades, education and support are equally impressive.

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SOFTWARE AND SERVICES

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FOR DATA CIRCLE 332 ON READER CARD

TAPE LIBRARY CONTROL

A new version of Computer Associates' DYNAM/T for OS and OS/VS users provides functional compatibility with the existing DOS versions of the tape library control system. As with the DOS version, the OS implementation of DYNAM/T handles catalog management, audit trails, and report generation. Current members of the DOS DYNAM family, including DYNAM/T, /D, and /FI, now share a common catalog, which the OS version also can access, CA cites this as a plus for users considering a move from DOS to OS, and for those running both systems under VM. The

system's audit trail facility logs all tape dataset activity for subsequent analysis using the report generator. The audit trail can also be used to automatically recover the DYNAM/T catalog if needed. The OS version of DYNAM/T is offered on a three-year lease for a single payment of \$10,000; other lease plans are offered. COMPUTER ASSOCIATES, INC., Jericho, N.Y.

FOR DATA CIRCLE 331 ON READER CARD

PERSONAL COMPUTER PACKAGES

A personal budgeting program, stock portfolio evaluator, and Microsoft BASIC have been added to Atari's software offerings for the Atari 800 personal computer. All require at least 32KB of memory (48KB for the Dow Jones Investment Evaluator) and a single diskette drive. The Investment Evaluator also requires communications capabilities (an Atari interface and acoustically-coupled modem), while Microsoft BASIC can make do with a cassette recorder in place of diskette.

The Personal Financial Management System (PFMS) consists of five modules that make use of a common database. PFMS can help users prepare and analyze their budgets; many common tasks such as checkbook balancing and simple budgeting are standard. Menu-driven, PFMS lets the user name up to 255 budget categories and

subcategories. PFMS comprises five modules. Record Keeper maintains the database, allowing the user to enter, edit, display, and print data. Budget Manager is used to set up a budget plan, while Budget Forecaster uses past patterns to project income and expenses for coming months. PFMS sells for \$74.95.

FOR DATA CIRCLE 333 ON READER CARD

The Dow Jones Investment Evaluator, priced at \$99.95, requires a computer with communications so it can connect to the Dow Jones Information Services database of financial and business news. The program collects current-day quotes for stocks, bonds, etc., and then prepares a report showing current portfolio value, along with net and percentage changes. The program also allows retrieval of current financial news items and special reports.

Microsoft BASIC, which seems nearly ubiquitous in the personal computer market, is now available through Atari. Exploiting the computer's graphics and sound generation system, Microsoft implementation is faster than Atari's BASIC and it provides greater floating point precision. It should also open the door for Atari users to make use of many applications developed in Microsoft BASIC on other computers. Atari Microsoft BASIC lists at \$89.95. ATARI, INC., Sunnyvale, Calif.

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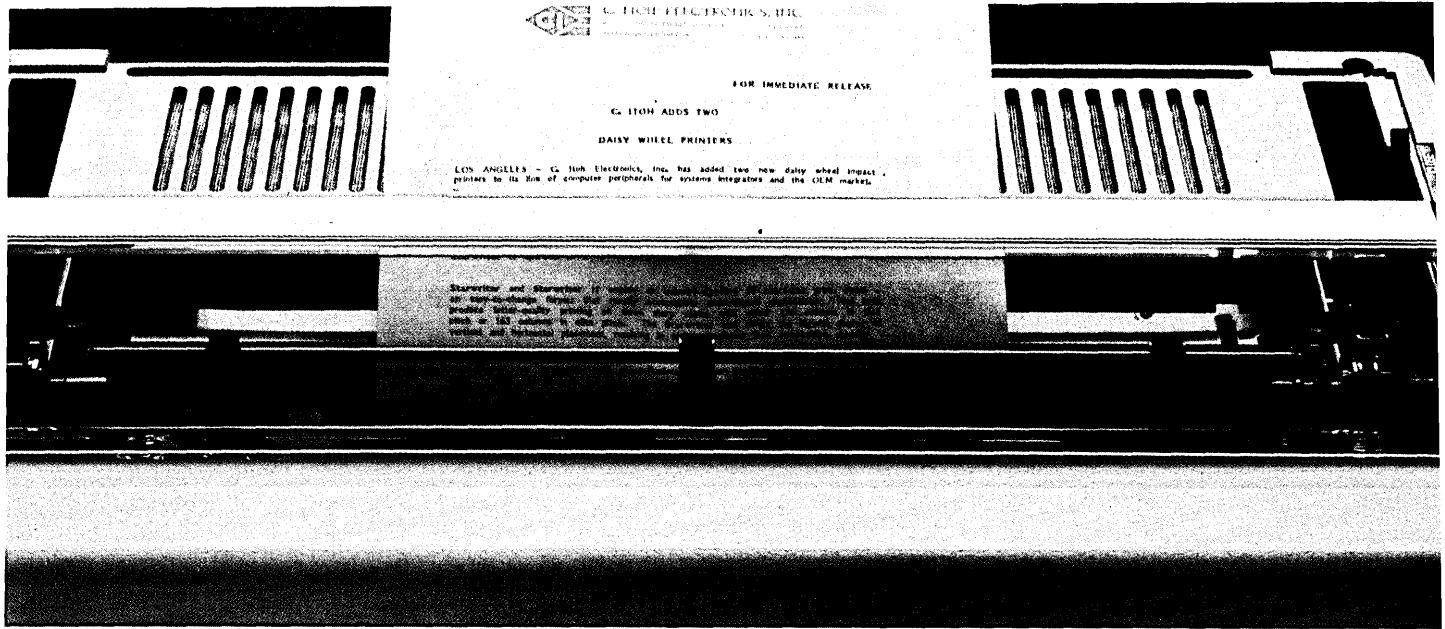
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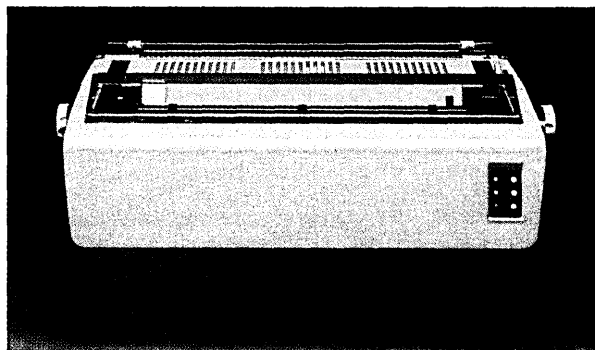
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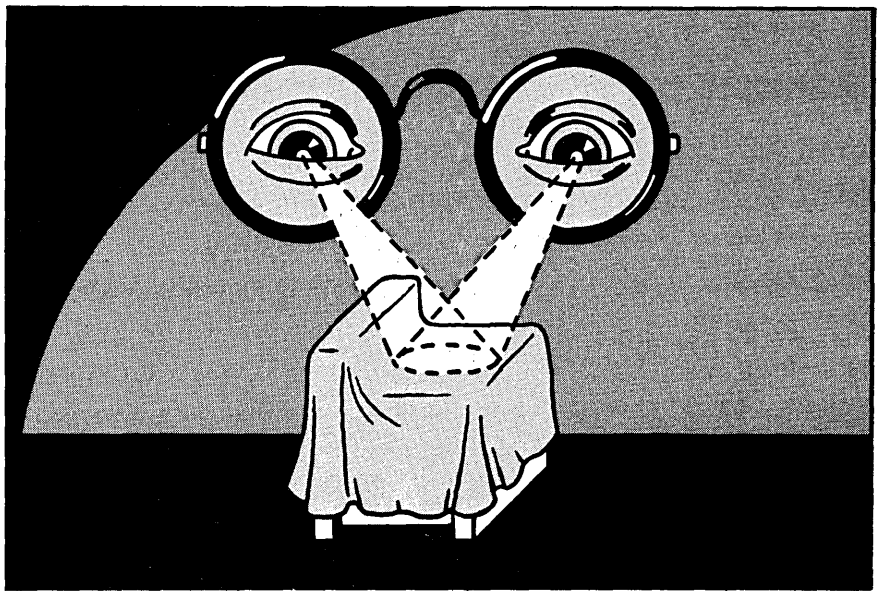
THE POLITICS OF PRIVACY by Rule, McAdam, Stearns, & Uglow

It is refreshing to read a book on the privacy issue which takes a strong stand against currently accepted solutions. It is especially interesting when the authors base their attack on the proposition that those "solutions" address a problem so narrowly defined that "key social choices have been obscured."

The Politics of Privacy criticizes many revered names (Profs. Arthur R. Miller and Alan Westin, for openers), oft-quoted reports and studies (by the National Academy of Sciences, the Secretary's Advisory Committee on Automated Personal Data Systems, the Privacy Protection Study Commission, and the National Commission on Electronic Funds Transfer), and the major pieces of relevant federal legislation (the Fair Credit Reporting Act, the Privacy Act of 1974, etc.), which together comprise the accepted definitions of and official responses to the privacy issue in this country.

For the purposes of this review, *The Politics of Privacy* can be reduced to three essential points: 1. a critical analysis of where we are and how we got here, 2. a proposal for reversing the steady drift toward increasing data surveillance, and 3. a discussion of the pros and cons of implementing the authors' proposal.

The authors chastise early writers for responding only to the grosser abuses which resulted from routine operations of personal-data systems. In so doing, these writers, and the legislators who followed their lead, limited their concern to the *procedural reform* of such operations. Those reforms, which eventually were enacted into law, aim solely at improving the accuracy, timeliness, and completeness of the collected data. These improvements were made possible by allowing some form of subjects' access to the records, providing mechanisms for limited challenge to the contents of the record, and placing some



restraints upon arbitrary dissemination of the data. Rather than accepting these improvements, the authors ask, "Is the existence and growth of surveillance a good thing?" and "What price are we willing to pay for the continued extension of surveillance?" They then propose a method to reverse the seemingly inexorable demand from organizations for more personal data. "The alternative to endless erosion of personal privacy through increased surveillance is for organizations to relax the discriminations which they seek to make in their treatment of people."

The authors cite organizations that rely heavily on surveillance, hint at the scope of the discriminations involved, and identify the costs of relaxing them. One example involves the insurance industry: "Insurance firms believe that people with bad reputations fare less well in litigation than others. Wishing to avoid heavy court judgments against people they insure, companies either decline business from persons reported to be disreputable, or accept it at higher rates than otherwise. Thus the interests of the companies in efficient discrimination, implemented through sophisticated

surveillance, serve to reinforce the effects of community prejudice."

While this example serves an expository purpose, the reference to "people with bad reputations" only hints at the full extent of these practices. Thomas Whiteside's revealing article in the April 21, 1975, issue of *The New Yorker* ("Anything Adverse?", pp. 45-101) shows that a person does not have to have a "bad reputation" to be placed in a higher risk category. Auto insurance underwriters' manuals turned up by Congressional investigators list such factors as age, physical impairment, type of employment, income, appearance, and manners, as well as reputation, which can affect a person's risk status. In particular, underwriters were cautioned against elderly persons, because "juries might be prejudiced against them." For the same reason, youthful drivers, physically impaired persons, students, actors, musicians, entertainers, professional athletes, bartenders, clergymen, unemployed persons, persons of low income, nationals of (or immigrants from) other countries, unmarried persons living together, and so forth, are characterized as posing higher

SOURCE DATA

risks to insurers—not because such people have poorer driving records, but because juries, before whom they might appear either as witnesses or as defendants, tend to be prejudiced against them. Clergymen are regarded as high risk witnesses or defendants, not because juries tend to be prejudiced against them, but because clergymen tend to be forgiving, and are not prone to place blame upon another person.

In any case, by relaxing such distinctions, organizations will not have to collect so much data. Accordingly, they will stop demanding it from those seeking their service, or snooping around to extract it from third parties. The costs incurred by such organizations in gathering, storing, and processing such data would be saved, thus lowering the total operational costs of the service to the consumer. And, to the extent that it "costs" an insurer more to insure a person in one of these categories, the incremental costs, presently borne by the people in such categories, would then be redistributed equally to all consumers of the service.

It would remain to be seen whether the net result for the lower risk consumer is a cost less or greater than the cost of supporting the present arrangement. But whatever the monetary result of such changes, the benefits in increased individual privacy would be substantial.

"No one really wants to live in a world where every previously private moment becomes a subject of bureaucratic scrutiny. . . . True, conventional wisdom in America endorses the notion that people must 'reap as they sow.' But popular sentiment also endorses the worth of 'a fresh start' or 'a clean slate.' Systematic 'forgetting' of peoples' pasts, even when troublesome from the standpoint of bureaucratic efficiency, may reflect a social value of considerable importance."

In summary, *The Politics of Privacy* presents a challenging proposal: if society wants to reduce the demands from organizations for the increasing surveillance of personal data, then society must alter its expectations of bureaucratic treatment based upon finely-drawn discriminations. One can only hope that this proposal gets the considered discussion and debate that it deserves. Greenwood Press, Westport, Conn. (1980, 212 pp., \$22.50).

—James L. Rogers

EARLY BRITISH COMPUTERS by Simon Lavington

Simon Lavington has written a comprehensive history of British computers and we can thank Digital Equipment Corp. for its publication in North America.

Lavington begins with the origins of British computers in the 1930s, follows

with the wartime developments of the 1940s, and ends with the emerging industry of the 1950s. He has put much effort into structure, following several historical trails and looking systematically at each organization he encounters. He covers several government laboratories, universities, and manufacturers, as well as the unlikely but useful early applications effort by the J. Lyons catering company. Each trail is traced carefully, showing the interconnections with the other groups and the development of ideas in their individual and peculiar contexts.

The sole flaw stems from the use of jargon, much of which is now archaic. An appendix, "The plain man's guide to terminology," helps but little. The genuine antiquarian, though, will relish the oldspeak and arcana, and will also savor a chapter on the programming techniques of the period with a comparison of the difficulties of several alternative systems.

Even those who are not computer buffs should be able to read the book with enjoyment and enlightenment while skipping gently over the jargon. Lavington's descriptive language and lucid explanations plus the many good photographs of computer pioneers and early machines add up to a good and carefully prepared book. Digital Press, Billerica, Mass. (1980, \$8).

—John Gosden

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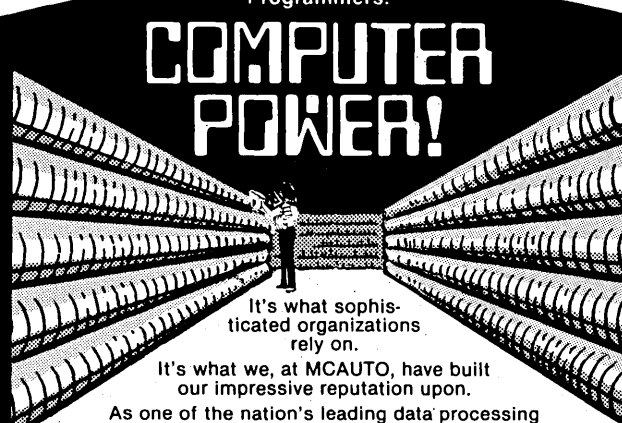
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PUBLIC POLICY

If indeed there is an "information society" forming, as so many self-proclaimed experts tell us, then this new quarterly will be in the right place at the right time. *The Information Society*, boasting of such establishment heavies as IBM chief scientist Lewis M. Branscomb and Bell Labs chairman William O. Baker on its advisory board, promises to cover such issues as transborder data flow, government regulation, information as a "determinant of public and private organizational performance" and "information and the sovereignty of the public." Judging by the first issue, which features articles by IBM World Trade chief Jacques Maisonrouge and former CIA leader William E. Colby, the \$48-a-year journal will be right at home in these conservative times. Crane, Russak & Co., Inc., 3 E. 44 St., New York, NY 10017.

VOIX MEDIUM

Speech Technology, a quarterly magazine on man/machine voice communications, will be published for the first time this fall. Media Dimensions, the publisher, plans such articles as adding word recognition to an existing computer system, the use of speaker independent speech recognition in telephone transactions, voice door lock ap-

plications, and linear predictive coding. In addition, each issue will contain departments on hardware, services, a newsletter on state-of-the-art and new developments in voice synthesis and recognition, an industry calendar, and a reader question and answer column.

The regular subscription rate is \$50 for one year (four issues). The publisher is offering a special introductory subscription rate of \$40 a year; the \$10 savings is available until Aug. 31. Media Dimensions, Inc., 525 E. 82 St., New York, NY 10028, (212) 680-6451.

VENDOR LITERATURE

KEEP ASKING RAMTEK

The company is offering two new booklets in the "Ask Ramtek" series, "High Performance Monitors for Computer Graphics and Imaging" and "Matching Colorgraphics to Your Management Information System." Both booklets are easy to understand and provide definitions for most of the jargon. "High Performance . . ." examines some performance considerations to be aware of before purchasing a graphics monitor. These considerations include flyback time, pixel rise/fall time, video bandwidth, underscan/overscan, and resolution. "Matching Colorgraphics . . ." discusses graphics as an alternative to printout, and gives some

pointers on selecting the graphics technology and available options that best suit a particular application. RAMTEK CORP., Santa Clara, Calif.

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PBX FOR EVERYONE

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Automatic redial, call back, conferencing, call forwarding, call distribution, etc., are discussed. Available from the HARRIS CORP., Novato, Calif.

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SDLC/SNA REFERENCE CARD

The reference card outlining SDLC frame sequence and SNA headers and errors is designed for educational and trouble-shooting uses. All four FID types are covered, including BIND formats, LU-LU session error codes, and function management header codes. The 14-page, foldout card uses several lists, charts, and tables to illustrate all information. QUESTRONICS, INC., Salt Lake City, Utah.

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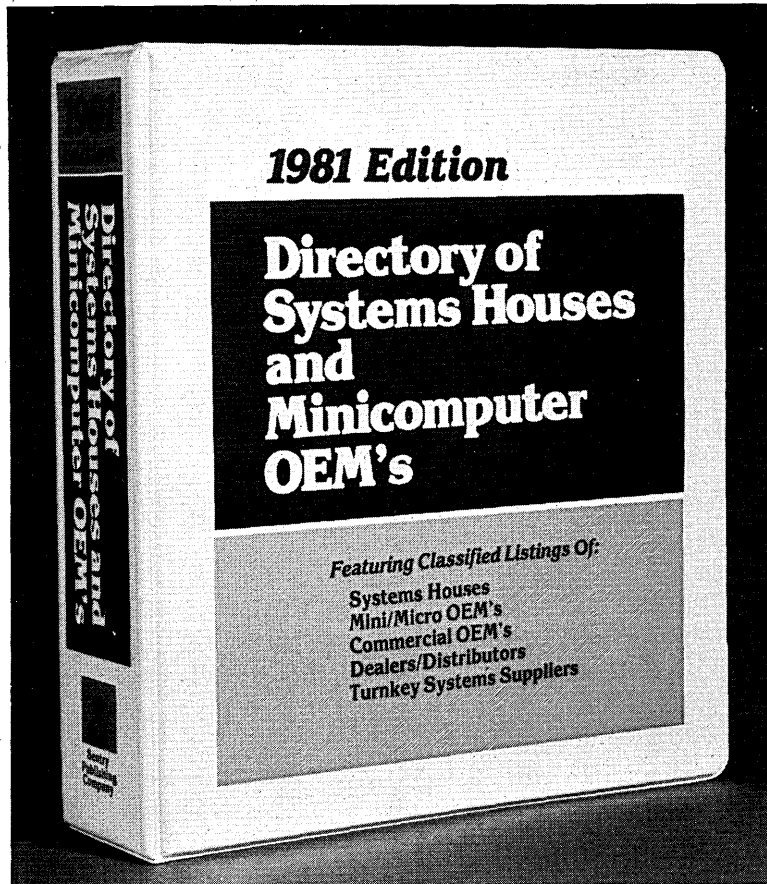
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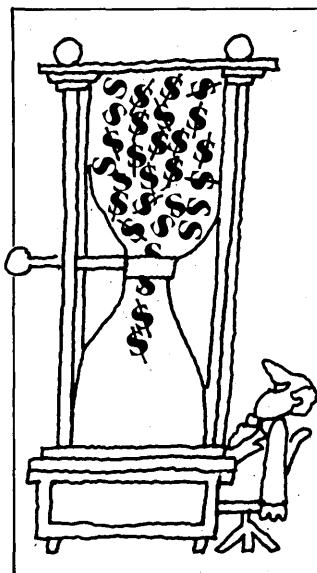
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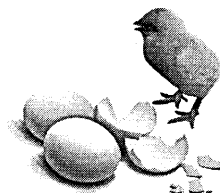
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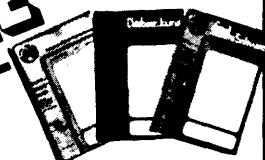
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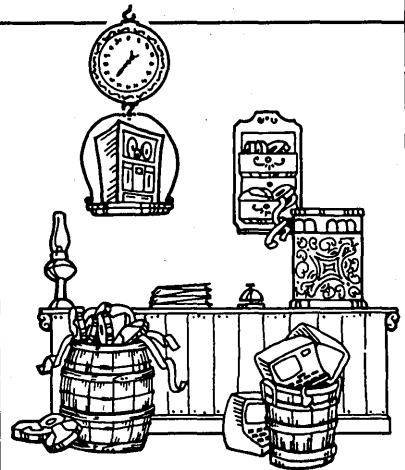
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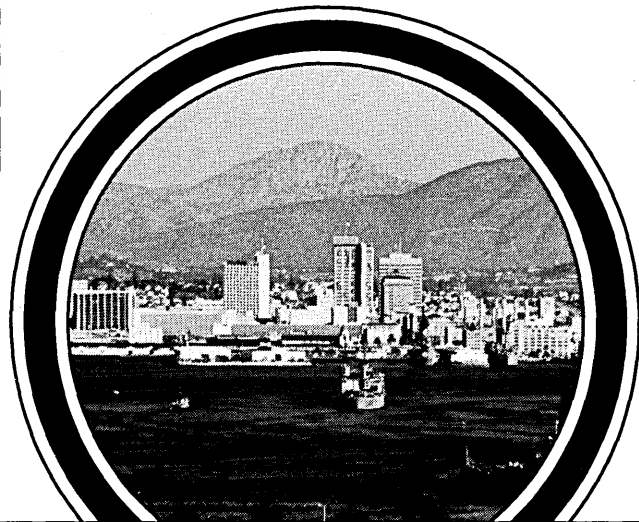
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READERS' FORUM

DATAKOM - THE MODERN WAY

The following papers were presented at the third annual Colloquium of Unchartered Banks, which took place a year or so ago someplace in Florida. DATAMATION is grateful to Danny Cohen, principal shareholder of FNBO, for bringing the first paper to our attention.

In our modern bank, the First National Bank of Oceanview, Kans., we key the details of each transaction on Hollerith cards. Each transaction is later processed by our central computer, located in the headquarters building.

Each transaction may require a different number of characters to be keyed. On the average, a transaction requires about 30 BCD characters; a few require less, some require more. A very small percentage require more than one Hollerith card, but some may even require three.

The cards are then fed into a device (we nicknamed it "card reader") that reads each column and electronically sends the appropriate code to the central installation for processing.

The computer specialists have told us that each transaction has to start on a new card, or else the processing may be faulty.

Sometimes the computer in the central installation detects a questionable group of characters, like alphabetic characters in a numeric field. When this occurs, the computer operator calls the card reader operator, and asks him to repeat this questionable group.

In order to make this process even more efficient, each transmitted character is assigned an "ordinal number." For example, the ordinal number 23 is assigned to the character in the 23rd column of the first card, and the ordinal number 167 is assigned to the character in the 7th column of the third card. Mathematicians in our advanced research division have invented a scientific formula for computing the ordinal number of each column. It goes like this:

$$\text{NORDIN} = 80 * \text{KARD} + \text{KOLUMN} - 80$$

NORDIN is the ordinal number to be computed. It corresponds to the character in the KOLUMNth column of the KARDth card. Both variables are spelled with a "K" (instead of a "C") not because our mathematicians cannot spell, as most people believe, but because our computers do not like the letter "C" as much as they like the letter "K" for reasons we fail to understand, though our computer scientists have spent hours explaining it to us. We were told there is a good reason for using NORDIN for "ordinal

number," but that it is probably beyond the scope of this paper.

We have proved and verified this scientific formula by testing it on many (at least a hundred or so) cases. Not even a single case failed to produce the correct result. The president of our company was so impressed that he ordered us to name this formula after him. Therefore, we always refer to it as the MURPHY formula.

We were told that there is also a mathematical method to find the KARD and the KOLUMN for a given NORDIN. Since this is not supposed to be a heavily mathematical paper, we'd rather not elaborate on it. We can, however, guarantee the worried reader that even though the mathematics are beyond the scope of our understanding, modern computers are able to solve the problem.

It is worth mentioning that some transactions require significantly less than a full Hollerith card, and that some of the multicard transactions have an L/C (this is how we refer to the "last card") with just a few characters on it. In these cases, there are many trailing blanks at the end of the transaction.

Recently, our teleprocessing scientists discovered that we pay for the telecommunication of these trailing blanks at the same rate that we pay for good characters, even though they carry no information at all! Although we failed to correct this wrongdoing, we have figured a way to circumvent the problem.

In order to save this transmission of trailing blanks we invented the EOC ("End-Of-Card") symbol, which we represent by a "%" (percent) sign, since we never use it for any other purpose.

This happened to be a great improvement. First, as planned, it reduces the communication cost significantly. In addition, it introduces another unexpectedly great improvement. Whenever the main computer is ready to accept more input, its operator tells the card reader operator how many characters can be sent. Now, since all the transmitted characters are information-carrying (unlike the way they used to be with the trailing blanks), a smaller delay occurs, making the entire operation even more efficient.

For example, suppose that when the receiver says: "You are now cleared to send 160 more characters," the sender already has several short transactions, say of 10 characters each, ready to be sent. Before the invention of the EOC only two transactions could be sent in response to this clearance. But now, thanks to the blessed EOC, the sender may send 16 transactions (assuming the 10 character length), without the need for extra delay while waiting for further clearances.

The ability to use these clearances to their full extent is the key to this unexpected performance improvement. We feel confident that this is the optimal utilization of the clearances because our transmission is now 100% pure information, without the burden of the information-free trailing blanks.

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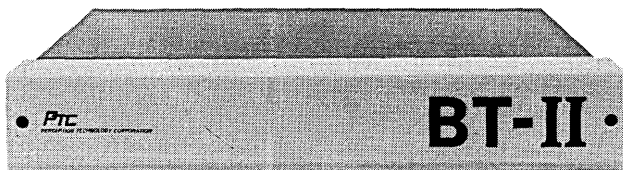
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that we are now considering writing a paper about it for publication in the communication literature.

However, a slight side effect was recently discovered. The Murphy formula does not work in many cases. In order to correct this catastrophic effect, a new feature was invented, the elastic EOC.

The elastic EOC happens to wipe out the unexpected side benefit to the flow control, but it keeps the Murphy formula operational. Since we never anticipated the improvements to the flow control, we decided that the elastic EOC is a small price to pay for the benefit of recovering the operability of the Murphy formula.

—J. Finnegan
Oceanview, Kansas

*

As so often happens in science, researchers half a continent away had grappled with a like problem and had come to the colloquium to talk about it. Herewith the Diddleburp Solution, for which DATAMATION thanks Ed Cain, LNBD's Vice President for Vault Security and Remembering the Combination.

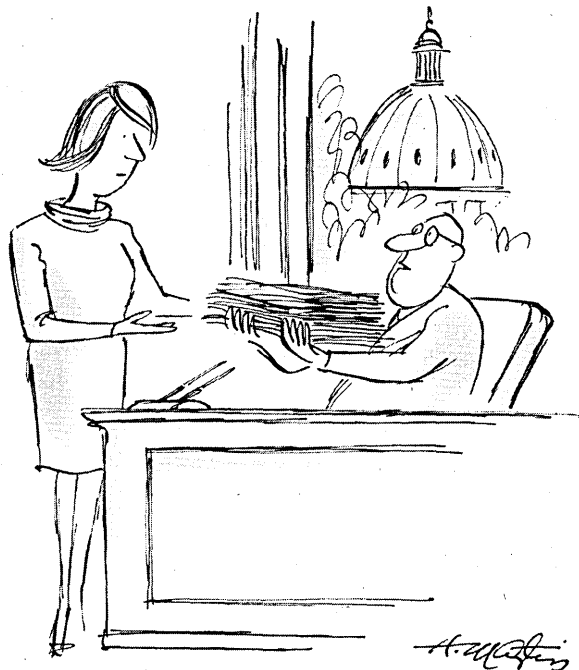
The Last National Bank of Diddleburp, Va., encountered a similar teleprocessing challenge, and independently developed a mechanical fix to the problem. Based on the technology of the BAR codes that one finds on genuine store-bought items, they developed a first-used bar (FUBAR) code, in which only the first bar has any significance. This concept was generalized and led to the invention of the single-column punched card.

With this novel technique, information-trailing blanks can be avoided, the side benefits of the flow control that J. Finnegan mentioned are realized, and the Booger formula is never violated. That's an equation similar to his Murphy formula, but named after our president, Dr. B.A. Booger. It goes like this:

NORDIN = 1

We haven't exhaustively proven the equation, but our chief mathematician, who used to be an electronics engineer, assures me that two examples are sufficient to prove anything.

Sadly, though, there is a disadvantage that must be reported. All of our card readers had to be modified to handle the single-column card, which looks more like a stick of chewing gum than the



"Miss Malcolm, would you see that this evidence gets to the shredder?"

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SCIENCE/SCOPE

A 100-kilovolt hydrogen ion source will play a vital role in fusion energy studies in the Tokamak Test Reactor at Princeton University. The source will create a 65-ampere beam of deuterium ions that subsequently will be neutralized by charge exchange to produce a beam of fast neutral particles. This neutral beam can cross the intense magnetic field lines that contain the plasma in the reactor. It will fuel and heat the plasma to the point where self-sustained fusion can take place. The reactor, when completed, will use 12 such ion sources. Hughes built the device under contract to the U.S. Department of Energy.

Pilots soon may get navigational information from a TV display instead of paper maps. Hughes, under a U.S. Air Force contract, is developing a system that will use a computer to electronically generate and display realistic pictures of terrain and man-made features. The new map will be coupled to an aircraft's navigation system to help the pilot fly at high speeds and low altitudes despite bad weather, darkness, and radar jamming. Ultimately, production models of the map could be tailored to meet different mission requirements. One mission, for example, may require roads and highways as navigational checkpoints, whereas another would require navigation with reference to terrain features. The prototype system will store 250,000 square miles and use more than 1,500 bits of data to encode each square mile. It is scheduled to be delivered in August 1982.

Certain military laser rangefinders should soon be improved now that researchers at Hughes have pinpointed long-suspected impurities in laser rods. Using a new dye laser technique in their spectroscopic studies of Nd:YAG (neodymium-doped yttrium aluminum garnet) laser rods, scientists uncovered a subtle crystal defect that cuts the laser's efficiency and brightness. They believe it will be possible to develop a process to increase the quantum efficiency of commercial Nd:YAG lasers from about 64 percent to the theoretical maximum of 91 percent.

Hughes Industrial Electronics Group offers the advantages and opportunities of a small company backed by the resources of a \$2-billion company. Our facilities are in the Southern California communities of Carlsbad, Irvine, Newport Beach, Torrance, and Sylmar. Our programs incorporate 34 different technologies. They include silicon and GaAs semiconductor technologies, fiber optics, microwave and millimeter-wave communications, microprocessors, lasers, and solar cells. Send resume to B.E. Price, Hughes Industrial Electronics Group, Professional Employment, Dept. SE, P.O. Box 2999, Torrance, CA 90509. Equal opportunity employer.

A new handbook on traveling-wave tubes and traveling-wave tube amplifiers is now available from Hughes. The 56-page booklet is designed as a complete reference guide. It discusses the history, operation, design, performance, and application of TWT's and TWTA's. It also includes a full glossary of terms, diagrams, and specification charts on all Hughes TWT's and TWTA's. For copies, write to: Hughes Electron Dynamics Division, 3100 W. Lomita Blvd., Torrance, CA 90509.

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conventional card. This equipment modification could be prohibitively expensive at other financial institutions, although with our Foonix equipment it was cheap enough. Also, we haven't yet figured out what to do with the EOC, much less an elastic one.

—Carruthers J. DeCanter
Diddleburp, Virginia

A DIFFERENT APPROACH

Over a four-year period, a workable application development methodology and set of project management guidelines were created at DP Services, IBM's contract application development group. Our project management guidelines are a collection of development standards covering each phase of the application development process. The standards were nominated and selected by our most experienced development managers. The key criteria: they had to be easy to learn, easy to use, and had to work.

Each of our project managers is given a set of the guidelines to read and follow. We conduct a formal one-week class for new project managers using material from the guidelines as an integral part of the class. The guidelines are centrally maintained and updated as new supportive material is developed. Recently we significantly broadened the training base by developing self-study courses based on our guidelines for use not only by project managers but by the entire development team, and users and management as well.

The self-study courses are designed to teach project planning, estimating, tracking and control, including the systems assurance function, risk assessment, and project reviews. The emphasis is on practical, how-to-do-it material with numerous examples, forms, checklists, and guidelines for the development "products" such as requirements and design documentation and test plans.

To date, we have four courses in the project management training series: *Managing the Application Development Process*, the basic course that teaches our process and the project management system that supports the process; *Estimating Application Development Projects*, a practical course on how to develop and validate estimates for design phase projects and implementation phase projects; *Managing the Application Development Process: Project Reviews*, a course based on project management case studies that show how to analyze a development project, determine its true status and deal with real or potential problems; and *Managing Application Conversion Projects*, which gives our people a solid base and proven techniques for planning and managing this special type of dp project.

Each course averages 10 to 12 hours to complete.

From our experience, the self-study courses have a number of significant training advantages. The entire project team can be trained simultaneously. The courses organize our development standards and guidelines into digestible, interesting units, with many examples to increase understanding of our development process and the project management tasks.

The courses also solve the train-at-several-levels problem since we have written material understandable to project managers, users, and management. The courses contain all the material in the guidelines so they provide the developers with a reference for on-the-job needs.

Last but not least, the training is far less expensive than other means because travel expenses and time away from the job are not factors. These training programs pay large dividends in terms of their contribution to realistic plans and estimates, successful project completion, and the overall productivity of our managers and development staff.

—Philip H. Braverman
San Francisco, Calif.

MICOM announces ADLC™

Data Communications for Minicomputer Users

If you use minicomputers and dumb terminals, you probably have a very cost-effective 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 or 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 *add-on* 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 ADLC™ products eliminate transmission errors, save computer ports, and allow low-cost dumb terminals to be

clustered, multidropped 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.

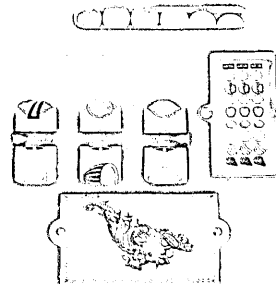
Send for complete details today...and if you would like to learn more about the subject of data communications, ask about our *tutorial seminars* designed specially for the minicomputer user. MICOM seminars are offered nationwide throughout the year.

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.

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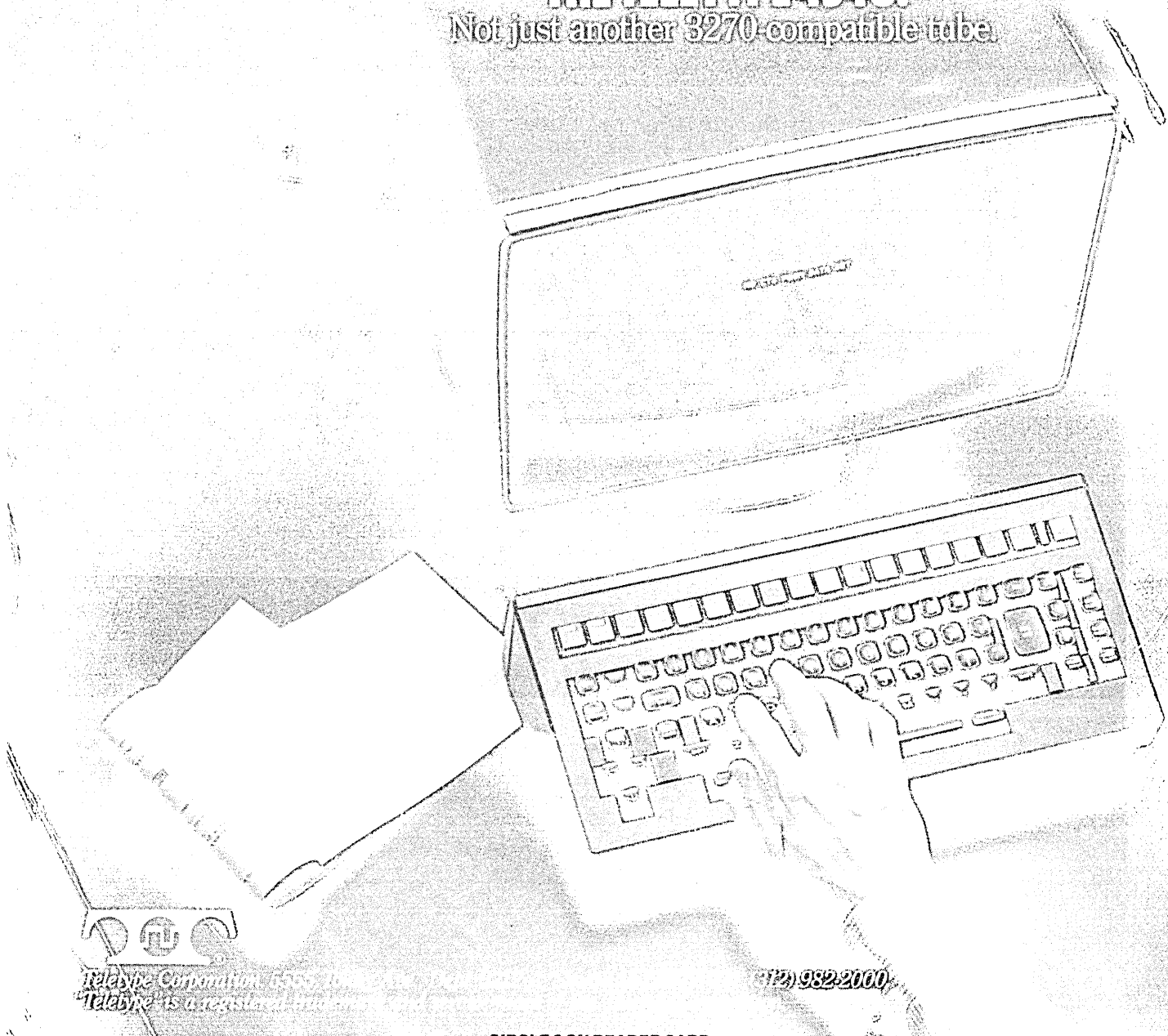
If it's in the terminal, the 4540's compact modular design makes it easy to swap components and get back on line in a hurry.

The 4540 also offers a wide variety of applications-oriented printers. Plus a long list of standard features that let it adapt to human beings, instead of the other way around.

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