Model 6470 Cartridge Recorder — the latest distinguished member of a

PIONEER FAMILY

Kennedy didn't just pioneer the 1/4" cartridge field — it
started it, with the first practical recorder using the new 1/4"
3M cartridge. Model 6470 continues the tradition with the usual package
of new features, such as:
• High Capacity — Model 6470 can store up to 54 MBYTES
of formatted data on one cartridge.
• Start/Stop with data streamings at 37.5 ips.
• Full Command Repertoire, utilizing either the Pico Bus or
Pertec interface.
• Automatic Read Thresholds — during read retry three
different thresholds are automatically selected, a feature
usually found only on large 9 track tape transports.
• Backward Compatibility — Model 6470 will read tapes
written by Model 6455.

These are but a few of Model 6470's many features. Write or
give us a call today for the complete story of the newest
member of this oldest family.

KENNEDY
An Allegheny International Company
1600 Shamrock Ave., Monrovia, CA 91016
(818) 957-8831 • ITT TELEX 472-0116 KENNEDY

KENNEDY • QUALITY • COUNT ON IT

CIRCLE 1 ON READER CARD
Don't waste your money on modems for local networking.

Whether you're connecting your terminal or personal computer directly to a nearby minicomputer or mainframe, baseband local networks, you probably don't need a modem at all.

MICOM's innovative MicroNet line-driven and local datasetter allows you to simulate regular-modem operation over distances of several miles at a full-data-rate up to 9600 bps. Then, because the MicroNet technology that can allow you to operate at any speed within their full range (rather than limiting you to one or two data rates as a synchronous device would), and—over better—they're priced at a tiny fraction of the cost of a high-speed modem.

Also unlike conventional modems, MICOM's MicroNet 490 and 490-4 require no extra wiring—and even a power cord. They simply plug into the back of your terminal. So, looking for a better way to transmit data over your own lines or over metallic circuits supplied by the phone company? Call us for more information on MICOM's MicroNet.

Considering a bunch of modems for local networking?

You'll find our local datasets more appealing.

MICOM Systems, Inc. 2015 North 7th St., Champaign, IL 61820  Telephone (217) 596-5550  TWX 510/231-3710
Regional Sales Service: Atlanta, GA  (404) 482-2220  Boston, MA  (617) 597-0116  Chicago, IL  (312) 787-2309
Dallas, TX  (214) 222-0778  San Francisco  (415) 342-0300  St. Louis, MO  (314) 537-7260  Toronto, NY  (208) 585-9000
MICOM-Data Ltd.  Basingstoke  15 Cambridge Road  Reading  Berkshire  RG24 9HR  England  (0734) 836031  Toronto  TWX 217-435

For literature please call: (800) "MICOM"
If you don’t remember everything you did last night—
you need EPILOG.

Are your critical batch jobs always completed on
time? Are you tired of poring through piles of printouts
and pages of reports to find the reasons for problems?
With EPILOG™ MVS, you can easily find the causes of
slow batch turnaround, such as: delayed tape mounts,
insufficient storage, excessive paging, delayed operator
replies, system deadlocks, I/O contention, improper I/O
parameters, and more. And you can get this information
in concise reports or displayed on a TSO terminal.

EPILOG/MVS, the Installation Performance Management
System from Candle, provides these powerful features to
improve system performance:

• Historical Analysis
• System Performance Navigator
• Change Evaluation

Historical Analysis tells you WHY there were specific
performance problems: last month, last week, or last
night—such as why the monthly Payroll job ran for
eleven hours. The importance of historical analysis lies
in its ability to help you prevent future problems and
improve future performance.

The System Performance Navigator helps you to
quickly identify system problems. It is a simple methodo-
togy to help you find the shortest route from the problem
to the solution. You start with an overview of the service
levels for a particular workload for the time period in
question...be it a day, an hour, or a week...and progress-
ively look at more detailed information based upon the
data from the previous level.

Data processing needs are changing daily, requiring
hardware changes, software changes, or the implementa-
tion of specific tuning methods. You need to determine
the effect of today’s changes and avoid yesterday’s
problems.

Change Evaluation helps you to understand the effects
of scheduled system changes in hardware and software.

EPILOG/MVS can help you understand the effects of these
changes and enable you to better predict and evaluate the
results of change.

EPILOG/MVS provides the information you need to
complete critical batch jobs on
time, improve and maintain
user service levels, solve major
performance bottlenecks, and
reduce costs by increasing effective capacity. Candle’s
EPILOG/MVS...the sensible installation performance
management system...will help you improve the perfor-
ance and capacity of your data center.

For more information, contact your Candle
representative.

Candle
10880 Wilshire Blvd., Suite 2404
Los Angeles, CA 90024
(213) 207-1400
CIRCLE 6 ON READER CARD
FEATURES

24 IN FOCUS
First there was Cinerama. Then came 3-D, followed by Sensurround. Tinsel Town's next craze may be computer-generated images. Edith Myers tells how "Cray Conquers Hollywood" with its X-MP.

68 THE BATTLE FOR THE DESKTOP
Michael Hammer
"I regret that I have but one workstation RFP to make for my company," lament marketing-war-weary dp managers, bewildered by the propaganda of brawling vendors.

78 THE LITTLE ENGINES THAT MIGHT
Ken Zita
In their infancy, the progeny of the marriage of the telephone and the data terminal look cute and promising, but will they grow up to be heroes or bums?

86 NCC PRODUCT PREVIEW
Robert Crutchfield
One-armed bandits and computer companies alike hope to profit from the horde about to descend on Las Vegas. But while the slots can offer only apples and oranges, vendors will exhibit everything from disk drives to ribbons, operating systems to aptitude tests. Herewith, a rundown of some representative products to whet any dper's appetite.

116 THWARTING THE HACKERS
Gene Troy
Hey, crime-stoppers! Sure it's hard to prevent breaking and entering when the perpetrators can't be seen and they leave no fingerprints. But a vigilant staff and a port protection device can keep your system unmolested.

171 READERS' FORUM
David Evans compares the risks and rewards of "Taming Large Projects" to a lunch with King Kong. In Digits, Roy Mengot proves computers aren't the only ones capable of producing graphics.

NEWS IN PERSPECTIVE

36 MICROCOMPUTERS
Patching up pcs.

38 DATA NETWORKS
British VAN plans.
IBM's IN in the red.

53 ARTIFICIAL INTELLIGENCE
Soviets aim for 5th gen.

64 BENCHMARKS

DEPARTMENTS

9 LOOKING AHEAD
15 LETTERS
21 EDITORIAL

133 PEOPLE
139 HARDWARE
147 SOFTWARE & SERVICES
162 MARKETPLACE
164 ON THE JOB
180 ADVERTISERS' INDEX
183 SUBJECT INDEX

INTERNATIONAL 128-1

- 2 FORGING THE LINKS
-11 EUROPEAN TOGETHERNESS
-14 CLOSE-UP

COVER DIORAMA BY KATHY JEFFERS;
PHOTOGRAPH BY WALTER WICK
Send the coupon.
Save a programmer.

Right now, every one of your programmers may be a serious candidate for "programmer burnout." That's because without realizing it, they spend much of their time rewriting existing source code—a tedious task for them, and a major productivity drain for you.

MANAGER SOFTWARE PRODUCTS' SOURCEMANAGER™ frees your programmers from this task and lets them get on with the challenge and pleasure of writing procedural code. Which of course greatly reduces the time required to develop COBOL applications in an IBM environment. SOURCEMANAGER is an on-line, dictionary-driven, COBOL application development system. It automatically generates standardized data definitions and program documentary sections. It helps programmers develop a library of re-usable code—and helps them develop procedural code. It even detects standards and style violations, and provides efficiency controls.

SOURCEMANAGER performs brilliantly as a stand-alone system. Yet it can be fully integrated with other dictionary-driven products in MSP's MANAGER family—such as DATAMANAGER®—the data and information resource management system, and DESIGNMANAGER™—the logical data base design and modeling system.

Find out how SOURCEMANAGER can help you prevent programmer burnout and increase productivity. Send the coupon today.

Or call (617) 863-5800 (Telex 703 36431).
FSCALC, the newest procedure in SAS/FSP, gives you the friendliness of a personal computer and the power of your existing communications network.

The FSCALC procedure provides an interactive, electronic spreadsheet for financial modeling and analysis. You can use FSCALC for budgeting, financial and strategic planning, forecasting, new product analyses, depreciation scheduling, manpower and salary planning, portfolio management and "what if" analyses.

An on-line help facility makes FSCALC easy to use. You can consolidate screens, combining data from several departments into a corporate report. The FSCALC procedure features an unlimited spreadsheet size, with flexible row and column operations. You can even split screens to view your spreadsheet and programming statements at the same time. A sophisticated modeling language gives you true modeling capabilities.

Best of all, the FSCALC procedure is integrated with the SAS System, giving you the tools for a complete Decision Support System.

Now you can enjoy the ease of a personal computer with the power of a mainframe—with FSCALC.

Call or write today. SAS Institute Inc., Box 8000, Cary, NC 27511 USA. Telephone (919) 467-8000. Telex 802505.
The new IBM DisplayWrite

Little Tramp character licensed by Bubbles Inc., s.a.

*Prices apply at IBM Product Centers and may vary at other stores.

Series is here. Spread the word.

In 1980, IBM introduced the Displaywriter System. Today, it's become the best-selling stand-alone text processor in the world. One reason for this success is the Displaywriter's function-rich software.

If you're looking for software like that, but working on an IBM personal computer, you don't have to look any further. Because the IBM DisplayWrite Series is here.

And it will put many of the features and capabilities of a dedicated word processor to work for you when you're writing.

It runs in the family.

You'll find two word processing programs in this series: There's DisplayWrite 1, for IBM personal computers—including PCjr. And DisplayWrite 2, with added functions for your PC, PC/XT or Portable PC.

You'll also find DisplayWrite Legal, a dictionary of about 16,000 words that a lawyer might need to check.

And you'll find DisplayComm, which lets your IBM PC send and receive text to and from other IBM PCs. If you're writing at the office, this program could also let you send text to an IBM Displaywriter down the hall. (From there, it could be sent on to an IBM host computer for distribution.)

Some words on high function.

The DisplayWrite word processing programs give you the time-saving features you'd expect from IBM. Justified margins, centered lines and pagination, for example. You'll even have prompts and messages to help guide you along.

But there are also some features in DisplayWrite 2 you might not expect. Like easy column formatting, four-function math capability plus a spelling checker based on a dictionary of about 100,000 words.

Yet the biggest surprise of all may be the price.* DisplayWrite 1, $95. DisplayWrite 2, $299. DisplayWrite Legal, $165. DisplayComm, $375.

Where you can find all four.

Get more information about the IBM DisplayWrite Series at your authorized IBM Personal Computer dealer or IBM Product Center. To find one near you, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

Stop there first and get the last word.

IBM®

Personal Computer Software

CIRCLE 8 ON READER CARD
Computerize your text files with BASIS.

Now you can take one to ten million documents from your file cabinets and put them into an instantly accessible electronic database. Save manual searching through your files and find important information when you need it.

BASIS is a proven, interactive software system that probes to find the key words you're looking for within seconds. Next, it displays a list of records containing the specified words. Then BASIS displays records you request and prints hard copy on demand.

Best of all, BASIS is extremely easy to use. Information is retrieved through "FIND" and other simple commands, using menus and helpful prompts. No programming is needed. And your application can be up and running in days. See how easy it is to computerize your text files with BASIS.

CALL FOR A BASIS BROCHURE
1-800-328-2648
In Ohio, call collect (614) 424-5524.

Basis runs on DEC VAX®, IBM, Prime and Wang VS mini and super minicomputers; on IBM, CDC, DEC* and Univac mainframes. UNIX version of BASIS available mid-1984. DEC and VAX are trademarks of Digital Equipment Corporation.

CIRCLE 9 ON READER CARD
LOOK AHEAD

INFLICTING AT AT&T

AT&T Technologies chief James E. Olson's recent demand for a 20% across-the-board cut in costs may presage big trouble for managers in the division formed out of the old Western Electric, Bell Labs, and some other bits of postdivestiture AT&T. There's talk of stripping out an entire level of management in the rank-obsessed company. But the real battle looks to be brewing between Olson and Ian Ross, president of Bell Labs. Ross, a proud, English-born engineer, is said have told Olson that there would be "no cuts in projects" at the labs. If anyone can keep the peace between these two, it will probably be Marilyn Laurie, vice president of public relations and public affairs at AT&T Technologies. She has Olson's ear and Ross's respect, having held a similar post at Bell Labs before taking the Technologies job.

MACINTOSH FOR OEMS?

Seems everybody wants to sell Macintosh, Apple Computer's mouse-equipped desktop. Wang Labs and NBI, two word processing equipment vendors, are understood to be talking to Apple about oeming the machine. Moreover, AT&T has taken an interest in the machine, which could be enhanced with a built-in telephone of some sort. One Big Eight accounting firm, we hear, has ordered some 3,500 of the machines to be used among its 49 domestic offices.

DO YOU HEAR VOICES?

In your PC, that is. You may, come NCC this month, when Interstate Voice Products, a spin-off of Interstate Electronics, Anaheim, Calif., introduces a voice recognition board for the IBM machine. The first model of the VocaLink board will deal only with discrete speech, but the company says it is working on connected speech algorithms, which are much more difficult to perfect.

IBM GOES LAP-TOP

Watch out for a notebook-sized computer to come out of IBM, which has been exercising its personal computing muscle lately with price slashing and further commitment to the micro software market. The new lap machine is expected to use a flat-panel liquid crystal display. Software would be run under the PC/DOS operating system. Chances are the hardware will be built in Japan by an oem to IBM specs, according to industry sources. Pricing is still up in the air.

INSIDERS' VIEWS

This summer will see published histories of two microcomputer companies, one famous, one infamous.
# LOOK AHEAD

| INK JET TAKING OFF? | "A Small Kingdom," by Michael Moritz, follows the Apple Computer gang from garage to the Pepsi generation. Surely more inflammatory is "Hypergrowth, the Rise and Fall of Osborne Computer Corporation," written (with John Dvorak) and published by the often scheming, and occasionally lying (he admits it), Adam Osborne himself. Dropped by an established publisher supposedly afraid of litigation from Robert Jaunich, president and ceo of the portable pc company at the time of its spectacular crash last year, the book offers a detailed business analysis of Osborne's sordid rocket ride to failure. |
| RUMORS AND RAW RANDOM DATA | A recently acquired Kodak subsidiary, Diconix (the former Mead Digital Systems) of Dayton, Ohio, is quietly showing off a high-speed ink jet printer that is claimed to print 8 to 10 pages a minute. Using a multiple array binary ink jet technique, the printer shoots 300 jets of ink at once, providing typewriter-quality printing. Deliveries of the product, expected to sell to oems for $8,000 to $10,000, will begin in October. Gould Inc.'s Compion subsidiary, in Champaign, Ill., is soon to unveil a line of Unix-based networking products that will enhance applications development and protection of software and data files....Braegen Corp., Cupertino, Calif., will soon introduce a means of connecting IBM PCs into its 3270-type terminal system....IBM watchers expect a doubling of the capacity in IBM's 3380 disk drive shortly. This would hurt PCMs, which have had trouble copying the original 3380, and help users who continue to grow DASD capacity at some 45% a year....We hear IBM expects to have some 600 retail outlets in place by the end of next year handling the PC and related products....Input, a Mountain View, Calif., research house, says the U.S. software and services market grew 22% last year to reach $33.5 billion....Tandem Computers will soon add multiple column formatting to its T-Text word processing package....3M is readying a new diskette manufacturing technique that enables up to 12 megabytes of data to be stored on a 5½-inch floppy....GrID Systems of Mountain View, Calif., is adding shared remote database files for users of its Compass portable computer. Several popular micro DBMS packages will be offered in the fall....It looks as if the Reagan Administration will go along with a move to deregulate Intelsat tariffs, a move that would drastically change international telecom rates. |
A PRINTER FOR EVERY NEED AND EVERY SPEED.

If you're looking for a dependable lineup of printers, look at Printronix. We've got it all in the family.

From Word Processing at 80 LPM, Graphics at 150 LPM, to high-volume Data Printing at 2000 LPM, Printronix printers do it all, without skipping a beat. In fact, they're the only printers built to take the pressure of continuous duty processing in the most rigorous environments.

And, in addition to industrial durability, our unique hammerbank technologies give you superior print quality and outstanding graphics capability.

For printers for every need and every speed, come to Printronix. The best printer line for your bottom line.

For more information, please write or call today.

---

Our MVP is the business printer that really means business. It's the world's first and only microcomputer line printer which puts the dependability of our P-Series into a smaller package.

The MVP is truly the Most Versatile Printer, with selectable speeds ranging from 80 LPM to 200 LPM, and full graphics capability. It's the perfect printer for all your multi-user, multi-application needs.

---

The P-Series consists of our proven printer/plotters, the P300 and P600. At 300 LPM, the P900 can combine bar codes, OCR and alphanumerics all in one dependable package to bring you the best in medium-speed line printer capabilities.

And, with twice the throughput of our P300, the extra-rugged P600 is truly an industrial printer designed for all your heavy-duty processing tasks.

Plus, there's our new P-Series XQ. Enhanced versions of our P300 and P600, delivering high-speed draft print and compressed print in an office-quiet cabinet.

---

Our DataPrinter series gives you the most reliable band printer performance available, using a precision hammer actuator system evolved from chain printer technology.

DataPrinter's fully-formed character bands offer superior print quality for your super-mini and mainframe data processing needs, at speeds from 600 LPM to a blistering 2000 LPM.

---

The 4160 GraphicPrinter combines the reliability and versatility of Printronix technology with higher dot density. Perfect for applications requiring high resolution graphics.

---

THE FIRST LINE IN PRINTERS.
PRINTRONIX
17500 Cartwright Road
P.O. Box 19559, Irvine, CA 92713
714/863-1900 TWX: 910-595-2335
Outside California: 800-336-1234, ext. 66
In California, 800-441-2345, ext. 66

CIRCLE 11 ON READER CARD
ON THE FIRST WE CREATED
When Bridge Communications first opened for business, we took a good look at what the computer age was creating.

We saw computers that couldn't talk to other computers. LANs that couldn't link up with other networks. Data PBXs so slow they could stop an entire organization in its tracks.

And we said, "Let there be MAN."

**MAN: The Multiple Area Network.**

MAN is more than just another LAN or Data PBX. Much more.

It's a highly intelligent, high performance communications system designed from Day One to link multiple devices, multiple networks, and multiple locations.

MAN can link all kinds of devices from multiple vendors to Ethernet. And Ethernets to other Ethernets, remote nets, X.25 public nets, and SNA.

Computers, printers, terminals, personal computers, and mainframes all become one transparent system with MAN.

**The MAN who has everything.**

Our Terminal Servers, Host Servers, and Gateways have the capacity to serve even the most demanding user. And they can grow to meet the needs of the largest organizations.

MAN systems use multiple 68000 microprocessors to move information faster and easier than any other network. There's no single failure point, and our expansion capability beats all other LANs or Data PBXs.

People who really need and depend on powerful communications systems have already gotten their MAN. People like Honeywell, Motorola, GTE, U.C.L.A., The U.S. Forest Service, and NASA.

Call 415-969-4400 or write Bridge Communications, Inc., 1345 Shorebird Way, Mt. View, CA 94043, and get the story of MAN.

It's the Genesis of a whole new way of networking.
To use INTELLECT, the natural language query system, all you have to do is ask—in everyday conversational English—and you'll retrieve. Immediately, in either text or full-color graphics.

INTELLECT, the world's only successful true natural-language query system, is an ideal tool for your information center. INTELLECT's powerful information retrieval capabilities are so advanced that it understands questions and responds with answers as if you were talking to a knowledgeable colleague. Executives access data themselves—more easily than ever before—without learning any technical jargon or "computerese." It's so easy to use, it doesn't even have a training manual!

Whether you use INTELLECT as a retrieval system or as an effective data analysis tool, it transforms raw data in the database into information and presents it in finished color graphics in a matter of seconds. It's a live dynamic interface that fully integrates your existing database and graphic systems.

Already hard at work in hundreds of organizations, INTELLECT is ideal for marketing, finance, personnel, manufacturing, and banking applications. INTELLECT is an important technological breakthrough. You can learn more about it by attending one of our nationwide seminars. Or put its amazing power at your fingertips in minutes with one of our demonstration tapes.

Call or write for more details. Look into INTELLECT, and be an eyewitness to the future of computing.

ARTIFICIAL INTELLIGENCE CORPORATION
100 Fifth Avenue, Waltham, MA 02254 617-890-8400
HURRAY FOR MERCER COUNTY!
I was wondering which Mercer County cartoonist Henry Martin was referring to in his cartoon on p. 182 of your February issue. I also wonder exactly what was meant by the cartoon.

Please be aware that I was not offended, but rather was surprised to see it in print. Very few people have ever heard of Mercer County, Ohio, which is where I am originally from. I am wondering if there is another Mercer County.

I look forward to a response because my curiosity is killing me!

LUCY FELTZ
University of Dayton
Dayton, Ohio

I live in Mercer County, Pa., and I don't understand Mr. Martin's cartoon. Please explain.

DARRELL L. STUYVESANT
Greenville, Pennsylvania

Cartoonist Henry Martin responds: I live in Mercer County, N.J. Like pride of country, pride of city, pride of home state, or pride of college, I have pride of Mercer County, and thought it would be nice to put up a sign with a cheer for my home county. I knew signs cost tax dollars and I doubted that I'd get my idea through legislation, so I chose the cheaper, quicker route and put it in a cartoon. Instead of my message costing me tax dollars, I was paid for it!

Now as to Mercer County, I checked my atlas very quickly and discovered counties of the same name in Kentucky, Missouri, New Jersey, North Dakota, Ohio, Pennsylvania, and West Virginia. If I missed a state, sorry. If you live in one of those states, let's hear it for Mercer County!

PUBLISHING IS PUBLISHING
I was prompted by the article on software piracy in your April 15 issue (p. 49) to make an observation.

Legal action and technical fixes of various sorts will be of some use, but pricing and packaging strategies will play the primary role in reducing this problem of piracy to a minor irritation. The chance to save hundreds of thousands of dollars is a strong motivator for a demonstrably creative community to develop those means.

I believe the solution becomes apparent when examining similarities to the book publishing industry. There, intangible intellectual property is sold and the creators are rewarded reasonably well. The differences between that industry and the software industry are mainly price and packaging. Books sell for well under $100 normally, and the "reward" for cheating the publisher is correspondingly less. The effort and cost of copying in that case is usually enough to keep people honest.

The reason this system works in book publishing is, of course, because there is a volume market for books, which has not until recently been true for software. Trends in desktop computer sales, however, indicate that a true volume market for generally useful software is rapidly developing. Software which is useful in only a limited number of applications may continue to be developed through in-house programming, consultation, or development syndicates.

I suggest that general use software should and will come to be packaged as a hardbound, well-written instruction and reference manual together with a floppy disk (or whatever), and will be sold for under $100. Making a genuinely useful manual the prime component, along with a lower price, reduces to negligible proportions the temptation to copy.

There has been a tendency lately to pretend that computer usage can be instinctive. While software should be as user
Need a 3270-compatible Controller or Network Server with more functionality at a lower price?

Look at the CTi 3000!

Make your dumb terminals powerful and intelligent workstations by providing multi-user access to an integral microcomputer running MPM-86* or Concurrent DOS*.

Choose between BSC or SNA/SDLC on the host side. IBM Category A or ASCII on the terminal side.

Investigate the CTi 3000. We offer much more at a lower price. Call or write today for complete technical details.

CTi DATA
CTi DATA Corporation
5275 North Blvd., Raleigh, NC 27604
Phone: 919/876-8731

* Registered Trademarks of Digital Research, Inc.
It's easier for HP to stand behind their computers when we stand in front

Hewlett Packard makes great computers. But when the input power goes flat, their computational capability reaches new lows. CPP's non stop power systems bring dead power back to life. And creates new, clean, efficient power continuously, so you never need to worry about incoming power problems again.

**Reliable UPS Systems**

Nobody offers more reliable UPS systems than CPP. Our systems are based on the field proven reliability of motor generation technology, combined with state of the art motor control circuits. Whether your computing facility needs kilowatts or megawatts, we have the right system for you.

**Call Toll Free 1-800-421-6102**

Call us now for our new Power Line Brochure. If you need minutes or hours of battery backup, we have UPS systems which generate clean power with high operating efficiency. If you prefer backup time without batteries, we have uninterruptible power systems backed by engine generators.

If you are a manufacturer like HP you can depend on happy customers when you specify CPP. We have power systems designed to power IBM, DEC, Sperry and many other computers. Call or write for information on which CPP system is right to recommend to stand in front of your computers.

If you are a manager of a data processing center, we can make you look good and make your job a lot easier. Let us show you how. Call or write for our Power Line brochure of UPS systems and power conditioning equipment.

**Put CPP between you and power problems**

Computer Power Products
227 East Compton Blvd., Gardena, CA 90248
(213) 277-6937

YES! I build ____ buy ____ computers.
Send me your new Power Line Brochure!
Name ____________________________
Company_______ Title ____________________________
Street __________________________________________
City_____________ St_______ Zip_________
Better yet, here's my card

HP is a registered trademark

CIRCLE 15 ON READER CARD
Let Persyst get your IBM PC talking to your mainframe, because we have more to talk about.

We have a full range of communication solutions to talk about. That's why Persyst is your single source for the most flexible, the most cost efficient ways to tie your IBM PC to your mainframe computer.

For instance, one solution is our Coax/3270. This single-slot expansion board lets you connect your IBM PC directly into virtually any IBM 3270 environment. And with our 3278/79 emulation software, it's easy to share information between your mainframe and IBM PC.

And that's just the start. Persyst has other solutions that will help you incorporate your IBM PC into almost any IBM communications environment, including SNA or Bisync.

With our DCP/88 and our Multiple Protocol Communications controller (MPC), you can create a sophisticated, remote, multi-user 3270 environment. One that can support up to nine devices, including five printers and four PCs functioning as 3278/79 display stations. Or, use either the DCP/88 or MPC to configure 2780/3780 or HASP RJE workstations.

Because Persyst's communication solutions are built on powerful software-controlled multiple protocol hardware, you'll have maximum configuration flexibility. And this means you'll be able to modify your communication strategies as your needs change—without constantly reinvesting in new hardware. It's your guarantee for the future.

And when you're ready to talk about quality and reliability we have plenty to say about that, too. All Persyst products are submitted to one of the most stringent testing and quality assurance programs in the industry. We're so confident in our quality and reliability that we back our products by a 2-year warranty.

So if you're looking for flexible, low cost and reliable solutions for IBM PC to mainframe communications, talk with Persyst. But be prepared to spend some time, because we have lots to talk about.

Persyst Products, Personal Systems Technology, Inc., 17862 Fitch, P.O. Box 19615, Irvine, California 92714. Telephone: (714) 660-1010 Telex: 467864

Insist on Persyst.
CIRCLE 16 ON READER CARD
The Sematrans 4848 modem developed by TRT operates at 4800 bps full duplex over the switched telephone network or on 2-wire leased lines.

When France's top manufacturer of high-speed modems announced its successful development of this avant-garde telecommunications instrument, the CCITT itself realized the importance of drafting a new recommendation on this significant aspect of data communication.

Users who are accustomed to 2400 bps data transmission can now switch over immediately to this double-capacity unit offered by TRT, with no compatibility problems whatsoever.

High speed and reliability are criteria that have become household words at TRT.

For more information:

88, rue Brillat-Savarin – 75640 Paris Cedex 13
France – Phone (1) 581.11.12 – Telex 250 838 F

CIRCLE 17 ON READER CARD
To survive all the heat, hoopla, and hyperbole that will surround members of the information processing community in Las Vegas next week, consider a good stiff belt of Skepticism Soda. This refreshing drink contains neither caffeine, sugar, calories, nor cholesterol, yet has a coolheaded taste that would soothe even the most harried NCC showgoer.

Over the past several years we've all learned lessons the hard way about the wares unveiled at the National Computer Conference. Amazing new software and hardware products are introduced with great fanfare at each confab; alas, many of these great inventions are never heard from again. Every pundit, consultant, and analyst from Route 128 to Silicon Valley claims to have originated the word vaporware, the new dp industry buzzword that graphically describes a new product that didn't really exist when it was introduced, except as a gleam in the eye of the salesman and his venture capital backers.

Products editor Robert Crutchfield was able to identify more than 40 brand-new products scheduled to debut at the 1984 NCC—and that number represents only those wares that had been awarded model numbers or names, as well as price tags, prior to our deadline last month for the annual “NCC Product Preview” (see p. 86). Included in this passel of new products are not only hardware and software, but vaporware as well.

The real thing at this year's show is certain to be workstations. You'll hear vendors from all corners talk about them, though you can expect widely differing definitions of these new wonders. Not to mention widely varying costs per user—from $1,000 to $10,000, depending on whose pitch you're getting. It's the hype that counts, say the gurus.

For the pause that refreshes, read Mike Hammer's analysis of the real "workstation" needs of the dp manager in "The Battle for the Desktop," beginning on p. 68. Consultant Hammer, author of the controversial "The OA Mirage" piece in the February issue of DATAMATION, warns that cheap desktop computer power has seduced senior executives, middle managers, and white collar professionals to collectively spend millions of dollars unwisely. Magic boxes selling for $1,000 leads to impulse spending, he contends. "Below some price threshold, people buy systems just for the hell of it. Not only don't they know what the benefits will be, they're not even sure what they'll do with them."

Nobody is knocking the validity of distributing computer power to the user, of course. Indeed, Hammer quotes a dp manager as saying that "the mainframe is a network peripheral." In Hammer's view, "while we're all grateful for the big MIPers, they are no longer the hub of the computing universe." The ultimate in distributed dp is upon us, the logical end result of years of trying to move the MIPS to the needy. It's just that too many machines are being bought after too little planning.

The hottest of the hot new workstation concepts now being foisted on dp managers is the sometimes gangling combination of telephone and computer. These integrated voice/data workstations are now offered by 18 vendors, reports Ken Zita in "The Little Engines that Might" beginning on p. 78. Zita's analysis of the gaps between market needs and vendor dreams, rhetoric and reality, offers some handy guidelines for the beleaguered MIS executive trying to sort out the treasures from the trash in his or her tote bag of vendor literature. "Some people complain that integrated workstation products are gimmicks nobody needs," Zita notes, and he predicts that customized packages dedicated to particular end-user market niches will survive. What's not clear is whether the millions of pc—uh, workstation—users really want handsets connected to their ergonomic screens.

A final word: remember, all of NCC is divided into but four days!
You need hardworking, multi-functional terminals dedicated to improving your productivity.

AT&T Information Systems can help. We have a full line of asynchronous and synchronous data terminal products that enable you to move and manage information quickly. Products designed to get the word around.

Our DATASPEED* 4000 Terminals get along well with people, too.
Non-glare, high-resolution, black background tilt screens, English language options, and lightweight detachable keyboards keep users more productive.
Features like windowing, split-screen mode, 80- or 132-column wide-screen format help reduce user errors.

Conversational and editing terminals that speak for themselves.

The DATASPEED 4410, 4415, 4420 and 4430 Terminals are asynchronous desk-top workstations with superior features and functionality.

The 4410 is conversational, with graphics and sophisticated display capabilities. If you need an editing display terminal, the 4415 is one of the most functional in its class. The 4420 is a feature-rich editing terminal. It's especially engineered to help the nontechnical user become proficient.
The 4430 is a conversational terminal for the multi-point, private line environment. There's no need for the computer to poll and address these terminals. This saves valuable processing time.

Synchronous terminals on speaking terms with IBM.

AT&T Information Systems' DATASPEED 4540, Enhanced 4540 and 4540 Touch Screen Terminals are designed for a clustered, polled environment.
All of these synchronous terminals are compact, modular and 3270 compatible.
The 4540 and Touch Screen 4540 both support SDLC/BSC line protocols. With one of our new controllers, you can upgrade to SNA protocols by simply changing a diskette.
For SNA/SDLC compatibility, there's the Enhanced 4540. It offers flexibility, introducing a choice of two controllers, standard- or reduced-sized displays and high- or low-profile keyboards.

The Touch Screen 4540 has 30 touch-sensitive areas on the screen which give you fast, easy access to information.

A history of communicating better.

For over a century, AT&T products and service have set the standards for performance and reliability.

Today, 4,000 scientists and engineers from Bell Laboratories are working full time to develop and design new business products at AT&T Information Systems Laboratories. Products we continue to support by the largest, most experienced sales and service force in the industry.

Our DATASPEED Terminals incorporate Information Systems Architecture, the design principle that integrates our products so they perform as one system. As you grow, its flexibility allows for easy system expansion.

To learn how our family of DATASPEED Terminals can increase your profits and productivity, call 1-800-247-1212, Ext. 329.

WHEN YOU'VE GOT TO BE RIGHT.

AT&T Information Systems

CIRCLE 18 ON READER CARD
CRAY CONQUERS H’WOOD

The new movie, The Last Starfighter, features 25 minutes of Cray X-MP-generated scenes.

by Edith Myers

Audiences viewing the Universal-Lorimar film, The Last Starfighter, which will premiere July 13, will be propelled to the far reaches of the universe.

Some of the technology behind the movie may have pushed the state of the art in filmmaking even farther than that.

Some 25 minutes of what audiences will see are images that never existed off-screen except as bits and bytes in databases. In some cases, the computer-generated images were combined with filmed reality, but only those who were in on the work could tell the difference.

The computer-generated portions of the film were the work of Digital Productions Inc., Los Angeles. Digital president John Whitney Jr. says his company was 12 months in physical production of its part of the movie and three months in preproduction for designing and planning.

Prior to The Last Starfighter, the greatest amount of digitally produced imagery in a major motion picture was in the Disney film, Tron, with about five minutes.

"Comparing what was done in Tron with what we’ve done here is like comparing apples and cows," says Sherry McKenna, Digital’s executive producer. "Tron’s computer-generated special effects were combined with traditional special effects."

Whitney, who had worked on some of the Tron effects while with Information International Inc. (III), Los Angeles, says, "If we had worked on this [Starfighter] at the same rate we progressed at Triple I, it would have taken us 24 years to do the same work."

Gary Demos, vice president of technology for Digital and a cofounder, worked with Whitney at III. "That experience taught us what we needed to know," he said, "but we’ve done everything differently here. In this company we’ve solved all the problems we had there. We have more computer power and software people."

At III, Demos and Whitney were working with a PDP-10 and had written code for some 50,000 polygons in an image. With Digital’s Cray X-MP, which last November replaced a Cray IS/100 they had had since the company’s inception in early 1982, they have generated from 400,000 to 1½ million polygons per image. Whitney says Gunstar, a hero ship in Starfighter, "has three quarters of a million polygons in it. It’s the biggest single object ever encoded. We’re able to simulate more realistic detail than anyone has before."

The Last Starfighter is a basic good guys vs. bad guys adventure that author Jonathan Betuel admits was influenced by his love of the Arthurian legends. His Arthur is an 18-year-old boy named Alex who lives in a trailer park run by his mother. The only excitement in Alex’s life is a video game called Starfighter, and he’s good at it. So good, in fact, that he serves the purpose of those who placed the game in his trailer park and at other strategic spots on earth: to find terrestrial with the abilities needed by real Starfighters to save the Star League, a federation of distant planets protected by a cosmic frontier but facing destruction.

Alex is recruited by a space-age con man, Centauri (played, appropriately enough, by Robert Preston, the fast-talking Harold Hill of The Music Man). Centauri pulls up in front of the trailer park’s arcade one night in a spacey automobile and asks Alex if he wants to go for a ride. The car Alex gets into, called the Star Car, was built in a traditional fashion by Lorimar. The one that takes off into space was digitally simulated by Digital Productions. It’s impossible to tell the difference between the two when they are on the screen.

When Alex finds he’s been recruited for a real life-and-death conflict, Centauri is forced to take him home because he didn’t really volunteer. In the meantime, however, Centauri has put a substitute Alex, called a beta unit, in place of the real Alex at home. This makes for interesting interaction between the unit and Alex’s girlfriend and mother.

The bad guys, called the Ko-Dan, destroy the good guys, but believing Alex to be a full-fledged Starfighter, they dispatch an assassin to earth. He chases the beta unit, however, because Alex has seen the light and returned to space to do battle for the forces of right.

“We started with the script,” says McKenna of Digital Productions’ part in the film. Ron Cobb, an artist and production designer hired by Digital for the film, had to decide what was in the writer’s mind. "He had to visualize what Jonathan intended, then break down all elements and put them into drawings," she says. "Then he had to get Lorimar’s approval, the director’s approval, and we added our input to make sure we could exploit all our technologies."

There were, she says, instances where the
The Gunstar, in the background chasing a cargo ship, is the largest single object ever encoded with 750,000 polygons.

The car Alex gets into was built in a traditional fashion. The one that takes off into space was digitally simulated. It's impossible to tell the two apart.
Mothership is the headquarters of the bad guys, and typical of the "hard" images currently considered state of the art.

Digital capabilities exceeded what the artist was asking for and expectations were upgraded.

After the drawings, as in traditional filmmaking, come blueprints. "But," says Whitney, "instead of physically building what is in the blueprints, we mathematically build it."

The first group in the production team to take over the blueprints, he says, are the encoder/drafters. "They take the two-dimensional information in the blueprints, incorporate proper X, Y, and Z axes, and input it into the computer in three-dimensional form utilizing a digitizing table that is hooked into a VAX 11/782. Several monitors, including a vector monitor, let him see his work as it progresses. Each image is given a name and can be called up by name."

"When we have the images encoded," explains Whitney, "the next step is to put them on stage." This is the job of the technical director/managers. Working with the movie director, the production designer, and the producer, the technical director/managers have a two-part job. "One," says Whitney, "is to create action in a scene, and the other is to create a look in a scene, so there are two kinds of workstations." The action workstations are standalone units in which the technical director/managers [there were eight on Starfighter] can work with the images interactively and in real time. They call them up by name and compose the scene the way the director says he wants it. "They can create choreography and performance in a scene," Whitney says. "This is like rehearsing. They can enter changes and optimize a scene in a real-time interactive way, until it meets everybody's satisfaction. They create an electronic storyboard which can be filmed and cut into the picture early so that special sound effects people can see the timing and start their work before the picture is completed."

"After the action, then comes lighting, color, location of lights, how bright they are, making things transparent that should be transparent, creating shadows for a field of view, setting multiple light sources—key light, fill light, and ambient light," says Whitney. "All of these can be moved like any other databases. All can be dynamically placed in a scene in a totally three-dimensional way."

This step is neither real-time nor interactive, he explains. "It's a batch processing environment and combines everything that was done before. It's the first time the Cray gets into the act."

"These workstations consist of the most advanced equipment in the industry," Whitney continues. Top-of-the-line color monitors from Ramtek Corp., Santa Clara, Calif., the largest investor in Digital Productions, are driven directly off the Cray using software based on what we started learning back at Triple I."

It was at Triple I, he adds, "that we evolved the laws that have guided us in
comes a file and goes to the Cray where it is deemed satisfactory, Whitney says, it becomes green, and blue in computer-controlled computer. For preview, we use a lower resolution stored in a queue for the final filming still a 35mm frame in seven seconds in red, green, and blue in computer-controlled problem and uses the full force of the computer. For this, Digital has its own computer. For preview, we use a lower resolution stored in a queue for the final filming still a minute or two, up to five minutes if four other people are working at the same time.

When a scene’s look has been deemed satisfactory, Whitney says, it becomes a file and goes to the Cray where it is stored in a queue for the final filming process. For this, Digital has its own “high-quality film recorder, which interfaces directly to the high-speed channel in the Cray and is capable of laying down a 35mm frame in seven seconds in red, green, and blue in computer-controlled combinations. The Cray feeds digital data streams to the film recorder, which transforms them into reusable light energy, allowing for color, and exposes that directly onto EON 5247 film.”

Some scenes require more resolution than others. The Cray, Whitney says, allows any resolution up to 10,440 raster elements per access. “At least it can compute that high but it is leveraged down by two for recording for a resolution of 5,220 raster elements.”

One advantage an image in database form has over a model or a life-sized tangible entity is that it can be replicated with ease. “You build one ship and you can create a fleet,” says McKenna. “If you don’t want them all to be exactly alike you can easily make minor changes.”

Digital produced a commercial for General Motors’ Pontiac Fiero. “General Motors sent us blueprints and they sent the wrong blueprint for the fender,” she recalls. “They thought we’d have to build the whole car over from scratch but, with a new blueprint, we manipulated the basic data and had a new one in no time.”

About one third of The Last Starfighter combines live action and digital images. “That’s the future of filmmaking,” says McKenna. “We had to go on the set with the live actors so we could plot them properly.”

How did the actors feel working with props they could only imagine? “They considered it a real challenge,” McKenna says.

For The Last Starfighter, all images simulated by Digital Productions are hard images, like Gunstar, Mothership (the command ship of the bad guys), deckfighters (the bad guys’ fighter ships), and the starfighters flown by the good guys. A big challenge was a mammoth hangar for spacecraft. Lorimar built one side against which live action scenes were shot. Digital simulated the whole thing.

McKenna is excited about the fact that a new movie for which Digital Productions is in the preproduction phase involves images of soft objects like flowers. “We had to prove to the director that we could do soft images before we could get the contract,” she says. “That one will be innovative, too. We’re crossing the bridge from the hard, cold computer image. We have a whole group of software people working on soft, warm images. Every day, we’re writing software to simulate the work nature does so beautifully. The psychology of [creating] organic structure takes a lot of hard work.”

Technology vp Demos elaborates: “The frontiers against which we’re pushing are things like trees with their leaves waving in the breeze. This is difficult now. Hair and fur are difficult, though we have done people with rubber hair.”

Another frontier Digital is pushing is the creation of characters. “Characters, to be believed, have to have expression,” Demos observes. “We’re working on that right now with Henson Associates [Jim Henson of Muppets’ fame], and I believe it will be a major activity for us for the next few years. We’re in the middle of that right now and we’ve had some exciting results, but we’re not ready to release them.”

Digitizing the human figure is another problem Digital is working on. “We have encoded a head and face and we’re working on a way to give expression,” says Demos. “We’re researching this problem for a client but we’d do it even if there weren’t a client. We don’t cover any range of emotions yet, but it’s on the horizon. It’s very close.”

While at Information International, Demos and Whitney did create a digitized figure, a juggler they called Adam Powers (see “Behind the Scenes,” March 1982, p. 7).
Today, you have to live in two different worlds. One belonging to IBM. The other to everyone else.

With that in mind, companies have come along with a variety of products that attempt to link the two together. Along the way, they look like a little dumb. AVATAR Protocol Converter is the most intelligent way to bring personal computers, portable computers, or low-cost ASCII terminals into the IBM coaxial environment. For the first time, overburdened DP/MIS executives can look forward to truly smooth integration, minimal confusion, and fewer demands on their time. And users can get an affordable, easy-to-use way to tap the riches of their IBM mainframes.

So if you're looking for the best of both worlds, keep reading. And you'll see why the AVATAR PA1000 can out-think any product on the market.

First of all, the AVATAR PA1000 is an almost universal link. With no modification, it connects to virtually any personal or portable computer you have: IBM, Apple, DEC, TRS-80, Kaypro, COMPAQ, NCR, and others.

The AVATAR PA1000 also connects to the DEC VT100, IBM 3101, LSI ADM5, Televideo 910, ADDS Viewpoint or other compatible terminals.

The PA1000 connects coaxially to an IBM 3274/3276 cluster controller, so whatever personal computer or terminal you use will perform all the functions of an IBM 3278-2. The coaxial connection also means you won't be in for a future shock: ever-changing IBM protocols will be no problem.

---

**AVATAR PA1000 vs. IRMALINE™**

<table>
<thead>
<tr>
<th>Feature</th>
<th>AVATAR PA1000</th>
<th>IRMALINE™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to install</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Q/A Installation</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>English language commands</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Help screens</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Keyboard types</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Remote dial-in</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Security password</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Dual host access</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Local screen</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Printout</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>3278 status</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Line modes</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Price</td>
<td>$995</td>
<td>$1395</td>
</tr>
<tr>
<td>Availability</td>
<td>Immediate</td>
<td>(?)</td>
</tr>
</tbody>
</table>

Two hosts are better than one. So in addition to the coax connection to IBM, the...
AVATAR PA1000 gives you an extra RS232 port. That gives you access to other local or remote asynchronous host computers or local printers.

HELP! If you need it (and who doesn't) you have help screens to put you back on track. The PA1000 also has easy-to-use, English language commands.

With a few simple keystrokes, you can switch from your IBM to the extra RS232 port, giving you access to private data networks and public databases like Dow Jones.

And when you switch back, the AVATAR PA1000 is smart enough to remember your IBM screen.

In a distributed terminal network, remote dial-in from personal computers or asynchronous devices is increasingly important. You can dial into your PA1000 at the nearest cluster controller, and reduce communications costs dramatically in the process.

Just by typing "1-2-3" (how much simpler can you get?), the PA1000 automatically determines the baud rate of the attached device and is ready to go.

In just five minutes (no kidding) you can install the AVATAR PA1000. And you don't need to be a computer operator.

The AVATAR PA1000 even gives you a file transfer option that lets you transfer information back and forth between your personal computer and an IBM mainframe.

What will AVATAR think of next? The latest news is our PA1500, a link that lets you print the output from your IBM host on a low-cost ASCII printer. It supports high-speed dot-matrix, letter quality, and line printers. It's very simple to install. And it will save you a bundle.

To find out more about the AVATAR PA1000, our company, our distributors and dealers, or our plans, just call us.


AVATAR
The Link That Isn't Missing Anything.

Avatar Technologies Inc.
99 South Street, Hopkinton, MA 01748

© 1984 Avatar Technologies, Inc. IBM is a registered trademark of International Business Machines Corporation. IRMALINE is a trademark of Digital Communications Associates, Inc. Apple is a trademark of Apple Computer, Inc. DEC is a registered trademark of Digital Equipment Corporation.
IN FOCUS

36). Adam Powers was Whitney's idea, Demos recalls. "There was a guy at IIT who could juggle and we had a lot of data available from work done on two other films. So we only had to manipulate these files to produce a film, with a camera on a crane, of the person juggling. The essential effort was then to rotscope each frame. We wrote the code to render the frames, and each of the shots had to be done by hand. The body construction and motion hierarchy were the most difficult efforts. The limbs had to be elastic and move, but we had to work with fixed cylinders or balls of constant size. There were other difficulties such as the need to describe the movement of the legs but these were filled in at times by approximation. This spare time work took about two years."

The Adam Powers film used from 25,000 to 30,000 polygons. Demos believes they've come a long way since then. "We have better tools now, lots better." Texture, "where details of the texture cast shadows on each other," is another frontier Demos is pushing. "If grass waves in the breeze, the shadows have to move. You have similar problems with sand on a beach or a pile of straw where shadows are definitive," he says. "We're working on ideas to solve the problem efficiently but we're not there yet, even inefficiently."

Another problem, he says, is how to improve the algorithm for tracing rays of light and color. "This is a technique to make an image emanate ray light that is traced through the scene. This is slow, even on a supercomputer."

Demos believes "the least understood problem is how to simulate the effects of light on surfaces. Research has not dealt with the shape of light. In all the history of computer graphics, only point light sources have been considered. We need more full simulation of light, of distributed light sources. Depending on how much people want this, it could happen in a month or in 10 years."

Demos first became interested in computer graphics while an undergraduate at CalTech in the late 1960s. There, he was impressed by the films of John Whitney Sr. (see "From FORTRAN to Film." August 1982. p. 76) and met the son who is now his partner. The senior Whitney is considered by many to be the father of computer-generated art.

"When I first got out of school, I got into the field immediately," Demos recalls. First he went with Vector General as a consultant and later joined Evans & Suther-

land. In 1974 he formed a company called Picture Design Group, with Ivan Sutherland and John Whitney Jr., "to work on what we later did at Triple I. We worked at it for six to nine months but were unable to raise money." Thus the move to Information International, where he stayed for six years. "Leaving was a painful experience for me but they were not tuned into our thinking."

One thing both Whitney and Demos wanted at IIT was more computer power, something they certainly have with the Cray X-MP. Demos says it gives them the capability of cranking out two 90-minute features a year. "Look at Disney. They have been producing on the average of one film every two years." The X-MP handles 320 million instructions per second or 160 million floating point calculations.

Whitney wants more. "The visual problem is computer-bound. We can use every available processing cycle we have, then we're dead up against it. If we continue to follow the plan laid out for the company, we'll have to acquire 100-fold more computing power than we have. I think we'll have an improvement factor of 20 in cost performance in the next five years. We're actively trying to find ways to make that happen."

Demos thinks more computer power would help push some of his frontiers, "possibly the character problem." He sees the main issue though as "people power, good scientific research and thinking. It's like wine, where there's always a market for a small amount of quality product. But, if you decide to produce in mass quantity, you may well suffer in a poor market. We know that cable and tv markets are hungry for programming, but we need to produce quality material for them. If we can, then who knows the amount of power that will be needed."

Both Demos and McKenna would like to see Digital's work move out of the restricted arena of space films. "People tend to think that all a computer can do. We've got to take off their blinders."

Traditional film production, she says, is "becoming more and more expensive and you know what you're locked into. The cost of computers is coming down and down and our software capabilities are growing. We're not locked into anything. This has a lot to do with the brilliance of our software people and, of course, with Gary Demos and John Whitney Jr. Without them it's a road we could not have traveled."

"Our software is never finished," says Whitney. "Our software team was our first big group and it always will be one of the biggest." Of 60 employees today, Digital has a software team of 12.

McKenna is a strong believer in marrying art and software and she thinks this has been done at Digital. "When I first came here a year ago, there was a vocabulary problem. We had to create a vocabulary to allow filmmakers to talk to the software people and the technical directors. When we say we want the spaceship to move from here to there and we want it two stops brighter, we can't have a software person saying he or she doesn't know what an f-stop is. We had to teach them the language of filmmaking.

"We have encoded a head and face and we're working on a way to give expression. We don't cover any range of emotions yet, but it's close."

"We're not scientists. We're not likely to go to them [the software people] and say one and one makes two. We're more likely to say one and one makes three and make it happen. We're out from under the constraints of the last 50 years of filmmaking."

Digital scene simulation, says Demos, "gives us the ability to create pictures of objects that are now physically impossible to see." He talks of things moving through themselves. "Gravity is optional. All the laws of physics in a simulated world are optional."

Digital is doing some work for the upcoming 2010, the sequel to the landmark 2001: A Space Odyssey, in which the planet Jupiter is simulated. "We've created gaseous motor clouds on the surface, which we can move at any rate. We control the movement of these clouds. No one has ever seen these."

A Demos goal is for digital simulation to one day carry a story line and to be used to create an entire motion picture. "We're close to that, no more than a year or so away."

This would make McKenna happy. "To be able to control the costs as well as the images—as a producer, nothing would thrill me more."

One of McKenna's toughest tasks at Digital has been delivering the message. She travels all over the world talking to filmmakers and advertising agencies who could use simulation effectively in commercials. "It's a real educational process. We've got to open up minds and make them understand that we can build sets, backgrounds, and environments that either cannot be done another way or would be prohibitively expensive. The hardest thing is making people believe what I say to them."

"I once showed a digitally simulated scene to a group, explaining before that everything in it had been digitally simulated and my first question from those who saw it was, 'What part was computer-generated?' I guess I'll have to show them how we do it."

"IN FOCUS"
THE BIG THREE IN BUSINESS SOFTWARE. BEFORE YOU BUY, SEE HOW THEY RUN.

Run their general ledger. Their payroll/personnel. Their entire product line of financial and human resources software. Run the packages on your mainframe and link them to your PC's. Run them together and see if they work together.

We believe you'll discover that two of the big three offer the mere appearance of integration, while one offers the real thing. Millennium. A true family of systems in which the whole works as smoothly as any part. In which every package has the same query mechanism, the same report writers, the same screen generation, the same on-line documentation, security and real-time capabilities. Giving you more efficiency than ever before from all your data processing resources.

Of the big three in software, who's blind to integration and who's not? When you see how they run, you'll know the answer.

WHEN YOU THINK ABOUT TOMORROW, MILLENNIUM MAKES SENSE TODAY.

McCormack & Dodge

a company of

The Dun & Bradstreet Corporation

McCormack & Dodge Corporation, 1225 Worcester Road, Natick, MA 01760
Sales and support offices throughout North and South America, Europe, Asia, Australia and Africa. 800-343-0325. Telex: 710-325-0329

CIRCLE 20 ON READER CARD
She probably wouldn't be able to go to far with that. Digital Productions is a company that carefully guards its secrets. Mystery shrouded its part in The Last Starfighter prior to the film's release. The company's headquarters is hard to find. It doesn't front on any street, reachable only by a driveway, and bears no identifying sign. It is guarded around the clock and a sign in the lobby greets visitors with the warning that they might be seeing jealously guarded secrets. It's a competitive issue. John Whitney and I have had bad experiences in the past."

Whitney believes Digital has a competitive edge well worth protecting. "If anyone else can make any scene that I can make, then I can do it faster and charge less."

Demos believes a key to all this is Digital's "generalistic" approach to digital simulation. "A flight simulator, for instance, is a special purpose computer. Many simulation people can do great work with special purpose computers but along with that comes inflexibility. At the other end of the spectrum is what we have with the general purpose computer. We have the ability to change what we do, to work through a scene."

Credited by many with being the underlying genius behind Digital Productions, Demos allows that "the code is basically my code, the image creation algorithm is my design. The underlying structure is mine but there have been all kinds of additions, nice things. I'm pleased with what some of our people have been able to do."

He would like, "at some point," to be able to license Digital Productions' software to other supercomputer users.

One project Digital has under way right now is a 3½-minute 35mm movie for the Expo '85 Hitachi pavilion in Osaka, Japan. Whitney and McKenna take particularly lar pride in this. Whitney because some of his father's work is incorporated in it and McKenna because it uses simulation of organic structure.

Demos believes what is being done at Digital is harnessing the power of the computer as an instrument for human creativity and interaction. "Computers as they are today can be converted for much more natural kinds of communication and one of the steps in doing that is to have them create imagery in a form that we can understand so that it will mean something to us. A lot of large computers, like the Cray, are being used to figure out gas flow, airfoil design, and other structural things. "There is something physical involved but they still are coming out with just numbers or plots. If the computer came out with a picture of what you were interested in seeing, however, that would be much more natural. It would be like communicating with a scientist who also could paint you a picture."

Whitney believes their use of the Cray could popularize the supercomputer. "It could make it the dp manager's computer. Entertainment is close to the heart of the American people. Anything that puts forth an entertainment experience becomes attractive. As the computer moves more into entertainment, it has greater impact on all aspects of our lives."

Computer makers, count your screen credits!
A few graphic words from our InterTest users:

"Testing without InterTest is like climbing a mountain without a rope."

Arthur R. Connal,
Technical Services,
The Home Insurance Co.

"Makes CICS debugging a breeze."

Neil A. Wells,
Manager Systems & Programming,
Top Value Enterprises.

"It provides an invaluable diagnostic capability."

Alan F. James,
Systems Analyst/Systems,
First Security Bank Of Utah.

"Best tool on market to help CICS program development."

Joseph C. Chen,
Senior Project Leader,
Briggs-Weaver.

"Unmatched for finding a needle in a haystack."

Charles C. Allan,
Manager, Computer Operations,
Carborundum Co.

"Greatly speeded the debugging process up."

Robert W. Belden,
Technical Support Programmer,
R.I. Hospital Trust National Bank.

A survey was recently sent to the users of InterTest software, the industry standard for CICS testing and debugging. As you can see, the comments speak for themselves.

Call today for more information or a copy of the survey results controlled, compiled and tabulated by one of the nation's leading public accounting firms. InterTest works hard for its 1,400 users. And On-Line Software International can prove it.

InterTest from

ON-LINE SOFTWARE INTERNATIONAL

Two Executive Drive, Fort Lee, NJ 07024, (201) 592-0009 Toll Free (800) 526-0272

CIRCLE 22 ON READER CARD
PRESENTING THE NCR TOWER.

This year, a lot of businesses will go out and buy personal computers only to discover thousands of dollars later that they need something more to handle their problems.

Something more powerful. More expandable. More economical. That something is the NCR Tower.

WHEN PERSONAL COMPUTERS AREN'T POWERFUL ENOUGH.

Compare the Tower with a personal computer like the IBM XT and you'll find there's no comparison.

The Tower processes information at twice the speed. It comes with over four times the storage capacity. It can stand alone or as part of a large distributed data processing network. It runs all the different types of software that personal computers do. And a whole lot more. They can help you control inventory better. Run a data processing department better. Even manage a nationwide network of hospitals or auto parts stores better.

In short, whether you run a small business, a department of a large business or a nationwide network of businesses, the Tower will help you do business better.

WHY does the Tower perform so well? Because it's built so well.

It is powered by the Motorola 68000, one of the most powerful 16-bit microprocessors around. It comes with other guarantees of high performance like a Winchester hard disk and the Intel Multibus. And it offers you a choice of two operating systems—RM/COS and UNIX. So it's simple enough for vice-presidents (just plug it in and go) or sophisticated enough for techies (you can do your own thing).

WHEN PERSONAL COMPUTERS AREN'T EXPANDABLE ENOUGH.

Any small business computer will grow at a rate that matches your growth. The question is, how far?

The Tower's storage capacity expand.
rom 40 million characters to 214 million. Translated, that means it will hold anywhere from 13,000 to 71,000 pages of text (it's not \text{for} short story writers) or from 260,000 to 1,420,000 names and addresses (you'd \text{better} have plenty of friends).

Even more important, up to twelve \text{people} can work on the Tower at once with \text{additional} work stations. On different projects. Or the same project.

\textbf{WHEN PERSONAL COMPUTERS AREN'T ECONOMICAL ENOUGH.}

Of course, you may save money in the short run by investing in a personal computer. But it can't do everything you want it to, it could easily cost you in the long run.

What's more, the Tower becomes more economical as you add more work stations. With eight work stations, for example, it ranges from $25,000 to $36,000. Eight IBM XT's, on the other hand, will cost you $45,000. Networking them all together would set you back even more. And you still wouldn't have anywhere near the power of the Tower.

Quite simply, the Tower gives you something no single personal computer or group of personal computers can: enough power, expandability and economy to handle your business problems. Put another way, the Tower is a computer you can grow into, not out of. No other machine on the market offers everything it does at the price it does.

And finally, it comes to you from NCR. A company committed to applying innovative computer technology to today's business problems. And one which offers its customers support and service from 1,200 offices throughout 120 countries.

For more information, dial us toll-free at 1-800-CALL NCR.

\textbf{INNOVATIVE COMPUTER TECHNOLOGY. YOU CAN EXPECT IT FROM NCR.}
Patching Up PCS

Mainframe service suppliers and new firms are jumping into the fight to maintain corporate America's pcs.

by Jan Johnson

It may not look like much of a problem now, the 50 or so nine-month-old personal computers sitting on corporate desktops, performing flawlessly—but wait a while. Wait until 500 or more of those little boxes are installed and users become dependent on them in their everyday routine. What happens, then, when things go down?

For the most part, pcs are still perceived as "hearty beasts that seldom break" and service contracts are a way for "vendors to make a bundle without doing much." Don't kid yourself, warn industry researchers. The nature of the beast is changing. As their numbers climb and as multitasking, micro-to-mainframe connections and easy-to-use software become realities, micros are becoming crucial to office productivity.

"People willingly indicate service and support will become more important in the future," observes Dick Munn, managing director of the Ledgeway Group, a market research and consulting firm in Lexington, Mass.

Most have just entered the early awareness stage. "They don't know what they want," finds Joseph Cleary, manager of Xerox's service business. The first step is education; see what's out there and what is being offered, Cleary says.

Among the better informed are the big boys. Some banks and insurance companies, already facing a battalion of desktops, are toying with handling service themselves. "The larger the installed base of pcs, the greater the tendency toward in-house maintenance," reports Steve Thurston, a principal with Ledgeway Group.

Taking control may sound great, but consider the management headaches and the budget consequences. Even companies that standardize on two cpu brands face an unruly ocean of peripherals from many vendors. IBM's pcs can support several types of monitor—black and white or color, graphics or text—and many brands of printers, plotters, and modems, depending on the application. And don't forget those little slots in the backplane. There are add-in boards to meet most every whim.

Now the tough questions: How much of what does one stock where? Logistics is always a problem for a company spread across many cities, states, or even countries. How many technical people should be hired? What about the cost of training, diagnostic tools, and documentation for all the parts and components?

That's just the hardware. Without also considering software, how can the service person figure out why Jean in sales can't get her Epson to print? "If you take on hardware and not software you are not addressing the heart of the problem," says Walter Smith, president of Prognostics, a Palo Alto, Calif., market research firm.

It's one thing to do swap-outs and send the broken parts away to be fixed or replaced. "Then you only have to worry about managing a buffer inventory," says Darryl Olson, marketing manager for microcomputer services at Control Data Corp.

"It's another thing to get into the repair business, into the big investment in parts, training, test beds, and people.

"Users should look very hard at the question, 'Can we succeed as a service company?' It takes focused attention to really do it right," Olson warns. CDC has been in the third-party maintenance business for 14 years, servicing IBM mainframes. It added Digital Equipment products to its list about six years ago. More recently, CDC pulled IBM's Personal Computer products under its service umbrella.

If the in-house service route looks rough, what about buying service directly from the pc vendor?

by Steve Thurston

If the in-house service route looks rough, what about buying service directly from the pc vendor? That road is pocked with potholes as well. Most corporate environments are not single-vendor—they are a mixed variety of cpus, printers, monitors, modems, and add-in expansion boards. Most major vendors—IBM and Hewlett-Packard to name two—are not interested in servicing the other vendors' peripherals. That creates a problem for dp managers who aren't interested in dealing with multiple service vendors.

Don't despair. Third-party service companies are falling over each other to fill that gap. TRW, RCA, General Electric, MAI's Sorbus division, and Control Data, old service hands in the mainframe maintenance business, have targeted personal computers as the next big boom.

Easier said than done. Entry into the pc service business has required the vendor to rethink and restructure the way service is delivered.
MAI/Sorbus, in Frazer, Pa., for instance, has added a new distribution channel and a dealer and reseller program, to its traditional business of working with device manufacturers and major accounts. "Those dealers that don't want to get involved with service can turn their customers over to us," explains Mark Schulz, national program manager of Sorbus's micro products program. "Or we can be transparent. The customer deals with the dealer and the dealer turns the equipment over to us for servicing."

Sorbus claims to have 165 field offices, 16 computer repair centers, and 1,900 inventory locations. Although Schulz says it's too early to have numbers on the pc business—"It's truly in an embryonic stage," he says—he has noticed a trend toward on-site service.

Traditionally, on-site maintenance has been expensive. Typically, the cost of an on-site contract runs about 15% to 17% of the purchase price of the hardware per year, says Ledgeway's Thurston. For the cost conscious there are ways, such as depot service, to slash as much as 40% off the on-site price. Thurston has found that carry-in contracts often run 10% to 12% of the hardware purchase price per year. Other types of depot service include pickup and delivery provided by the service company, and mail-in service.

Volume discounts are available for both depot and on-site service, depending on the total number of pcs to be covered and where those pcs are located. The fewer the pcs and the farther apart they are, the higher the cost of the contract.

In contrast to Sorbus, Control Data's approach starts with a telephone call. The customer calls a CDC toll-free number with a problem. Working over the phone, CDC technical people try to identify the problem and determine what parts need to be replaced or repaired. Depending on the type of service contract, a CDC service person makes an on-site repair call or the customer swaps out the faulty item, and parts are relayed through a courier or the mail. CDC doesn't offer carry-in service, says Olson. "The sector we are going after doesn't want it."

Prognostics' Smith concurs: "Corporate users, on average, are not interested in anything other than on-site maintenance." That's no surprise, since on-site service offers the speediest remedy.

The goal at CDC is to have a service person on-site within four hours of hanging up the phone. Depot methods, courier delivery, and mail-in can each take 24 hours or longer. Again, the trade-off is higher costs for quicker turnaround.

Sensitive to the price issue, Control Data has come up with a wide variety of pricing schemes. Customers can opt for noncontract or contract service. Noncontract work is charged on a per-incident basis or on a time-and-materials basis. Within those structures there are price breaks based on mode of delivery: on-site, courier, or mail-in.

Contract customers also have two choices: fixed fee or flexible fee service. Flexible fee is the most creative, offering a hybrid pricing scheme. "First you pay a low annual fee, approximately one third the cost of a fixed fee option," explains Olson. "Then you pay only if and when you need us, on a per-incident basis."

Flexible fee customers are treated just like fixed fee customers," Olson says, "plus they get a discount on the incident charge because they are on contract. The upper end for a customer is that they will never pay more than 25% over what they would have paid had they signed up for fixed fee service."

Fixed fee is more traditional. A customer agrees to a certain price, which covers a certain period of time and certain predefined items. "We work up the price based on our judgment of the failure rates and the cost of the equipment to replace or
**NEWS IN PERSPECTIVE**

repair. We don’t have a set percentage or list purchase price we work from. Every configuration is different,” explains Olson.

Clever pricing schemes and reputation aside, the old hands don’t have the pc business wrapped up. Several new names have sprung to life, most notably Service-land and Xerox’s Americare.

While Serviceland may be a newcomer to the business, its founder, George Harmon, is not. Considered by many to be the father of third-party mainframe maintenance, Harmon formed his first company, Comma Corp., more than 15 years ago. It was later sold to Control Data and became the basis of CDC’s IBM service business. Prior to forming Comma, Harmon headed up field engineering at IBM.

His latest venture, Serviceland, headquartered in Westlake, Calif., was formed in late 1982. The first store opened May 1983. Since then, two additional stores in California and one in Texas have opened. Targeting both on-site and carry-in service, Serviceland generally charges 15% to 20% below comparable service from IBM.

An on-site contract for an IBM PC with 64KB of memory, a keyboard, monochrome display, and printer sells for about $230 per year. Those willing to carry in their computer would pay about $150 per year.

Acknowledging that bigger companies already are moving into the pc service business, Frank Salowitz, a management consultant in Northridge, Calif., gives Serviceland “at least five to 10 years to grow.” Serviceland is a client of Salowitz. Eventually, Salowitz suspects, “throw-away” designs and parts might take their toll on service. “With parts getting cheaper and labor going up, it may make good sense to build in redundancy or throw a keyboard or disk drive out rather than to fix it.”

Formed about the same time as Serviceland was Xerox’s Americare unit. Today, Americare claims to have 91 service centers nationwide specializing in microcomputer service. Xerox’s Cleary believes the decision to specialize in personal computers gives Americare an edge over the traditional third-party vendors. “Sorbus, RCA, and TRW are upstream, servicing mainframes and minis as well. Since we had not been in the third-party service market, we were able to specialize, focus on an area. Others will have to divert resources away from something else.”

Americare was one of the first, ahead of Sorbus, to announce a dealer-oriented program. Americare provides participating dealers with training, advertising assistance, and incentive programs. In return, Xerox expects its dealers to generate at least $1,000 worth of business per month. “If they sell three service contracts and put through one-time-and-materials service transaction,” that should cover the requirement, Cleary says.

By affiliating with Americare, dealers are better equipped to bid for major national account business. In the past, dealers couldn’t compete. They couldn’t offer nationwide service and support. “Now ABC dealerships can offer service in Chicago and Des Moines via an arrangement with a local Americare affiliate,” says Cleary.

Americare’s contract options include on-site repairs, responding by the “next day,” and a depot service, either carry-in or pickup and delivery. Turnaround on depot service is 48 hours. Currently, Americare supports the IBM PC and XT and CompuPro cpus; printers and plotters from Diablo, Okidata, and Epson; and several add-in boards and disk drives. Americare does not cover Apple, but is said to be negotiating with Kaypro, and is in “discussions” with Compaq.

About 3,000 dealers have “inquired about” Americare since its grand opening, says Cleary. “We are now in the process of culling those 3,000 to find out how many have been active.” Cleary says he’d be happy with 1,500 “active” dealers.

That’s phase one, the dealer program. In May, Americare launched its major accounts program. “Our effort there is to go in and try to understand the needs of the dp managers and tailor a service to meet those needs,” explains Cleary. “We are not trying to seek fixed packages. Our pricing will depend on such things as the number of systems and their locations.”

Although Xerox insists its major accounts program is a “separate program for those not serviced directly by dealers,” it remains to be seen if dealers will perceive it as a noncompetitive move and continue to support Americare.

That’s the lineup of current major players and their offerings. Before choosing that route, or choosing among the vendors along any route, dp managers should take stock of their corporate crop of cpu types, printers, and especially third-party add-in boards. Make a list of the items, and compare it to the product lines supported by each service vendor.

Service companies vary significantly in the range of products they support, the type of service they offer, and their pricing options. The trick is to find the best match at a livable price. Almost all vendors support the IBM PC family. After that they wander off everywhere.

The pure third-party service companies tend to offer the broadest product choice. Sorbus, for instance, claims to service all the IBM pc offerings, including the XT/370, plus Kaypro, North Star, and the Apple II Plus. Serviceland claims to cover a variety of lines within IBM, Apple, Radio Shack, and Convergent Technologies.

Notably missing from the vendors’ support list is Compaq. Although Sorbus and Xerox’s Americare group currently do postwarranty service on Compaq machines, Compaq will not sell parts at a discount, nor does it authorize third-party vendors to do warranty service.

According to H.L. “Sparky” Sparks, Compaq’s vice president of sales and service, Compaq is reconsidering that position. “There are some large account situations that probably could do better with a third-party service like Americare,” Sparks admits.

What he is trying to avoid, he says, is a dealer who farms out all service. He worries that if a Compaq dealer is relieved of warranty service responsibility, “it might not put in postwarranty service. Then where does that leave the person who walks in and buys one or two Compas? I’m trying to protect all my end users.”

It’s odd that with so many players in the market and such a broad base of service options available there is a “marked absence of any major accounts signing with a third-party service vendor,” muses industry consultant Salowitz. That will change by the end of the year, predict several vendors.

**DATA NETWORKS**

**BRITISH VAN PLAN**

The United Kingdom finds itself the target of much U.S.-inspired telecommunications activity.

by John Lamb and Paul Tate

U.S. Vendors led by IBM and AT&T are embarked on a grand European Tour, staking their claims to the Continent’s developing telecommunications markets. In deals covering everything from data transmission components to network information services, the two American giants are sealing alliances with Europeans that can be used to set up rival trade routes across the Atlantic.

The activity is frenzied. IBM has already teamed up with the German Bundespost for the development of a national videotex system, and it is now talking hard
Has the only migration software that converts your applications from VSAM to a relational data base management system. Overnight.

We've taken state of the art to a new state: Easy and available. Before you make a software decision mail in the coupon below. Or call in N.J. (201) 874-9000 or toll free 1-800-ADR-WARE.
We wrote the book on portability.
In nine different languages.

<table>
<thead>
<tr>
<th></th>
<th>8080/8085/280</th>
<th>8086/8086/8086</th>
<th>Concurrent CPM†</th>
<th>IBM PC/DS</th>
<th>8086/8088</th>
<th>MS/PC-DOS</th>
<th>MC-68000</th>
<th>CPM-88</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORTRAN-77</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBASIC Compiler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pascal/MT+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level II COBOL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL/I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assembler Plus Tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>microSPF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBOL Animator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal BASIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Logo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To every software developer who'd written off portability as an impossible dream, Digital Research humbly announces a few monumental breakthroughs.

We not only offer languages that are portable from 8 to 16 to the 32-bit chips of the future, they're portable across all popular operating systems, too. What's more, we supply the broadest range of quality languages and development tools available today. And will tomorrow.

So rest assured. Whether you design applications at a major corporation, plan to become a major corporation or just qualify as a hobbyist, you only have to write it once.

Simply pick the Digital Research language that's right for you. From Personal BASIC™ to Digital Research FORTRAN-77™. The newest member of our remarkable family.

To complement languages, we offer a complete workshop of development tools. Our Display Manager™ and Access Manager™ simplify the design of screen displays and data bases. So you spend less time and effort.

If you write in COBOL, our Animator™ source level debugger will get your software running in record time.

And for programmers skilled with IBM mainframe SPF, we offer micro/SPF™. An editor that helps turn your invaluable experience into valuable new software applications.

At Digital Research, we work as hard for you after the sale as we do to get the sale. With backup like quality documentation, software updates and a phone line to our technical support team.

With so much productivity and service to draw on, it's small wonder IBM chose our languages for its IBM® PC, XT and the new IBM 3270/PC.

For more information, or the name of the Digital Research retailer nearest you, call 800-227-1617, ext. 400. In California, 800-772-3545, ext. 400. Or call your IBM representative directly.
NEWS IN PERSPECTIVE

with the French telephone authority about a computerized directory system. IBM also hopes for a deal with Italy's Italtel covering telecommunication switches—a worrying prospect for AT&T's prime European ally, the Italian local hero, Olivetti.

Nevertheless, AT&T is well positioned elsewhere. After a disastrous attempt to establish itself with Irish company Telectron, its joint venture to build switching systems with Philips in the Netherlands is beginning to offer products. Now AT&T is seeking to form a joint semiconductor manufacturing company for with Spain's Telefonica. AT&T, a one-time suitor, has also become a major customer of the British semiconductor maker, Inmos.

A prime battlefield for this U.S. thrust into European data markets is Britain, where the local telephone authority, British Telecom, is learning what it is like to live with a liberalized market. That is where AT&T's latest cooperative link, with International Computers Ltd (ICL), is in no doubt that this is an important slice of this pie, and a decision on the technology.

ICL already runs several videotex systems, including one that connects tour operators with travel agencies. More recently, the company won a major contract with the Article Numbering Association (ANA), the organization responsible for bar-coding retail products in Britain, to provide a network for the exchange of invoices and orders between retailers and their suppliers. Called Tradanet, the network will link some 2,000 ANA members and is due to begin operations on the new ICL net at the end of 1985. At peak Monday morning periods Tradanet is handling some 1.4 billion transactions.

"We have a flourishing private viewdata business that has trebled over the past two years," says Miles Flint, marketing manager of ICL's network services division. "There is a tremendous interest here in VANs of all kinds." Flint predicts that the U.K. van market alone will be worth between $850 million and $1.1 billion by the end of the decade, with major growth beginning around 1986.

ICL's network will cover five major cities from six nodes using packet switching technology. In addition to the X.25 system operating over 64Kbps lines, ICL will be setting up local clusters of protocol convert-

ers (30 to 35 units, initially), which will feed IBM 2780 and 3780, SDLC, and ICL's own CO3 data streams into the X.25 backbone at a speed of 9.6Kbps. Work on the first three nodes and the Net/1000 gateway should be complete within four months. By the time the network is complete, 85% of the U.K. population should be able to reach it with a local call.

Apart from the retail system, ICL intends to run its own internal applications on the VAN net and is also developing four or five new services, half of which are aimed at multinational corporations.

The reasons behind the sudden upsurge of interest in European VANs are partly technical, stemming from the convergence of dp and telecoms; partly political, having to do with the trend toward deregulation of European PTTS like British Telecom; and partly economic. "A lot of companies are interested in VANs because they have now got cost savings on their internal dp sorted out and they want to apply the same savings to their external trading relations," says Flint.

Britain is up with Europe's best in exploiting network services. The first U.K. VAN, a public videotex service called Prestel, now has over 40,000 subscribers and is being tested as a vehicle for financial and retail services. A home banking service has been running on the system for some time and residents of the Birmingham area can place orders for groceries and other items via Prestel. British Telecom, which runs Prestel, also operates a national electronic mailbox service based on the U.S. Comet system (designed and sold by Computer Corp. of America, Cambridge, Mass.), a security alarm service for homeowners in the southeast of England, and a public packet-switched service.

But these systems are only the first tentative steps in the VAN world. Britain's major banks, known as the clearing banks, are planning a direct-debit-at-the-point-of-sale system that would enable retailers to receive money from their customers directly through electronic funds transfer. That is where IBM steps in. Both British Telecom and IBM are among those negotiating for a slice of this pie, and a decision on the technical and financial details is expected shortly. Satellite Business Systems (SBS), in which IBM has a stake along with Comsat and Aetna Life, has also linked up with British Telecom with the idea of providing satellite links across the Atlantic. In addition, Big Blue has been approached by an independent operator to set up another VAN for travel agents, although a spokesperson for IBM says the firm has yet to make a full commitment.

The involvement of both IBM and AT&T in British VAN developments raises the question of whether SNA or the OSI standards will be chosen as the network architecture norm for European VANs. Bob Holder, AT&T International's U.K. managing director, is in no doubt that this is an important issue for his company. "The real story behind the agreement with ICL is that there are going to be more VAN nets based on the OSI model," he says. ICL as a member of the European Computer Manufacturers' Association has committed to OSI standards for some years, and the net it plans with AT&T will embrace the Tradacom's file transfer standards (developed for Tra-

The reasons behind the sudden upsurge in European VANs are technical, political, and economic.

Datanet). Holder believes that once each European country has one or more VANs based on OSI standards in place, they will be open to providing European-wide VAN services, although the PTTS have yet to sanction any such move. "If the OSI model is embraced," he says, "the remaining technical decisions become regulatory and political rather than technical."

As far as American firms are concerned, the political aspects of operating in Europe's VAN market could still prove a bugbear. In Britain, the Department of Trade and Industry took over the job of issuing VAN licenses in 1982. Up to that time, British Telecom had a monopoly over such services, although it had done little to actually provide them. The 1981 telecommunications act, however, paved the way for deregulation in U.K. telecoms and was followed the next year by an announcement that the Industry department would issue very low cost licenses for "applicable systems." Exactly what that means, however, is tricky.

To begin with, electronic mail systems that connect subscribers directly to one another are out because the British Post Office has a monopoly on mail, electronic or otherwise. Mailbox systems are allowed, provided they are used for communications within organizations. General Electric Information Services (Geisco), for example, has a special license to operate an international service called QuickComm.

The definition of a VAN can vary a great deal, what constitutes a VAN is a gray area," admits John Taylor, Geisco's director of client services. "We are a solution provider, not a VAN company, and at present, so far as Britain is concerned, we are watching what
It expects...
ITT PRESENTS SYSTEM 3100:
THE COMMUNICATIONS SYSTEM THAT TAKES
THE SHAPE OF YOUR BUSINESS.

With many business communications systems, your needs are often compromised. That's because you're forced to work with built-in capabilities and features that have no relevance to your situation.

The ITT System 3100 takes an entirely different approach.

Initially, System 3100 is non-dedicated. In other words, it's totally open to your demands. From there, we help you shape your system to meet the specific needs of each department. And each user.

Should those needs ever change, System 3100 can change, too—easily and inexpensively.

Freedom of choice.
We offer you a most extensive list of advanced features and options to choose from. Like privacy, on-hook dialing, conferencing, call forwarding, call detail recording, least cost routing, executive override, non-blocking intercom, and remote programming and diagnostics, to name a few.

There's also what we call flexible port assignment. This allows you to decide how a communications channel will function—either as an outside phone line or a telephone. In System 3100, you have full control of up to 288 ports.
An unprecedented degree of versatility.
The bottom line is that System 3100 offers more possibilities and more choices than any other system in its class.
For example, you can mix electronic multi-button phones with less costly single-line sets. And both will give you easy access to your system's capabilities.
Multi-button phones can be programmed for one-button access to any outside line, telephone, or feature. Single-line phones will connect you with many system features simply by dialing a code.
Either way, your employees will find System 3100 easy to use. Even if they're non-technical.
You'll find it cost-effective and highly productive.

Shapes of things to come.
Because System 3100 is built of leading edge technology, it is future safe. So not only will it continue to handle a wide range of telephone traffic, it will also provide advanced data capabilities. And since it's designed to support simultaneous voice and data communications, or data-only communications, System 3100 can be your link to the office of the future.

One more thing. System 3100 is made by North American craftsmen and has the ITT world of experience behind it. So you know there won't be any hang-ups when it comes to quality and service.
The ITT System 3100. It's the complete digital communications system that takes the shape of your business today. While being compatible with shapes of things to come.

SYSTEM 3100
AN ITT TELECOMMUNICATION TO VERSATILITY

For more information, please call this toll-free number:
1-800-742-1240
Or write: ITT Telecom, 3100 Highwoods Blvd., Dept. D4-1, Raleigh, North Carolina 27604
In Canada, call: 1-519-821-2000

ITT Telecom
CIRCLE 27 ON READER CARD
NEWS IN PERSPECTIVE

The center had spent 46
according to Taylor, Geisco needs no license
the company is doing some processing,
IBM'S IN

The role of the PTT, British Tele­
com, in all of this is also unclear. The
orporation is consulted by the Department of
Trade and Industry before a license is is­sued, although both parties claim the PTT
has no power of veto over any particular
service. British Telecom, however, owns
the very data transmission lines anyone run­
ing a VAN would have to use. Geisco’s
Taylor, for one, sees the question of owner­
ship as a major stumbling block to provid­ing
third-party, transatlantic VANS.

“We have a VAN in the U.S. [Mark­net], but we wouldn’t be able to link it with
a similar one in Britain unless we could find
someone to carry it across,” he says.

“There are no agreements on this.” Even
AT&T has yet to receive international carrier
approval for its gateway between the ICL
network and Net/1000 in the U.S.

Whatever the obstacles posed by
political and vested interests, it is clear that
Europe wants VANS, and hardware, soft­
ware, and expertise will be bought from the
U.S. As U.K. junior industry minister John
Butcher said at the time British Telecom
lost its U.K. monopoly: "We now have the
charge to become the Western world’s lead­ing
entrepot traders in the growing and lu­
crative trade of information processing and
handling.”

IBM'S IN

THE RED

The industry leader’s remote
computing service now has
some new software up its
sleeve to help it attain
profitability.

by R. Emmett Carlyle

It is two years since IBM’s Information Net­
work (IN) entered the timesharing and data
service market, and it has yet to turn a
profit. Analysts estimate the unit has lost
hundreds of millions of dollars in startup
costs and think it has a long, hard road
ahead of it.

The Tampa, Fla., operation,
viewed by analysts of IBM as strategic to its
future growth in many lucrative informa­tion
and communication-related markets,
has been troubled by internal squabbles
over software that have hindered its market­ing
efforts. Moreover, some observers say,
the operation’s objectives have been poorly
defined, leading to IBM’s stumbling reentry
into the service bureau business after a de­
cade away from the game.

As sorted (see "Local Nets' Gen­
esis?" March 1982) the coast-to-coast bu­
reau entered the market with a collection of
"plain vanilla" services based largely on
old APL language products running under the
VM/CMCS operating system. Internal poli­
tics evidently held back the European-writen
Applications System VM/CMCS that had
generated so much revenue for IBM’s Euro­
pean Data Center (EDC) and which a 1979
IBM task group had recommended as the
model for a return the following year to the
remote computing services business in the
U.S.

Rather than follow the European
lead, IBM elected a fresh approach based on
developing a front-end applications system
for VM. This failed to materialize, however,
by the Information Network’s slated startup
date of October 1981, and the following
year the network began its life with a much
reduced service and no integrated applica­tions
for users.

It apparently became clear to Infor­
mation Network management in 1982 that
some form of AS would have to be offered
on the network in order for it to gain cus­
tomers in key business computing markets.
That, of course, meant an about-face for
those managers and technical advisors who
had voted against the European model, and
left them open to charges that they had
kissed millions of dollars in revenue good­
bye from 1980 into 1982.

“It also opened the door for a cho­
rus of ‘I told you so!’ in Armonk, where
there were warnings against returning to the
remote computer services business in any
form,” says one source.

Another unsavory aspect for the
pro-VMers was that they would have to re­
vert to an IBM software product that has
been dead-ended in the U.S. for years. That
product is Virtual Storage Personal Com­
puting (VSPC), the ugly duckling of the three
timesharing systems the company offers,
the others being MVS/TSO and VM/CMCS.

VSPC, however, was the only one at the time
that could handle AS.

In retrospect it seems ironic that in
IBM terminology VSPC is deemed
"functionally stabilized." That is, slated to
be neglected in favor of other software.

This essentially has been the product’s sta­
tus since 1981, although IBM didn’t declare
as much until 1983.

Further irony lies in the fact that
those IBMers who voted against the task

It seems ironic that in IBM
terminology VSPC has been
"functionally stabilized."
In the data protection game, the best offense is a good defense.

DEFENDER II.

It's Your Move.

In chess you make your move after careful consideration of the advantages and pitfalls. The same careful consideration should be given to using telephone lines to communicate with your computer. Preventing unauthorized phone access to the information in your computers is essential. Equally important is insuring adequate control of authorized "dial-in" users. We can help. The Defender II Computer Access System allows your organization to efficiently access its information systems through the telephone network, without the worry of unauthorized usage. The Defender II works with any computer and is expandable to fit your current and future needs. To find out more about the Defender II contact your nearest Digital Pathways sales representative.

DIGITAL PATHWAYS

Digital Pathways Inc.
1060 East Meadow Circle
Palo Alto, CA 94303

Headquarters:
TEL: (415) 493-5544
TWX: 910-379-5034

Eastern Regional Office:
(201) 836-3000

Southern California:
(714) 476-2612

Midwest Regional Office:
(312) 932-4848

Southern Regional Office:
(404) 998-6361

See Us At NCC '84
Booth #C3130

CIRCLE 29 ON READER CARD
NEWS IN PERSPECTIVE

Calif.: "We tried desperately hard to get VSPC/AS in-house, but gave up in the summer of 1982. We were told at that time that we'd have to get VSPC/AS from the bureau, and that VSPC would be running it.

But, according to William McCain, a VSPC consultant based in Palo Alto, Calif., IBM is being inconsistent in its policy of not allowing VSPC/AS to be used at customer sites. "I have it on good authority that IBM has made an exception with Sony Corp. in Japan, maybe because of the highly competitive nature of the Japanese market. There may be other cases," McCain says.

IBM declined comment.

IBM, which obviously doesn't want to support three timesharing operating systems, has made it clear that now that VSPC has been put on hold as far as future enhancements go, it expects customers worldwide to migrate to MVS/TSO. But there are already signs that powerful users in Europe—like the French-based service bureau CIST and Dutch giant Philips—may band together to push for greater long-term support of VSPC. The chances are less likely of this occurring in the U.S., says Richard Gravois, VSPC project manager at the IBM user group SHARE.

"But by the same token I don't expect everyone to move over obediently to TSO, either," Gravois says.

Charles Parish, VSPC project manager at sister user group GUIDE, says that quite a number of smaller users of VSPC might not move from it at all. "IBM has quietly let it be known that it expects to have to support VSPC for several more years," he confides.

When IBM announced its stabilization of VSPC, it said there would be one more release of the product, version 2.2. "It's basically to clean out the remaining bugs," says Lockheed's Millar, "because despite its beauty as an end-user system and its ease of use, it has been known to break more than a few times."

Sources say that a cadre of systems programmers from Europe are currently working at IBM's Santa Teresa, Calif., lab to complete the final version of VSPC. "They are mostly fixing bugs, but they are also improving the library system for improved service bureau use, which should keep the IN people happy," confides one.

Through the grafting of VSPC/AS to the heart of the Tampa complex, the IBM Information Network at least has a life-giving infusion, and has now entered a build-up phase. From its original two or three 303Xs, the complex is believed to have built up to some 10 cpus, including 308X upgrades. About half the cpus are devoted to VSPC/AS—three for customers and two for support, sources estimate. Between 500 and 600 people man the complex, with about 100 of them added last year. IBM declined comment on these estimates.

As far as can be determined, the IN will use VSPC for the indefinite future, or at least until it has a VM-based solution that delivers the same performance as VSPC. The first release of VM/AS was described by sources as significantly slower than VSPC/AS. A TSO version of AS is expected in the latter part of the year and will be offered for sale to customer sites.

There have been other changes, notably the departure of Jim Hewitt, the man who built up the IN and was vice president in charge of the operation. Hewitt was recently moved to IBM's Trintex videotex operation (a joint venture with CBS and Sears, Roebuck) to coordinate an eventual link with IN. He has been replaced by Syd Heaton, former director of information systems.

Sources expect a push by IN of

INTRODUCING BEROL® CASSETTE.

An exciting breakthrough in mechanical pencil technology.

The Berol Cassette Pencil is a breakthrough in mechanical pencil technology with its innovative, easy-loading cartridge design. Just take a long-lasting cartridge of 15 leads and slide it in like a ballpoint refill! It's clean and simple, and you never have to fool with one-at-a-time leads. With a click of the automatic push-button lead advance, you get a ready supply of lead to keep you writing. And to help reduce lead breakage, each Berol Cassette Pencil has a special shock-absorber cushioned point. The Berol Cassette... the most innovative mechanical pencil since mechanical pencils were invented!

Shock-absorber cushioned point reduces lead breakage.

Available in .5mm and .7mm lead diameters.

Automatic push-button lead advance.

Cassette cartridge holds 15 leads plus eraser.

Berol USA
Division of Berol Corporation
Danbury, Connecticut 06810

CIRCLE 30 ON READER CARD

July 1, 1984 49
You’ve invested a lot of money in multi-vendor office systems. Making it all work together requires just one thing.

Soft-Switch.


NEWS IN PERSPECTIVE

packaged training and other software through retailers such as Sears, which is involved in the Trintex project. Other former colleagues of Hewitt say he may have been the "necessary scapegoat" that this saga of political intrigue and lost opportunities has created. IBM wouldn’t elaborate on the Hewitt move, and Hewitt himself could not be reached for comment.

It’s easy, in retrospect, to say that the IN wouldn’t have gotten into such a mess if it had gone with the European model to begin with. EDC is tied neatly into SNA (as is VSPC), whereas there is no such fusion between VM and SNA. In the end, it probably was inevitable that the internal momentum from IBM’s technical divisions—an estimated 75% of whose products initially are developed under VM—would be reflected in the use of VM as IBM’s premier account control mechanism.

As Lockheed’s Millar points out, "Neither TSO nor VSPC has attracted the new software and applications to the same extent as VM/CMS" so perhaps even TSO eventually will fall victim to VM’s evolution. But for the present, it’s VSPC that’s on the block.

It seems clear that in the U.S., VSPC has reached the end of the line. Richard Gravois sighs that he’ll be presiding over the next SHARE/VSPC session as ‘‘funeral director.’’ VSPC certainly is dead; it just won’t lie down.

In a May "statement of direction," the company hinted that AS will eventually be modified to work with the popular MVS operating system, support the PC, and interface to relational databases managed by SQL/DS and DB2. Further details of these enhancements would be made available in the fourth quarter of 1984, the company said.

IBM watchers generally agree that IBM’s Information Network has not lived up to initial goals and that the operation has not been a model of IBM’s sleek management style. “The main problem with IN is that it’s trying to accommodate too many conflicting objectives at once,” says Ken Bosworth, president of International Resource Development, a Norwalk, Conn., market research firm.

"They figured erroneously that since they were building a large remote computer service vehicle, they might as well pit themselves against AT&T’s phantom Net/1000 and get into the timesharing business as well,” Bosworth says. He notes that many market forecasters have predicted a rosy picture for remote computing services, a picture he doesn’t agree with. "IBM may have been seduced by the prospect of easy pickings.”

The insurance network is one of IN’s bigger successes.

"IBM’s idea,” says Tim Tyler, a Palo Alto, Calif, consultant, “is to use such revenue to underwrite more ambitious plans to turn the Information Network into a vast network management vehicle sitting at the hub of big customer networks.” He sees IBM’s current project of building a value-added network for the insurance industry, the so-called Ivans network, as a trial run for bigger fish like the medical industry, which last year contributed 11% of the GNP.

The insurance network is one of the bigger successes for IN, which beat out AT&T on that firm’s own turf to win the multimillion dollar contract. The network is designed to connect insurance agent offices to the home offices of insurance underwriters. IBM designed the network to handle data streams from a relatively wide range of machines and has stated that the insurance net’s design is “generic” and thus applicable to many other industries.

IBM also says it has “several score customer processors and more than 7,000 terminals” attached to its network. Some “9,000 users are presently being serviced by the network,” the firm claims.

Observers see IN as the backbone of
many future offerings for the company, particularly in areas where datacom and processing are to be effectively combined. Ulric Weil, industry analyst at Morgan Stanley, New York, suggests that IBM is “rethinking” its’ positioning in the marketplace and has decided that the network cannot be “all things to all people.”

Rather than adopting an Ivan’s approach to the brokerage community, IBM has bypassed it to build a network with industry leader Merrill Lynch. It could pick off other industry leaders in the same way,” Weil says.

According to Al Berkley, an analyst at Alex. Brown in Baltimore, Md., pioneering new applications means more than just selling AS. “My impression is that IBM has brought little entrepreneurial verve to its new enterprise. It is turning its nose up at the small database companies that want to sell through IN in favor of soliciting only the large applications like Ivan’s. I know of numerous innovative startups that IBM has cold-shouldered. As a result the company hasn’t yet put up anything compelling for its customers to use.”

IBM may disagree, but it evidently has some work to do in polishing IN’S image as well as beefing up its network’s offerings.

ARTIFICIAL INTELLIGENCE

SOVIETS AIM FOR 5TH GEN

Not to be left out of the race for future computer systems, the Russians have begun their own advanced computing effort.

by Paul Walton and Paul Tate

At a Moscow trade fair in the fall, the Soviets will announce their third five-year plan for computing. Running to the end of 1989, it will involve a strong collaboration between the USSR and the other six East European partners in the Council for Economic Mutual Assistance (CEMA). Part of that plan will highlight fifth generation technologies.

Fifth generation computing, as defined by the Japanese when they began their own efforts under that title in 1981, is to employ so-called artificial intelligence techniques to make computers easier to use and able to mimic several characteristics of human intelligence. The hope is to make machines that can speak, understand verbal communications, make inferences, and generally deal with “knowledge” instead of raw alphanumeric data.

The Moscow Academy of Sciences, which will coordinate the Russian program, confirmed that it will cover five strategic areas: design and manufacture of VLSI microprocessors, development of parallel and multiprocessor architectures, design of operating systems to better support logic programming, creation of problem-solving software and development of expert systems and user-responsive applications.

These goals are similar, if less ambitious, to those set out by the U.S. Defense Department in its Strategic Computing Initiative, which aims to design futuristic computers for battlefield management and to provide guidance for “autonomous” weaponry (“DARPA’S Big Push in AI,” Feb., p. 48).

According to the Moscow Academy, the Russian plan will be backed by an initial $100 million of state funds, and a spokesman stressed it was very much a “civilian, not a military, initiative.” What is more, one official explained, the academy

Experience in conversions is generally the most important factor in success or failure when changing computers or languages.

CAP GEMINI DASD has been in the conversion business continuously since 1974. As a client, you enjoy over 10 years of constantly improved technology in methods, translators, and other conversion tools to help you avoid the many pitfalls present in any conversion process.

We structure the plans and techniques to secure the fast, high-risk environment of moving all of a company’s applications at one time.

PEOPLE/PRODUCTS/RESULTS

For instant information call 800-358-5148; in Wisconsin, (414) 355-3405 or your local CAP GEMINI DASD branch.

Atlanta  Denver  Jacksonville  Milwaukee  Orlando  Seattle
Baltimore  Edison, N.J.  Los Angeles  Minneapolis  Philadelphia  St. Louis
Chicago  Houston  Miami  New York  Portland  Tampa
Dallas  Indianapolis  San Francisco  Washington, D.C.

CIRCLE 33 ON READER CARD

JULY 1, 1984 53
Memorex announces Freedom of Choice in the 3270 world.
Have your choices in 3270 systems been too costly, too piecemeal or too uncertain?

Now, you can break away from the crowd. Because Memorex® now offers a complete cluster of plug-compatible 3270 peripherals. So you're free to mix and match them with your IBM equipment. Or add new products as they are introduced.

The Memorex cluster features:

Controllers that support from 8 to 32 remote users, and speak SNA/SDLC or BSC. Terminals with low-profile keyboards, tilting screens and easy-to-read CRTs in green phosphor, amber or seven-color. A PC Attach that supports MS-DOS™ 2.0 software, to make your “dumb” terminals smart.

A two-in-one printer that allows you to print high speed dot-matrix and, with the flip of a switch, near-letter quality.

All backed by a corporation whose PCM choices go all the way up to mass storage. With worldwide sales, service and the flexible terms of the Memorex Finance Corporation. So you can be independent without going it alone.

Reach for the real choice in the 3270 world today. Call Memorex, 800-538-9303. (In California, 408-725-3456.) Or write to: Memorex Communications Group, 18922 Forge Dr., Cupertino, CA 95014.
NEWS IN PERSPECTIVE

The creation of the atomic bomb and space rocket technology.

usual role of the academy is simply to do the necessary development work to interface Western advances into the local computer culture.

As a result, the academy's new program is definitely one of innovation. Academy delegates have been scouring the Eastern Bloc for state-of-the-art researchers for nearly two years, and they have been seeking collaborations with nations like Japan.

Befitting its political and international status, the CEMIA project will be run by the International Committee for Computer Engineering (ICCE), an influential technology body based at the academy. ICCE already coordinates computing among the other six European CEMIA members, East Germany, Bulgaria, Rumania, Czechoslovakia, Hungary, and Poland. In 1982 these countries and the Soviet Union agreed to pool R&D resources in an open-ended commitment to a joint computing effort.

Some observers say, however, that despite ICCE, technical cooperation is often less than cordial between Soviets and their Eastern Bloc allies. The Poles, Czechs, and to some degree the Hungarians are still reticent to work too closely with the Soviets. Officially ICCE is led by General Georgi Constantinovich Serbin, general secretary of the academy's scientific section. But observers believe that the real architect of the fifth generation program is Yerengyi Velikhov. He heads the newly formed Informatics, Computer Technology, and Automation Division of the academy, and is viewed as the Soviet's foremost computer scientist.

The academy's foreign relations department described Velikhov's new "advanced computing division" as the home of the new project. He has a team of some 150 staff and it appears to be a young team. One observer suggests that up to 80% of these researchers may have graduated from universities only within the last five years. The division was formed by merging research teams previously scattered across the USSR, with the primary criteria for acceptance being the ability to support state-of-the-art research. Good researchers are few and far between, whichever country you are in, and due to the lack of experts, the Soviet specialists may also be called on to do more conventional development to keep the existing industry afloat.

In fact, these fifth generation projects are only part of a much wider scheme for computerization that the Eastern Bloc governments have now deemed necessary for their economic and military survival. In these respects, this scheme is no different from many others being operated throughout the world. The president of the Academy of Sciences, Alexi Alexandrov, set the new tone in the Soviet approach to computer technology in an article published by the workers' newspaper, Izvestiya, in January this year. He called for the "investment of significant state resources" to develop "information technology, computers, and automation for all sectors of activity."

He claimed that the socialist countries have the automation technology, but that they must carefully plan "the computerization of the economy" so as not to waste vast resources. He is well aware of the chronic shortage of skilled staff and the lack of an educational system to train them, and he concludes that the next generation of computers must therefore be simple to apply, reliable, and cheap.

According to Alexandrov, developing that next generation of computers is of paramount international importance—close to another space or missile race—and he hints that the East/West trade embargos on high-technology goods are beginning to bite. "The U.S. has imposed the strictest embargo on the import into our country of electronic technologies and techniques, hoping to slow or even halt our progress..." he wrote. "However, in this they have forgotten we have overcome problems of no less complexity, such as the creation of an atomic bomb and space rocket technology. Our science and technology was able to develop these by itself, and in a short time as well."

Some might argue with such claims of self-sufficiency, recalling the Soviet's dependence on U.S. and British atomic secrets and German rocket research, but a spokesman for the Moscow Academy

For your best investment in printers.
Call your nearest Qume distributor today.

United States:

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Calculator &amp; Computer</td>
<td>(206) 933-2344</td>
<td>AL</td>
</tr>
<tr>
<td>Almac Electronics</td>
<td>(206) 643-0992</td>
<td>WA</td>
</tr>
<tr>
<td>Anacom Computer</td>
<td>(800) 681-1113</td>
<td>CA, UT, WA</td>
</tr>
<tr>
<td>Anthem Systems</td>
<td>(415) 342-9182</td>
<td>CA</td>
</tr>
<tr>
<td>Bohig &amp; Associates</td>
<td>(812) 922-7011</td>
<td>MN</td>
</tr>
<tr>
<td>Butler Associates</td>
<td>(817) 964-5270</td>
<td>CT, MA</td>
</tr>
<tr>
<td>Byte Industries</td>
<td>(800) 217-2070</td>
<td>Outside CA</td>
</tr>
<tr>
<td>David Jamison Carlyle</td>
<td>(212) 410-8250</td>
<td>CA, CO, HI, IL, NJ, TX</td>
</tr>
<tr>
<td>Computers &amp; Peripherals Int.</td>
<td>(315) 476-6664</td>
<td>NY</td>
</tr>
<tr>
<td>The Datasore</td>
<td>(909) 779-0200</td>
<td>NJ</td>
</tr>
<tr>
<td>Equipment Resources</td>
<td>(404) 955-0313</td>
<td>GA</td>
</tr>
<tr>
<td>Future Information Systems</td>
<td>(212) 732-3905</td>
<td>NYC</td>
</tr>
<tr>
<td>Gentry Associates</td>
<td>(303) 589-7450</td>
<td>FL, GA, LA, NC, SC, TN</td>
</tr>
<tr>
<td>Inland Associates</td>
<td>(913) 764-7977</td>
<td>KS</td>
</tr>
<tr>
<td>InterAct Computer Systems</td>
<td>(704) 254-1894</td>
<td>FL, GA, NC</td>
</tr>
<tr>
<td>Kirluff Electronics</td>
<td>(800) 338-9111</td>
<td>AZ, CA, CO, CT, FL, GA, MA</td>
</tr>
<tr>
<td>MD, MN, MO, NC, NJ, OH, OK, TX, UT, WA, WI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA/COM-Ahantsus Data</td>
<td>(301) 770-1150</td>
<td>MD</td>
</tr>
<tr>
<td>MicroAmerica Distributing</td>
<td>(800) 431-7660</td>
<td>MA Only</td>
</tr>
<tr>
<td>(800) 343-4411</td>
<td>Outside MA</td>
<td>CA, MA, TX</td>
</tr>
<tr>
<td>Midwest Microcomputers</td>
<td>(419) 782-1115</td>
<td>OH</td>
</tr>
<tr>
<td>National Computers Syndicate</td>
<td>(312) 459-6400</td>
<td>IL, MN</td>
</tr>
<tr>
<td>Pacific Mountain States</td>
<td>(800) 272-3222</td>
<td>CA, WA</td>
</tr>
<tr>
<td>PAR Associates</td>
<td>(309) 371-4140</td>
<td>CO, UT</td>
</tr>
<tr>
<td>PCA Microsystems</td>
<td>(512) 654-4711</td>
<td>TX</td>
</tr>
<tr>
<td>PCS, Inc.</td>
<td>(214) 247-9946</td>
<td>TX</td>
</tr>
<tr>
<td>Pioneer Electronics</td>
<td>(301) 921-0660</td>
<td>FL, GA, MD, NC, PA</td>
</tr>
<tr>
<td>Polygon Industries</td>
<td>(504) 834-7658</td>
<td>LA</td>
</tr>
<tr>
<td>Printer Warehouse</td>
<td>(213) 829-5493</td>
<td>CA Only</td>
</tr>
<tr>
<td>(800) 245-9812</td>
<td>Outside CA</td>
<td></td>
</tr>
<tr>
<td>R.C. Data</td>
<td>(408) 946-3800</td>
<td>CA</td>
</tr>
<tr>
<td>Rudor Communications</td>
<td>(212) 245-5509</td>
<td>NYC</td>
</tr>
<tr>
<td>Schweber</td>
<td>(800) 645-3040</td>
<td>CA, CO, CT, FL, GA, IA, IL, MA, MD, MI, MN, NJ, NY, OH, OK, PA, TX, WI</td>
</tr>
<tr>
<td>Southern Microcomputer</td>
<td>(305) 621-4237</td>
<td>FL</td>
</tr>
<tr>
<td>Tek-Aids Industries</td>
<td>(818) 673-7400</td>
<td>IL, PA, TX</td>
</tr>
<tr>
<td>Terminal Rentals</td>
<td>(714) 832-2414</td>
<td>CA</td>
</tr>
<tr>
<td>Terminals Unlimited</td>
<td>(800) 336-0423</td>
<td>24 Locations</td>
</tr>
<tr>
<td>Tricom</td>
<td>(516) 485-9700</td>
<td>NY</td>
</tr>
<tr>
<td>Unico</td>
<td>(512) 451-0251</td>
<td>TX</td>
</tr>
<tr>
<td>Western New York Computer</td>
<td>(716) 381-4120</td>
<td>NY</td>
</tr>
</tbody>
</table>

Canada:

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abacus Data Services</td>
<td>(416) 677-9555</td>
<td>Ontario</td>
</tr>
<tr>
<td>Datumax</td>
<td>(416) 781-9135</td>
<td>Ontario, Quebec</td>
</tr>
<tr>
<td>DataTech Systems</td>
<td>(804) 479-7117</td>
<td>Alberta, BC, Ontario</td>
</tr>
<tr>
<td>Data Terminal Mart</td>
<td>(416) 677-0184</td>
<td>Alberta, BC, Nova Scotia, Ontario, Quebec</td>
</tr>
<tr>
<td>Future Electronics</td>
<td>(416) 697-7710</td>
<td>Alberta, BC, Ontario, Quebec</td>
</tr>
<tr>
<td>Micro Distributing</td>
<td>(604) 941-0822</td>
<td>BC</td>
</tr>
<tr>
<td>Printem Data</td>
<td>(416) 977-1711</td>
<td>Ontario</td>
</tr>
</tbody>
</table>

R. A Subsidiary of ITT
DON'T PAY MORE FOR A PRINTER THAT DELIVERS LESS.

A simple comparison tells the whole story. Qume's new SPRINT 11/55 PLUS™ daisywheel printer is tops in performance, with a steady speed of 55 characters per second. Print quality that's second to none. And the industry's best reliability rating—equal to almost three years of all-day, five-day-a-week business use without a single repair. That's nearly a year longer than its closest rival.

And the SPRINT 11/55 PLUS is a perfect fit for most popular business computers, via our inexpensive plug-in interface modules. That means you won't have to change printers when you upgrade your current system.

It's this kind of value that has made Qume one of the largest manufacturers of letter-quality printers in the world. So don't pay more for less. Choose Qume's SPRINT 11/55 PLUS—the best printer you can buy. And the best buy in printers. For more information, contact the Qume distributor nearest you. Or write Qume Corporation, 2350 Qume Drive, San Jose, CA 95131.

Qume printers. Your best investment in productivity.

Qume's SPRINT 11/55 PLUS™ outperforms NEC* and Diablo® for a lot less money.

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Printing speed (cps)</th>
<th>Avg. hours before repair*</th>
<th>User-changeable multiple interfaces</th>
<th>Mfr's suggested retail price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diablo 630 API</td>
<td>40</td>
<td>4,000</td>
<td>YES</td>
<td>$2340</td>
</tr>
<tr>
<td>NEC 7700 Series</td>
<td>55</td>
<td>2,000</td>
<td>NO</td>
<td>$2595</td>
</tr>
<tr>
<td>Qume SPRINT 11/55 PLUS</td>
<td>55</td>
<td>5,500</td>
<td>YES</td>
<td>$1990</td>
</tr>
</tbody>
</table>

*Mean Time Before Failure at 25% duty, (manufacturer's published data)
*NEC is a registered trademark of Nec Corporation
*Diablo is a registered trademark of Xerox Corp.
Today's COM from Bell & Howell is a whole different story. Our 6650 is a compact, dry system that's totally self-contained. There's no laboratory, no chemicals, no water. Nothing!

What's more, with most COM systems, you have to hire expensive technicians. And put up with frustrating operating procedures that often cause delays. But not with the 6650. It was designed specifically for DP environments.

1. To load the 6650, simply insert the film. There are no messy chemicals.
2. When you're ready to print, it's easy. Just press a button.
3. Your fiche will be ready in seconds—for a fraction of what it would cost to put the same data on paper.

It's as easy to operate as most line printers. So your staff can use it with minimal training. And because it operates on-line, it can produce your data in real time. All you have to do is enter a few simple English language commands. The 6650's software will take over from there. It can handle microfiche production. Create and maintain job setups. And even produce audit trails. All at the same time.

Meanwhile, you won't have to interfere with your host computer's software because the 6650 has its own minicomputer and emulates an IBM® 3211 printer.

And here's another surprise: Your end users will appreciate the sharp, clean images from the 6650's dry process.

Isn't it time you learned more about Bell & Howell's clean new approach to COM? Call our marketing manager toll-free at (800) 538-4000. In California, call collect, (714) 660-1050. In Canada, (416) 746-2200.
Increase your organization’s efficiency with real-time portable terminals...

radio-linked to provide wire-free communication with your computer.

- Hand-held and/or vehicle-mounted terminals transmit and receive real-time data and permit interactive communications.

- Whatever your remote communication needs—from inventory control to quality assurance or work in process—and whether the location is outdoors, in the manufacturing area, or a ‘hostile’ environment where running wires is neither feasible nor desirable, your roving personnel can perform with the improved efficiency of instant access.

- Bar code scanners eliminate human input errors and speed handling procedures.

- Compatible with most computers.

For specific application details call us at (404) 448-5770.

LXE a division of Electromagnetic Sciences, Inc.
125 Technology Parkway
Norcross, Georgia 30092

CIRCLE 89 ON READER CARD
Why do you think we call it broadband?
Maybe it's the way our network technology spans a broad range of applications. From everyday digital to state-of-the-art video, only broadband handles them efficiently and economically. And all at once.

Then again, it might be the broad range of options you have for dealing with the future. (We had room for personal computers and peripheral servers five years before they were born.)

Or just maybe it's the broad range of people who can relieve their network headaches with the contents of a single broadband cable.

Find out if you're one of them.

CONTAINS:
High-speed data; terminal-to-computer connections; electronic mail; security monitoring; teleconferencing; P.C. file server; environmental control; video; encrypted data; baseband simulation; 3270 link; voice; television; P.C. to P.C. link; facsimile; FM radio.

with our LAN planning guide. It contains the 13 factors critical to the success of a local area network. And a scorecard for determining the technology right for you. Information we've collected from hundreds of LocalNet broadband systems around the world. (More true LANs than any other open network supplier.)

For your free copy write Sytek, Inc., 1225 Charleston Road, Mountain View, California 94043. Or call (415) 966-7330.

Why do we call it broadband? Read the label. Then call us in the morning.

© 1984 Sytek, Inc.

SEE US AT NCC BOOTH C3474
NEWS IN PERSPECTIVE

states: "We think we can become self-sufficient in these new technologies in ways in which we are not in the technologies around today."

That statement says a great deal about the problems now facing the Eastern Bloc's computer industry. It is not self-supporting, it is hampered by limited production facilities, and it is sorely lacking in innovative dynamism. Soviet specialists, say sources, are just as adept at solving technical problems as their Western counterparts, but the essential difference is that the Eastern Bloc does not have the industrial or market infrastructure to stimulate or support advanced developments.

What is more, there is much less of a tradition of indigenous development in socialist countries. Following competent advances in the '50s, there has been increasing dependence on imitations of Western technology over the last 20 years. The Ryad mainframe range with its IBM 360-like design, the DEC-copy SM series of minicomputers, and more recently the Agatha personal computer have much in common with the Apple II, and each is a key product of the Soviet industry.

The policy of imitation has been a two-edged sword for the Soviets, according to Seymour Goodman, professor of management information systems at the University of Arizona. "It is doubtful that the Soviets would have been able to come as far as it has in the past 15 years solely on the basis of domestic efforts," says Goodman, "although the domestic efforts needed to acquire and assimilate Western technology should not be underestimated. Nevertheless, the overall gap between the Soviet and principal Western industries and user communities is growing."

In a draft memorandum on the Soviet industry prepared for the Center for Strategic and International Studies at Georgetown University, Goodman also points out that the research environment doesn't lend itself to innovation. "The Western computer-related R&D community functions in a milieu that is inconceivable in the USSR. A large part of the inability of the Soviets to innovate on any broad and deep scale is due to the lack of experience with, and exposure to, a huge, world class, dynamic user community."

Not all observers are as convinced as Goodman that the Soviets lack technical initiative. John W. Kaiser, a Washington-based researcher, argues that the Soviets and East Europeans are "right up there with us and the Japanese [on some fifth generation technologies]. You talk to anyone who's dealt with the Russians and they tell you that they are working on the same problems as we are—at least intellectually, even if they can't make things like we can."

Certainly they suffer from a shortage of up-to-date computer aided design and chip making equipment, thus hindering their VLSI work, yet what they have they seem to use productively. Soviet copies of U.S. chips are even imported to the U.S. to supply the present industry famine for 64K dynamic RAMs for Intel 8080-family microprocessors. The U.S. importer asserts that the Moscow Academy now has a prototype 256K dynamic RAM "to match anything in the West."

British Soviet industry researcher Paul Snell at the University of Birmingham adds that the Eastern Bloc "might not be at the forefront of technology, but they are producing their own unique chips, not just copies." He has identified some 15 families of native Soviet chips from patent listings.

---

OS/MVS Users

. . . over 500 users are using FastDASD to improve system performance.

- Speeds Response Time
- Solves Problems Quickly
- Increases Throughput
- Saves People Time

For faster results, call us today at our toll-free number 800 368-7638.

To get a Free FastDASD brochure, fill out and mail this coupon today.

Name ____________________________ 
Title ____________________________ 
Company __________________________ 
Phone ( ) ____________________ 
Address ____________________________ 
City __________________ Zip ________ 
State ___________ OP SYS _____ CPU _____ #DASD Spindles ______ 

Software Corporation of America
455 Carlisle Drive 
Herrdon, VA 23070 
Tel. (703) 471-1545

CIRCLE 38 ON READER CARD
JULY 1, 1984 61
How to pick up the most portable computer for your money.

The advantages of a portable computer.

Personal computers.

No matter where you are or what you do, you can see how they're changing your world. If you've done any reading on the subject, you know that there are a dizzying array of personal computers on the market today, all with differing features, capabilities, sizes, and prices.

If you're planning to buy a personal computer, consider the advantages of a portable computer. Today, the portable computer can offer the same capabilities as a desk-top model, yet give you options that go far beyond your desk: if you work at home, a portable can free you of the cost of separate computers for your home and office. A portable computer can make any business trip infinitely more productive. And outside the office, a portable can also become an educational tool for your family.

The benefits of a portable computer go as far as you can take it.

Weigh the differences.

When looking at portable computers, keep in mind the three P's: power, price, and portability. Every portable computer design is the result of trade-offs between these three factors.

At one end of the spectrum you'll find small, inexpensive lap models with very limited capabilities, and at the other, relatively large and bulky portables with desk-top computer power, costing up to thousands of dollars more.

Within this broad range, however, exceptions do exist. Whatever your needs, remember: you're looking for the model with the most power and features at the lowest possible weight and price. A portable like the Visual Commuter:"

The Visual Commuter: two computers for the price of one.

Commuter is a breakthrough in portable computers. In only 16 pounds (half the weight of comparable portables), and for only $1995, Commuter offers you the same features as a powerful desk-top computer: a 16-bit 8088 processor.
128K of memory expandable to 512K. Single or dual floppy disk drives with up to 720K of storage (roughly 360 typewritten pages). A full 16 line by 80 column optional flat panel display. And expansion capabilities for printers, hard disk, communications, and external monitors, including your TV set.

So instead of buying a desk-top computer for the office and a portable for the road, you can save yourself thousands by buying a Commuter.

**A portable without IBM® PC compatibility is no bargain.**

Any computer, no matter how advanced, is only as good as the software that goes into it. And in micro-computers, IBM PC compatible software sets the standard. The success of the IBM Personal Computer and the resulting IBM PC compatible software industry means that today's most innovative, powerful, and useful programming is being written expressly for the IBM PC. And only a truly IBM PC compatible can take advantage of it.

Commuter offers a level of IBM PC compatibility unsurpassed in a portable or desk-top computer. With the IBM PC compatible MS-DOS™ operating system and GW Basic.™ A full 83 key keyboard with a layout identical to the IBM PC. 5¼" floppy disks that are interchangeable with the IBM PC. Built-in IBM compatible color graphics and monochrome support. There's even a port for the IBM PC expansion chassis. And unlike many so-called IBM PC compatibles, Commuter can run virtually all of the software written specifically for the IBM PC.

**No computer makes $1995 go farther.**

For $1995, Commuter not only gives you desk-top power and features, it does it in only 16 pounds. And at 3½" x 18" x 15" with built-in handle and carrying case, you can take it anywhere you'd take a briefcase.

For more information on Commuter, call 1-800-847-8252 (in MA call 1-800-462-5554), or write Visual Computer Incorporated, 135 Maple Street, Marlboro, MA 01752. Or visit your local Commuter dealer today.

Commuter. Whether you compare it to desk-top models or other portables, you just can't pick up more computer for your money.

**Commuter. It can take your business places it's never been.**

Visual Computer Incorporated is a wholly owned subsidiary of Visual Technology Incorporated. COMMUTER is a trademark of Visual Computer Incorporated. IBM is a registered trademark of International Business Machines Corporation. MS-DOS and GW Basic are trademarks of Microsof Corporation.
There is also some considerable disagreement over the Soviet's capability in hardware design. Snell argues that over and above current microprocessor architectures, "the Soviets would seem to be ahead of the world in some respects." According to other analysts, many of these so-called advances are little more than rhetoric. "I have heard them claim the parallel application of off-the-shelf 8-bit chips as an advance," scoffs one.

Nevertheless, the Soviets built a parallel processor machine for process control applications called Elbrus in 1977, and in the new plan they have the well-advanced Hungarian Prolog researchers, of which there is a growing number, to help them.

Again, however, these Eastern Bloc teams will face the formidable inertia in the Soviet industry, whatever they manage to develop, and perhaps the international co-ordination the Academy of Moscow says it wants is as much to ensure further development of their own research as it is to glean ideas from outside the bloc.

Whatever the level of success of the Soviet effort, its announcement will add a new dimension to the international race for dominance and independence in the computer technology of the '90s and beyond. At worst, it will give a much needed fillip to Soviet R&D. At best, it could provide the kind of systems that would make it easy for the Eastern Bloc to institute a massive computerization scheme in both the commercial and scientific fields, and help to open up international trade routes. In any event, workers on fifth generation projects in Japan and, especially, in the U.S., will watch its progress closely.

**BENCHMARKS**

**BARS BOEING:** Investigators from the U.S. Department of the Interior accused a Boeing Computer Services unit of obtaining and benefiting from confidential bidding information in competing for a $5 million contract from the National Parks Service. As a result, BCS's Federal Systems Group has been barred from receiving federal government contracts at least until next May. The Parks Service contract has been rescinded as well. Government investigators found that BCS officials had helped write some of the criteria that were later used to choose the winning bid, and failed to disclose the conflict-of-interest violations to the government. Investigators also charged that Boeing had obtained parts of documents submitted by competitors in the bidding competition. Under federal law, Boeing can be barred from competing for any government contract if a federal agency finds evidence of major legal or ethical violations in obtaining a previous contract. Interior Department sources said that the matter will probably be turned over to the Justice Department for possible prosecution. No other BCS units were named in the charges.

**BOWING OUT:** Raytheon Co. has called it quits in the commercial data processing business, having decided to close down its Data Systems division, which showed a $24.3 million loss last year. Approximately 1,600 workers are to be laid off. The company evidently suffered the onslaught of IBM's 3270 and PC marketing efforts as well as extreme competition in the word processing market. Raytheon entered the dp market in 1971, building terminals and minicomputers. Word processing was added in 1977 when Lexicon Corp., Chatsworth, Calif., was acquired. With the write-down of inventory and other closing costs, Raytheon Data Systems is expected to show an after-tax loss of $95 million. Part of the division's troubles were said to stem from delays in shipments of a workstation from Convergent Technologies, a situation that is understood to have affected other office systems and terminal suppliers. Data Systems contributed less than 10% of Raytheon Co.'s total revenues, the majority coming from weapons systems.

**BACK SCRATCHING:** IBM and Cray Research have entered into a nonexclusive cross-licensing agreement covering information processing patents. While not unusual in the dp marketplace, the agreement gives added weight to speculation that IBM is readying its own entry into the supercomputer sector. The agreement covers existing and future patents through Jan. 1, 1989. No money was exchanged, according to Cray, which said this is the first deal of this kind it has signed. Cray could benefit from having access to IBM patents covering 300-type processors, which Cray might need in order to build front ends to its vector processors. "As Cray further expands into the commercial world there are more opportunities for us to hook to front ends in ways unique to a customer's environment," a Cray spokesman said.

**QUITS OLIVETTI:** John Douglas, president of Docutel/Olivetti Inc., resigned his post after the banking systems firm reported a $26 million gross operating loss for the year. He was replaced by Giovanni Fei, formerly president of Olivetti of Japan and 30-year veteran with the Italian company. Fei will take office June 30. Docutel/Olivetti reported that its net loss for 1983 was $18.3 million, compared to a $6.7 million profit in 1982. While the loss was expected, analysts say, the severity of it was not.

Some $10.1 million of its loss was due to inventory write-downs, the company said, while $8.1 million came from increases in accounts-receivable reserves and $3 million was due to the reorganization of the company following the Docutel-Olivetti merger in 1982. Douglas said only that he was leaving "to pursue other interests." Fei has served with Olivetti as manager of the company's European division, as general director of British Olivetti Ltd., and chief financial officer of Docutel/Olivetti.

**TROUBLE AT FRANKLIN:** Still recovering from its courtroom traumas of the past year, Franklin Computer Corp. lost its president and vice president of manufacturing. Avram Miller and Vabarem Erdkeian resigned in the wake of Franklin's agreement not to use certain software in its Ace computer line that Apple Computer charged in court violated its copyrights. Since that agreement, Franklin has had difficulty selling the Ace line of micros, and recently cut its work force by 70 employees, bringing the total to 480. It reported sales of $71 million for its fiscal year ended March 31, 1984. R. Barry Borden, Franklin's co-founder, chairman, and CEO, will replace Miller as president, and VP of research and development William L. Sydnes will take over the manufacturing post.

**WINS STORAGE PACT:** Control Data Corp. snared a contract with AT&T Technologies Inc. to manufacture the disk and tape drives for AT&T's 3B line of computers. The contract, one of CDC's largest ever, is worth $540 million over at least three years. Control Data and AT&T would disclose neither the exact length of the contract nor the names of other firms that competed for the contract. (Industry sources, however, believe that Storage Technology Corp. was close to winning the contract.) Under the agreement, CDC will manufacture three disk drives, including 14-inch Winchester drives for the 3B superminis, and 51/4-inch drives for the 3B2 desktop model. CDC will also provide AT&T with tape drives and media. CDC said deliveries under the contract had already begun, and the total volume would be in the tens of thousands of units.

**INDEFINITE DELAY:** Amdahl Corp. has indefinitely delayed manufacture and shipment of two models of its 580 series IBM-compatible mainframe. The top-of-the-line 5880 and 5868, both multiprocessors, have been stopped in favor of smaller attached processor models just a month and a half before first customer shipments were to have been made. The company said it had received little demand for the high-end cpus but had strong demand for the smaller machines. Little effect on revenues was foreseen by the company. The 5880 had already been delayed twice when the company said it would have to put the machine through further testing. Amdahl said it would now be able to devote more manufacturing resources to smaller cpus.
Transport your COM (Computer Output Microfilm) production into a new era with InterLINK™. The industry breakthrough from Datagraphix that fully automates your COM operation from start to finish.

By simply pressing one button, InterLINK transports your cut silver originals smoothly from recorder to duplicator in just seconds. Automatically, without human hands or human error.

Specifically, InterLINK loads the fiche into the AutoFEED™ stacker of your DataMASTER™ completely eliminating the need for your operator to manually insert, retrieve, and sort the fiche. The result: increased productivity and reduced labor costs. It's that simple.

If you already have an AutoCOM™ or ARIS™ system, for a very small investment InterLINK will save you hours of manpower and production time. While your COM system runs itself.

If you've been considering in-house COM, the Datagraphix fully automated systems are the solution for you. They'll be up and running in less than a day. So your savings can start immediately.

Make the right connection in your COM system with InterLINK. It duplicates your fiche without duplicating your effort.

InterLINK. Only from Datagraphix. The world's leading supplier of computer output microfilm systems.

For more information on InterLINK, fill out and mail the coupon today.

---

Yes! I’m interested in fully automating my COM system.
☐ Send more information on InterLINK.
☐ Yes! I’m interested in learning more about a COM system for my business.
☐ Please have a sales representative call me.

Name ____________________________
Title ____________________________
Company _________________________
Address __________________________
Phone ____________________________

Datagraphix
The Computer Output Management Company
a General Dynamics subsidiary.

Dept. 3515, P.O. Box 82449, San Diego, CA 92138
(619) 291-9960, Ext. 5581 TWX: 910-335-2058

CIRCLE 40 ON READER CARD
Lee Data is your passport to MORE LEEWAY™ in planning the growth of your information system.

The Lee Data family of displays, controllers, printers, IBM-compatible personal computers, and Coax Eliminators gets you across borders that used to stop you cold. Or slow you down because of high cost.

And when you travel with Lee Data, you’re in good company. Many of our customers are in the Fortune 1000, a fact that speaks for the quality of our service as well as the quality of our products.

But, perhaps most importantly, the design of every Lee Data product starts with you. With the

Lee Data opens the borders between the IBM world, the non-IBM world, and the world of IBM-compatible personal computing.
Add concurrent local processing, plus host/PC file transfer, to any Lee Data monochrome display by simply plugging in the Personal Workstation (PWS) module.

The Lee Data station printer enables any Lee Data display to generate hard copy locally. Controller-level printers include dot-matrix, letter quality, and line printers.

Travel freely across the IBM, non-IBM, and IBM PC borders on a single display, with high-resolution presentations in up to 4 different screen sizes.

real-world wants and needs of MIS people, management, and end users.

At Lee Data, our job is to give you MORE LEEWAY in crossing the borders you face today. And the new borders you’ll face tomorrow.
The din and smoke are impressive. But what's really at stake in the war of the workstations?

THE BATTLE FOR THE DESKTOP

by Michael Hammer

According to late reports from the front, the desktop is about to become the free-fire zone of the office. The war of the workstations has been joined. Every vendor in existence (as well as many just moving into or out of that state) is seeking to capture the real estate atop managerial and professional desks. Like Arnold's "ignorant armies that clash by night," vendors are locked in a fearsome struggle, "swept with confused alarms of struggle and flight." Each believes it has the magic formula that will make its device as common a managerial tool as a Cross pen and pencil set: voice/data integration, bit-mapped screens, built-in coffee makers, pointing devices, etc., etc. What concerns me is that the innocent bystander is usually the major victim of flying shrapnel.

The term "workstations" itself is, of course, both posturing and misleading. Its vagueness allows everyone to use it without fear of contradiction or FTC suit. Humpty-Dumpty must have had it in mind when he told Alice, "A word means precisely what I want it to mean, no more and no less." The proliferation of workstations and of workstation companies has far exceeded the bounds of good taste. Even the venture capitalists, never known for self-restraint in the face of tasteless phenomena, have cottoned on. I recently heard one fund manager describe a business proposal he was reviewing as JAWS—Just Another WorkStation.
No man is an island; neither is any workstation.

As the Buffalo Springfield had it, "Something's happening here/And what it is ain't exactly clear." Is this all just another of the mass delusions that seem to afflict the computer industry when the moon is full? Or should we, in fact, be preparing for a major onslaught of devices onto desks and into briefcases? And, if the latter is true, what ought we do about it, and what will be the impact on our overall information system environment?

In order to come to terms with the issue, we need to begin with a reexamination of the fundamental question in the area: what is a workstation really for? The answer to this turns on a distinction between classes of computer applications and computer system beneficiaries, which has been obscured by some recent terminology. While the advent of the personal computer has had an enormous and salutary effect on the information systems arena, the phrase "personal computer" has sown widespread confusion. There is nothing personal or impersonal about any computer; what is important about the pc is that it is cheap. Because it is cheap, it can be acquired by individuals or by small workgroups; because it is cheap, its resources can be expended on providing a palatable user interface, rather than on simply getting the job done; because it is cheap, it can be employed on a single-user basis, thereby providing the high degree of interactivity that we have come to expect from pcs. The term "personal" should be applied to certain applications, not certain machines.

**PERSONAL, INSTITUTE BENEFITS**

Although the picture is actually a bit more complex, we can usefully distinguish between personal and institutional computer applications. In a personal application, the beneficiary of the system is the actual user of the system, as an individual. A manager who uses a spreadsheet program to compute his budget more rapidly and thereby gets to have dinner with his family, or the professional who uses a word processor to produce a document that is a better representation of his work, are both deriving personal benefit from their applications. The clerk who is the user of an order-entry system derives little or no personal benefit from that system; the real beneficiary is the corporation, which is spending less to process orders, or is shipping its goods faster. Note that the beneficiary of an application is quite a different issue from the platform on which the application runs. There is no inherent reason why a personal application might not run on a corporate system, and vice versa. On the other hand, there is nothing personal about a safety deposit box accounting system that happens to run on a microcomputer located in a branch bank.

A workstation, then, is the preferred locus of execution for personal applications, which support the individual in his or her work and are of direct and personal benefit to the individual. The nature of these applications, and consequently of the principal functionality derived by a workstation, will depend on the individual's position and the work that he or she performs. A secretarial workstation will emphasize document processing; a financial analyst's workstation will offer spreadsheet processing; a managerial workstation will provide database access and decision support; and a senior executive's workstation will support him with, well, something that's no doubt very important.

These various types of workstations will inevitably have different features and characteristics, in terms of both software and hardware. The requirements of an engineer who performs intricate computations and displays complex diagrams are different from those of a manager who needs occasional access to financial information. In this sense, the notion of a universal workstation is just wishful thinking on the part of manufacturing engineers lusting after economies of scale. Something that's equally good for everyone isn't worth a damn to anyone; something that serves very different user populations equally well isn't addressing the major needs of any of them. In another sense, though, a user's workstation needs to be universal (or at least galactic) in that it ought to be the single point of contact with the entire information resource environment (personal, corporate, and public). Depictions of workspaces containing a dozen or so crts and resembling the flight deck of the Starship Enterprise may make for good photos in Sunday supplements, but would probably require daily retraining sessions after lunch.

No man is an island; neither is any workstation. A company is not simply a collection of atomistic individuals; there is a difference between an organizational chart and a telephone directory. People work together in groups variously known as offices, departments, divisions, and the like. If these groupings are not vacuous, then any such department has a particular business mission to discharge, a mission that transcends the individual, personal tasks performed by department members. Every department deserves a system of its own, whereon will reside the shared data and shared applications that are used by members of the group.

Consider a marketing department. Where do sales performance data, competitive analyses, and programs that forecast market performance belong? Not on any indi-
THE NEW 924. THE TELEVIDEO SUCCESS STORY (cont’d.)

TeleVideo® has combined the best innovations in technology, design and quality of manufacturing to bring you superior terminals. Now with the new 924 we've built in comfort and productivity features that leave the other manufacturers behind.

For user comfort, the 924 has a tilt and swivel non-glare screen and DIN-standard low profile keyboard. 16 programmable, non-volatile function keys (shiftable to 32) turn often used instructions into one key commands. Extra display features include full screen editing, character and block graphics, plus 32 non-embedded visual attributes. The 924's logical attributes define protected and unprotected regions for accurate data entry.

If you don't need the full power of the 924, our 914 has all the design advantages of the 924 at less cost.

Whatever your application, nothing measures up to TeleVideo. And nothing succeeds like the 924!

Call us at (800) 538-8725 for more information. (In California call (408) 745-7760) or contact your nearest TeleVideo office:

California/Santa Ana ........................................ (714) 476-0244
California/Sunnyvale ........................................ (408) 745-7760
Georgia/Atlanta .................................................. (404) 447-1231
Illinois/Chicago ................................................. (312) 397-5400
Massachusetts/Boston ............................................ (617) 890-3842
New York/New York ............................................. (212) 396-4777
Texas/Dallas .......................................................... (214) 238-6776
Central Europe ..................................................... (31) 2901-3544
Northern Europe ................................................... (44) 9-905-6464
Southern Europe ................................................... (33) 1-686-4412

TeleVideo® Terminals
© TeleVideo Systems, Inc.
Service is available nationwide from General Electric Instrumentation and Computer Service Centers.

CIRCLE 42 ON READER CARD
Any organizational unit that is more than a dumping ground deserves its own system for its own data and applications.

individual's workstation, because they do not belong to any individual; they are not mine or yours, they are ours. Just as I have my system (workstation) and you have yours so we should have ours. Should these data and applications then reside on a corporate mainframe? No. Why should our data and applications sit on their machine?

Any organizational unit that is more than a dumping ground for the chairman's brother-in-law deserves its own system to support its institutional applications and data. To this system will be connected the workstations of people in the unit and the systems of its subsidiary units. There is an old rule in software development, known as Conway's Law, which states that the structure of a software system mirrors the structure of the organization that developed it. (There are those who believe that this law describes the root cause of all sorrows in the world.) An updated version of the law advises us that the architecture of a corporate information system should mirror the structure of the corporate organizational chart.

THE DIS IS THE HEART

The departmental information system (DIS) is the heart of the organization's system architecture. It provides "server" functions (filing, printing, and communications) to its attached workstations. It is also the platform for departmental applications. Consequently, its software components should include database management and decision support tools, as well as languages to support rapid, user-driven application development. It should also have a "virtual workstation" facility to provide the capabilities of an intelligent workstation to a user of a dumb terminal.

As a rule, a DIS, with its single, shared processor is not an appropriate means of delivering highly interactive, processor-intensive personal support applications. As the Stalinists would say, "it is no accident" that the invention of the electronic spreadsheet followed the development of the "personal" computer, with its dedicated processor and very high bandwidth between this processor and the screen (and therefore the user). There are no longer any significant economies of scale in "pure" processing; quite the contrary. Sharing a common processor is a very ineffective way of delivering capability to most users. Some individuals are, however, likely to have too occasional and intermittent a need for personal applications to warrant owning a full-function workstation. The DIS can provide them with these capabilities, delivering them through a significantly less expensive terminal.

The DIS and the workstation need to operate in close harmony. Ideally, the user should not be aware of the degree of intelligence in his workstation, or even of the site at which his current application is running. He should be able to compose a document with his local word processing facility and dispatch it as electronic mail, without going through the contortions of linking the systems, moving control from one to the other, transferring the document, and so on. This should occur automatically, through the miracles of technology and common operating systems.

The DIS, not the workstation, is the centerpiece of a distributed processing strategy (whether that of a vendor or of a user). The workstation is an appendage of the DIS: the DIS barks, the workstation wags. Some vendors seem to have a concept of capturing the desktop, and of using that beachhead to land the heavy artillery. Though this may have worked in Normandy, it doesn't figure in the office. It is in the DIS-based data and applications that the real investment occurs, and that vendor specificity becomes a significant issue. Workstations are rapidly becoming indistinguishable commodities. With the more popular software packages available on many different workstations, there is little to differentiate them and tie a user to any one model.

The various DIS offerings, however, are very different. In particular, their major software packages are vendor, rather than third-party, supplied. Once a customer selects a particular system, the remarkable phenomenon of lock-in begins to manifest itself. Users soon find themselves committed to idiosyncratic and nontransportable application packages, database systems, and software development tools. Old workstations may be discarded for new and fancier ones, but the DIS will persist. The battle for the desktop is nothing compared with the battle for the hall closet. Account control in the office is based on the departmental controller, not the workstation.

Apple Computer appears to have ignored this principle, much to its regret. Its workstations may be good or bad, but they don't connect to anything in a significant way (3270 emulation is not that significant). Apple offered no departmental system with which their workstations could operate in harmony. Perhaps such a product would have violated Apple's deeply held theological views; or perhaps Apple was simply unfamiliar with the implications of corporate organization, since until recently, it seems, they were not burdened with one themselves.

Today, the DIS is typically implemented by means of a superminicomputer: DEC VAX, DG MV, Wang VS, HP 3000, etc. Indeed, the mini vendors have identified the DIS
Back in 1959 when computer graphics was barely an idea, CalComp pioneered the first computer-driven plotters. Since then, we've had one successful product after another, and the momentum has never been greater than it is now.

Versatile DUAL-MODE® pen plotters fill out the line.

To offer you the broadest line of plotters in the industry, we've introduced a new generation of intelligent, microprocessor-based DUAL-MODE® pen plotters. They give you the versatility to run unattended, continuous roll batch jobs, as well as drawings on cut-sheet or pre-printed forms.

The fastest electrostatic plotters in the industry.

CalComp offers a complete line of electrostatic plotters with the fastest paper travel speeds in the industry. You get finished-quality plots at an affordable price.

An unmatched choice in precision digitizers.

Known for accuracy and reliability, CalComp digitizers range from a small hand-held 575 series to digitizers as large as 44 x 60 inches (1176 x 1524 mm), with advanced features such as near projection and microprocessor control.

Powerful new CAD systems.

The new CalComp System 25 interactive CAD system is designed to meet your most demanding design and drafting needs. Configured as a small stand-alone system or as a large multi-station network, System 25 delivers the most complete solutions quickly and cost-effectively.

Displays draw on local intelligence.

We've also enhanced our display family with a valuable option that lets you use the intelligence of your terminal for developing customized graphic applications.

Move forward with the leader.

CalComp will introduce a wide array of state-of-the-art products this year. Our 25th anniversary year. That's the kind of momentum that has made CalComp the leading supplier of computer graphics equipment, with the most complete product line in the industry.

You'll find CalComp plotters, displays, digitizers and CAD systems in every corner of the world, supported by a comprehensive sales and service network.

As you can see, the momentum is growing every day.

CalComp, 25th Anniversary, Avenue, PO Box 3250, Anaheim, CA 92803.

In continental U.S., except California, call (800) 556-1284, ext. 156.
In California, call (800) 441-2245, ext. 156.

Calcomp, A Sanders Company

The Momentum is Growing

See us at SIGGRAPH '84 Booth 8525

CIRCLE 48 ON READER CARD
Looming on the horizon is the supermicrocomputer, which will offer DIS capabilities at greatly reduced prices.

(under a variety of marketing guises, from "productivity centers" to "departmental clusters") as their essential market strategy. While they offer their own lines of compatible workstations, many of them have also chosen to support the ubiquitous IBM PC. Indeed, to many of these vendors, the workstation is a decidedly mixed blessing. Because of the intense price competition in this area, and the high costs of the oem components many use, margins on workstations are significantly lower than they are in the rest of their product lines; selling too many workstations could hurt their gross margins, terrify the innocents on Wall Street, and bring on a rash of early retirements. Not too surprisingly, these vendors are increasingly restructuring their workstations as downsized versions of their minis. Their intent is to have a compatible family of devices that can serve as workstation, departmental controller, and divisional resource.

LUKEWARM TO DIS CONCEPT

IBM, on the other hand, seems until lately to have been somewhat lukewarm to the entire DIS concept, emphasizing instead the desktop machine and the mainframe. It did not take a clearly identified DIS product; rather, it presented a range of alternatives (8100, 5520, System 1, System/38, etc.). User views of these products as departmental information systems cannot be printed in a family magazine. IBM actually went so far as to claim that the inadequacies of its offerings were beneficial, because they freed users from needless generalities; users were to pick that system with the precise subset features each needed. In my neighborhood, we would call that making a feature out of a bug. (Anyway, IBM probably thought it would be better if all those PCs were connected directly to the mainframe, in order to degrade its performance even further and hasten the next upgrade.) More recently, however, IBM seems to have jumped on the DIS bandwagon, and is actively promoting the System/36 for this role.

Looming on the horizon is the supermicrocomputer, which will offer DIS capabilities at greatly reduced prices. These new devices will create serious problems for the minicomputer, which will in turn create serious problems for the minicomputer vendors. At the 1983 Hammer/Seybold Forum, I asked Julius Marcus, then vice president of business and office systems engineering at DEC, if the (just announced) Micro VAX would not, butcher the VAX 730 and even the 750. His reply: "I'd rather butcher myself than have someone else do it." Mr. Marcus is no longer associated with DEC.

Conspicuous by its absence in the foregoing architectural discussion is any mention of the mainframe. Its role has been well expressed by one of our clients: "The mainframe is a network peripheral." The big MIPSers are still out there, and while we're all grateful for them, they are no longer the hub of the computing universe. The DIS, with its workstations waiting in attendance, is the new belle of the ball. The mainframe is becoming a utility, to support large-scale transaction processing and the databases to which all wish access.

The foregoing analysis is based on architectural principles, application analysis, and logical principles, and consequently will appeal to dp managers and others whose early training in business arts was a trifle on the exigent side. Unfortunately, an entirely different and even contradictory force is at work, which threatens to make a mockery of our systems planning work. This other phenomenon is related to a remarkable bit of analytics that I have termed Hammer's General Graph (see Fig. 1). This graph has the singular advantage that its axes are not only unnumbered, they are also unlabeled, thereby greatly increasing the domain of its applicability. For the purposes of this discussion, let us interpret the horizontal axis as "cost of a worked-out system," and the vertical axis as "amount of justification required to purchase the system." The graph then expresses the reality that below some price threshold, people buy systems just for the hell of it. Not only don't they know what the benefits will be, they're not even sure what they'll do with it. But it is fashionable and fun, so they join the party.

We have seen this occur with the telephone. When the typical company hires a white-collar worker, he is given a telephone on his desk. No cost-benefit analysis is done; no consideration is given to the sharing of a telephone, or using one in the candystore down the block. We have also seen this occur with the copying machine, and we may be about to see it occur with the workstation. The critical question is, what is the price threshold at which impulse buying sets in? The word from the stable is that the breakpoint (in 1984) is somewhere between $1,000 and $1,500. But do not be deluded into believing (as some vendors have been) that price is the only criterion. The product must offer some real, value-added functionality that is personally useful to the individual user. Only the most senior managers are naive enough to pay $1,000 for a paperweight.

NOBODY'S PERFECT GRAPH

This phenomenon is exacerbated by another trend, which cannot be adequately described by Hammer's Generic Graph (nobody's perfect). For that reason, we introduce Hammer's Other Generic Graph (Fig. 2). Once again, the vertical axis is "amount of justification required," but now the horizontal axis is "experience with a system." This graph shows that once we have a sufficient amount of experience with a particular type of system, we begin to take its benefits for granted, and acquire new instances of it without much fuss. Pretty soon, it becomes a necessity rather than a luxury, and soon after that, a standard fixture of business life.

There is one wrinkle that may impede the applicability of our Generic Graphs. That is the fact that despite the low individual cost of new workstations, their aggregate cost can still be quite significant. (Buying a $1,500 workstation for each of 10,000 employees amounts to $15 million, which still warrants a line item in most corporate dp budgets.)

At least we have identified the principal combatants: on one side, the mainstream minicomputer vendors, seeking to offload function onto workstations tightly coupled to the departmental information system; on the other, standalone workstation vendors, seeking, with a combination of low price, sex appeal, and novelty, to populate lots of desks while no one is looking. Who will win? Who will lose? What will distinguish the successful workstations from the losers? I have the answers to those questions, I would be taking very large short positions in selected publicly traded equities. But I can divulge one trade secret that provides useful tactical guidance, one that is particularly appropriate given the timing of the publication of this article: Beware the NCC Kiss of Death. Each year, at the close of the NCC, the grand panjandrums of the press and consulting fraternities meet in closed session at the Bohemian Grove and anoint one of the newly displayed products as the pick of the charts. A tidal wave of articles and reports soon follows. My advice: avoid it like the plague. Think back over the last three years. What were the sure winners? Xerox Star, Grid Compass, and Apple Lisa. Let us be kind, and not dwell on their subsequent marketplace misfortunes. Let us note, however, that the superficial glitter and novelty that attracts the puntists with their three-minute attention spans is usually inversely correlated with utility and real value.

Who will win the war of the workstations? I quote again from the Buffalo Springfield: "Battle lines are being drawn/But nobody's right if everybody's wrong." My advice is to keep your eye on the ball and your hand on your wallet, and don't let all the workstations prevent you from getting some work done.

Dr. Michael Hammer is president of Hammer and Co. Inc., a Cambridge, Mass., consulting firm specializing in new information technologies.
Dear Ma:

Scotsman multiplexers are the way to go with AT&T falling behind on line installations.

Ma Bell,
% Heaven

There's Good News and Bad News
The good news is that Racal-Vadic's fine Scotsman multiplexers (45 versions to choose from) are available for immediate delivery.
The bad news is that, according to USA Today, AT&T is filling only 25% of its private line orders on time, has doubled the waiting time to 10 weeks, and is taking 50% longer to repair private lines than in 1983. They miss you, Ma.

Install Scotsman and Reduce Line Costs
How can data network users avoid these delays? Easy. Reduce the number of private lines by installing Scotsman multiplexers. Scotsman I is a high-quality, low-cost 4- or 8-channel stat mux with optional built-in 2400 or 4800 bps modem. Scotsman II is even more sophisticated, providing system control and monitoring. One customer saw his line costs drop from over $1,000 to $58 a month merely by adding a pair of Scotsman. They paid for themselves in a few months.

Data Compressor Further Cuts Line Costs
Racal-Vadic's new data compressor sends a 19.2 kbit data stream over a single voice-grade line using 9600 bps modems. Or data from 4 bisync or 2 full-duplex 9600 channels can be transmitted over one telephone line. This can add up to great savings for users.

Now, Free Installation
No one has to wait for AT&T — or deal with multiple vendors — because Racal-Vadic can supply the whole system, including multiplexers, modems, data compressors — and accessories.
They're even offering FREE INSTALLATION 'til September!
I doubt if you can find a better deal in heaven, Ma.
Your independent thinking son.

Racal-Vadic
1525 McCarthy Boulevard, Milpitas, CA 95035
Tel: (408) 948-2227 • TWX: 910-339-9297

Phone (800) 543-3000, Operator 507
America's largest household products company
Do they know something your company doesn't?

Ask them. They're Procter & Gamble.
Motorola is a world leader in advanced electronics
for memory, logic and voice and data communications.
Elies on our business information systems.
Voice/data workstations may make sense, but that doesn't mean they'll capture the hearts, minds, and desktops of corporate America.

THE LITTLE ENGINES THAT MIGHT

by Ken Zita

A new class of fighting machine has joined the legions of PCs and terminals currently battling for space on corporate desktops: terminal equipment that can switch both voice and data. Users are not yet surrendering in droves, but that hasn't tamed the mettle of a host of vendors.

In the market wars, the integrated voice/data terminal (IVDT) is a weapon with considerable strategic value. It offers computer vendors a chance to get involved in a customer's telecom affairs, and it puts telecom vendors in the data business. It also rep-
resents a niche many startups are finding attractive. But IVDTs may prove difficult to sell precisely because they fit into what is currently a no-man's-land. While the technology is relatively straightforward, the devices require corporate planners to think about electronic communication in a new way.

This varied genre of products still lacks a proper name and, depending on what you're reading, you may find them referred to as ComputerPhones, Integrated Voice/Data Terminals (IVDT), or Executive Workstations (EWS). They resemble computer terminals that have made amends with the telephone handset. There are dumb ASCII terminals garnished with software and telephone capabilities, and there are electronic telephones with elaborately expanded LED displays and qwerty keyboards. Some pack a sensational, multitasking, user-friendly wallop: a so-called two-line PBX, business card directories, programmable keys for communications and other functions, and 8088/MS/DOS downloading. Others are $1,200 answering machines, lap computers with autodialers and speakerphones, or modified 3270 terminals.

The traditional demarcation of vendor desktop territories grows increasingly blurry as telephone station and data terminal products not only look more alike, but wind up doing exactly the same thing. This is straining the ingenuity of marketing departments. PBX vendors see their products ideally positioned to capture the user's fancy, but are finding established telephone distribution and support channels inadequate. Computer vendors may be better situated to capture the business of large organizations, but they have yet to produce devices that match the user congeniality of products derived from the telephone.

The common user perception is that telephone vendors sell telephones and computer vendors sell computers. They don't
know who to believe for an integrated product. And some people complain that integrated workstation products are technology rather than market driven, and that the boxes are gimmicks nobody needs.

There are currently 18 manufacturers in the domestic market, if you include all the product varieties—the all-in-one stations, plus the pc add-ons and peripherals and plug-in circuit boards (see Fig. 1). Most are produced by the telecom industry and are distributed by national accounts, authorized dealers, and interconnect companies, and (to a lesser degree) large equipment supply houses. It is reasonable to expect every PBX vendor to have its own, or an oem, version of one or more integrated workstations on the market by late 1985. Several large computer companies are known to have products ready for market, though none has formally announced one. More than 50% of the remaining companies are venture capital startups building products explicitly for this market.

Since Northern Telecom announced the Displayphone two years ago, the total number of integrated voice/data terminals shipped by all vendors is fewer than 30,000 units, valued at more than $40 million. Estimates differ on how many will be sold.

There are currently 18 manufacturers in the domestic market, if you include all the product varieties—the all-in-one stations, plus the pc add-ons and peripherals and plug-in circuit boards (see Fig. 1). Most are produced by the telecom industry and are distributed by national accounts, authorized dealers, and interconnect companies, and (to a lesser degree) large equipment supply houses. It is reasonable to expect every PBX vendor to have its own, or an oem, version of one or more integrated workstations on the market by late 1985. Several large computer companies are known to have products ready for market, though none has formally announced one. More than 50% of the remaining companies are venture capital startups building products explicitly for this market.

Since Northern Telecom announced the Displayphone two years ago, the total number of integrated voice/data terminals shipped by all vendors is fewer than 30,000 units, valued at more than $40 million. Estimates differ on how many will be sold.

One research firm predicts the market will top $2 billion by 1990; it expects every desk that currently has both a computer and a telephone to have an integrated device within the next 15 years.

NO MOVE WITHOUT A FIGHT

But the equipment currently inhabiting corporate desks is unlikely to get up and migrate without a fight, and most forecasters expect a $1 billion market by 1990, or a total of one to three million units shipped. Price per station is expected to drop from the current average of about $1,400 (depending on complexity), to between $600 and $800, competitive with PBX station equipment.

This immature market should start moving after expected major product announcements from Northern Telecom and AT&T appear later this year. It won't be until mid-1985 that users will start laying down cash for what many still perceive to be just another roadside attraction. And then there is the eternal question: whither IBM? There is a cocktail party theory that says IBM will move quickly, if only to remind AT&T that its adolescence in the terminal industry is not going to be uncomplicated.

ROLM, Northern Telecom, Mitel, and AT&T—the big four—are the only PBX vendors currently manufacturing and distributing their own integrated workstations. While the announcements have been less than thrilling, some of the marketing tactics are proving more interesting. One trend is to give terminal equipment away sometimes to purchasers of large PBXs and sometimes just for the PR value. The idea is to get users better acquainted with the utility and undeniable sex appeal of integrated station products. Test drive them to see if they are working. Northern Telecom, for instance, recently donated 35 Displayphones to the New York University School of Business Administration. The school, which does most of its switching via New York Telephone Centrex, says they want a bunch more to wire all students and faculty into an electronic mail network by the end of next year.

Startups hope to make a killing with big-name procurement agreements. Once the paper is signed and orders are placed, the company makes its first public stock offering, and the founders make a mint and forget they ever heard of fourth-round financing. Venture capitalization just barely funds R&D and initial production, even when investor interest is flowing freely. Everyone knows a national/major accounts sales force costs a bundle. So why not design a product and find someone willing to take the end-user marketing off your hands? The startups thus avoid noisome sales support and fussy service contracts and stick to what they know best: building the box.

Convergent Technologies is a case-book example. The much touted N-Gen, which isn't yet configured for voice, will be sold by Prime, Gould, and Raytheon, and even bigger clients are expected. The company has $2 billion of "commitments to buy" from oems.

A startup has to turn around a revenue-generating product before the cash runs out, and this rarely happens overnight. Roy Dudley, director of marketing at Ambi, Stanford, Conn., points out that "the period of time from the first knock on the right door at an oem, to when the product actually hits the user's desk, privately labeled with the oem logo, can be one and a half to two years." Dudley feels Ambi's early strategy of oem-only distribution was naive, and the company has expanded its product line to enter products for direct sales.

Some of the PBX and computer vendors have no intention of building their own products. They have the resources to sit back and watch the market develop, and then enter with complete product families manufactured largely by startup vendors. They'll offer one model for the order-entry clerk, another with database access for the accounts manager, standalone processing for the financial analysts, and a full range of personal maintenance software for executives. AT&T, for instance, has the design and production power to generate OA terminal products for every conceivable type of user.

This is the main difference between

FIG. 1

<table>
<thead>
<tr>
<th>VOICE/DATA WORKSTATION VENDORS</th>
<th>BOARDS &amp; PERIPHERALS</th>
<th>ASCII</th>
<th>ASCII HYBRIDS</th>
<th>LIMITED PROCESSING OR IBM-COMPATIBLE</th>
<th>FULL PROCESSING</th>
<th>UNIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T, Morristown, N.J.</td>
<td>Rolm, Santa Clara, Calif.</td>
<td>Daidaco Communications Santa Clara, Calif.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTE, Reston, Va.</td>
<td>Telrad-Solcor, Long Island City, N.Y.</td>
<td>Zaisan Houston, Texas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIND A COMPUTER THAT’LL OUTPERFORM OURS AND WE’LL GIVE YOU A HEADSTART. FREE.

If you can find a microcomputer, equally priced or less, that'll beat only half of 10 standard features we've selected on our HeadStart Model 512, we'll give you a HeadStart absolutely free. How can we make this incredible offer? Because looking for a better computer than our new HeadStart is like looking for a needle in a haystack. You're more apt to come up with a case of hay fever.

HeadStart is simply the fastest, smallest, most powerful business computer in its class. Period.

In fact, we're so certain we have an unbeatable machine, we're offering you this challenge. If, by some inconceivable circumstance, you shouldn't find a business computer that is even equal to ours, we'll give you a HeadStart. Absolutely Free.

If you'd like to accept our challenge and learn more about this small wonder of microcomputer technology we call HeadStart, call us or fill out and return the coupon.

You could come up with a free HeadStart, which is nothing to sneeze at. Take the Intertec challenge at NCC Booth 1758.

HERE'S YOUR CHANCE TO WIN A FREE COMPUTER AND GET A HEADSTART ON THE COMPETITION.

Intertec, Dept. "HeadStart"
2200 Broad River Road, Columbia, SC 29210
Phone: 1-803-798-9100

☐ I accept your challenge. Please send me details on how I can beat the HeadStart VPU 512.

☐ HeadStart sounds terrific. Tell me more.

Name: ____________________________________________
Title: ____________________________
Company Name: ____________________________
Phone: ____________________________
Address: ____________________________
City: ____________________________
State: ______ Zip: ______

CIRCLE 46 ON READER CARD
Startups hope to make a killing with big-name procurement agreements.

the big switch and computer vendors and the startups: the big guys can afford to turn out a series of products to address different applications, while the startups begin with the specific need. PBX vendors depend on the "total system" sale. To be competitive in the integrated terminal business—and they cannot afford not to be—they must either generate an entire family of products of their own, or second-source other devices that fill out their product lines.

Because they lack an array of products, the startups go after niches. AMBI is seeking friendly oems and systems houses to customize its products for point-of-sale and credit verification machines and host terminal emulations. The company changed its original strategy (to take greater control over corporate and product definition), but the overall tack has remained the same: specific terminals for specific applications.

Several startup companies have a strong enough product purpose to sell themselves directly. Integrated Office Systems, Cupertino, Calif., has targeted its product specifically for large companies with sales people frequently on the road. Many kinds of organizations might find the system useful—it's a VAX and Unix-based voice/text electronic mail system with battery-powered briefcase terminals—but the manufacturer had sales professionals in mind from the beginning. This is the clearest strategy yet unveiled in the integrated workstation market.

Workstations with predefined, pre-programmed applications are attractive to users. They do not have the same flexibility as a pc with interchangeable or flexibly programmable software, but they do meet actual, specific needs, and that makes it easier to justify their cost.

According to Coleman Washington, who handles marketing for Zaisan, Houston, the largest organizations are interested in integrated terminals as entry-level data equipment: terminals for the first-time data user. MIS managers, Washington reasons, are worried pcs erode their direct control over network access, and are anxious to maintain spending clout. By expanding the number of workers on the corporate databases with simple integrated ASCII devices, the MIS directors can more accurately keep track of who does what.

Access to the database and host communications protocols is ROM driven, and most integrated terminal equipment demands a healthy amount of programming. The MIS staff runs circles around the telecom manager and a new realm of hardware is added to the MIS empire. Best of all, MIS can more legitimately dip its fingers into that part of the budget slated for telephone station equipment.

Another product line aimed at a specific, well-defined market comes from Davox, based in Merrimack, N.H. The company is selling integrated terminals that are, in essence, extremely flexible 3270 terminals for multiple communications protocols. Davox president Dan Hosage says he would be delighted to see IBM come out with products to compete with his. "IBM is in the business of legitimizing markets. Right now we still occasionally hear reservations about the workstation concept. If they did make an announcement, it would perfectly validate our existence and mission."

Another class of products aimed at a specific niche are pc add-on or adjunct equipment. Three million corporate desks have IBM PCs, and at least two million more are expected to acquire one this year. Most of these desks also have telephones. Asher, made by Atlanta-based Wilcom, is a plug-in board for the IBM PC and compatibles. Lift the housing off your box, slip in the board, plug two telephone lines and a handset into the modular plugs in the back, and slap the handset on the computer's side with a special adhesive. Asher's software automatically boots into a 128k partition in the PC's RAM. Price is $900.

ARTSCI, North Hollywood, Calif., makes a similar, simpler product for the Apple Macintosh, but with no significant electronic messaging or referential directories. It's little more than a primitive telephone line with an interface to a computer, and cannot justifiably be called an "executive workstation," in no matter how loose the definition. Its function, however, is clear: this is integrated data and voice, and the price is $200.

Virtually all of the vendors sing praise to "multitasking software" as the means by which they control voice and data integration. But most haven't yet effectively exploited the potential. The obvious exceptions are the Unix-based systems which, when properly configured, may establish absolute simultaneity of communications resources. Every conceivable communications operation—speaking, reading, or writing—may be organized and reviewed (or at least recognized) simultaneously. A standard telephone line becomes the conduit for multiple communications channels, and simultaneity becomes the measure of efficiency. Sydis from San Jose has the premier Unix executive workstation product.

The question one is left with is whether the new products are significant, or merely clever. Will integrated workstations contribute to lasting changes in the way we communicate? The next 10 months will give some sporting insights.

Ken Zita is a senior analyst in charge of the subscriber equipment division (paxs, key systems, and integrated terminal equipment) of Northern Business Information, a New York-based telecommunications research firm. He was formerly associate editor of Teleconnect magazine.
HYPERbus is a HYPERformance LAN system compatible with IBM 3278's. It is a premier system from Network Systems Corporation, the original successful developer of the networking concept in 1974.

HYPERbus is fast, maintaining a 10,000,000 bits per second data transfer speed. This means you can have subsecond response when you put your IBM 3278 Terminals anywhere in the system.

Getting data fast means productivity. Experts agree, reducing delay on system requests increases productivity and user satisfaction.

What if you want to move a 3278 terminal to a new location? With HYPERbus, it's easy. Using HYPERbus and HYPERchannel we can even provide cost effective subsecond response for remote IBM 3278's miles away.

HYPERbus can provide productivity with other systems as well. Whether your LAN need is for IBM 3270 terminal equipment, RS232 SYNC, ASYNC, high-speed communications links, ports to Telco Circuits or even DMA connections to minicomputers, HYPERbus is the answer.

Call or write, Network Systems Corporation and Investigate HYPERbus. Offices and support in most larger cities.

We are your best cost effective solution for putting your IBM 3278's on LANS.

Network Systems Corporation
Network Systems. The Total Solution.

7600 Boone Avenue North, Brooklyn Park, MN 55428/(612) 425-2202

HYPERbus, HYPERchannel are registered trademarks of Network Systems Corporation. IBM is the trademark for International Business Machines Corporation.
Now IBM brings you a Sort of a different sort.

It’s faster.

It’s called DFSORT. It’s a new release and it turns in a truly remarkable performance—thanks to an advanced “blockset” algorithm and effective use of advanced technology in IBM direct-access storage devices.

In tests using realistic samples of frequently sorted data, DFSORT dramatically reduced CPU time and the number of EXCPs.

The gains were significant under almost all test conditions, regardless of the character of the work or the system configuration. And IBM benefits from this performance daily in its own operations.

But speed is only part of the story.

Powerful DFSORT functions let the application programmer specify several commonly needed actions without writing exit programs. For example, the programmer can define criteria for including or omitting records to be sorted or merged, which improves performance since only relevant records are processed.

Similarly, the programmer can include or omit data elements within records, before or after sorting. In some applications this can significantly improve the time and cost of the sort.

And there’s a new summing function that provides the totals of designated fields.

DFSORT works in the OS environment. It is compatible with IBM’s Extended Architecture (XA), and XA systems can invoke it from above the 16-megabyte line.

For facts on the faster sort, call your local IBM representative. Or call IBM toll free at 1 800 IBM-2468, Ext. 82; ask for the Software and Education Department.

Or return the coupon.

IBM software for the DP Professional.
The place is Vegas, city of showmanship, and there will be enough gear in the spotlight to satisfy any keyboard virtuoso.

NCC PRODUCT PREVIEW

by Robert J. Crutchfield

Well, it’s time to trade in the Mouse Ears for a wide brim hat and sunglasses as the National Computer Conference moves from Anaheim, Calif. to Las Vegas, Nev.

The theme for NCC ’84 is “Enhancing Productivity,” though it might be argued that it’s hard to be productive in this convention city. Barring the distractions, NCC will offer a conference program featuring more than 90 technical sessions and 20 professional development seminars. A highlight will be the keynote address by John F. Akers, president of IBM.

There will be more than 650 exhibitors at the show, many introducing new products. But in a scant four days it will be difficult to visit every booth. Veteran conference goers contend booth visitation criteria should range from legitimate interest to interest in giveaways. To aid in the process, DATAMATION has compiled a sneak preview of what some vendors are introducing at the show.

So, bring comfortable shoes, lots of suntan oil, stake out a cool place in the shade, and get ready to participate in the computer industry’s annual bash.

ALPHA DATA INC.
Chatsworth, Calif.
DISK DRIVES
Booth A1146

This vendor will introduce a mass memory disk drive. It is a Winchester-style device with 128MB of storage. It has an 18 msec average access time based on a combination of disk head seek and settle times.

The unit has a rotation speed of 3600 rpm, and an average latency time of 18 msec. It has a 1MB cylinder and 54 heads per sealed chamber. The disk drive will process 50 to 60 commands in 72 msec, and not be saturated, according to the vendor.

The machine has an integral spindle and a brushless DC motor that runs at both 50 Hz and 60 Hz. It also has a rotary actuator. The retractable heads are mounted on a patented head lifter and never touch the disk surface. The vendor says the unit doesn’t need a landing track for the heads because there is no disk contact when starting or stopping. It uses the ANSI/SMD interface. The Alpha Mass Memory Disk Drive costs $6,000 each in a quantity of 100 units.

FOR DATA CIRCLE 400 ON READER CARD

AMPEX CORP.
Redwood City, Calif.
WINCHESTER DRIVE
Booth A1034

This vendor will introduce Centaurus, a new line of 14-inch Winchester disk drives offering up to 825MB of performance in a rack-mountable configuration.

The products will offer the Oem with 330MB, 660MB, or 825MB of unformatted capacity. All three models offer an average access time of less than 25 msec using a linear voice coil actuator in a closed loop dedicated servo system. Other features include a direct drive DC spindle motor, built-in tester, universal AC power supply, automatic spindle/cartridge locks, and SMD interface with dual port capabilities.

The units support the data transfer rate of 1.859MBps while maintaining the standard SMD interface protocol. Track capacity is increased to 40,320 bytes per track with a 50% increase in the data transfer rate, the vendor says.

The units use conventional ferrite heads and oxide media are employed. The drives support densities of 960 tpi and 12,500 tpi. All the models are equipped with a control panel that permits off-line test and diagnostic functions without the need for external test equipment. Status and fault codes appear on a four-character display, while test selection is accomplished via keyboard entry. The Centaurus Model 825 is priced at $8,250 in Oem quantities.

FOR DATA CIRCLE 401 ON READER CARD

ANN ARBOR TERMINALS
Ann Arbor, Mich.
TERMINALS
Booth A1826-1920

This vendor will introduce its current line of terminals in new, ergonomic enclosures and serial keyboards. The entire line of ANSI standard and graphics
terminals will be housed in this new package. Terminals to be featured in the new housing include the Genic, Genic Plus, Ambassador, Graphics Master, Guru.

FOR DATA CIRCLE 402 ON READER CARD

AUDIOTRONICS CO.
North Hollywood, Calif.
CRT DATA DISPLAY
Booth A1434

The 14dh981 is a color crt data display terminal. It has a 14-inch diagonal screen with a deflection angle of 90 degrees. Its usable display is 210mm by 280mm, and has a resolution of 720 dots by 396 lines. The video bandwidth is 25 mHz. Its power consumption is 75 watts. It has a D-type, nine-pin interface connector, and weighs approximately 25 pounds. The unit is available in kit form or integrated neck-mount format and costs between $400 and $500 in quantities.

FOR DATA CIRCLE 403 ON READER CARD

BATELLE SOFTWARE PRODUCTS CENTER
Columbus, Ohio
RELATIONAL DBMS
Booth C4336

DM is a database management system designed to take advantage of the relational access method, while storing the data in "flat files" or relations that let users work with two-dimensional tables. DM uses indexes that are independent from the data records to support the various data structures. Indexes are optimized for on-line retrieval, and any individual record can be directly accessed by using a key that uniquely identifies the record. It handles large textual as well as numeric databases, and supports both information center retrieval and transaction-oriented production environments.

The package is fully integrated by a multithreaded central processing kernel that handles up to 511 simultaneously executing programs manipulating up to 125 databases at a time. Each user may operate on as many as 10 data files at once. Each DM kernel can support up to 2,000 databases and 65,000 users. Depending on the installation's requirements and hardware configuration, up to nine additional copies of the kernel may operate in conjunction.

Components include a fundamental query and manipulation language, formatted screens with windows, a report writer with forms capability, COBOL and FORTRAN precompilers, high-volume loader, and a complete complement of system maintenance utilities. DM is currently available on DEC VAX minicomputers and will soon be available on IBM and CDC computers. The standard purchase price depends on the modules selected. Prices start at $29,000 for mini versions.

FOR DATA CIRCLE 404 ON READER CARD

BELDEN ELECTRONIC WIRE AND CABLE
Geneva, Ill.
DATA CABLES
Booth C4511-13-15-17

The 8162 series is a line of extended distance multipair data cable. The combination of low capacitance (12.5 pF/ft.) and shield effectiveness in these cables allows extended distance data transmission in EIA RS232 and RS422 applications. The series is part of the vendor's new standard line of multipair and multicore conductors.

The Belden 8162 series has 24 AWG conductors insulated with Dataene foamed polyolefin. Each pair is covered with a Beldfoil shield to reduce crosstalk and improve signal integrity between pairs.

The cables have a braid shield and a chrome PVC jacket. The series is made up of eleven cables with 2, 3, 4, 5, 6, 7, 8, 10, 18, and 25 pairs. A representative price for the Belden 8162 Series is $465 for 1,000 feet.

FOR DATA CIRCLE 405 ON READER CARD

CALIFORNIA SOFTWARE PRODUCTS INC.
Santa Ana, Calif.
RPG II SOFTWARE
Booth H822

Baby/36 is a software system developed for the IBM PC and PCXT that allows programs and systems written for the IBM System/36 to be transported to the PCXT where they may be executed as is.

The software may also be used as a standalone development system. The components include an RPG II compiler, operations control language processor, screen format generator, source entry utility, sort utility, workstation I/O, data exchange utility, and data file utility. Baby/36 sells for $3,500.

FOR DATA CIRCLE 406 ON READER CARD

CINCOM SYSTEMS
Cincinnati, Ohio
NETWORK MANAGEMENT
Booth A2434

Net/Master is a network management software system that integrates a multi-cpu, multi-application computer network into a single, integrated operating unit. Currently running under MVS and VS/1, Net/master realizes the full potential of the SNA and AC/F VTAM environment while protecting users from its complexities.

Users of the vendor's TIS relational database and application software can integrate multiple TIS installations on different cpu's operating systems, as well as link diverse teleprocessing applications. For example, Net/Master can integrate IMS, TSO, CICS, TIS-DC, and Environ/1 into one integrated network.

The product features include network security with user identification and password controls; multiple application interface so any terminal in the network can access other operating systems simultaneously; distributed processing services; activity logging; network error warning system; network operation facility; network partitioning facility; network command language; timer commands; multi-cpu network control facility; and broadcast services so the network operator can broadcast messages and stay in touch with terminal operators.

The system is designed for large corporations with complex, multisite networks. Net/Master costs $15,000. There is a one-time installation fee of $3,000. Lease and rental agreements are available from the vendor.

FOR DATA CIRCLE 407 ON READER CARD

CIPHER DATA PRODUCTS INC.
San Diego, Calif.
TAPE DRIVE
Booth 4118

This vendor introduces two GCR CacheTape products, the Model M990 and Model M991. Both incorporate cache technology and employ the standard Cipher 1/2-inch tape interface for hardware integration. The units have an error-free interface with outboard error (defect management) that relieves the host system from the performance-limiting tasks of handling media defects, the vendor says.

The M990 feature cache size of 128KB and a maximum transfer rate of 450Kbps. The M991 has a 256KB cache size and 790Kbps maximum transfer rate. Maximum block size is 32KB for the M990 and 64KB for the M991. The M991 features downstream erase, which eliminates tape repositioning on write error retries.

The 1/2-inch tape drives are 14 inches high and have front-loading and threading design along with a front-panel work display for operators and service maintenance messages. The M990 is priced between $6,000 and $7,000. The M991 costs between $7,000 and $8,000.

FOR DATA CIRCLE 408 ON READER CARD
Infinite possibilities in finite element analysis.

Now there's a better, and much faster way to analyze any kind of structure at the model stage. It not only cuts the time spent in testing, it also helps define those tests, and reduces the number of prototypes that need to be built. In short, it's a more rational approach to prototype testing. It's called MSC/NASTRAN.

MSC/NASTRAN is a comprehensive, easy-to-use computer program that solves a wide variety of engineering analysis problems using the industry-accepted finite element method. It's currently operational on more than 450 computers.

MSC/NASTRAN has gained worldwide acceptance in such diverse industries as automotive, civil engineering, ship-building, off-shore oil, and computer.

MSC/NASTRAN has been used for precise vibration, buckling and thermal analysis in the design of oil drilling platforms. It's been used to analyze the design for fabricating the Marlboro McLaren International Formula I composite MP4 race car chassis. It's provided detailed heat transfer calculations for gas turbine engines in Cessna jet aircraft. And it greatly simplified the analysis required to prove the structural integrity of Priam's disc drive base casting and spindle assembly.

So, if you want more flexibility and creativity in your designs, if you want your product more competitive, and on the market sooner, MSC/NASTRAN can put you on the right track fast.

For a free folio covering MSC/NASTRAN capabilities including non-linear, heat transfer, composites and more, contact us at: The MacNeal-Schwendler Corporation, 815 Colorado Blvd., Los Angeles, CA 90041. 213-259-9111. Telex: 4720462 MSC.

*NASTRAN® is a registered trademark of the National Aeronautics and Space Administration. MSC and MSC/NASTRAN are service and trademarks of The MacNeal-Schwendler Corporation.
Hewlett-Packard surge in office

Discover the Personal

It's a place where personal computers, office software and distributed computer systems merge. As a result, people find their individual productivity surging to new heights.

The Touchscreen Personal Computer — the HP 150 is a key part of the Center. It's made personal computing much easier and faster. And now we've combined its flexibility with the versatility of the latest office software and the power of our HP 3000 family of distributed computer systems.

Each Personal Productivity Center can be shaped just the way you want it by adding other office and computing products from our extensive range. You can link managerial and secretarial workstations. Create impressive presentations, merging business graphics and word processing. Store everything on disc files. And get finished copy from laser printers and color plotters.

Your people will also have access to a greater variety of software. Besides the leading PC programs like 1-2-3™ from Lotus™ and popular word processing
packages, they can use HP 3000 software like our exclusive DeskManager. This combines electronic mail, quick memo writing, personal filing and calendar functions.

Through a Personal Productivity Center, people can interact with similar networks in other parts of your company, as well as your mainframe. And, as you grow, these Centers can expand to handle more than 100 workstations. Without any software conversion.

So if PCs alone are making your people more productive, just wait till you see them all working together. And you can see them right now by calling your local HP sales office listed in the white pages. Ask for a demonstration, and check out our special offer in effect through July 31. Or write for complete information to Hewlett-Packard, Dept. 004191, 19447 Prunemedge Avenue, Cupertino, CA 95014.

Productivity. Not promises.

HEWLETT PACKARD
COMPUPRO
Hayward, Calif.
MICROCOMPUTER SYSTEM
Booth H854
The System 816/G is an IEEE 696-compatible, NS16032-based microcomputer. The unit is based on National Semiconductor's 6MHz cpu, with NS16202 ICH and NS16082 MMU. It also features 512KB of 16-bit static memory, expandable to 16MB, 12 serial ports, one Centronics printer port, one parallel port, 1.2MB of floppy disk storage, 40MB of hard disk storage, and 1.5MB of MDrive/H solid-state disk storage.

Software provided includes Unix version 4.2, Unix C, and Unix FORTRAN programming languages. The System 816/G costs $20,000.

FOR DATA CIRCLE 409 ON READER CARD

COMPUTER-LINK CORP.
Burlington, Mass.
TAPE MAINTENANCE SYSTEM
Booth A1232/1234
The Series 3000 Tape Cleaner/Evaluator is a tape maintenance system that utilizes a microprocessor and permits preprogrammed error limits, tape lengths, leader lengths, and stripping lengths to provide one-button maintenance. The unit automatically analyzes test results and positions the tape to the optimum stripping location. The user select mode allows operators to preselect all tape acceptance criteria to customize to the user's specifications.

This tape evaluator utilizes a crt screen, and visually allows checking of results, programmed criteria, and operator checks. In addition to a summary of errors shown on the cft screen, a microprocessor-controlled printer shows exact location, within each foot, of all types of computer errors, e.g., one track, two track, three track, edge, gross, permanent write errors, and write skips.

If a tape doesn't meet the error acceptance levels, the unit automatically analyzes the acceptance levels compared with actual error levels and automatically aborts the test. The Series 3000 Tape Cleaner/Evaluator costs $18,000.

FOR DATA CIRCLE 410 ON READER CARD

COMPUTER POWER SYSTEMS INC.
Los Angeles, Calif.
CONTROL SYSTEM
Booth 4282
This environmental monitoring system is for use with small and large computer mainframes. The Environmental Data Acquisition and Control System (EDACS), microprocessor controller of the vendor's new 4000 series of power distribution and regulation peripherals, provides computer users with a sophisticated, electronic data acquisition monitoring system through which the entire computer room environment can be managed.

The control provides a method of collecting data on all aspects of the computer room. The user selects the environmental functions most appropriate to the computer operation before the system is delivered. These functions are then programmed into EDACS to create a custom-designed environmental monitoring system. Once on-site, additional programming by the user is also possible using the microprocessor-based, interactive capabilities of the system. For example, new halon zones can be added to the system as required.

Because the Series 4000 provides an active response to out-of-tolerance conditions, the user can operate a completely unattended computer room if desired, according to the vendor. The system is based on CMOS components and has full battery backup power. The system's interface includes a 320-character LCD display unit and a 16-key user keyboard for interactive communication. The displays are in formats using common dp language terms. An optional 40-character data logger line printer is available as well as full mainframe and remote diagnostic communications. The Series 4000 product line is priced from $7,000 to $30,000, depending on configuration.

FOR DATA CIRCLE 411 ON READER CARD

DATARAM CORP.
Cranbury, N.J.
GRAPHICS CONTROLLER
Booth 1314
This vendor will introduce the gc-20 Graphics Controller for use with monitors on DEC's LSI-11 minicomputers. The unit consists of two standard DEC quad boards, the GI-20 graphics interface board and the RM-20 refresh memory board.

The GC-20 generates a 1,024 by 1,024 interlaced image, with four bits per pixel. It emulates the Tektronix 4010, 4014, and 4065 terminals. Emulation is also provided for DEC's VT-100 alphanumeric terminal and Remote Data Base Interface (RDBI) protocol support provides emulation for the VT-125 and VT-240 graphics terminals.

The unit can operate in either a programed I/O or a DMA mode. It uses an onboard 68000 microprocessor, supported by a 128KB scratchpad RAM and a 128KB EPROM firmware set. The controller uses a rear edge cable to interface to the RM-20. The RM-20 contains four 7200 VLSI graphics controllers, each of which drives one of four 1,024 x 1,024 planes. One 7220 per plane allows modifications of entire pixels, rather than individual bits, with a single memory update, according to the vendor.

Vectors, circles, and arcs are drawn at a rate in excess of one million pixels per second. Four bits per pixel provide for the simultaneous display of 16 colors from a palette of 4,096 colors. Zoom capability from 2X to 16X is provided, and the pan is smooth vertically and coarse horizontally.

The text capability provides four screens of 64 lines by 80 characters. Blind and underline features are also provided. Four Rs232 serial ports are standard and can be used to support required peripherals. Current and voltage requirements are 9.6 amps on +5.0 volts and 0.4 amps on +12 volts. Six coax-to-BNC cables, up to 75 feet each, can be used. The GC-20 Graphics Controller is $5,900 in single quantity.

FOR DATA CIRCLE 412 ON READER CARD

DIGITAL PATHWAYS INC.
Palo Alto, Calif.
PROTOCOL CONVERTER
Booth C3130
The Defender II/Is protocol converter allows asynchronous ASCII terminals to communicate with an IBM or equivalent host computer using SNA/SDLC or BSC protocols. The unit has full screen mapping, maintenance of an internal image buffer, operation of remote full screen applications at low baud rates, menu-driven setup capabilities, backup memory, and support of terminals with full color and extended highlighting features.

The device supports over 100 types of asynchronous terminals. The protocol converter, installed in the Defender II/Is chassis, is available in an eight port configuration and sells for $5,500.

FOR DATA CIRCLE 413 ON READER CARD

FUJI PHOTO FILM U.S.A. INC.
New York, N.Y.
FLOPPY DISKS
Booth B3315 and B3317
This vendor will introduce its full line of floppy disk products to the American market. These include the FD Series 8-inch standard, MD and MH series of 5 1/4-inch hard and soft sector mini, and the 3 1/2-inch micro, and 3-
When your ANSI needs are multiplying, we'll be there.

Qume's QVT 103, an ANSI terminal lets you expand your system without the usual growing pains. You get full compatibility with Digital's VT 100 series for a lot less money. You can be sure of high reliability, thanks to Qume's advanced engineering and stringent quality control. And with our nationwide service network, support is always just a short hop away.

Best of all, there's Qume's experience and stability as a member of the ITT family. As your needs grow in the years ahead, we'll be there.

For complete details on the QVT 103 and our full line of alphanumeric and graphics terminals, call (800) 223-2479. Or write Qume Corporation, 2350 Qume Drive, San Jose, CA 95131.

*For the American National Standard for Terminals, ANSI X3.61-1975 and the X3.64-1973.*

©1982 Qume Corporation

CIRCLE 61 ON READER CARD
THIS YEAR, WARE THE HOTTEST NUMBERS IN SYSTEMS SOFTWARE.

Ware UCC-1. And step into the future with systems software so complete and totally integrated, you'll never again ware anything else. Because this year, more than ever before... UCC-1's got your number.

UCC-7. Incredible. A production workload management system that surpasses all others. Real-time feedback responds to your immediate needs and addresses all areas of production control. Designed to fit all data centers, UCC-7 is available in three different sizes: small (UCC-7 Basic), medium (UCC-7 and large (UCC-7 with RIT). And there's more... UCC-7 makes another hot number especially designed to work with UCC-7 UCC-11. An automated job management system that provides comprehensive job tracking and makes reruns and restarts a breeze. Ware it with UCC-7 and your data center will almost run itself.

UCC-1. The tape management industry standard. UCC-1 virtually eliminates data losses while improving operating productivity. A companion to UCC-1, UCC-1/VMTAPE extends all facilities of UCC-1 to the CMS user.

UCC-3. A comprehensive DASD management system designed to work with UCC-1. Automated facilities promote efficient usage, enforce space allocations, and provide tools for complete analysis and maintenance of the DASD environment.

UCC-9. A unique software product which can ensure high levels of vendor support, reduce hardware failure and get the most out of each hardware dollar.
UCC-10: A Data Dictionary/Manager which automates the communication and control needed to effectively manage the IMS data base operation.

UCC-8: An online, integrated system designed to manage the complex support activities of today's data centers. Key areas of use are: problem management, change management, customer support, inventory management and TP network control.

UCC-2 (DUO): In a class by itself. UCC-2 helps you move from DOS to MVS with minimal effort. More than 1,000 data centers worldwide have found that UCC-2 is the easy way to get to MVS and IBM agrees.

UCC-20: An OS JCL Generator which works in conjunction with UCC-2 to ease the transition to OS.

Oops. UCC-4. UCCEL's newest hot number, is not quite ready yet. But when it is, this unique hardware accounting system will take the industry by storm. So were the hottest numbers in systems software. Were UCCEL. Because this year, more than ever before... UCCEL's got your number.

Systems software that makes you look good.

FORERL SY UCC
UNIVERSITY COMPUTING COMPANY.
UCCEL Corporation, UCCEL Tower,
Exchange Park, Dallas, Texas 75235
UCCEL is a trademark of UCCEL Corporation.
1-800-UCCEL-1234
inch compact floppy disks.

Employing the vendor's three-dimensional RD Binder System, the company offers heavy-duty floppy disks that meet or exceed international industry standards, including IBM, Shugart, ANSI, ECMA, ISO, and JIS, the vendor says.

The disks feature a metal shutter on the head window that automatically opens when the disk is inserted into the disk drive and closes when removed. The products have a write/protect mechanism, which features a sliding tab that when open exposes a write/protect notch, thus preventing the accidental erasure of data. When the tab is slid shut, new data can be written. The disks are also equipped with a durable hub ring, made of special plastic on the compact disk and metal on the micro disks.

In addition, the vendor says the floppy disks perform superi­orly even after 10 million passes under extreme temperature and humidity conditions. The vendor certifies that every track is guaranteed to be error­free. The floppy disks are engineered to mi­cron tolerances of 1/1,000mm.

The 3 1/2-inch micro floppy disk has a recording capacity of 500KB one side (un­formatted) and 1,000KB two side (unformatted). It has a data transfer rate of 200Kbps and a track density of 135 tpi at 80 tracks and 67 1/2 tpi at 40 tracks. The recording density is 8.717 (side 1).

The 3-inch compact floppy disk has a recording capacity of 250KB one side (unformatted) and 500KB two side (unformatted). It has a data transfer rate of 250Kbps and a recording density of 9.0. Track density is 100 tpi and the number of tracks per side is 40.

The 5 1/4 floppy disk MD-2D has the same recording capacity, data transfer rate, and number of tracks as the 3-inch compact floppy. Track density is 48 tpi and the recording density is 5.876 (side 1). Prices for all the floppy disk products start at approximately $5 for single quantities.

FOR DATA CIRCLE 415 ON READER CARD

NCC PRODUCT PREVIEW

Genicom Corp.
Waynesboro, Va.
PRINTERS
Booth C3308

The Genicom 4000 models operate at speeds from 300 lpm to 600 lpm and incorporate a resonant print module system with three printing modes: draft, NLQ, and graphics/plotting. The units are available with standard serial and parallel interfaces and are designed for high-throughput, heavy-duty cycle printing operations.

Some of the other features include character expansion printing, automatic bold and underline printing, automatic superscripts and subscripts, nine popular barcodes, and the capability to download characters. There is also a software interface package for the Diablo 630, Epson mX80, Graftrax Plus, and plug-in type fonts with faces such as Courier, Italic, and OCR A and B as well as a plug-in system to add additional line buffing up to 6.144KB.

FOR DATA CIRCLE 416 ON READER CARD

GIMIX INC.
Chicago, Ill.
C DEVELOPMENT SYSTEM
Booth B4016-4018

The GIMIX 6809 CPU III performs high-speed DMA transfers from memory to memory and uses memory attributes and illegal instruction traps to protect the system and users from program crashes. If a user program crashes, only that user is affected. Other users are left undisturbed.

Intelligent serial I/O boards reduce system overhead by handling routine I/O functions, thus freeing the host computer for running user programs. This improves overall system performance and allows user terminals to be run at up to 19.2K baud, the vendor says.

The system also includes 1MB of CMOS static RAM, a 72MB hard disk drive, a 6MB removable pack hard disk drive, and a 96 tpi double sided, double density floppy disk drive.

The C compiler runs under OS-9, a Unix-like multi-user, multitasking operating system. Also included is an editor, assembler, debugger, Basic69, RMS, DD, and Flex. The system costs $19,000.

FOR DATA CIRCLE 418 ON READER CARD

INNOVATIVE ELECTRONICS INC.
Miami, Fla.
PROCESSOR/CONCENTRATOR
Booth A1333

The Netmaster is a multifunction microprocessor-based concentrator providing IBM SNA conversion to NCR Poll/Select in a credit card inquiry/data entry network. The system consists of an IBM SNA host with a front-end processor, leased communications line, one or more netmasters (per location), and one or more NCR controllers connected to point-of-sale terminals (POSTS). The general purpose of the network is to connect distributed POSTS to a host for credit authorization and data collection, in conjunction with the CICS application programs.

Functions of the Netmaster in the network include SNA/SALC to NCR poll/selection conversion, preprocessing POST data in-bound and outbound to reduce mainframe processing, packing and unpacking 3270 virtual screens, and providing mass storage of print data so mainframe pacing is not required.

Standard features include a 16-bit microprocessor, 32KB EPROM, 256KB RAM, seven segment displays, three status LEDs, and up to four communications ports. Local storage options include one to four 320KB floppy disk drives, one to four 640KB floppy disk drives, and up to a 5MB Winchester hard disk. The SNA Netmaster costs $3,000.

FOR DATA CIRCLE 419 ON READER CARD

INTERSTATE VOICE PRODUCTS
Orange, Calif.
SPEECH RECOGNITION BOARD
Booth B3628-B3632

This speech recognition board (SRB) is custom designed for the IBM PC and PC XT Personal Computers. The SRB is a plug-in printed circuit board that contains all analog-to-digital, processing, memory, and I/O interfaces needed to convert the spoken work to digital code.

The board incorporates a 16-bit Intel 8086 microprocessor as well as 128KB of dynamic RAM, and 32KB of EPROM (expandable to 64KB). The unit incorporates the vendor's proprietary ASA-16 spectrum analysis chip, which converts speech input from sound waves into spectral patterns.

The SRB comes equipped with a menu-based utility program, including a set of subroutine written in BASIC and supplied in source code. The program prompts its user with questions and instructions via the PC's display. A help display is available at each menu level.

Instructions are spoken in English, transmitted through a microphone, and converted by the SRB's audio spectrum analyzer from sound waves into spectral patterns representing the time and frequency characteristics of each utterance. Through a process of coding, compressing, and dynamic programming techniques, the voice recognizer translates the spectral data into binary patterns, which are then compared with previously stored reference patterns to determine the actual word spoken.

The system uses speaker-dependent, isolated word technology. To acquaint the voice recognizer with speech characteristics of a particular voice, the system must initially be trained by a speaker so that it understands each of the words uttered by that particular speaker.
WITH RAMIS II ENGLISH,
THE COMPUTER HAS FINALLY
LEARNED YOUR LANGUAGE.

Now, you can talk to your computer the way you talk to a colleague: in plain English.

Even if you've never been on speaking terms with a computer, RAMIS II's advanced knowledge-based technology lets you ask questions, obtain answers, even create reports in only a few minutes. As a result, you can work more effectively and productively-without having to learn a specialized computer language. You just use English.

RAMIS II: ARTIFICIAL INTELLIGENCE THAT DELIVERS REAL PRODUCTIVITY.

RAMIS II English combines years of research by Mathematica in linguistics and artificial intelligence with proven expertise in developing practical, easy-to-use software products. The result is maximum fluency with minimum demands on support staff. In fact, while other systems require days or weeks of dictionary setup for each application, the extensive built-in knowledge base of RAMIS II English provides immediate access to most data.

RAMIS II English enables you to access data directly, without costly and time-consuming downloading or reformatting; so the latest information is always available. Wherever your data is stored—in RAMIS II databases; in ADABAS, IMS, TOTAL, or IDMS databases; or in VSAM or sequential files—there's only one language you need to know: English. And, because English comprehension is an integral part of RAMIS II, you have full access to all of its fourth-generation capabilities, from powerful reporting and analysis to full color business graphics.

THE BENEFITS OF RAMIS II ENGLISH SPEAK FOR THEMSELVES.

Teaching the computer to speak your language is the best way to put the vast power of today's computer systems directly into the hands of every user from every department. RAMIS II English is one more powerful demonstration by Mathematica of the increased productivity available through RAMIS II—the real leader in complete software for business.

RAMIS II ENGLISH MAKES IT EASY TO UNDERSTAND WHY WE'RE THE REAL LEADER IN COMPLETE SOFTWARE FOR BUSINESS.

Let RAMIS II English speak for itself. See it in action at one of our regional Product Demonstration Centers. For more information, contact your local Mathematica office, call toll free (800) 257-5171, or return the coupon below.

MATHEMATICA PRODUCTS GROUP

A MARTIN MARIETTA DATA SYSTEMS COMPANY
P.O. Box 2392
Princeton, NJ 08540

I'd like to see a demonstration of RAMIS II English
Please send a brochure describing RAMIS II English

Name
Title
Company
Address
Telephone
Computer Operating System

CIRCLE 53 ON READER CARD
As an extension of yourself, your networked PC helps you become a better business consultant, secretary, messenger, meeting planner, graphic artist, author, financial analyst, executive, and friend.

You're probably getting a lot out of your PC. But you'll never realize its full potential until you get a 3Com EtherSeries network. It takes about an hour to connect. Then you and your PC take on a series of exciting new personalities.

Our award-winning EtherMail puts you in touch with everyone else on the network. So you can reach out with electronic memos, notes, reports and gentle reminders about meetings and the boss' birthday, without worrying about them getting lost in the paper shuffle. You improve the quality of your business life through sharing.

Avoiding duplicate work makes more people using the same printers, plotters and disk storage, the cost goes down. And you can afford better peripherals. So the content and appearance of your work improves.

Sharing a wealth of information

All the leading software packages you're running now become even more useful by sharing data among them. Whether it's 1-2-3 from Lotus, WordStar, VisiCalc, dBase II, MultiPlan or you name it, you get more out of each program by using information other people are putting in.
you, individually, far more productive. Multiply that extra efficiency by everyone in the network, and productivity increases company-wide.

EtherSeries: for your personal best Ethernet has been widely adopted by computer companies as a networking standard. And we've made it even better with the hardware and software packages that make up EtherSeries. Our approach is the choice of Hewlett-Packard, Texas Instruments and Zenith for their own network products. As well as hundreds of companies using IBM PCs and most compatibles, such as Compaq, "TeleVideo" and Eagle. Now we've made it easier for you to get the fastest, most flexible PC network going. Our prices are about the same as the slower, less powerful networks. And we've just introduced two new products that save you money. One lets you use diskless PCs. The other allows a PC to act as the network server and workstation at the same time.

To learn more, send for EtherGuide, our networking seminar-on-a-diskette. Or check the box for complete information. Either way, you'll see how personal networking can help you do your personal best.

3Com
The personal networking people

☐ Send me your EtherGuide seminar diskette. Enclosed is my check for $10. (That's $10 off the usual $20 price.)

☐ Just send me more information. I'll let you know later if I want the diskette.

Name
Position
Company
Address
City/State/Zip
Phone

Mail to: 3Com Corporation, 1390 Shorebird Way, P.O. Box 7390, Mountain View, CA 94039. Attn: Corey Randall. (415) 961-9602.
The SRB operates in two modes. The keyboard mode simulates keystrokes based on speech input. The PC mode accommodates users who prefer to write their own application software incorporating speech input. In this mode, the user has over 50 commands available to control the SRB, although only a few are required in general use.

The SRB recognizes 240 utterances (words and short phrases) with an accuracy of approximately 99%, the vendor says. In addition to the utility program, the unit also comes equipped with a connecting cable, user’s manual, and a choice of either of two codes that are the same as the Diablo 100 API.

The disks have a density of 800 bpi from the unit will accept input from the voice recognition unit. The speech recognition Keyboard costs $1,500, and the vendor says volume discounts are available.

FOR DATA CIRCLE 422 ON READER CARD
LIEBERT CORP.
Columbus, Ohio
UPS SYSTEM
Booth A1722
The Programmed Power Center is designed to be an integral part of the data center environment. According to the vendor, the system is quiet, has a compact design, and is low in weight. With front access, the unit can be installed and serviced easier. It occupies minimal floor space. Additional access improvements facilitate customer access to terminals and other internal components.

A battery pack for the system can be placed next to the unit itself in the data center. Depending on requirements for battery backup time, this option eliminates the need for a remote battery room. The vendor says enhanced performance features offer a high level of safety, reliability, and efficiency. One benefit of the system’s high DC-AC conversion efficiency is reduced battery requirements.

The system is basically cost-effective in delivering watts per pound, watts per dollar, and watts per square foot, the vendor adds.

The Programmed Power Center is available for loads of 50 kVA to 200 kVA. The system can be configured in a redundant, parallel, or parallel redundant mode. System costs range from $75,000 to $120,000.

FOR DATA CIRCLE 423 ON READER CARD
MEGADATA CORP.
Bohemia, N.Y.
INTELLIGENT TERMINAL
Booth C4036
The Model 8188-7 VIT is an intelligent terminal configured for user-selectable emulation of Univac UTSc-400, U100/200, and IBM 3271/3277. Also included is TTY emulation for communication with Unix-based systems. An alternate operating system is available for CP/M-80 and will soon be available for MS/DOS.

The VIT utilizes a Motorola 68000 microprocessor with 128KB of memory and 1,024KB of RAM, which provides two RS232 host interfaces and one printer interface. Options include a serial printer and dual floppy disk drive. The Model...
Isn’t it about time for the next milestone in office information systems?
Motorola/Four-Phase introduces
The 6000 Series - a new milestone.

A milestone for new standards in office information systems from the company that started it all.

From the moment Four-Phase introduced the world's first all-LSI computer in 1970, we have consistently presented the industry with innovative hardware and software products to help make business more profitable and productive.

Today, as a member of the Motorola Information Systems Group, Four-Phase once again unveils another milestone in information processing - the new 6000 family of office information systems. Compact, powerful processing units and flexible, capable software have been fused together into a family of systems that deliver maximum results today, with substantial expansion capabilities for tomorrow.

Technology for the real world.
Motorola/Four-Phase systems are tough enough and smart enough to deal with the real world - where speed, power, and reliability in a multi-user environment are prime considerations. The new 6000 systems feature the high-performance 32-bit Motorola 68010 CPU and an operating system derived from UNIX* System V under license from AT&T. We created
integrated system software that combines these two industry standards into a powerful, multi-user, multi-tasking environment that can stand up to practically any application.

There are two systems in the 6000 family. The 6300 supports 1-8 users, making it perfect for the smaller user or a remote office. The 6600 is a high-performance system designed to support up to 128 users. Both systems offer complete and integrated solutions—whether they’re working in an operations-oriented environment where efficiency and precision are needed, or a results-oriented environment where flexibility and quality are key.

Service and support to match our technology.

At Motorola/Four-Phase, our commitment to you goes beyond providing quality, high-performance hardware and software. Support is just as important. Our award-winning Customer Support Operation is staffed with over 1,400 customer support specialists in over 175 cities across the nation. One phone call to our Operations Center will ensure prompt response from the nearest available specialist. And you can call the Center 24 hours a day, 365 days a year.

If you’re a DP/MIS manager or OEM, find out what the latest milestone in office systems can mean to you. Contact Motorola/Four-Phase today at 1-800-528-6050, ext. 1599. In Arizona, call 1-600-352-0458, ext. 1599. Or write us at 10700 North De Anza Blvd., M/S 52-3B1, Dept. S., Cupertino, CA 95014.

Motorola and @ are registered trademarks of Motorola Inc. Four-Phase is a registered trademark of Four-Phase Systems, Inc. "UNIX" is a trademark of AT&T Bell Telephone Laboratories, Inc.
The MT-2210 and MEGATAPE and employ a book-sized cartridge of 1/2-inch wide magnetic recording tape but differ in physical packaging.

Both drives operate in a 200 ips or 50 ips streaming mode and a 50 ips start/stop mode. The data transfer rate at 200 ips is 240 Kbps. When operating at 200 ips, the units are capable of backing up or restoring 500MB in 36 minutes, the vendor says.

A 24-track, bit serial, serpentine format is employed along with a packing density of 9,600 bpi (12,000 fpi). Data is encoded into a 4/5 GCR format. All encoding and decoding of data is accomplished in the integral formatter and is totally transparent to the controller. The formatter accepts byte-wide data from the controller and encodes it into bit serial data during a write operation. During a read operation, data is decoded and presented to the controller as a 9-bit byte (eight data bits plus odd vertical parity).

The 24-track serpentine format is achieved through the use of a two track read/write head assembly, which is stepped 12 times to create 24 tracks. A true read-after-write operation is performed during the write mode to ensure data reliability. The vendor says a record stored in the cartridge can be accessed in an average time of 30 seconds.

The drives incorporate a positive loading mechanism with a three-point reference to a record positioner of the cartridge, which employs precision tape guides on either side of the head and a simple tape path so only the heads touch the oxide surface. A calibration track is written on the tape if one was not previously written. During a subsequent read operation on the same or another drive, the calibration track is read and internal logic positions the head at the optimum position for data recovery from that particular cartridge. The M-2210 costs $5,500 and the M-2220 sells for $5,750.

According to the vendor, the company went with EDSI controllers because of the products' popularity. The 1353 (85MB) costs $1,500, the 1354 (127MB) costs $1,700, and the 1355 (170MB) retails for $1,800. All prices are in oem quantities.

The 3.24-pound drive features a self-diagnostics system which continuously monitors the unit's operation. Selection of the drive is indicated by a red LED located on the front panel. In the event of an error, a green LED indicates the exact error that occurred via a 4-bit flashing code. The HH-725 costs $1,000.

The HH-725 is a 5¼-inch Winchester disk drive designed as a half-height solution for microcomputers, including portables, for a wide range of applications. The hard disk provides 25.6MB of unformatted storage. A closed-loop servo positioning system centers the head in the data track regardless of thermal expansion or hysteresis of the stepper motor. A stepper motor, which half-steps at 0.9 degrees, allows microstepping to keep the head on track.

A single printed circuit board contains all drive electronics, and uses LSI circuitry to reduce the amount of generated heat. All drive control functions are performed by a single microprocessor. An access time of 80 msec is achieved through a buffered seek.

Features of the terminal include 16 user-definable function keys, bidirectional pass-through printer port, five video attributes, double high, double wide characters in landscape mode, scroll in landscape mode, editing keypad, nonvolatile set up mode, alternate character generator, 25th status line, five keyboard LEDs, block mode with protected fields, settable tabs, settable margin bell, and P-4, P-31, or amber phosphor.
A New Way of Seeing Your Network
A New Way of Controlling Your Network
A New Way of Improving Your Network

AUTOSCOPE
is a Completely New Way of
○ Monitoring
○ Measuring Performance
○ Compiling Statistics
○ Alarming
○ Analyzing
○ Emulating

AUTOSCOPE
is the Ultimate in Simplicity of Use,
the Most Intelligent Monitor/Analyzer/Emulator
Ever Developed
for Asynchronous, Bisynchronous, SDLC/HDLCE, X.25, SNA, X.21 and Others.

AUTOSCOPE
from an Innovative New Company
Formed by the Data Communications Industry's
Most Experienced Test Equipment Professionals.
OUR BUS WON'T GET STUCK IN TRAFFIC. EVER.

There are always more channels than users on your ROLM® CBX II business communication system. (Our ten-thousand-user system has more than twenty-three thousand channels to handle voice and data.) No blocking at any time. Ever.

And, thanks to its parallel bus and about 4½ billion bits per second system bandwidth, the CBX II lets you network a whole company full of common digital critters — telephones and terminals — plus all the latest high-performance devices: PCs, word processors, graphics terminals and computers. You can even network networks.

On one system, ROLM can deliver voice and data to the desk at speeds well beyond the much-discussed 56Kbps. CBX II's advanced architecture gives you hundreds of kilobits, using existing telephone wire;
megabits, using other media. Try that on your favorite serial architecture.

*Are the steps killing you? Take the Ramp.*

CBX II is a breakthrough communications controller. It's the centerpiece for a totally digital, absolutely expandable communications system. Instead of the typical stops and starts of expansion, CBX II lets you grow smoothly, easily and very, very cost-effectively. You move up the ROLM Ramp with each new need for voice and data management. And you do it all on one system.

If you want to know how fast, how far a business communications system can go, don't miss the bus.

4900 Old Ironsides Drive, M/S 626, Santa Clara, CA 95050

CIRCLE 57 ON READER CARD
Mr. Chips is a multifunction card that adds memory, printer ports, and a clock to the IBM PC. Every card comes with software for RAM disk and printer spooling.

Some of the features of the multifunction card include a parallel port, serial port, 64KB to 256KB of RAM, clock/calendar, dual and control equipment like thermostats, game port, real world interface to monitor AC line controller to control electrical devices, Chipdisk RAM disk to set the memory to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a device to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a spooler for the PC memory will serve as a to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a spooler for the PC memory will serve as a to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a spooler for the PC memory will serve as a to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a spooler for the PC memory will serve as a to act like a disk drive, and the Chipdisk print spooler for the PC memory will serve as a spooler. For business, scientific, or industrial applications, the printer plots at 100 by 100 dots per inch and is compatible with leading graphics software packages. The MVO 150B carries a suggested end-user price of $3,750.

FOR DATA CIRCLE 429 ON READER CARD

QUALITY MICRO SYSTEMS INC.
Mobile, Ala.
NONIMPACT PRINTER

The Lasergrafix 800 Model II is a low-end addition to this vendor's line of intelligent, nonimpact page printers. It is an eight-page-per-minute word processing printer with limited graphics capabilities. It is based on the Canon LBP-CX print engine with a QMS raster image processor. The printer has a resolution of 90,000 dots per square inch, and is seen as a daisywheel replacement printer for the office automation environment. The Lasergrafix 800 Model II ranges in price from $5,000 to $6,000.

FOR DATA CIRCLE 432 ON READER CARD

RANDOMEX DATA MAINTENANCE INC.
Signal Hill, Calif.
AUTOMATIC DISK CARTRIDGE CLEANER A1039-1041

The Model 850 is a combination disk cartridge cleaner that cleans CMF (Phoenix 1204) cartridges, front-loading cartridges and top-loading cartridges .05 inches to .075 inches.

According to the vendor, the unit utilizes a three-step purging action. It brushes loads with proprietary MMS cleaning solution, which emulsifies and floats away oily contaminants, and moves to the inner edge of the disk. The brushes then move outward, and are rinsed with filtered solution.

According to the vendor, the unit was drive manufacturer tested to a 9-micro-inch clean level—half the read/write head flying height. The operation of the machine involves mounting the cartridge and pressing the cycle switch, which begins a four minute cycle. Disks are ready for immediate use. Disk release button eases removal of the cartridge from spindle, and eliminates jarring. Optiona}
Tally Technology

No other 600 LPM line printer is engineered like a Tally. So nothing else performs like a Tally. Or prints like a Tally.

► The proof's on paper.
► Everything from high volume report printing to high resolution graphics. And a quality, fully formed look for correspondence.
► All in one machine. All the result of Tally technology. Like the MT660's innovative hammer bank and linear “shuttle” system that perfectly positions every impression and prints with uniform impact.

► There's also more than enough resident intelligence and paper handling versatility to make programming shortcuts easy. For operator convenience, status reports are illuminated on a scrolling display. And it's quiet enough—at 60 dBA—to go almost unnoticed.
► Precision printing at its reliable and repeatable best. From Mannesmann Tally.
► For more information on the world's most advanced, most productive line printers call now: (206) 251-5524. MANNESMANN TALLY

Precision dot placement and innovative engineering make Mannesmann Tally today's leader in computer printer technology.
A sure cure for the problem of information bottleneck.

Programming backlog is the source of the problem. Eliminate it, and you eliminate the bottleneck.

Which is precisely what Sperry has done with the MAPPER™ System.

With MAPPER, you work with the computer directly. You ask questions in plain English. And you get immediate answers.

And if the information you get raises other questions, you can ask them right away. With no delay for programming. Or reprogramming.

MAPPER is that powerful. It allows you to manipulate information in almost any way you want. And, interesting to note, it can even help your programmers become more productive.

AN AFFORDABLE SYSTEM. You don’t have to be a large company to have a MAPPER System. MAPPER can be scaled to the real and present needs of just about any size company. The cost of a MAPPER System makes it practical for even a department.

Visit Booth C-4088 at the NCC Show.
within a company to own its own system. Or you can time-share through a Sperry service bureau.

What you get for your money is a whole new order of efficiency in your day-to-day management tasks. Because you'll have the information you need right at your fingertips. Literally.

SEEING IS BELIEVING.

We've made some promises here that may sound extravagant. But if anything, our claims are on the conservative side. And to prove it, we offer you the opportunity to see a demonstration of MAPPER at work.

800-535-3232

But first, you might want to look over our MAPPER brochure. A copy is yours for the asking. Call toll-Free:

800-535-3232 Or send us the coupon.

<table>
<thead>
<tr>
<th>Sperry Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Systems</td>
</tr>
<tr>
<td>Department 100</td>
</tr>
<tr>
<td>P.O. Box 500</td>
</tr>
<tr>
<td>Blue Bell, PA 19424-0024</td>
</tr>
</tbody>
</table>

Please send me a brochure on the MAPPER System.

DA7/1-72

Name__________________________

Title__________________________

Company_____________________

Address_______________________

City_______ State______ ZIP_____

Telephone_____________________

CIRCLE 80 ON READER CARD
SPECTRA LOGIC CORP.
Sunnyvale, Calif.
CONTROLLER
Booth A2122, A2124
The S120 is a fully emulating disk controller and tape coupler in a single printed circuit board. It is fully compliant with FCC regulations with Data General's recently introduced hardened chassis. The unit and its companion disk-only controller are capable of emulating both DG's 606X and 616X series of disk subsystems with virtually any SMD-type disk drives. The tape coupler emulates DG's 6021 tape subsystem. The S120 costs $4,500 in quantities of 50.

FOR DATA CIRCLE 436 ON READER CARD

TRANSEND CORP.
San Jose, Calif.
COMMUNICATIONS SOFTWARE
Booth C3698
This vendor is introducing two communications software packages. One is for the IBM Personal Computer and terminal communications package. The vendor's PC modem card is a plug-in Hayes-compatible modem. The Motorola Plus 68000, 68010, and 68020 processors are supported. The modem card is designed to be used with non-vendor modems. The vendor offers a 30-day free trial.

FOR DATA CIRCLE 437 ON READER CARD

VERBATIM CORP.
Sunnyvale, Calif.
FLOPPY DISK
Booth B4132
The DataLife 3½-inch Microdisk is protected in a permanent, non-removable hard plastic case. It has an autoshutter that protects the media from dust, debris, and fingerprints. When the disk is placed in a drive, the auto-shutter automatically opens for data reading and recording. The Microdisk can be used only in systems that have drives with an automatic shutter feature. It will not work in systems requiring the user to manually slide the shutter on the disk before inserting it into the drive.

At the center of the disk is a metal drive hub that holds media centered for accurate reading and writing. The device also has a write/protect feature. An adjustable window in the corner of the product works with the write/protect mechanism in the disk drive. With this window open, the data is protected from accidental erasure and overwriting. Close the window and the user is free to write to the microdisk.

Microdisk is a single-sided, double density unit. It is 70 tracks-compatible and works at 80 tracks/135 tracks per inch. It is compatible with several microcomputers that accept 3½-inch disks. It has a storage capacity (single side, double density) of 500KB. The Microdisks sell for $6 each.

FOR DATA CIRCLE 438 ON READER CARD

VERMONT RESEARCH CORP.
North Springfield, Vt.
HARD DISK SUBSYSTEM
Booth D3326-D3328
The 81MB is a fixed/removable hard disk subsystem designed for oems and systems integrators who are configuring systems around the Intel Multibus. The subsystem is designed for the Intel System 310 and operates under iRMX 86 or Xenix software.

The main system component is the WRC Model 8520 8-inch fixed/removable hard disk drive, which stores 10MB on a removable cartridge and 10MB on a fixed disk. The controller mounts in the CPU card cage. The system operates at 0°C to 55°C range.

FOR DATA CIRCLE 439 ON READER CARD

WOLF COMPUTER PERSONNEL TESTING
Oradell, N.J.
PC PROGRAMMING TEST
Booth A1106
This programming aptitude test is on a diskette that can be run on various microcomputers. Several of the vendor's tests will be available on 5½-inch disks to evaluate programming aptitude in several languages such as COBOL and BASIC.

Some of the advantages of this product, according to the vendor, are immediate evaluation in user departments of potential programmers, close simulation of work environment, programming to allow reading and execution of test questions, instructions, and a candidate's report is provided. The general programming aptitude test costs $200.

FOR DATA CIRCLE 440 ON READER CARD

ZAX CORP.
Irvine, Calif.
CIRCUIT EMULATOR
Booth H338
The ICD-178 In-Circuit Emulator is designed for the Motorola 68000 series of microprocessors. This standalone emulator emulates the 68000, 68008, and 68010 in one unit to 10MHz. It has 128KB of emulation memory expandable to 256KB.

It has a 4KB-deep by 48 bits-wide real-time trace buffer. The unit also features an external event probe for triggering logic analyzers. It has three hardware and eight software breakpoints. This unit can also be connected to the IBM PC with an optional software package that turns the PC into a complete development system for the 68000. The unit is 4.2 inches high by 8.2 inches deep by 11.8 inches wide and weighs less than 10 pounds. The ICD-178 68000 costs $8,000.

FOR DATA CIRCLE 441 ON READER CARD
Engineers have used the computer to automate every industry but their own.

Software engineers have developed the technology to automate the secretarial world, banking, printing, defense systems, manufacturing, communications... even the Stock Exchange. But here we sit in the dark ages in our own industry, still documenting with pencil and paper, still manually assimilating, still groping with the ambiguities of translating the original idea into written form.

Introducing TAGS™ Technology for the Automated Generation of Systems developed exclusively by Teledyne Brown Engineering.

TAGS is the first automated system designed specifically for the field of software development in order to give computer aided design (CAD) capabilities to the software engineer. It consists of a specific, unambiguous language called IORL® (Input/Output Requirements Language) and a series of software application packages that automate the system design process, documentation, configuration management, and static analysis of your system specification.

TAGS also permits computer simulation code to be generated automatically from the IORL specification which then provides for dynamic analysis, statistical evaluation and the fine tuning of system and application software long before your system is built and implemented—an automated capability never before afforded to the software engineer.

TAGS gives systems/software engineers what they have needed from the beginning, the ability to finally harness the computer to automate and aid in the design, testing and maintenance of systems. The dramatic cost reduction, accuracy and confidence factors that can be achieved by TAGS hold the promise of revolutionizing the field of systems software development.

Finally the shoemaker has made himself a pair of shoes.

This most necessary approach to systems/software engineering is available to you today by calling or writing: TAGS/ IORL Marketing, 300 Sparkman Drive, Cummings Research Park, Huntsville, Alabama 35807. 1-800-633-IORL (Toll Free).

TECHNOLOGY FOR THE AUTOMATED GENERATION OF SYSTEMS

TAGS

TELEDYNE BROWN ENGINEERING

CIRCLE 60 ON READER CARD
32 pages later you'll know a lot more about the best data communication products in the world.

Keeping up with what's new in transporting information is harder than ever. Keeping up with what's best is even harder. That's why we put every one of our products, systems and services into one comprehensive catalog.

Companies that take data communications as seriously as we do aren't easy to find. Neither are companies that can offer a product range so broad that it includes not
only advanced multiplexers, local area networks and data security devices, but also large-scale network management systems, intelligent modems and dependable worldwide service.

Your search is over. Now all you have to do is send for the new 32-page Racal-Milgo catalog. It represents 29 years of product development. You can have it by return mail. Call (800) 327-4440 or write for your copy now.

Racal-Milgo®
A Reputation for Reliability
8600 N.W. 41st Street, MS1302, Miami, FL 33166
THwarting the Hackers

Keeping intruders out of your system is tough, but protection devices can help.

by Gene Troy

If you saw the movie "War Games" or read about the 411 Gang's activities last summer, then you have an idea of the damage computer hackers can do to inadequately protected computer systems. Dr. Carl Hammer, Sperry's recently retired director of computer sciences and a well-known computer pioneer, often speaks of the recent massive technology transfer in which highly sophisticated computer technology has become available and understandable to anyone—even a child. Many people are now "technically smart," and with these "smarts" comes the ability to wreak mischief. Indeed, a subculture has arisen around the use of microcomputers as playthings, with business computers and public communications networks (including the telephone system) serving as the playground.

What are the potential risks of this situation and what should managers do about it? At the National Bureau of Standards'可达 Institute for Computer Sciences and Technology, we have been studying computer security problems for several years. One of the jobs of our Computer Security Management and Evaluation Group is to develop guidelines for pr
It is seldom a good practice to let users assign their own passwords.

There are three primary requirements for an effective computer log-on system. The first requirement is to select and properly administer a set of user identification codes and passwords that have a very large number of possible combinations. This reduces the chances for success of an outsider who either guesses the codes or uses a computer to make repetitive “brute force” attempts under program control. The passwords should consist of randomly selected groups of at least four alphanumeric digits. It is useful for the passwords to contain pronounceable combinations of characters so users can easily remember them and avoid writing them down. A five-digit alphanumeric password would have 36 to the fifth power (60,466,176) possible combinations. In security jargon, the number of possible combinations is called the “keyspace.” This keyspace size sounds very large, but it may not be large enough if two further security requirements are not met.

One note of caution: it is seldom a good practice to permit users to assign their own passwords. A review of password files in systems using this approach often shows that the effective keyspace is trivially small. People tend to use personal names, dates, and other readily guessed information. That type of password system is very easy to break.

The second requirement for effective log-on security is automatic disconnection of the incoming terminal line after a small number of invalid password attempts have been made. The usual limit is three to five attempts. This disconnection, which requires the perpetrator to hang up and redial after every few tries, can increase the time required to perform a brute force penetration by a year or more, depending on password characteristics. The programmed attack favored by hackers is then rendered useless. A related and very valuable feature is automatic deactivation of a user identification code if it is used in multiple, invalid log-on attempts.

The third requirement for log-on security is an operating system module that logs and reports invalid sign-on attempts and other “events” with security implications. These could include, say, an unauthorized person attempting to run sensitive applications programs, such as human resources systems, or using high-powered system utility programs to copy or modify files. This feature will reveal whether attempts at computer vandalism are taking place, so that further, more positive means can be used to report and apprehend the hackers. Security reports can also be used as evidence in police or FBI investigations and trials.

If your computer system effectively uses all three of the security procedures described above, then it can be considered reasonably resistant to penetration via telephone by unauthorized persons using random or computer-assisted search patterns. A most important additional ingredient is careful security administration that focuses mainly on...
Only MSA software makes your mainframe work 100 times better

1. Now MSA's Executive Peachpak II™ links personal computers to the mainframe. So you can...

2. Use your PC to access all your MSA mainframe systems, from General Ledger to Manufacturing.

3. Access entire mainframe files, so you can work with large amounts of information at one time.

4. Choose the exact mainframe information you need, as much as you need, in the form you need.

5. Use it with Peachtree Software, 1-2-3™ from Lotus, DIF™ VisiCalc™, or other micro software.

6. Replace terminals with PCs at about the same cost—with many more capabilities.

7. Plug PCs directly into your existing online network.

8. Or establish dial-up access with regular telephone lines.

9. Interface mainframe data directly to typewriters, graphics plotters, and printers.

10. And automate your office economically.

11. Install this new technology in less than one hour.

You've got your own personal computer. Now what do you do with it?

Thanks to MSA's new Executive Peachpak II™ software, you can do more than you ever dreamed.

MSA's new Executive Peachpak II links your personal computer directly to your company's mainframe. So you can get vital information without waiting for print-outs.

It includes all the functions you'll need to really make your PC useful: an electronic spreadsheet, graphics, report production, telecommunications and much more. And it's perfect for use with IBM's new 3270 PC.

For a free brochure that shows you 100 specific ways you can use Executive Peachpak II to get mainframe information through your PC, contact Robert Carpenter at (404) 239-2000. Or write Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326.

MSA makes the mainframe link to personal computers a reality

MSA The Software Company
If you've had your share of sharing a personal computer, TeleVideo® Multi-User Computers mean the end of the line. From two users to 16, and even more, our systems offer the expandability and power to meet your growing needs.

**OUR SYSTEMS GROW WITH YOUR BUSINESS.**

And with TeleVideo it's easy, inexpensive and controllable. You can add users to the systems with plug-in simplicity, when and where you need to. Secretaries and bosses can all share the same system without sharing the same computer. And by simply adding to your system as your business grows, your original investment is always protected.

**3,000 SOFTWARE PROGRAMS AND MAIN-FRAME COMMUNICATION.**

Our systems support industry standard software, so you'll have access to nearly 3,000 very productive programs. And by emulating IBM® 3270 and 3780 terminals with additional TeleVideo software, you can even communicate with IBM mainframes.

However large or small your business, or department, TeleVideo offers a variety of multi-user computers that offer each user all the conveniences of a personal computer. And all the power of a computer network.

**THE LOWEST COST PER USER.**

The all-in-one system that's the one for all, the TS 804 is completely integrated into a single desktop enclosure. The system can support up to four users and a wide selection of peripherals. And it's all available for the lowest cost-per-user on the market: under $1500.

**TO EACH HIS OWN PROCESSOR.**

A powerful desktop micro computer system, the TS 806 offers all the conveniences of the TS 804, and even more throughput. With the ability to

---

IBM is a registered trademark of International Business Machines Corp.
provide true multi-user capabilities for up to six stations, any combination of TeleVideo 8 and 16-bit personal computers can be supported by the TS 806.

UP TO 16 USERS AND 16-BITS.
Up to 16 workstations can be used with the TS 816, creating a flexible multi-tasking system. Any combination of 8 and 16-bit personal computers can be supported, with or without local storage.

THE WORLD'S LEADING MANUFACTURER.
TeleVideo is the leader in multi-user computers and the number one independent manufacturer of terminals. And from systems to peripherals to service and support, only TeleVideo offers you the convenience of a single-vendor solution.

For more information, call 800-538-8725 (in California, 800-345-8008).
TeleVideo Multi-User Computers. To each his own.
## FIG. 2
### PORT PROTECTION DEVICES AND THEIR CHARACTERISTICS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VENDOR</th>
<th>NO. PORTS/LINES PROTECTED</th>
<th>NO. USER ACCESS CODES</th>
<th>CAMOUFLAGE OF PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway</td>
<td>Adalogic, 1522 Wistaria Lane, Los Altos, CA 94022, (408) 996-8559</td>
<td>1</td>
<td>20</td>
<td>Partly (Blank Screen)</td>
</tr>
<tr>
<td>Dialsafe 3 &amp; 3 Plus</td>
<td>Backus Data Systems Inc., 1440 Koll Circle, #110, San Jose, CA 95112, (408) 279-8711</td>
<td>3</td>
<td>65</td>
<td>No</td>
</tr>
<tr>
<td>Sleuth (Formerly Sherlock, Esq.)</td>
<td>C.H. Systems, 8533 W. Sunset Blvd., #106, Los Angeles, CA 90069, (213) 854-3536</td>
<td>1</td>
<td>74</td>
<td>Optional (Originatel-only Modern)</td>
</tr>
<tr>
<td>Defender IIS</td>
<td>Digital Pathways Inc., 1060 E. Meadow Circle, Palo Alto, CA 94303, (415) 493-5544</td>
<td>16</td>
<td>1,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Defender II</td>
<td>Digital Pathways Inc., 1060 E. Meadow Circle, Palo Alto, CA 94303, (415) 493-5544</td>
<td>48 Std. (Optional to 384)</td>
<td>1,000 (Optional to 4,000)</td>
<td>Yes</td>
</tr>
<tr>
<td>Entercept</td>
<td>Integrated Applic. Inc., 8600 Harvard Avenue, Cleveland, OH 44105, (216) 341-6700</td>
<td>1</td>
<td>1</td>
<td>Partly (Blank Screen)</td>
</tr>
<tr>
<td>Barrier</td>
<td>International Anasazi Inc., 2914 E. Katella Avenue, Orange, CA 92667, (714) 771-7250</td>
<td>1</td>
<td>1</td>
<td>Partly (Blank Screen)</td>
</tr>
<tr>
<td>Micro Sentry</td>
<td>Digital Pathways Inc., 1060 E. Meadow Circle, Palo Alto, CA 94303, (415) 493-5544</td>
<td>1</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>Computer Sentry</td>
<td>Int'l Mobile Machines Corp., 100 N. 20th Street, Philadelphia, PA 19103, (215) 569-1300</td>
<td></td>
<td>8</td>
<td>Yes</td>
</tr>
<tr>
<td>Multi Sentry</td>
<td>Int'l Mobile Machines Corp., 100 N. 20th Street, Philadelphia, PA 19103, (215) 569-1300</td>
<td>16 Std. (Optional to 128)</td>
<td>1,000</td>
<td>Yes</td>
</tr>
<tr>
<td>SAU (Secure Access Unit)</td>
<td>Lee Mah Inc., 729 Filbert Street, San Francisco, CA 94133, (415) 434-3780</td>
<td>1</td>
<td>99</td>
<td>Yes (Silent on Answer)</td>
</tr>
<tr>
<td>SAM (Secure Access Multiport)</td>
<td>Lockheed-GETEX Co., 1100 Circle, 75 Parkway, Atlanta, GA 30339, (404) 951-0678</td>
<td>2 to 64 (22 Std.)</td>
<td>256 (Optional to 2304)</td>
<td>Yes (Silent on Answer)</td>
</tr>
<tr>
<td>Data Sentry</td>
<td>Lockheed-GETEX Co., 1100 Circle, 75 Parkway, Atlanta, GA 30339, (404) 951-0678</td>
<td>1</td>
<td>16</td>
<td>No</td>
</tr>
<tr>
<td>Oz Guardian</td>
<td>Tri-Data Inc., 505 E. Middlefield Road, Mountain View, CA 94039, (415) 969-3700</td>
<td>1</td>
<td>160</td>
<td>No</td>
</tr>
<tr>
<td>Lineguard 2001</td>
<td>Western Datacom, 5093 Market Street, Youngstown, OH 44512, (216) 788-5583</td>
<td>1</td>
<td>64</td>
<td>No</td>
</tr>
<tr>
<td>Lineguard 3000</td>
<td>Western Datacom, 5093 Market Street, Youngstown, OH 44512, (216) 788-5583</td>
<td>2</td>
<td>100</td>
<td>No</td>
</tr>
<tr>
<td>Lineguard 3060</td>
<td>Western Datacom, 5093 Market Street, Youngstown, OH 44512, (216) 788-5583</td>
<td>15 Std. (Optional to 60)</td>
<td>100</td>
<td>No</td>
</tr>
<tr>
<td>CALLBACK CAPABILITY</td>
<td>EVENT LOGGING CAPABILITY</td>
<td>PRESENTATION (CODE ENTRY METHOD)</td>
<td>STD. CONFIG. COST PER PORT/LINE</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------</td>
<td>----------------------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Yes (List on Command)</td>
<td>Terminal</td>
<td>$395</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (Printer Optional)</td>
<td>Terminal</td>
<td>(Gross $6,000 for 16 Ports) $375/Port</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Terminal</td>
<td>$595</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (Printer or Disk)</td>
<td>Touch-Tone (Terminal Option)</td>
<td>(Gross $6,000 for 16 Ports) $375/Port</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Terminal</td>
<td>$369</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (Printer Optional, 3 Alarm Modes, Shutdown Optional)</td>
<td>Touch-Tone or Voice</td>
<td>(Gross $21,500 for 16 Ports) $1,343/Port</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Touch-Tone</td>
<td>$1,195</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (Bad Phone Nos &amp; IDs Saved)</td>
<td>Terminal</td>
<td>$895</td>
<td></td>
</tr>
<tr>
<td>Yes (May Include 2nd Password)</td>
<td>Yes (No. Invalid Attempts)</td>
<td>Terminal</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (No. Invalid Attempts)</td>
<td>Terminal</td>
<td>$695</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (No. Invalid Attempts)</td>
<td>Terminal</td>
<td>(Gross $1,120 for 2 Ports) $560/Port</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes (Monitor Optional)</td>
<td>Terminal</td>
<td>(Gross $3,730 for 15 Ports) $249/Port</td>
<td></td>
</tr>
</tbody>
</table>

procedures for the distribution and changing of passwords. If these procedures are either missing or poorly administered, then the security problem increases greatly. Users should be reminded of the need to protect their passwords from disclosure.

If your computer system does not have or cannot fully use these three operating system security features, its vulnerability to dial-up telephone attacks can still be reduced. A new class of device can reinforce the protective measures just described. This type of device, totally external to the computer system, was introduced about a year ago. Now, there are at least 11 manufacturers supplying them. The device can be viewed as a block box placed between an incoming telephone set and the computer to screen out unauthorized callers (see Fig. 1). These can be called "port protection devices" (PPD), because they are completely external to the computer’s dial-up access ports. Most do not communicate with the computer host in any way and are completely transparent to it. The PPD units are frequently combined with modems or communications network controllers within the same enclosure.

All PPDs have on-board microprocessor intelligence, which is used to add a layer of external password protection to any communication line. The PPD will require a potential dial-up terminal user to enter some form of password as a first step toward connecting to the host computer. The PPD then matches this password code with a table of valid user codes stored in its own memory. If the match is correct, the user is connected with the host and permitted to go through the routine log-on sequence. If the code provided by the user is invalid, the user cannot access the host, and the call is terminated.

The important point to remember with these units is that this password checking is completely external and independent of the host computer system. The potential user cannot even contact the host unless the initial password code is correct. Most of these devices are also resistant to the brute force password discovery attack described earlier. Of course, once users pass the obstacle of the PPD, they will be required to deal with any security measures for identification, authentication, and authorization that may be in use by the host’s operating system and application programs.

The PPDs discussed in this article do not protect the password or any data passing between the terminal and host from monitoring by unauthorized parties, i.e., wiretapping. When this type of protection is required, encryption devices using the Digital Encryption Standard (DES) developed by NBS should be used on all external communications lines.
WHEN A PERSONAL COMPUTER ISN'T ENOUGH, YOU NEED A PERSONAL PDP-11.

NOW YOU CAN HAVE DIGITAL'S PERSONAL PDP-11/S AND VAX-COMPATIBLE SOFTWARE ON YOUR DESK.

You know who you are. You've been doing a major part of your work using a terminal connected to a PDP-11™ or VAX™ system. Your applications are as wide-ranging as your knowledge. Theoretical physics, real-time data analysis, statistics, financial modeling, CAD/CAM, process control—there's very little that's beyond the reach of your professional experience.

Like most users, you're very satisfied with the services you've been getting from your PDP-11. You've come to rely on them, in fact. And you're not willing to give them up for just a personal computer. What you really want is a full-powered minicomputer dedicated exclusively to your work.

If you're this type of user, Digital has exactly the computers you need: the Professional™ 300 Series, our personal PDP-11's. They're engineered to give you the minicomputer power and sophistication you've come to expect—in a personal computer size, and at a personal computer price.

RICH PDP-11 DEVELOPMENT ENVIRONMENTS AT YOUR COMMAND.

Digital's Professional 300 Series, the best-engineered desktop systems for computer-experienced professionals, offer you a choice of minicomputer-powered operating systems. First among these is P/OS™, the Professional Operating System. A single-user, multi-tasking version of RSX-11M-PLUS™, it gives you capabilities that far exceed typical personal computer software. Its complement of compiler languages includes BASIC 11, DIBOL, COBOL-81, Pascal, FORTRAN-77, and WHITESMITH C. What's more, a Native Tool Kit and a rich selection of editors, debuggers, task builders, forms management and sort utilities helps you achieve the high programming productivity you've come to expect from a minicomputer. The UCSD-p System™ is available as an alternative development environment under P/OS. Plus, P/OS lets you use Digital Classified Software, a portfolio of proven applications such as TK Solver,™ a high-performance equation-solving tool, and RS/1™, an industry-standard laboratory research system.

Next, there's PRO/RT-11™, a single-user, multi-tasking, real-time version of the RT-11 operating system that's so popular in technical OEM PDP-11 applications. There's also the STANDARD MICRO MUMPS 300™ System. And for commercial applications there's the CTS 300™ system, which features RT-11 DIBOL portability. VENIX®, a UNIX® V7M operating system complete with Berkeley 4.1 enhancements, has been optimized for the Professional Series. It even includes a UNIX System 5 software license, demonstrating our commitment to keeping the Professional current with future UNIX directions.

MINICOMPUTER STRENGTH APPLICATIONS ON THE SHELF, READY TO GO.

The reason we've engineered the Professional with a variety of operating systems isn't just to let you write your own minicomputer-powered programs. It's to let you access a vast library of proven, developed PDP-11 and VAX programs, and run them independently on your Professional.

Many third-party PDP-11 and VAX applications—or the ones you're using now—can be transported to your Professional. You can use the same files, the same commands. This puts an incredible variety of scientific, industrial, technical and commercial solutions at your disposal.

Just as important, you can attach a real-time interface to the Professional to adapt it for scientific and industrial use. And you'll have a wide variety...
of printers, plotters, and special purpose peripherals to choose from.

A TRUE DISTRIBUTED OFFICE WORKSTATION ON YOUR DESK.

The Professionals acknowledge the fact that you work in an office as well as in a lab, offering Pro Office Workstation, the Professionals' version of Digital's ALL-IN-1™ software, the best-engineered office automation system you can buy. Running in conjunction with a VAX host, ALL-IN-1 gives you word processing, automatic spelling verification, electronic filing, electronic mail, calendar management and more. And that can increase productivity organization-wide.

Office automation tools designed for independent use on your Professional include Digital's ASKIT™ software, which provides business graphics, personal database, word processing and spreadsheet functions, plus a game. And with the optional CP/M® Softcard, you can run a variety of CP/M-80 packages on your Professional.

ETHERNET/DECNET LOCAL AREA NETWORKING TODAY.

The Professional 300 Series supports a variety of networking options. Foremost among these options is DECnet™ which lets your Professional serve as a distributed workstation with PDP-11 and VAX processors. And, DECnet gives you a choice of local and wide-area communications devices, including 10 Mbit/sec Ethernet, with full support for V2.0 standard (IEEE 802.3 specification); public packet-switched X.25 networks; and standard telephone lines.

And by virtue of its compatibility with PDP-11 and VAX software and RMS file structures, the Professional lets you download remote files from your PDP-11 or VAX to your Professional, all transparently to the user and the program. Or, if you wish, your Professional can emulate Digital's VT™ terminals.

The Professional doesn't leave out the rest of the world, either. Device emulation includes IBM 3270, 2780/3780, 3277, and more.

THE LEADING GRAPHICS WORKSTATION IN ITS CLASS.

If you only want to portray simple X-Y values, lots of personal computers can do the job. But if you need a way to graphically display thousands of information variables, there's no finer tool available than a Professional. It gives you a palette of 4,096 colors to work with. State-of-the-art graphics architecture, like GIDIS™ a virtual device interface, helps you design fast graphics for your programs, while allowing them to run independently of future hardware enhancements. Industry-standard graphics application interfaces are also available. And the Virtual Device Meta file capability lets you integrate text and graphics in a single file under P/OS 2.0. Just as important, the quality of Professional 300 graphics is unsurpassed. The bit mapped screen provides a 960 x 240 pixel resolution. And Digital's IVIS™ Interactive Video System is available for advanced program development.

BEST ENGINEERED MEANS ENGINEERED TO A PLAN.

The Professional 300 Series, like every Digital hardware and software product, is engineered to conform to an overall product plan. This means Digital systems are engineered to work together easily and expand inexpensively. Only Digital provides you with a single, integrated computing strategy from desk top to data center.

For more information on Digital's Professional 300 Series systems, the Professional 325 and the Professional 350, call 1-800-DIGITAL, ext. 690. Or send the coupon or write: Digital Equipment Corporation, Attn: Mr. Dennis Coady, 200 Baker Avenue, West Concord, Massachusetts 01742.

I'd like more information on Digital's Professional 300 Series, the Personal PDP-11's:
☐ Please send a copy of your new Professional Series Handbook.
☐ Please have a sales professional call with complete information.

Name
Title
Company
Address
City
State Zip
Telephone Ext.

Return to: Digital Equipment Corporation, Attn: Mr. Dennis Coady, 200 Baker Avenue, West Concord, MA 01742. Media Code: N.

THE BEST ENGINEERED COMPUTERS IN THE WORLD
The callback feature provides more communications security, but also causes some problems.

**EXTRA SECURITY FEATURES**

Camouflage the telephone line so that the existence of a computer port on the line is not obvious to a caller with an autodial modem. For example, IMM’s Computer Sentry answers with a synthesized human voice, and Lee Mah’s Secure Access Multiport (SAM) is completely silent once it picks up the line. Hiding the high-pitched carrier tone of the modem significantly deters the common hacker ploy of using an autodial modem and hobby computer to search telephone exchanges for computer telephone numbers.

On the negative side, many portable terminals and personal computers designed for use as terminals will have problems working with strictly voice-oriented PDs. It is becoming very common for these machines, such as the Tandy 100 “knee-top” computer, to be equipped with internal modems and plugs that connect directly to the telephone line without using a standard voice set. For these, the user would have to place a separate call using a voice telephone for the sole purpose of interacting with a voice-oriented PPD, then, some means must be available for switching over to the direct-connect modem after connection to the host is given.

Callback is a feature available on several PDs, such as the Tri-Data Oz Guardian and the Western Datacom Lineguard units. The assumption here is that each legitimate user of a computer system should have a routine terminal work location and associated telephone number. A PPD equipped with this capability can keep a person who has stolen its password from masquerading as a valid user. To do this, the PPD independently places a return call to the expected terminal location once it verifies the password code on the first call. For example, the user would dial the computer telephone number, engage in dialogue with the PPD, enter the password, and would then be instructed to hang up. The PPD would scan its internal table to check the code’s validity. For each valid user, the table in memory would contain both a password and an associated telephone number. Within a few seconds, the PPD would place a call to the indicated number and proceed to connect the user to the computer’s modem or port.

While the callback feature does provide an additional layer of communications security, it also causes some problems. One possible drawback of this feature is that the computer host, rather than the terminal user, is billed for all dial-up telephone connect charges. But if the PPD is equipped to keep a running record of all calls and their durations, better accountability of toll charges is gained. Another potential concern is that there must be some method of deactivating or getting around the feature for special groups of users, such as traveling salespeople, who cannot have fixed telephone numbers for their terminals. Finally, this feature adds a significant delay (up to a minute) to each dial-up access because of the time needed by the PPD to disconnect and redial. System users may find these additional steps bothersome.

**LOGGING VARIES WIDELY**

Communications logging capabilities, which can help bolster any inadequacy in the security logging capabilities of the host computer, vary widely among the different products. At one end of the spectrum we find PDs, like the C.H. Systems’ Sleuth, that do not have this ability. Others, such as the Adagologic Gateway, store in memory the number of invalid attempts made since the device was last checked. At the other end of the spectrum are devices like the Backus Dialsafe 3. These PDs are integrated with multipart communications controllers and can collect an extremely wide assortment of communications usage information in addition to noting details of security events, such as time and line of each failed log-on. A printer is usually connected to these devices for continuous display of the log.

A valuable security feature common to all PDs is that they may be administered separately from the computer host’s operating system. This makes it possible to establish a separate communications security job function that has no connection with the function of systems programmers, who handle the computer’s passwords and internal access control. Such separation of duties is a very powerful security mechanism because it requires collusion between persons performing different job functions before violations can occur.

Not every PPD has all the features described above. They also vary in the ways in which they implement these and other features, for example, their methods of presentation to the user. As described earlier, several use a synthesized voice to communicate. These PDs require the user to answer either by voice or telephone touch-tone keypad. This system has the advantage of camouflaging the port. As an alternative, several of the newer devices on the market, such as the Lockheed-Cetex Data Sentry and the Integrated Applications Entercept, permit the user to enter the password directly via a terminal keyboard. These PDs operate on the digital side of the modem rather than the voice side, so they can communicate directly with terminals. When the user dials a computer telephone equipped with such a device, the PPD automatically makes connection to the terminal through the modem. The user must then key the password on the terminal keyboard.

Using the terminal rather than the telephone to enter the password has a very important advantage for high-security applications, because a much larger selection of characters are available for use in the password. The keyspaces for devices of this type may include most of all of the 128 ASCII characters that can be generated on the keyboards of terminals commonly used for dial-up access. These characters consist of uppercase and lowercase letters, numbers, special and graphics symbols, and even nonprinting "control characters." A short five-character ASCII password can have a keyspace of over 34 billion combinations. This lies in contrast to a telephone touch-tone keypad, which has a maximum of 12 available characters (0 to 9, *, #). A five-character, touch-tone password would have a keyspace of less than one-quarter million, well within brute force cracking range. Voice-entry methods have even smaller potential keyspaces, because they typically use only the numbers from zero to nine.

How are PDs generally configured in computer systems, and what do they cost? On the smaller side, a device like International Anasazi’s Barrier protects a similar telephone line or port and stores one ASCII password code, which all users share. The Digital Pathways Defender II, on the other hand, protects up to 384 lines simultaneously, with a maximum potential user community of 4,000. Most PDs now on the market are single-line devices and usually permit the storage of about 100 user codes. These single-line devices cost about $500 each, with a separate auxiliary modem (required for callback) adding another $600. For multiple-line devices, the cost per line on small configurations is very high initially but goes down proportionally to about $400 per line (plus the auxiliary modems for each line) in the largest configurations. This declining cost per line occurs because the large PDs consist mainly of expensive chassis and power supply components, with circuit boards added as required for more telephone lines and user password tables.

Fig. 2 lists 11 currently known manufacturers of PDs and their devices, along with a comparison of some key features. Within the next few months a number of new devices will be introduced into this rapidly growing market. Although we can expect few new security features to be announced, the prices should come down soon as the competition heats up.

This article attempts to provide general information on PDs—it has no expectation of being exhaustive. Devices included herein have been identified from several sources.
Imagine a system that successfully settles the uncharted territory of 3270 local networking—that “no man’s LAN” of unlinked and unrealized potential.

Imagine a system that delivers the power of 3270 processing, and the flexibility to build two local area networks from a single controller. Imagine being able to attach up to 120 devices to that controller. Or attaching four distinct controllers—and multiple coaxial links of up to 10,000 feet each—to any of those LANs.

Imagine the economies of a system that handles that networking with standard 3270 coax. That requires no commitment to special architectures or non-standard LAN technologies. And that, thanks to a multi-drop, station-to-station design, can eliminate thousands of feet of new coax.

Of course, such a system would have SNA compatibility. But it would also have a set of capabilities to dramatically increase throughput, while reducing hardware and support cost in any environment. Capabilities like multi-host and multi-personality support, application and address switching, and system printing.

This system would have multi-user personal computing “built into” the network—allowing you to assign true 16-bit computing power, maintain overall MIS control and share expensive disks and printers.

Such a system would boast an intelligent display station that displays a mastery of ergonomic and aesthetic design. With multi-screen formats, anti-glare screen, low-profile keyboard, and a tilt-and-swivel pedestal with the smallest footprint in the industry. Such a system would also include a full line of printers.

Imagine. 3270 processing. IBM-compatible personal computing. Versatile, economical, powerful local area networking. In one system.

Braegen has imagined just such a system. They have designed it. Built it. And called it the ELAN™ System.

If such a system sparks your imagination, give us a call. We know the feeling. The Braegen Corporation, 525 Los Coches Street, Milpitas, CA 95035 (408) 945-8150; TWX: 910-338-7332

*ÉLAN is a trademark of The Braegen Corporation.
Hardware port protection devices add a valuable extra layer of security.

We have canvassed the Computer Security Institute, the new products editors of several popular computer and electronics magazines, and knowledgeable users of security products. In addition, NBS has begun to collect its own database of computer security products from these sources, advertisements, and vendor literature.

We would be pleased if readers who know of other devices in this class would bring them to our attention.

EVALUATE NEED FOR PPDs

Potential users of PPDs should ask themselves the following questions before making any decisions concerning these devices:

1. Do I need a PPD at all? Does my computer's operating system inadequately handle user identification codes and passwords, failed access attempts, and security event logging?
2. Do I need callback authentication? Will the shift in telephone charges be burdensome? Will users put up with the additional delays in connecting to the host?
3. Is my communications environment so complex that I need a sophisticated multiline protection device?
4. Do my dial-up terminal users normally communicate with a direct-connect modem in which no voice traffic is involved? If so, can I expect them to support reversion to voice for authentication purposes?
5. How much communications event logging do I need? Is my dial-up traffic so easily controlled that extensive logging is extraneous?
6. Am I willing to pay the additional salary overhead costs for maintaining tables of user password codes and possibly also callback telephone numbers for each user?
7. Is it likely that dial-up communication will be monitored or interfered with by unauthorized individuals? If so, then DES-based encryption devices should be used instead of or in addition to PPDs.

Hardware port protection devices add a valuable extra layer of security when dial-up terminal communications are needed and the host computer operating system cannot be wholly trusted to screen out hackers and other computer criminals. Many small business computer systems now using telephone terminal access fall into this category. For these systems, the PPD can be a very cost-effective and easy-to-use security measure.

One final note: PPDs are no solution to shoddy computer security administration practices. It is just as easy to be lax in maintaining PPD password tables, thereby causing major security risks, as it is to be ineffective in administering the present computer host access controls.

Gene Troy, a CDP and computer scientist at the National Bureau of Standards, is engaged in research and consulting in computer security. Prior to joining NBS, he worked in private industry for several years as a security consultant and seminar leader. Mr. Troy holds an MS in system theory and cybernetics from George Washington University.

NOTICE: Mention of products in this article in no way constitutes endorsement of them by the National Bureau of Standards or the author. Product descriptions are based on information provided by the vendors. All products of this type known to the author at the time of writing have been included.
Now you can buy flexible disks with a five year warranty from Control Data.

A lot of companies make diskettes. But Control Data also makes disk drives. In fact, we're the leading independent supplier of disk drives to computer manufacturers.

Now we've put our expertise into a truly superior line: StorageMaster diskettes from Control Data.

You can choose from a complete line of premium 8" and 5.25" diskettes in single or double densities, single or double-sided. And each diskette is 100% certified and backed by a 5 year warranty. So you can depend on them to perform for years to come.

Look for StorageMaster diskettes at your local computer store or ask for them from your computer supplies distributor.

Or give us a call toll-free at 1-800/328-6207 (in Minnesota call 612/835-8065) and we'll tell you where to find StorageMaster diskettes.
"How I increased with the flick of a

"My DP Department was up to here in work."

"And routine end-user requests were just adding to my backlog until I heard about the Solution Center."

"It's a collection of user-friendly products that allows almost anyone to do their own data processing."

"That would make them very happy."

Honeywell Introduces The Solution Center.

Now there's a way you can increase the satisfaction of your end users and improve the responsiveness of your information management system. It's called a Solution Center.

A Solution Center is a user-support facility that enables personnel throughout your organization to do their own data processing, quickly and easily. And it enables you to give them direct but controlled access to online information.

Increases Productivity

A Solution Center features Honeywell's GCOS8 software that ranges from personal productivity and decision support tools to business-specific solutions. So now your end users can build
user satisfaction
switch."

"AND ME
A LOT HAPPIER
TOO."

"SO I TALKED
TO HONEYWELL,
SET UP A
SOLUTION CENTER,
AND..."

"BILL, I NEED
AN ANALYSIS OF
WESTERN
DIVISION SALES
DESPERATELY."

"CLICK."

their own spreadsheets, forecast trends with color
graphics, browse through online files, and create
or revise reports.

Think of how that could increase their produc-
tivity as well as their satisfaction. And, by freeing
the MIS staff to do more of the significant tasks
they were hired to perform, a Solution Center can
increase the productivity of your data processing
department, too.

Improves Data Management

A Solution Center improves data manage-
ment by providing consistent information to end
users and by eliminating unnecessary application
development. It can facilitate the introduction
of personal computers. And, best of all, you
can tailor it to meet your specific needs.

With a Solution Center, end users get the
information they need and you get the control you
demand. It's bound to make them a lot happier, and
you a lot happier too.

For more information on how a Solution Cen-
ter can work for you, call toll free at 800-328-5111,
extension 2724. In Minnesota, call collect 1-612-
870-2142, extension 2724.

Another Big Idea From Honeywell
Large Systems

Look to Honeywell Large Systems for solu-
tions to information management problems and for
products ranging from powerful computers to com-
prehensive networking capabilities.

Together, we can find the answers.

Honeywell

CIRCLE 66 ON READER CARD
If you're presently evaluating FOCUS, take a closer look at NOMAD2 and you'll be surprised at how smart software can be.

Whether your comparison is based on specific features, the scope of the product, or the sheer power it puts into your Information Center or your development activities, NOMAD2 is smarter.


And we don't just drop a tape on you and walk away. Education, documentation, service and support are part and parcel of the NOMAD2 offering. Talk to us before you make your decision and your decision will probably be the smarter software. . . . NOMAD2.

NOMAD2... Experience the difference

For more information write to:
Roger Cox
D&B Computing Services
187 Danbury Road
Wilton, CT 06897
or call Roger Cox at (203) 762-2511

* NOMAD is a registered trademark of D&B Computing Services, Inc.
A MAN WITH A PLAN

For the past 14 years he has been called everything from "eccentric" to "missionary." Most people who have been exposed to David L. Childs over this period have come away shaking their heads in wonder and disbelief. "You get the feeling that there is something in what he says," notes one enthusiast, "but you don't really understand his language."

Childs speaks the language of set theory—or, more precisely, the underlying mathematics of a concept he terms "intelligent storage management."

Says Childs, "It's been a case of having a solution for a problem that is only now beginning to manifest itself in dp circles." Simply put, the problem is to summon information quickly from auxiliary memory at a time when new, unstructured applications from end users are placing tremendous demand on that same storage. "The main computer now has to slog through every bit of information in secondary storage to find what is requested, and as disk memory gets cheaper and secondary storage larger, the user only compounds his problem. The searches are taking longer and longer," Childs explains. Several MIS managers contacted by DATA-MATION confirm, in addition, that emerging relational DBM systems put tremendous pressure on their underlying central support structure, the IMS production database.

"Our percentage of relational data grew from under 2% to 15% of the total corporate database in just two years," says Peter Hill, IMS project manager for Bank of America, San Francisco. He estimates that in more mature manufacturing and process industries, the percentage is already 25% relational and increasing fast. "Financial services will go that way too, with increased deregulation and demand for decision support systems."

Childs contends that this trend has supplied the necessary momentum for his Ann Arbor, Mich.-based Set-Theoretic Information Systems (STIS) to cocreate a company to market his idea. The new concern, SMC (for Storage Management Control) Technology was formed in collaboration with the PDC Venture Group, Dallas, and is reportedly seeking $6.3 million of venture funding to begin field testing of a system created from Childs's long-standing theoretical model.

An early investor in SMC Technology is Gould Inc., which is determined to diversify from its battery business into high-technology and artificial intelligence systems, and has already purchased the Florida-based supermini company, Systems Engineering Labs.

This sudden flurry of commercial activity has come none too soon for Childs, who has been eager to make the transition from theoretician to businessman, from "mathematical philosopher to marketer," as he puts it.

While it's true that as a missionary, Childs hasn't yet made any converts at MIS sites, at least he has their attention when he makes his pitch. Sources claim that both Exxon and Equitable Life Assurance are well disposed to SMC and may have big enough database problems to give the Childs prototype a test platform. What has pricked their ears, it is believed, is Childs's focus on what he terms the "irrelevant data" that flow between the host and secondary storage when using IMS.

"It's not uncommon for the host to have to slog its way through a 10-page record just to get one item, and thus to be tied up in nonproductive I/O operations," creating what he calls the growing "I/O bottleneck." As a result Childs believes that only about 4% of the information transferred between the IMS host and secondary storage is relevant, or what he calls "informationally dense."

"All the problems stem from the way that data are captured and preserved in secondary storage, namely, in a rigid, predefined structure or hierarchy," says...
Childs. He believes that he has surmounted this problem using the mathematics of set theory to allow records to be kept in pieces that dynamically combine to form records and files and then destroy themselves after use, returning to their piecemeal form. Childs estimates that using this method, an IMS database can be stored in one tenth the disk capacity of current systems, and that data can be retrieved by the host at rates up to 40 times faster than at present.

These estimates are based on a University of Michigan system that, since 1972, has been running a version of Childs's theoretical model alongside its own relational model, Micro, which was developed by a university team headed by Professor Malcolm Cohen during 1970-72.

Cohen, now president of Condor Computer Corp., in Ann Arbor, says many MIS managers have visited the university's installation complaining that their relational models were proving to be slow and impractical except on small amounts of data. "I think their perception was that the university system was extraordinarily fast compared to their own. But without specific benchmarks, one can only speak in generalities." Cohen says that the university’s database, while not large by commercial standards, handles 50,000 accesses a year, ranging from one minute to eight hours each, and contains around 100 million to 200 million characters in all. The biggest IMS databases are currently between 5 billion and 10 billion characters, according to experts.

The storage management software provided by STIS for the university was described by the director of the university's business school systems research group, Jim Fry, as "third" generation. "With the new prototype, STIS seems to have created a fourth generation that, rather than running inside the host as it does at the university, runs outside it on an outboard processor," says Fry, a noted expert on Codasyl database systems. The logic behind this move (apart from the opportunity it affords SMC Technology to get into the hardware business) is to preserve the integrity of the system and make it totally fail-safe. Fry points out that an "inboard" is subservient to the host and operating system, and must be shared with many people who could conceivably wipe out the code.

Fry describes the SMC prototype as a combination I/O processor and "content analysis" machine. "The company has said 'let's analyze the database on content, and create content indexes that dynamically create and destroy themselves around each incoming query.' Adds Fry, 'The company appears to be building a dedicated I/O processor to perform this continual content analysis, but it's by no means certain that it can be done with the cost and performance of current hardware, or how difficult it might be to maintain these constantly changing content indexes over time.

"Perhaps the most significant thing the company might have already achieved is that the new processor apparently will work with any DBMS software in the physical store, whether it's IMS or IBM's relational DB2 and SQL/DS, or Adabas, IDMS—you name it. This is something IBM is far from achieving as far as anybody knows," he concludes.

There is speculation that because of the Gould tie-in, the hardware for the new SMC processor will be based on an SEL supermini. The company is noted for its fast scientific and engineering processors and very fast data bus. Sources say a seven to eight MIPS SEL CPU will be used to host the STIS code, and that SEL will handle field service.

None of the participants in the SMC Technology venture would discuss their prototype processor, as they are in the process of seeking new investors and had entered an SEC-dictated "quiet period."

Childs, however, reverts to his usual chatty self when asked about the future of intelligent storage management. "Relational DBMS software is acquiring the reputation of being a poor performer because it is coupled with a rigid and inflexible physical storage structure. If, on the other hand, you couple your relational model with intelligent storage management, it will provide greater applications functionality and better performance than even the most optimistic forecasters can imagine. Together they provide the perfect tool for breaking the I/O bottleneck."

IBM's current approach to the bottleneck problem is essentially to throw more MIPS and disk storage at it, including its upcoming Trout mainframe family ranging from 20 MIPS to 50 MIPS/256MB main memory challengers. IBM is not exactly delirious about the idea of somebody else making its existing mainframes more productive, because it is working on the equation that bottleneck equals big business. It recently predicted a 50% per annum growth rate in MIPS demand from its customers over the next few years.

Companies such as Britton Lee and Teradata are promoting the use of back-end database machines to run IMS (or its equivalent) and take the strain off the host. IBM, cagey as ever, now owns 20% of the largest of these, namely, Intel/System 2000, and will presumably push to introduce the technology at its own pace.

The bottleneck is also being addressed by bleeding off IMS data into separate information centers where they are converted into table form, at the same time creating extra demand for IBM technology on all levels from the PC to mainframes, observers point out.

As far as Childs is concerned, these approaches don't even address the real problem: speed of data retrieval between the host and secondary storage. "The back-end DBMS machine just creates a new I/O bottleneck between itself and the host; relational host and IBM hosts do the same thing as they communicate."

Childs believes that sooner or later IBM's customers will have to come to terms with this fact. "When they do, we'll be waiting."

—by R. Emmett Carlyle
"dBASE II helps keep us on our toes."

Robert Hubert
Marketing Director
The Boston Ballet

"The Boston Ballet was a company in search of a computer when I joined the organization earlier this year. And, after discovering that a large computer system was being considered, I urged a smaller, more sensible first step.

"Since almost no one at The Boston Ballet had any previous computer experience, I strongly recommended the purchase of a microcomputer and dBASE II.

"dBASE II, the relational database management system from Ashton-Tate, would give the people in the Company the time and the opportunity to get used to computing before bringing in a larger, more expensive system later on.

"dBASE II is a command-driven, highly flexible system that can be used for a great variety of applications ranging from very simple to highly complex."

A premier performer from Day One.

"dBASE II manages our extensive season subscriber mailings; keeps track of all our advertising insertions, costs and efficiency; and makes project time management a snap. We are now making plans to use dBASE II in handling the special promotions and manpower analyses critical to our day-to-day management.

"dBASE II made an immediate and sizeable impact on the efficiency of our operation."

The real kicker.

"Recently, we hired a custom systems house to develop a long-range computer program for The Boston Ballet. Without prejudice, they came back and said the new system should be based on dBASE II.

"dBASE II can provide you with virtuoso performance, regardless of your application."

For more about dBASE II, contact Ashton-Tate today. 10150 West Jefferson Boulevard, Culver City, CA 90230. (800) 437-4329, ext. 217. In Colorado (303) 799-4900. In the U.K. (0908) 568866.

ASHTON-TATE

dBASE II is a registered trademark of Ashton-Tate. Suggested retail price for dBASE II is $700. ©Ashton-Tate 1984

CIRCLE 68 ON READER CARD
It's really very simple: A DCA network can integrate all your datacomm equipment—IBM or non-IBM—into one flexible, efficient system. We call it Integrated Network Architecture (INA). And it offers many remarkable advantages.

Like network transparency: Our hardware is compatible with all hosts and terminals—synchronous or asynchronous. So you're free to use less expensive async terminals and modems.

Host selection: With INA, any async terminal in the network can access any host in the network. Including IBM hosts, packet mode hosts and public data networks. And any 327X terminal can access any host running 3270 BSC.

High speed transmission: You can transmit combined voice and data at speeds up to 1.544 MBPS.

Modular hardware: You can upgrade and expand your network simply by adding—instead of replacing—low-cost DCA components.

And since data is routed through a network processor instead of a dedicated host, no host software is involved and no extensive programmer training is required.

Introducing Lear Siegler's 3278 Keyboard Compatibles

Easy to Look at. Easier to Use.

Now you can combine Lear Siegler's exclusive High Touch™ style with the convenience of true IBM 3278 keyboard compatibility.

The ADM 1178 video display terminals offer superior performance and ergonomic design. With standard protocol converters, you can interface with virtually any IBM mainframe to achieve substantial savings in hardware and operator training expense.

The ADM 1178 terminals can handle computer transmissions up to 19,200 baud without handshaking. They feature five video attributes (underlining, blink, blank, bold and reverse video), the IBM extended character set, four cursor modes (block or underline, blinking or steady), and 24 Program Function (PF) keys and two Program Access (PA) keys.

For operator convenience, the ADM 1178 terminals come with a full tilt and swivel monitor that stops positively in any position, an easy-to-read non-glare screen, and a detached, low-profile DIN standard keyboard.

The ADM 1178s are available with a standard 12" green or amber screen and an RS-232C serial printer port. They can be easily modified for OEM applications and are available with such options as 14" green or amber screen, answerback memory, current loop or RS-422 interface, and international character sets.

These Lear Siegler High Touch terminals are made in America-designed, engineered, manufactured and shipped from Anaheim, California. With this total, on-shore capability, and a complete worldwide network of sales and service centers, OEMs as well as end users can be assured of the best local support available in the industry.

Call our ADM 1178 product specialists today for complete information on products and protocol converters.
Embattled Franklin Computer Corp. recently unveiled its new line of postlitigation microcomputers. The three products introduced are in the $1,000 to $3,000 range for home and professional use. In addition to running Apple software, the CX series of portable computers also run CP/M and MS/DOS under Franklin DOS (F/DOS). This company will market its latest offerings through the computer retail channel. Joel Schusterman, who returned to Franklin as executive vice president and acting president following the resignation of Barry Borden, contends that Franklin had developed F/DOS operating system before the suit filed against them by Apple Computer Co. over Franklin's BIOS. Schusterman says his company submitted documentation to Apple on the CX series, but neither the Cupertino, Calif.-based computer manufacturer nor its lawyers has responded. Franklin's acting president summed up his company's woes by saying, "the last five months [have been] quite difficult," and optimistically added that "with the CX series, together with a reconstituted organization, Franklin can thrust forward into its important role in the personal computer business...Franklin is in a position to be a continued force in the ferociously competitive personal computer business." When asked if he saw litigation as a new competitive tool used by large companies against smaller ones, Schusterman said that if nothing else, the lawsuit established that BIOS was protected under copyright laws, and now the way was paved for large computer companies to sue smaller ones for being too compatible. Schusterman predicts Franklin will have a "long and healthy future in the marketplace." He added that the company is aggressively searching for a new chief executive officer. Any takers?

The Franklin CX series of personal computers is typical of most of the new offerings filtering their way into the office, home, and school computer marketplace. Most of the new entries seem to be adopting the Sperry Corp. micro philosophy (at least its advertising philosophy). First Sperry said that when you're late, you better have something more to offer. And the company's machines did; besides running MS/DOS, they could also run CP/M. That isn't good enough anymore. Sperry now says that it isn't enough to be IBM-compatible. Most of Sperry's, and for that matter IBM's, competition seem to concur. Nearly all of the new players on the personal computer field tout how much better, faster, and cheaper their machines are. Another characteristic that is common to the competition is a chart filled with little boxes. For the most part, the competition's boxes are marked yes and IBM's boxes are marked no (except for voltage and operating system). What does this mean for IBM? No one can say, but for computer users, it means a lot of choices with many features at lower price points. At least in the micro world Big Blue is getting a run for its money.

Well, the computer industry can breathe a sigh of relief. IBM finally announced its plans in the area of local area networks. The cabling system is permanently wired with connections made to outlet plates in office walls within a building or site. No surprise that Rolm Corp. has announced its plan to support, bid, and install the IBM cabling system, which still seems to support a token ring.

The Franklin CX series of personal computers is typical of most of the new offerings filtering their way into the office, home, and school computer marketplace. Most of the new entries seem to be adopting the Sperry Corp. micro philosophy (at least its advertising philosophy). First Sperry said that when you're late, you better have something more to offer. And the company's machines did; besides running MS/DOS, they could also run CP/M. That isn't good enough anymore. Sperry now says that it isn't enough to be IBM-compatible. Most of Sperry's, and for that matter IBM's, competition seem to concur. Nearly all of the new players on the personal computer field tout how much better, faster, and cheaper their machines are. Another characteristic that is common to the competition is a chart filled with little boxes. For the most part, the competition's boxes are marked yes and IBM's boxes are marked no (except for voltage and operating system). What does this mean for IBM? No one can say, but for computer users, it means a lot of choices with many features at lower price points. At least in the micro world Big Blue is getting a run for its money.

Well, the computer industry can breathe a sigh of relief. IBM finally announced its plans in the area of local area networks. The cabling system is permanently wired with connections made to outlet plates in office walls within a building or site. No surprise that Rolm Corp. has announced its plan to support, bid, and install the IBM cabling system, which still seems to support a token ring.
HARDWARE

manufacturer attention and too dispersed for local dealer sales and service, the vendor says.

The multi-user, multitasking workstations provide an integrated information management system designed for communications distribution and office task processing. The workstations, which will serve multipoint communications networks that require a full range of message distribution, word processing, spreadsheet, and graphics capabilities, will support the Xenix operating system. They have 16-bit microprocessors, 256Kbytes of memory, expandable to 1MB, 10Mbytes of hard disks, expandable to 40Mbytes, up to 2 million character floppy disk storage, bit-mapped graphics, and detachable keyboards. Prices start at $7,000. RCA, New York.

FOR DATA CIRCLE 306 ON READER CARD

FAULT TOLERANT COMPUTERS

The XA 400 and XA 600 are two extended architecture models of the vendor’s Stratus/32 Continuous Processing System. The XA 400 CPU employs four logical, independent Motorola 68010 processors, each capable of running a different program.

XA 600 uses six logical, independent 68010s, each accelerated by dedicated memory and a hardware arithmetic processor. The arithmetic processor provides commercial and decimal arithmetic in addition to IEEE double precision floating point. Each 68010 provides full hardware support for VMS’s virtual memory environment. The 68010 also accelerates many common instruction sequences.

The basic XA 400 contains a 20-slot chassis, two multiprocessor CPUs, 4Mbytes of duplicated memory (four logical and eight physical), two communication controllers, two disk controllers, tape controller and tape drive, and system software. The XA 400 may be configured with up to 8Mbytes of duplicated memory, 2Gbytes of disk storage, 128 workstations, and three tape drives.

It contains a 40-slot chassis, two multiprocessor CPUs with cache memory and arithmetic processors, 8Mbytes of duplicated memory, two communication controllers, two disk controllers, tape controller and tape drive, and system software. The XA 600 may be configured with up to 16Mbytes of duplicated memory, 42Gbytes of disk storage, 256 workstations, and three tape drives.

The XA 400 costs $185,000. The XA 600 sells for $270,000. There is also an existing upgrade program to bring the vendor’s existing units up to the XA models. STRATUS COMPUTER INC., Natick, Mass.

FOR DATA CIRCLE 307 ON READER CARD

NETWORK MANAGEMENT

Overlord 1 is the first of four levels of a network management system offered by this vendor. Each level will offer an additional functional control capability as well as performance enhancement. This product, using a DEC minicomputer, provides centralized automated control of T-Bar switching equipment located in data networks and multiprocessor data centers. It is designed to build up a database of operational intelligence and, through the control of the physical switching equipment, provide a user with configuration alternatives.

The information system software package is also contained in the system, designed for data collection and database management.

The unit provides color graphic displays, database printouts, and a trouble ticket reporting and monitoring feature that will allow an operator to open or update an outage ticket. This information can be stored, retrieved, and printed for daily, weekly, and monthly reports. Prices for Overlord 1 start at $60,000. T-BAR INC., Wilton, Conn.

FOR DATA CIRCLE 309 ON READER CARD

SMALL BUSINESS SYSTEM

The I-Tower is a small business system utilizing hardware architecture of the vendor’s Tower 1632 system combined with the RMCOS operating system. The vendor says the system is designed to provide solutions specifically for the small business computer market via a range of application software, including RMC/COBOL and compatible application programs.

The nucleus of the I-Tower is comprised of a 16-bit, 10MHz Motorola 68000 processor. The dual-bus design of the unit combines a multiprocessor I/O subsystem with a high-speed processor memory bus. Peripherals designed for the system include 5¼-inch and 8-inch Winchester disks, streaming tape, a wide variety of printers, and several CRTs. It can be expanded to 2 million characters of error correcting memory, up to 260 million characters of disk storage, and can support up to 16 concurrent users.

The list price for the I-Tower configuration, which includes the processor, 512Kbytes memory, 46Mbytes Winchester disk, 1MB flexible disk, 20Mbytes streaming tape, 125 lps matrix printer, CRT display terminal, eight RS232C/3270 ports, 2780/3780 remote batch communications, RMCOS, and RMC/COBOL compiler package is $28,900. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 310 ON READER CARD

LASER SCANNER

The OBM Laser Two is an optical character recognition (OCR)-based, data entry system that reads select machine print fonts and handwritten documents. It is designed for a high-volume data entry environment. The system can read a wide variety of forms ranging from small payment stubs to full legal-size pages.

The system consists of a microproc-
The Whisper Terminals, from 3M.

Three devices that plug in anywhere for instant TWX/Telex, electronic mail, and database communications.

Does your organization need portable and/or desktop terminals for TWX and Telex users?

Are your sales representatives interested in a handy, time-saving way to submit orders and obtain information from headquarters while in the field?

And has your company been seeking a cost-effective means of implementing electronic mail?

If your answer to even one of the questions above is "yes", then you should be looking at the Whisper Terminals from 3M.

An integrated family of multi-purpose terminals.

3M's Whisper Writer, Whisper Reader, and Whisper Screen are communications devices that serve users in four different ways:

- As TWX and Telex terminals.
- As substitutes for (or supplements to) dedicated ASCII terminals.
- For message forwarding and retrieval via an electronic mail network.

Whisper Writer: a fully transportable teleprinter.

Whisper Writer is about the size of a portable typewriter. It incorporates all of 3M's four Whisper Terminal functions and can be used in an office, or on the road. Its built-in text-editing software, battery-maintained memory, and quiet 35-cps printer make it a versatile performer at a competitive price.

Whisper Reader: a terminal that weighs just 2 lbs.

This book-size unit does most of what Whisper Writer does, with the obvious exception of printing. Like Whisper Writer, it lets users prepare text off-line to save on telephone, TWX, and Telex charges.

Whisper Screen: a smart terminal that communicates.

3M's intelligent CRT terminal has a standard RS-232C interface, plus a built-in modem for communications at 1200 or 0-300 baud. A 16K memory with print spooler is standard, as are a variety of automatic dialing, log-on, polling, and answering features.

Hard copy output for both the Whisper Screen and Whisper Reader is provided by 3M's complete line of low-cost, quiet Whisper Printers.

Obviously, there isn't room here to describe the attributes of 3M's Whisper Terminals in detail. For the full story — and for a brochure on other 3M products for the Orchestrated Office — call toll-free or mail the coupon today.

Call 800-328-1684 toll-free, (In Minnesota, 809-792-1072; in Canada, call 800-268-9696)

FOR DATA CIRCLE 311 ON READER CARD

MICRO CAD

The Control Data Corp. personal computer aided design (CDC/PCAD) system includes a workstation and schematic design and documentation software. According to the vendor, the CDC/PCAD system provides 80% of the schematic and documentation functions an engineer needs at 20% of the cost; manual design, drafting, schematics, and writing documentation comprise most of the 80%.

The system enables engineers to design a circuit in hierarchical schematic form by using symbols that represent components. Users of Cybernet data services for advanced simulation, analysis, and design verification. Engineers can enlarge portions of a circuit and add to portions of it not on the screen. Design documentation can be developed through word processing, spelling checks, electronic spreadsheet, and database management.

A fully configured CDC/PCAD system includes an IBM PC-compatible microcomputer, software for schematic entry, directory to several design software packages, a dot matrix printer/plottter, 10MB Winchester hard disk drive, 360KB floppy disk drive, and mouse. It costs $15,800. Users with an IBM PC/PC XT or compatible can purchase the computer add-ons, software, utilities package, and mouse for $7,800. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 312 ON READER CARD

GRAPHICS WORKSTATION

The PowerStation 5000 is a 32-bit supermini computer based on the Unix operating system. It is targeted for computer-intensive electrical, mechanical, architectural, and engineering applications, and allows all P5500 workstations to communicate with the vendor’s PowerNode in a network. Users can create drawings on terminals and transmit them to the host system database.

The P5500 system contains a 32-bit virtual application processor and display processor. The applications processor can perform computations associated with drafting, design, solids modeling, and database manipulation. It is dedicated to display manipulation, operator interaction, and graphics management.

The graphics subsystem displays both color and monochrome graphic output, and includes a 19-inch display monitor, keyboard, and mouse. The unit has a resolution of 1,280 by 1,024 pixels with 8-bit planes of image memory for 256 colors out of a palette of 16.7 million.

The UTX/32 operating system is based on the Berkeley 4.2 version of Unix. TCP/IP, UUCP, and CU communications provide interaction within this Unix-based network. It can be linked to Ethernet, RS232, synchronous bit serial, and high-speed parallel ports. The price for a P5500 system with 2MB main memory, 32KB cache memory, cartridge tape, 80MB disk, and graphics subsystem is $39,900. GOULD INC., Computer Systems Division, Fort Lauderdale, Fla.

FOR DATA CIRCLE 313 ON READER CARD

LINE PRINTERS

The LW400 and LW800 are line printers that use technologies such as linear, free-flight hammers, and VLSI components. According to the vendor, these printers produce near letter-quality printing at a speed of 400 and 800 lpm.

The printers come in floor-length cabinets and have a 262KB hard disk. The units have an intelligent control panel with touch switches and a four-character, alphanumeric display that reports the status of the printer and identifies the source of print malfunction. Print bands may be changed for a selection of character sets and font styles. They each have an 80-yard cassette ribbon. The price of the LW400 with a Data-products or a Centronics-compatible parallel interface, acoustic cabinet, and paper basket is $6,000. The LW800 with the same features is $8,800. An optional RS232 serial interface costs $500. SYNERGY PRINTER SYSTEMS INC., Palo Alto, Calif.

FOR DATA CIRCLE 314 ON READER CARD

LOGIC ANALYZER

The HP1630G is a 65-channel logic analyzer. It provides software performance analysis plus state and timing analysis in one instrument. It has a nonvolatile memory for storing a disassembler and instrument configuration, mass storage device, and full compare mode. According to the vendor, the unit is suited for applications involving 16-bit microprocessors and multiple bus monitoring.

The unit can display the order in which state values occur in a program. With this feature, the user can view any piece of program flow, and dual cursors can help locate specific addresses for further analysis. This mode spots infinite loops, erroneous jumps, and activity in forbidden areas of memory.

With the HP-IB (interface bus) and HP-IL (interface loop) built into the HP 1630G, the user can choose from many peripherals to simplify setup, testing, and documentation. Combining the unit with a desktop computer results in fully automated data acquisition capability. A kit is available for upgrading an HP 1630A or an HP 1630D to an HP 1630G. The HP 1630G costs $12,100. HEWLETT-PACKARD COMPANY, Palo Alto, Calif.

FOR DATA CIRCLE 315 ON READER CARD

PERSONAL COMPUTER

The Royal Alphatronic Personal Computer is targeted for professional business applications as well as home use. The unit, which runs on CP/M, includes a 280A microprocessor with 64KB RAM, 32KB ROM. According to the vendor, any color or black and white television or professional quality RGB monitor can be used with the unit. Depending on the monitor, it can display either 80 or 40 columns by 24 rows.

The 79-character keyboard has six double programmable function keys (ASCI layout), separate numeric keypad, and separate cursor controls. Built-in interfaces connect to a cassette recorder, two disk drives, and Centronics-type printers. The Royal Alphatronic Personal Computer costs $700. ROYAL BUSINESS MACHINES INC., Windsor, Conn.

FOR DATA CIRCLE 316 ON READER CARD

MICROCOMPUTER SYSTEM

This vendor has introduced the B 25 desktop microcomputer system and the ES520 shared resource processor, which complements it by supporting clusters of up to 32 B 20 and B 25 workstations. Both units are designed for the business market.

The basic standalone system includes a central processor with a 256KB RAM memory, a 12-inch display, keyboard, and a dual floppy disk storage module. Expansion to 40MB, color, and graphics will also be available on the system. The operating systems for the B 25 include the B 20 Operating System (BTOS), MS/DOS, and CPM-86. According to the vendor, BTOS allows MS/DOS and CPM-86 to be used in a clustered environment.

A B 25 master can support up to five additional workstations. The workstations also have their own local dedicated disk storage, printers, and data communication lines. The larger workstation clusters can be configured using the ES520 shared resource processor. The unit utilizes multiple dedicated processors to provide file handling and I/O management. Memory size can range from 1 to 45MB. The unit has a disk capacity up to 262.5MB, the ability to drive high-speed printers at up to 600 lpm, and the capacity to expand communications capabilities. A broad range of applications software will be available on the B 25. Additionally, more than 250 third-party applications software packages are also available. The B 25 costs $4,000. A cluster workstation is priced at $2,700. The ES520 shared-resource processor sells for $26,000. BURROUGHS CORP., Detroit.

FOR DATA CIRCLE 302 ON READER CARD

—Robert J. Crutchfield
A world of information services for airlines.

- Automated reservations and passenger processing
- Weather services and computerized flight planning
- Customized data management assistance
- Business and telecommunications management services

Automation Systems Inc.

101 Continental Boulevard, Suite 200, El Segundo, California, U.S.A. 90245
SHARING LAXCOO = Telex 047-1117 = Telephone (213) 626-6666

CRSA 72 ON READER CARD
Call 1-800-331-3113 and compare our products, service, and our rates with what you're paying now. You may get a happy surprise.

Northern Telecom batch processing systems have proven themselves, in more than a decade of use in a variety of applications, to be among the most reliable, practical, cost-effective systems ever developed. They deliver more throughput per dollar than any competitive system.

Now, as solid evidence of our commitment to batch processing, we're improving these already successful systems for even more productivity. For instance, we're introducing a new high-speed band printer with changeable type. Operating now with IBM's SNA, we've also added new, low-cost distributed data processing capabilities for more system versatility, and to provide for future growth toward the integrated office.

Match our
Time-proven performance with long-term savings.

Northern Telecom's aggressive pricing is more proof of our commitment to batch. Our discount structure offers long-term savings on multi-year leases. And at renewal time, you can save even more with discounts up to 30%.

Your processing may be remote, but Northern Telecom service is on the spot.

With service and maintenance professionals located at 157 cities nationwide, we're able to provide prompt response to your call for service. How fast? Two hours in major metropolitan areas; four hours in most other areas of the country. And our multi-year maintenance agreements guarantee continuing, low-cost operation of your Northern Telecom system.

If your system lease expires within the next six months, now is the time to find out more about batch processing from Northern Telecom.

Call our toll-free number: 1-800-331-3113. Or write Northern Telecom, Mail Station T-240, P.O. Box 1222, Minneapolis, Minnesota 55440. We'll show you how we can tailor a batch system to your specific needs. And save you money, too.
Infodata

The reliable software technology company. Providing dependable, easy-to-use software products for a full range of information system environments:
- INQUIRE/Information Center
- INQUIRE/Text
- INQUIRE/DBMS
- PC/INQUIRE

Reliable because Infodata products are well-documented and time-proven in hundreds of organizations, many of which have used INQUIRE for over a decade.

Reliable because Infodata's fifteen years of software design experience guarantees easy installation, exceptional user friendliness, and continued compatibility with changing user environments.

An Invitation to Reliable Performance

Reliability is only part of the Infodata story. To find out more about the performance INQUIRE makes possible, attend one of Infodata's free MIS Executive Seminars.

For complete details and registration information, call toll free (800) 336-4939. In Virginia, call (703) 578-3430.

Infodata Systems Inc.
5205 Leesburg Pike
Falls Church, VA 22041
**SOFTWARE AND SERVICES**

### UPDATES

"One of the worst pieces of advice you can give youngsters today is to become a computer programmer," says Professor Edward Feigenbaum, a computer scientist at Stanford University and author of The Fifth Generation. One of the pioneers in the field of artificial intelligence, the educator predicts automation of software development will take place in this decade and in the 1990s, adding "programming will inevitably be automated."

According to the professor, the world is entering the second computer age, moving from computers that file and calculate to computers that do "reasoning and understanding." He says computers are approaching zero cost, and by 1990, they will be in three fourths of all homes, compared to only one in 12 today.

Feigenbaum observes that more and more corporate interest in computers is involved in information processing and the computer is the knowledge worker's tool. "Most information processing involves reasoning and problem solving, not calculating and data processing." In his remarks before the Stanford School of Humanities and Sciences meeting in New York, he said that corporate interest in computers and knowledge engineering is so great "it's on the verge of killing us" in academe. He said that 200 of the Fortune 500 firms have established laboratories and have become "vacuum cleaners" for talent. The "best example," he says, is Digital Equipment Corp., which has about 135 people working in artificial intelligence. He theorized that past gains in the popular standard of living have come not because people worked harder, but because they got smarter. Quoting Winston Churchill, Feigenbaum said:

"The empires of the future are the empires of the mind." Rule Britannia!

A less esoteric view of data processing but one that is equally interesting is expressed in a survey conducted by General Employment Enterprises Inc. The Chicago-based firm found that dp professionals seem to be taking a more open-minded view of relocation today than they did a year ago. The survey found that 45% of the 3,522 data processing professionals polled would consider relocating if presented with a good career opportunity elsewhere. Only 17% said they would not consider a position that necessitated a move, while 18% said they were unsure. Among those who would relocate for a better career opportunity, 24% said location was not a concern. Some 40%, however, expressed a preference for the West Coast. Only 10% would opt to move to the Southwest.

According to the vendor, the software increases the chances of a clean compilation and reduces the chances of a program being rejected due to syntax and simple semantic errors. As a result, mainframe central processing unit time is reduced. The product complements the software development features of Unix System V. The COBOL Syntax Checker is available in source code under license agreement from AT&T. It costs $7,500 for the first cpu and $3,750 for each additional cpu. It is available on tape media for the vendor's 3B20 computers as well as other development microcomputers. AT&T SOFTWARE SALES AND MARKETING, Greensboro, N.C.

**DATA MANAGEMENT**

This vendor is offering three data management packages that run on its DECsystem-1095 and DECsystem-2065 mainframe computers. The software packages are Datatrieve-20, DBMS-20, and Traffic-20.

Datatrieve-20 is syntactically compatible with software packages for the VAX, PDP-11, and Professional 350 computers. The package enables users to access and manipulate data in the TOPS-20 record management services (RMS) files. The recode-oriented query language permits users to define, store, update, and display data.

**COBOL SYNTAX CHECKER**

The COBOL Syntax Checker, running under Unix System V, allows programmers to edit and check the syntax of COBOL programs before they are transmitted to mainframes and for compilation and execution.

According to the vendor, the software increases the chances of a clean compilation and reduces the chance of a program being rejected due to syntax and simple semantic errors. As a result, mainframe central processing unit time is reduced. The product complements the software development features of Unix System V. The COBOL Syntax Checker is available in source code under license agreement from AT&T. It costs $7,500 for the first cpu and $3,750 for each additional cpu. It is available on tape media for the vendor's 3B20 computers as well as other development microcomputers. AT&T SOFTWARE SALES AND MARKETING, Greensboro, N.C.

**FOR DATA CIRCLE 326 ON READER CARD**

**SOFTWARE AND SERVICES**

"One of the worst pieces of advice you can give youngsters today is to become a computer programmer," says Professor Edward Feigenbaum, a computer scientist at Stanford University and author of The Fifth Generation. One of the pioneers in the field of artificial intelligence, the educator predicts automation of software development will take place in this decade and in the 1990s, adding "programming will inevitably be automated."

According to the professor, the world is entering the second computer age, moving from computers that file and calculate to computers that do "reasoning and understanding." He says computers are approaching zero cost, and by 1990, they will be in three fourths of all homes, compared to only one in 12 today.

Feigenbaum observes that more and more corporate interest in computers is involved in information processing and the computer is the knowledge worker's tool. "Most information processing involves reasoning and problem solving, not calculating and data processing." In his remarks before the Stanford School of Humanities and Sciences meeting in New York, he said that corporate interest in computers and knowledge engineering is so great "it's on the verge of killing us" in academe. He said that 200 of the Fortune 500 firms have established laboratories and have become "vacuum cleaners" for talent. The "best example," he says, is Digital Equipment Corp., which has about 135 people working in artificial intelligence. He theorized that past gains in the popular standard of living have come not because people worked harder, but because they got smarter. Quoting Winston Churchill, Feigenbaum said:

"The empires of the future are the empires of the mind." Rule Britannia!

A less esoteric view of data processing but one that is equally interesting is expressed in a survey conducted by General Employment Enterprises Inc. The Chicago-based firm found that dp professionals seem to be taking a more open-minded view of relocation today than they did a year ago. The survey found that 45% of the 3,522 data processing professionals polled would consider relocating if presented with a good career opportunity elsewhere. Only 17% said they would not consider a position that necessitated a move, while 18% said they were unsure. Among those who would relocate for a better career opportunity, 24% said location was not a concern. Some 40%, however, expressed a preference for the West Coast. Only 10% would opt to move to the Southwest.

According to the vendor, the software increases the chances of a clean compilation and reduces the chances of a program being rejected due to syntax and simple semantic errors. As a result, mainframe central processing unit time is reduced. The product complements the software development features of Unix System V. The COBOL Syntax Checker is available in source code under license agreement from AT&T. It costs $7,500 for the first cpu and $3,750 for each additional cpu. It is available on tape media for the vendor's 3B20 computers as well as other development microcomputers. AT&T SOFTWARE SALES AND MARKETING, Greensboro, N.C.

**DATA MANAGEMENT**

This vendor is offering three data management packages that run on its DECsystem-1095 and DECsystem-2065 mainframe computers. The software packages are Datatrieve-20, DBMS-20, and Traffic-20.

Datatrieve-20 is syntactically compatible with software packages for the VAX, PDP-11, and Professional 350 computers. The package enables users to access and manipulate data in the TOPS-20 record management services (RMS) files. The recode-oriented query language permits users to define, store, update, and display data.

**COBOL SYNTAX CHECKER**

The COBOL Syntax Checker, running under Unix System V, allows programmers to edit and check the syntax of COBOL programs before they are transmitted to mainframes and for compilation and execution.

According to the vendor, the software increases the chances of a clean compilation and reduces the chance of a program being rejected due to syntax and simple semantic errors. As a result, mainframe central processing unit time is reduced. The product complements the software development features of Unix System V. The COBOL Syntax Checker is available in source code under license agreement from AT&T. It costs $7,500 for the first cpu and $3,750 for each additional cpu. It is available on tape media for the vendor's 3B20 computers as well as other development microcomputers. AT&T SOFTWARE SALES AND MARKETING, Greensboro, N.C.
SOFTWARE & SERVICES

Datatrieve costs $10,000. DBMS-20 and Traffic-20 are priced at $34,500 each. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 328 ON READER CARD

INTEGRATED PACKAGE

This vendor has rewritten its Context MBA integrated software package to run under the MS/DOS operating system and has added 3270 communications to enable connections into IBM mainframes.

The package, Corporate MBA, is said to run up to five times faster than the previous version, which was written in UCSD p-System Pascal. The software is aimed at midsize to large corporations and is being sold through dealers and through a direct sales force. It offers word processing, database, graphics, and spreadsheet functions, as well as a new programming facility that captures long strings of keystrokes for future execution.

Also added is a data exchange facility that enables files to be transferred to and from such popular packages as WordStar, VisiCalc, and dBASE II. The product is designed to run on IBM, DEC, Hewlett-Packard, and NEC personal computers. Corporate MBA is priced at $895 and comes with a self-running tutorial disk. CONTEXT MANAGEMENT SYSTEMS, Torrance, Calif.

FOR DATA CIRCLE 327 ON READER CARD

FINANCIAL MANAGEMENT

The Smart Checkbook is a total personal financial management software program. It is available for PC/DOS, MS/DOS, CP/M, and CP/M-86. The product is designed to accommodate sophisticated financial needs. The program produces complete financial records, including family budget reports, net worth statements, tax records, custom reports, and summary tables.

Money market, checking, savings, credit card, and cash accounts can be tracked individually or in any user-desired combination. Income and expenses can be organized with up to 200 budget and 200 tax categories. Any amount can be split among any 15 budget and 15 tax categories.

The product has a reconciliation process that corrects errors and pinpoints discrepancies between user and bank account records. It locates duplicate entries and shows items returned by the bank that aren't in the account. SOFQUEST INC., McLean, Va.

FOR DATA CIRCLE 330 ON READER CARD

VIDEO TRAINING

"Introduction to Lotus 1-2-3" is a complete hands-on training system that includes a videotape, computer disk, guidebook, and command chart of all of 1-2-3's commands.

Users first watch a procedure demonstrated on the videotape. Then they use the LearnPC disk and guidebook to complete the same procedure on their computer.

According to the vendor, the videotape shows exactly what keys to press and what the computer screen looks. Additionally, the entire program is written in plain English. The color tape runs almost two and a quarter hours. It is available in VHS, Beta, and ¼-inch videotape. The complete program sells for $500. Additional guidebooks and computer disks are available for seminars and department training sessions. LEARN PC VIDEO SYSTEMS, Minneapolis, Minn.

FOR DATA CIRCLE 332 ON READER CARD

BANKING SOFTWARE

Bankplan2 is a strategic planning software package for banking institutions, which can simulate the financial effects of an acquisition, using either purchase or pooling methods of accounting.

The modeling package is for bank decision makers who need to investigate the financial effects of alternative investment strategies, deal structures, regulatory policies, and economic conditions before making an acquisition decision.

The product provides answers to questions relating to the current and likely future condition of the acquiring institution; what the financing mix should be; financial impact of the deal on the acquiring bank; and which potential candidate has the financial characteristics of interest to the buying bank. Bankplan2 is available for installation on IBM or IBM-compatible mainframe computers for a $25,000 license, or it can be leased on a monthly basis. CHASE DECISION SYSTEMS, Cambridge, Mass.

FOR DATA CIRCLE 331 ON READER CARD

PRINTER SOFTWARE

Printer Bashier is a printer utility program that provides full menu-based operation of all control functions and print modes of all Epson printers. It allows users to send all of the printer control codes necessary to set up the printer by making menu selections using just a few keystrokes. In addition, it downloads into the FX series printers the three IBM character sets that are not included in Epson printers, the vendor says.

The software runs on the IBM PC, PC XT, Apple IIe, and Epson QX-10 personal computers and compatibles. It drives the MX-80, MX-100, FX-80, FX-100, RX-80, and RX-100 Epson printers.

To operate the package the user loads the program and a menu appears. Pressing a few keys to indicate printer modes and functions desired is all that is necessary. When the printer is up, the software's menu retires until called again. SPEER RESEARCH CORP., Rowayton, Conn.

FOR DATA CIRCLE 333 ON READER CARD

COMPUTER GRAPHICS SOFTWARE

The Architectural Interactive Design System (AIDS) is designed for a broad range of applications by architects, engineers, and others in the design and construction fields. In the Aids, scaled architectural drawings can be produced three to five times faster than by hand, and production

SOFTWARE SPOTLIGHT

CONVERSION SOFTWARE

Emphasizing compatibility rather than conversion, a procedure to migrate from IBM System/34 to HP 3000 computers has been developed. After the change, RPG programs will run in their native mode as fast as before the conversion, says the vendor.

The HP/Transform/3000 product is a value-added software package for users of the vendor's HP 3000 computer. The software has three product elements: upgrade utilities to bring over procedure and data files, a process monitor to speed up execution of a set of commands that perform S/34 functions on the HP 3000; and on-site consultation for the transformation process.

Key to the ability of this system to run S/34 software in its native mode is the process monitor. PROCMON gives the HP 3000 the features that are familiar to S/34 users, but not with a performance-impairing emulator, the vendor says. While some S/34 statements translate one-for-one to the HP 3000's operating system, those that do not are translated by PROCMON.

Transform/3000 will run on any HP 3000 system equipped with the current version of its MPE operating system; HP's RPG compiler, version 6.0 or later, is also required. Full documentation is included in the purchase price. License to copy is offered, and users who wish to do future S/34 to HP 3000 upgrades on their own need not purchase factory systems engineer support, which is required on the initial installation.

The vendor expects the package will appeal mainly to medium-sized and large organizations with in-house programming expertise and to software suppliers. Transform/3000 costs $15,000. HEWLETT-PACKARD, Palo Alto, Calif.

FOR DATA CIRCLE 325 ON READER CARD
Where to make the right micro to mainframe connection.

NCC BOOTH #B3832

That's the Cullinet booth. Where else would you expect to find the industry's most intelligent micro-to-mainframe connection?

Cullinet's new GOLDENGATE™ PC Software and Information Database are key components in our integrated approach to information systems. That approach also includes our new high performance relational database, IDMS/R, and our applications software for manufacturing, finance and human resources.

Stop by our booth and we'll show you how they all connect.

PC Software: Cullinet

© 1984 Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, MA 02090-2108
Phone, toll-free, 1-800-225-9930. In MA, 617-329-7700.

Cullinet Software products are designed to run on IBM 3083/370, 30XX or 43XX or plug-compatible computers.
Cullinet PC Software is designed to run on IBM XT and several compatible personal computers.

CIRCLE 75 ON READER CARD
SOFTWARE & SERVICES

speed of nonscale drawings is increased 40
to 50 times, the vendor says.

The system allows for overlays of
all types of architectural and engineering
drawings, space planning, interior design,
component costing, and graphic presenta-
display. Designers are able to create a
three-dimensional model of a building start-
ing with a sketch and ending with all re-
quired drawings.

A self-teaching program assists users
in becoming conversant with the pro-
gramming within 40 hours, according to the
vendor. A library of 2,000 standard sym-
bol and details allows users to begin draft-
ing immediately. It can be modified or ex-

tended to suit the users’ needs. A single
computer terminal workstation is licensed
for $7,000, and two or more workstations

can be licensed for $14,000. ARCAD, Los
Angeles, Calif.

FOR DATA CIRCLE 334 ON READER CARD

SYNTAX-DIRECTED EDITOR

The Syntax-Directed Editor (SDE) is a pro-
ductivity tool that provides an interactive
programming environment for writing,
editing, and executing COBOL source
programs. Its shorthand method reduces the
amount of code that a programmer must
enter and immediately checks for format
and syntax errors.

SDE supports the creation of COBOL
74 programs in the General Comprehensive
Operating Supervisor (GCOS) 8 environ-
ment for Honeywell large-scale computer
systems. According to the vendor, its ob-
jective is to provide application building
tools that can be incorporated into a user
development center.

The vendor says SDE understands
the rules of COBOL. Instead of the pro-
grammer typing complete statement structures,
SDE is used by selecting a series of tem-
plates, one per COBOL verb type. All fixed
aspects of the statement grammar are then
automatically generated and displayed on
the screen. Using the cursor and tab con-

controls, the user fills in the blanks with vari-
able information. The Syntax-Directed Edi-
tor for COBOL is available for $225 per
month, with a 12 month minimum. HON-

EYWELL INC., Phoenix, Ariz.

FOR DATA CIRCLE 337 ON READER CARD

CROSS REFERENCING SYSTEM

Probe is an interactive analysis and cross-
referencing system for the IBM System/38.
It uses object source code level analysis to
provide cross-referencing information. The
analysis is performed in a batch subsystem;
the information is provided on-line.

The product is menu-driven and will

display job-stream explosions. It will show
all control transfers from one program to
another, including CALL, TR XCTL. DPU. and
SB MOD. All RPG, COBOL, and CL programs
will be included. Flowcharts will be pro-
vided by the vendor.

On-line database information in-
cludes record layouts for externally de-
scribed files and RPG- and COBOL-program
described files. It does field analysis and
can display program usage of field informa-
tion for internally and externally described
files.

Reference field analysis and physical
and logical file dependencies are able to be
displayed. Also displayed are where-used
displays and explosions.

The software is both menu- and
command-driven. The command processor
provides access for frequently used func-
tions and the menu provides a structured
interface to all of its features. All displays
are help-key capable, and the software in-
cludes a user manual. The system is com-
pletely compatible with ACS’s Abstract/38
documentation system. Probe costs $1,000.
ADVANCED SYSTEMS CONCEPTS INC. Chica-
go, Ill.

FOR DATA CIRCLE 338 ON READER CARD

GATEWAY SOFTWARE

The Comten Multiple Access Facility with
Remote Host Option (MAF/RHO) is designed
for the Comten 3600 communications pro-
cessor system. SNA and BSC 3270 terminals
in an IBM SNA or pre-SNA network can access
non-IBM hosts and IBM hosts with this sys-
tem. In addition, SNA 3270 and BSC 3270
terminals can access a gateway between
IBM hosts located in separate networks.

According to the vendor, MAF/RHO
increased the flexibility of the user’s net-
work by eliminating the restriction that
3270-type terminals be dedicated to either
IBM or non-IBM hosts, or to any one net-
work.

The software works without host
modification, IBM MSNF, or any specialized
gateway function. Polling and addressing
of terminals for the host, error recovery,
and control functions, and alternate routing
for remote nodes are all provided by
MAF/RHO. The license fee for the Comten
MAF/RHO data communications software is
$6,400 per year. NCR COMTEN INC., St.
Paul, Minn.

FOR DATA CIRCLE 339 ON READER CARD

BUSINESS GRAPHICS

APSGRAPH is a graphics package compatible
with CP/M-based personal computers. The
software produces business graphs such as
line graphs, pie charts, bar graphs, stick
graphs, step graphs, and scatter plots. It
also generates clustered and stacked
graphs. The product is completely menu-
driven and it allows users to graph new data
or data already stored on a database or
spreadsheet program. APSGRAPH is de-
signed for the executive or professional
who needs to produce graphs quickly and
doesn’t want to learn a command language,
the vendor says. It also incorporates a help
function.

To produce a graph, the program
either displays a menu or asks a question.
After selecting the type of graph to be gen-
erated, the user inputs the data for the graph
or specific source. To generate very com-
plex graphs, the product reads multiple data
files. It then produces a single graph with
overlaid images for each set of data. APS-
GRAPH costs $300. AUTOMATED PROFESSION-
AL SYSTEMS INC. New York, N.Y.

FOR DATA CIRCLE 340 ON READER CARD

ROBERT J. CRUTCHFIELD
At Morgan Stanley, software is like any other investment. They judge it by the rate of return.

NATURAL Fourth-Generation Information Processing Systems

Ask the MIS Department at Morgan Stanley how they decide what software to buy, and you'll hear the no-nonsense logic that has made them America's leading investment bank in the underwriting, sales, and trading of securities.

At Morgan Stanley, revenues per employee have significantly increased in the last decade, thanks to a series of company-wide initiatives. MIS's contribution to this effort has been the implementation of a software approach specifically designed to make the most of each employee's time—and every dollar spent on MIS.

Implementing that approach has been helped dramatically by the use of advanced productivity tools from Software AG. With ADABAS, our relational database management system, worldwide financial information is available instantly to meet an average of 15 million requests a day. And through the use of NATURAL, our fourth-generation information processing system, Morgan Stanley has improved programmer productivity by 500% or more.

With performance like this, no wonder NATURAL is the world's most widely installed system of its type. And no wonder that the Morgan Stanleys of the world are increasingly turning to Software AG products for their demonstrable effects on the bottom line.

Systems software can be an expensive investment. But if you're prudent, it can pay off handsomely. To find out more about ADABAS, NATURAL, and other Software AG products, call or write today.

Software AG of North America, Inc.
11800 Sunrise Valley Drive
Reston, VA 22091
(703) 860-5050

Copyright 1983. ADABAS, NET-WORK, NATURAL and PREDICT are trademarks of Software AG of North America, Inc.
UNIX SYSTEM V. FROM AT&T.

What's the first question you should ask about a new business computer? Considering what's at stake, none is more important than "Is it based on UNIX System V?" The answer can affect your cost of doing business for a long time.

Here's why good business decisions are based on UNIX System V.

No more making the software fit the computer. Or junking the computer because its operating system isn't compatible with other machines.

Because UNIX System V from AT&T has emerged as an industry standard for business, engineering, and scientific computers.

That means your programmers won't spend precious time and money reprogramming software every time a new computer comes along.

Instead, they can work more productively. And more profitably.

That's important because as programmer productivity goes up, your costs come down.

The profits of portability

UNIX System V from AT&T frees you from the tyranny of computer obsolescence. Because it's hardware independent.

Considering how much you invest in a computer these days, that can mean real savings.

Another saying: applications software written for UNIX System V is easily adapted to a wide range of computers. From micros to mainframes.

We call that portability. You'll call it a most important consideration when it's time to invest in a new computer.

Service that goes on and on

AT&T is committed to seeing that UNIX System V does the best possible job for your company.

That's why we offer a complete program of training, support, and documentation.
NOW ON, CONSIDER IT STANDARD.

Including periodic updates. A newsletter. A problem-reporting system.
And more.
The source of this service is AT&T, whose own Bell Laboratories first developed the UNIX Operating System over 20 years ago.

So your company has access to the motivation and technnicians who created UNIX System V in the first place.

It’s reassuring to know that, in the often volatile world of business computers, you’ll have a service team that won’t go out of service next year.

Is it based on UNIX System V?

Reliability. Portability. Compatibility. Flexibility. They’re all important reasons why UNIX System V from AT&T has emerged as an industry standard.

For you, the most important reason is its ability to cut the cost of doing business.

It’s the reason you should ask, “Is it based on UNIX System V?” before you ask anything else.

To find out how UNIX System V from AT&T can help your business, just fill out the coupon.

We’ll send you our specially prepared booklet, “Ten Questions You Should Ask Your MIS Manager About UNIX System V.”

UNIX System V. From AT&T.
From now on, consider it standard.

©1984 AT&T Technologies, Inc.
More and more, people in your company want to access data from the mainframe. And since IBM PCs are in (while dumb terminals are on their way out), you need one good source for a complete family of micro-to-mainframe communications products. That's where we come in. AST is the leading supplier of IBM PC-compatible products. With over 200,000 board-level PC enhancements already on the job. And now we're offering a full line of 3270-compatible products that will fit a variety of connections and protocols. Without forcing you to reconfigure your mainframe hardware or software.

For starters, there's our new AST-SNA family. Hardware and software that let your PCs talk to your mainframe (and let the mainframe talk back) via the SNA/SDLC protocol. Giving you all the facilities of a 3270 terminal. And with the computing power of your stand-alone PC maintained!

Plus, the basic hardware can support multiple protocols. And you can support a variety of emulations from a single PC. Or support additional PCs by using one as a cluster controller. An arrangement (with up to four PCs) that can save you a lot of money. You can even attach low-cost ASCII CRTs to a PC and emulate 3278 Model 2a.

What's more, our AST-BSC package lets you work in a 3270 BSC environment and still migrate to 3270 SNA/SDLC without hardware upgrades. Another way to save money and aggravation.

Still, there's more. For example, if you have an IBM 3274/3276 Cluster Controller, our coaxial connection hardware is your answer. Once installed (via coax-A), it lets your PC retain its stand-alone processing capabilities and emulate a 3278/9 terminal. With no performance degradation!

You can even use our AST-3780 to support 3780 RJE batch communications. Which gives your PC the ability to operate unattended. And transfer program, data or text files between your PCs and an IBM host at very high speeds.

AST is the only supplier that can give you a complete line of PC-compatible products. Communications hardware and software for 3270, 3780 and 5250 environments. I/O and memory expansion cards. And utility programs.

Find out how thousands of users have benefited from AST's communications products. To get detailed product and configuration data, call us today at (714) 863-1333. Or write AST Research, 2121 Alton Avenue, Irvine, CA 92714. TWX: 753699ASTUR.
BOOKS

THE AMAZING RACE: WINNING THE TECHNORIVALRY WITH JAPAN
by William H. Davidson

THE JAPANESE CONSPIRACY: THE PLOT TO DOMINATE INDUSTRY WORLD WIDE—AND HOW TO DEAL WITH IT
by Marvin J. Wolf

In the last decade, Japan's economy has become the second most powerful in the world. Its manufacturing methods are as much envied as feared; its technology, once dismissed as shamelessly imitative, now serves up stunning innovations; its principles of corporate organization are studied with Talmudic fervor.

More arresting still, the fundamental business talent embodied by modern Japan may not be mass production or negotiations or even political brinksmanship—it may simply be conquest.

Students of Japanese history note that Japan's awesome postwar recovery should not be surprising; its roots are a millennium deep. Its swift rise to economic dominance of choice industries should not have caught the United States off guard—after all, the U.S. helped make Japan's resurgence possible, even charted its course. (Perhaps our greatest postwar talent was revitalizing rival economies.)

But decidedly, U.S. business has been vulnerable to the Japanese. And the results have been an uneven distribution of disasters, shocks, dislocations, and unmistakable benefits—chiefly consumer benefits. By now few Americans have not participated in Japan's rise to economic power. Buy-American sentiments to the contrary, it's a rare U.S. citizen who doesn't own a dozen Japanese products. We buy them because they're not only cheaper, they're better.

Take passenger cars. Unless you're inured to mediocre workmanship, clumsy handling, and premature deterioration you can't change, the car you own is designed, and probably built, as they say, offshore.

The Big Three are making money again, but find themselves in the embarrassing posture of imitating their betters, and far more slavishly than their new rivals once aped Detroit. So far the best these Motown geniuses can do is rip off foreign car styling. Meanwhile Mitsubishi has developed the ceramic diesel engine, Europeans are pushing suspension design ahead 10 years, and Honda is about to redefine commuting.

The auto business, as many have been saying, offers an instructive clinic for the information processing industry. Some would argue this clinic is not of much use, among them are William H. Davidson, author of The Amazing Race: Winning The Technorivalry with Japan. Davidson finds, peering westward from his perch as associate professor of the Colgate Darden School of the University of Virginia, that Detroit has not been the latter-day Rome of vanity, bureaucratic cowardice, and sloth we thought, but an able, useful organism suffering a spring cold. Others, including Marvin J. Wolf, author of The Japanese Conspiracy, see Detroit with its massive layoffs and enormous debt to the federal government as the first of many would-be Lazaruses.

These two books in some ways define the spectrum of enlightened strategic thought about the Japanese threat. Both provide, for the nonspecialist at least, significant new information and sound, if not bell-ringing, insights. Both are unquestionably de rigueur for information processing managers.

Essentially, Wolf's methods are interpretative, Davidson's are mathematic. In that the vulnerability of U.S. markets to Japanese conquest has resulted more from cultural blindness than our inability to analyze financial data, Wolf's approach holds more promise. Of the two, in fact, The Japanese Conspiracy is more useful, once one gets beyond its initial (and, one suspects, sales-savvy) paranoia. It is merely regrettable that, given the shattering transformations underway in American-Japanese business relations, better books on such a topic could not have been written.

Since Commodore Matthew Calbraith Perry forcibly introduced Western culture to Japan in the 1850s, Japan has been trying to beat Westerners at their own game. At the same time, the Japanese have been remarkably successful in preserving longstanding social structures and values.

The modern Japanese corporation, Wolf shows is very much an ersatz feudal village, built around the noblemen of contemporary Japan, corporate executives. There is a serf class—the two thirds or more of all Japanese workers who do not have lifetime employment with one of Japan's diversified high-tech giants. They live in tiny, poorly heated, nearly identical flats in fiercely overcrowded neighborhoods. They work long hours, and are expected to—they have no Western-style labor unions to protect them. Even lifetime employees are exploited by Western standards. Their favored status doesn't provide affordable housing—comparatively few Japanese acquire suitable dwellings, consumer credit being many times higher in interest and more difficult to obtain than we're accustomed to, and land within reasonable commuting distance is prohibitively expensive anyway. Those who manage to buy a tiny flat or house often acquire loans from their companies, cementing the loyalty to their employer.

Nor do lifetime workers have real job security: most are forced to retire at 55, whereupon they must find low-paying service jobs to supplement what savings they've scraped together over the years. (Japanese workers are compulsive savers, socking away 20% of income in postal or corporate accounts; this supply of cheap capital helps drive business expansion.) Unmarried workers appear hardly different from labor-camp detainees—if they work for a large corporation, they're housed together in company dormitories governed as strictly as disciplinary military schools.

There is a hidden hand in all this: with little to look forward to in private life, the Japanese worker devotes his energies to the company. There, and throughout Japanese society, conformity is the rule. Imagine an American manufacturing company where workers report early to take part in mandatory calisthenics, file quietly to the company cafeteria for lunch, return to their stations with five minutes to spare, and stay late to attend, without pay, a quality circle.
SOURCE DATA
dedicated to improving not their own lot but company profits.

All of this may sound like a dream to American managers—the perfect humanoid work force. Especially to those confronted with Kafkaesque union contracts. In this country, the typical worker thinks first of himself and his family; his union comes second; the company, if its management is not too adversarial, is at best a distant third. But American managers cannot expect workers to exhibit the binding loyalty to company that Japanese workers apparently feel. The two cultures are radically different. Nor, given the tenets of democratic capitalism, is such loyalty desirable. The fact that American workers have, in general, more disposable income than their Japanese counterparts means that the U.S. is the best market for consumer goods in the world. Until recently, the principle beneficiaries of this market have been American companies.

In Wolf’s view, the advantages of worker loyalty and (in key industries) productivity that Japanese companies enjoy are significant, but far from overwhelming. The real edge Japan holds in the marketplace derives from two other factors: unsavory business practices, and national policies that amount to economic totalitarianism. Dumping, theft of industrial secrets, violation of patents, and then lying about such practices summarizes the first factor; the pervasive influence of Japan’s government throughout private economic activity, especially that of the Ministry of International Trade and Industry (MITI), describes the latter.

In the current view, much of Japan’s economic success is attributable to MITI’s foresight, its bullying insistence on specific long-term economic goals, and its sway over elected Japanese officials. MITI, according to some, is a kind of national board of directors that overserves the voracious conglomerate—James Abegglen coined the phrase “Japan Inc.”—that is modern Japan. This perception is at the heart of Wolf’s book, as its title suggests; and while Wolf qualifies it now and then, he strains to substantiate it. Unfortunately, such a ready explanation is far too pat. MITI does help fund research and development in Japan for projects it deems critical to the furtherance of Japanese business. Its fifth generation project is the most prominent ongoing example. But Wolf fails to spell out U.S. government subsidies of industrial research in the same detail, from lavish Defense Department grants to small-scale funding from the National Institutes of Health, which amount to a far greater sum than MITI’s handouts and arranged tax breaks.

MITI’s ability to direct the use of resources within Japan, however, has no parallel in this country. Japanese antitrust laws are more relaxed than ours, and they are rarely enforced, allowing business leaders from competing companies to form temporary alliances. Behind such alliances one can often find MITI machinations. But rather than a conspiracy, such high-level cooperation is more likely yet another example of the Japanese cultural tendency toward consensus. Such cooperation may be no more menacing than the joint ventures that U.S. computer companies are currently engaged in. To term such alliances conspiracy simply furthers Western ignorance of Japanese “convention.”

Wolf does make a compelling point about discriminatory pricing. Prices for Japanese consumer goods have rigid national controls; at the same time Japan continues, by myriad means, to effectively prevent imports. This arrangement provides Japanese manufacturers with a captive market in which to achieve sufficient profits to subsidize underpriced exports. As Wolf sees it, this practice explains Japan’s immensely successful triumphs in U.S. markets with products from televisions to automobiles. It incorporates, but goes beyond, Davidson’s insight: “Japanese firms are willing to forego profits, period.”

But not all products Japan sells in the U.S. are priced in a discriminatory fashion. Perhaps the central reason for low Japanese profit margins is that the Japanese almost invariably sacrifice short-term gain for longevity in order to survive in the marketplace. Far-sightedness is, in fact, deeply infused throughout Japanese society, from the loyalty workers and managers show their companies (and the support, from housing to loans, companies dispense in return) to the much greater saniion bankers, rather than stockholders, have in Japanese corporations. Beneficial results of such a perspective range from heavy commitments to research and development to sizable investments in the technology of production. Compare this focus to, for instance, the orientation of U.S. steel companies.

Unfortunately for the U.S. and other Western countries, the factors in favor of the Japanese do not end with a culture uniquely suited to business success. The Japanese also happen to be extraordinarily canny businessmen. Wolf describes a long litany of Japanese business triumphs in considerable (and bloodcurdling) detail. The most interesting is Houdaille Industries’ fight to survive a Japanese attack on its basic product—perhaps the most fundamental building block of industry—machine tools. As Houdaille found out, the Japanese acted with methodical, amoral inevitability. Wolf offers the method, including its “ugly underside,” as common Japanese business strategy:

- Protect Japanese manufacturers from foreign competition at home with tariffs and quotas. When trade barriers are challenged, reduce the formal impediments but institute informal barriers such as incentives to buy Japanese.
- Rationalize Japanese industry by encouraging mergers of small, less effective firms and forcing others into different pursuits.
- Organize the remaining companies into a virtual (often an actual) cartel, empowered to act as one through a convenient loophole in Japan’s antimonopoly law.
- Direct the new cartel to concentrate on products that MITI has targeted—in this case, numerically controlled machine tools, so-called steel collar workers.
- Fund the necessary research and eventually the accumulation of inventory, in preparation for flooding the market with low-priced products—and do so secretly.

At first MITI licensed machine tool companies to import sugar at prevailing world prices and then sell it at controlled, artificially high prices to Japanese consumers. When Japan’s trading partners discovered the scam, MITI sanctioned betting on bicycle and motorcycle races, funneling the profits into machine tool company coffers.

In addition, by reverse engineering or other means (possibly outright theft), the Japanese acquire the essential technology. Houdaille allowed Yamazaki Machine Works Ltd. to build its machines and sell them in Far East markets for a fee per each machine sold. Five years later Yamazaki machines appeared in the U.S., identical to Houdaille’s right down to design flaws, and they were priced to walk. In 1976, the Japanese share of the U.S. machine tool market was 3.7%; now they own 30% of the market and 60% of numerically controlled machine tool stakes. Wolf’s lengthy description of government inaction during this period is too painful to relate here.

What, if anything, does this all mean for the information processing industry? According to both books, it means plenty. The Japanese presence in semiconductors is already considerable. Their explosive entrance into the RAM market burned virtually every American RAM maker, and the damage is far from over. Wolf also points to microprocessors—the next logical development—and to office automation. Other targets include 150-seat commercial aircraft (remember the Zero), biotechnology, products from genetically engineered cells to discount drugs, the entire field of robotics, heavy construction machinery, solar and nuclear energy technology, telecommunications, and new markets spawned by fifth generation products including artificial intelligence.

Given the Japanese record, MITI’s confident public announcement of some of these targets should be enough to make American managers swear off weekends. The Japanese play hardball (they even dominate Little League baseball). The question is, to what extent do previous Japanese business successes pertain to the mar-
Reactive or resourceful?

Action rather than reaction marks the resourceful and successful manager. As an MIS/DP specialist, you can anticipate the needs of your colleagues and act in your company's best interests by introducing Dow Jones News/Retrieval® into your corporation.

Dow Jones News/Retrieval can be accessed with most standard time-sharing terminals, personal computers or word processors with communications capability...or even integrated into your office automation systems.

It's one way to be certain any manager and staff member, in any department, can have the reliable business and financial news, corporate analyses and economic forecasts needed to anticipate and respond quickly to opportunities for growth and profits.

Dow Jones News/Retrieval is a powerful, versatile, time-saving and, above all, extremely easy-to-use information resource that has application at every level of corporate activity. It will give your entire management team an immediately accessible selection of high-quality data bases they can use to solve problems, analyze trends and increase productivity.

Only Dow Jones News/Retrieval provides instant electronic access to The Wall Street Journal, Barron's, the Dow Jones News Service and Dow Jones Current and Historical Quotes that are continuously monitored for accuracy by our staff.

Dow Jones News/Retrieval can even accommodate departmental usage billing if you wish.

Users may also purchase Spreadsheet Link, the Dow Jones Software package that allows you to download data from Dow Jones News/Retrieval into three of the leading spreadsheets: Visicalc®, Lotus 1-2-3™ and Multiplan®.

For every action there's a reaction. Call Dow Jones News/Retrieval right now and watch your colleagues applaud a very smart decision.

For full details, call Eric Bradshaw, National Sales Manager, during office hours at (609) 452-2000, Ext. 2678.

CALL ERIC BRADSHAW AT 609-452-2000, EXT. 2678
many have noted resembles the television market. And a resounding victory in personal computers will lead, naturally, to penetration of the minicomputer, mainframe, and office equipment markets, where the Japanese presence has so far been negligible. But once the Japanese have established a customer base, one that will need to trade up, the marketing edge U.S. mini and mainframe makers have in service, support, and vendor loyalty will become Japanese advantages.

The next Japanese thrust, which Davidson figures will occur in the next five years, will be into the emerging office equipment arena. It is here that the Japanese will first display their mastery of advanced technology, especially highly sophisticated word processing systems. Computers and other devices developed in the course of fifth generation research will reach market about the same time. Further, the Japanese as technological innovators. Finally, by believing in these various pursuits will begin to merge and coalesce. As Davidson notes, "each of the six leading [Japanese] suppliers possesses the computer, communications, and office equipment technologies needed to compete on a system basis."

If this scenario seems like a blitzkrieg, the image is apt. Wolf points out that Japanese business talk is saturated with military argot; he also thinks the Japanese consider business "the moral equivalent of war." Is there cause for hope? Or should we all take up handicrafts?

Wolf's response, in tenor with his image, is predictable. He thinks the Japanese will pursue what they're good at and leave the rest. Such information processing markets include personal and small business computers, low-cost peripherals, subsegments of the telecommunications market such as telephones, and mass-produced components for all markets.

Component makers, especially semiconductor makers, have already felt the effects of Japanese industrial genius. Most U.S. semiconductor companies are chip specialists, integrated neither vertically nor horizontally; Japanese semiconductor makers are, by contrast, huge companies with strong vertical integration and are thus capable of suffering initial losses to gain market share. Once this tactic succeeds, as it did with memory chips, the Japanese can begin supplying integrated components through the same channels. Next, Davidson says, comes hardware. By such steadily increasing pressure—a method Davidson calls the termite strategy—the Japanese will gradually displace U.S. manufacturers, consuming their American elder brothers from within.

This strategy lends itself to the personal computer market, an opportunity affection of investors, for long-term market position. Unquestionably, IBM employed predatory pricing, and with impunity—the Departments of Commerce and Justice shut their eyes. The signal thus sent to the Japanese was twofold: IBM was no pansy, and U.S. inaction would not always work in their favor.

But most people see little difference between the Japanese and such monoliths as IBM and AT&T. In the struggle to come, Davidson offers us scant hope: "There will be niches in which smaller or slower companies can survive, but not many." Elsewhere, he says, "global firms will dominate virtually every market segment." Maybe one can cling to that "virtually."

In sum, Wolf, despairing that U.S. managers and their government will never wake up, all but concedes the future of information processing to Japan. It will happen soon, he feels—a direct result of the fifth generation project. Davidson wants to believe the competition. "This model," he says, "the Japanese will be competing against a far tougher field on a far tougher course. The competition is bigger, quicker, and smarter." He sees in the U.S. several cheering developments: improved labor relations, the shift of U.S. capital from housing to money markets, and a growing spirit of protectionism. But his conclusion reveals his secret convictions—a new order with one winner:

The information technology sector is today what North America was 200 years ago—a large undeveloped area with limitless potential. Many nations attempted to secure all or part of it. . . . Only one participant had the vision to view the development of the bulk of the continent as its manifest destiny."

It is useful to remember that only a few years ago, similar gloomy pronouncements were offered in France and Great Britain with an eye to the economic menace that was the United States. Perhaps Wolf and Davidson accurately foresee the gradual erosion of American economic might. But there is in these books a telling lack of admiration for genuine Japanese accomplishments.


—Tom Parrett
Without complete understanding of user needs, software development can take forever.

The most important component of a major new software system is the user. If user needs are not accurately defined and met, a system will constantly require adjustments, and productivity will suffer. That is why Boeing Computer Services insists on a comprehensive, preliminary understanding of all user requirements.

For example, our Consensus program defines user requirements in a unique way that greatly reduces software development time and significantly improves system performance. With Consensus, all the key participants from your organization — users and DP professionals — attend an intensive, one-to-two week session at a carefully selected facility away from the workplace.

Our Boeing consulting professionals facilitate these rigorous sessions.

Encouraging different viewpoints. Probing for necessary inputs that would otherwise be neglected. Consequently, the definition process moves quickly. And people from diverse disciplines and functions can openly agree upon actual problems and their solutions.

This user-oriented approach has brought amazing results: across-the-board reduction of development flow time by 80% or more — in one instance from three years to 1½ weeks. Accuracy and quality of the requirements document and resulting system boosted to 85%. And most important, satisfied users.

Boeing's consulting expertise is just one part of our integrated information services. Including enhanced remote computing services. Distributed processing and micro/mainframe links. Additional software solutions. And complete education and training. For more information, contact Mr. Edward Klamm at (206) 656-9247.

Or write him at BOEING COMPUTER SERVICES, P.O. Box 24346, MS 6K-86-12C, Seattle, Washington 98124.

BOEING COMPUTER SERVICES
A Division of The Boeing Company

CIRCLE 79 ON READER CARD
YOU DON'T HAVE TO REMODEL TO ADD ON.
With some computers, the more you do, the more you have to add on.
A little memory expansion here. A graphics adapter there. Next thing you know, you need
an expansion chassis. And a loan from the bank.
Corona builds memory expansion (up to 512K) and high-resolution graphics right into the
main board. That saves you money. And expansion slots. Plus, our 128K standard memory and
IBM® compatibility let you run thousands of software packages right out of the box. The net result
is a PC that grows on you. Painlessly.
The Corona PCs.
It's a matter of simple addition.
In North America, call 1-800-621-6746 for the Authorized Corona Dealer
near you. In Holland, call 020-03240-1811. There are over 1,600 dealers
worldwide. And their job is to help. Service by Xerox.

THE CORONA PC

©Corona Data Systems 1984

CIRCLE 59 ON READER CARD
SOFTWARE CONVERSION SOLUTIONS

Dataware provides the software translation system for your complex conversion problems. Over 15 years of conversion experience has resulted in thousands of satisfied customers, worldwide.

- **COBOL to COBOL**
  Circle No. 500

- **AUTOCODER / SPS to COBOL**
  Circle No. 501

- **EASYCODER / TRAN to COBOL**
  Circle No. 502

- **BAL / ALC to COBOL**
  Circle No. 503

- **DOS / ALC to OS / ALC**
  Circle No. 504

- **PL / 1 to COBOL**
  Circle No. 505

- **RPG / RPG II to COBOL**
  Circle No. 506

- **RPG / RPG II to PL / 1**
  Circle No. 507

Dataware offers services & software to meet your needs. For more information, call or write today.

The Conversion Software People
Dataware, Inc.
2565 Elmwood Avenue
Buffalo, New York 14217
Phone (716) 876-8722
TELEX: 91519

SOFTWARE SERVICES:
- Business Information Systems ........ 162
- Data Set Cable Co. ...................... 162
- Dataware, Inc. ............................ 162
- SIS Sundata ............................... 162
- Westinghouse Electric Corp. .......... 162

TIME & SERVICES:
- Omnicomputer ............................ 163

BUY, SELL, LEASE
- Intelligent Tool Co. ...................... 163
- W C S .................................... 163

JOB MARKETPLACE
- MIT ........................................ 163
- Jim Walter Corp. .......................... 163

**WESTINGHOUSE ADVANCED SYSTEMS SOFTWARE FOR DOS/VSE & VM**

- **DISK UTILITY**
  - Complete fast backup and file maintenance for security and file integrity. Support all types of files and libraries.

- **DISK SPACE MANAGER**
  - Automatic space allocation for single- and multiple-CPU installations. Rated tops by users!

- **SPOOLPRINT**
  - Transfer partial or complete Power/VSE print queues to local or remote serial printers. Loaded with special features!

- **VIRTUE**
  - Access multiple VM machines from a single terminal the easy way. Automatic ‘hold’ and ‘clear’ for VM machines.

For a free trial or more information, write or call:

Westinghouse Electric Corporation • Advanced Systems Technology Management Systems Software • 777 Penn Center Boulevard Pittsburgh, PA 15235 • Phone (412) 825-7000

CIRCLE 508 ON READER CARD

**CICS USERS**

- **Screens MadeEasy**
  - BMS Maps Without Programming
  - Online Screen Design
  - Automatic BMS Code Copybooks
  - Documentation Prototyping
  - All 3270 Features

**SUN REMOTE PRINTING FACILITY**

- Allows the printing of spooled JES SYSSOUT on most 3270-attached printers.
- Reduces the need for expensive RJE printers.
- Allows you to share inexpensive printers among various applications at multiple locations.
- Improves productivity by providing printer support where needed.

For a free one month trial, call toll-free: 1-800-441-4203; in PA, 215-341-8700. Or write SIS SunData, Two Glenhardie Corporate Center, 1285 Drummers Lane, Wayne, PA 19087

CIRCLE 509 ON READER CARD

**EIA AND 200 OTHER INTERFACE CABLES**

Call on Data Set Cable for all types of cables and connectors, many in stock for immediate shipment... or order printed to your specifications: ribbon, coax, twin-ax, TELCO, compatibles for IBM, DEC, H-P... to name just a few. EIA RS-232C cables - 25 conductors, all connect ed. $1/ft plus $5.00 Send for catalog. Data Set Cable Company, 722 Danbury Road, Ridgefield, CT 06877 - (203) 438-9684. Also Las Vegas - (702) 382-8777.

CIRCLE 510 ON READER CARD

**"A little space."**

— WILLIAM BLAKE

**Songs of Innocence**

**"At little cost."**

— KATHY MONAGHAN

Call me or Shirley Stirling for more details about the DATAMATION Marketplace at (800) 223-0743.
Heart disease and stroke will cause half of all deaths this year.

Put your money where your Heart is.

American Heart Association
WE'RE FIGHTING FOR YOUR LIFE

Heart disease and stroke will cause half of all deaths this year.

Put your money where your Heart is.

I know the secrets of the stars and the mysteries of the moon. But the origin of The Common Cold baffles even a great thinker like myself. That's why I rely on the Consumer Information Catalog. It's published by the Federal Government and lists over 200 booklets you can send away for. Over half are free. And all are wise. With tips on everything from repairing a flat tire to relieving a cold.

So send for this free catalog. Write: Consumer Information Center, Dept. B, Pueblo, Colorado 81009. After all, it's hard enough deciphering the mysteries of this planet, without the handicap of an earthshaking sneeze.

THE CONSUMER INFORMATION CATALOG
A catalog of over 200 helpful publications.
THE TIDE IS HIGH
A recent survey of 424 companies indicated
that the second quarter of 1984 should
prove to be a good one for dp employment.

The survey, conducted by Compu­
Search (the dp division of Management Re­
cruiters International Inc., Cleveland,
Ohio), showed that over 200 of the compa­
nies queried will be increasing staff size.

According to the report, 50% of the
firms will be hiring in 1984, 45% will main­
tain current employee levels, and 5% will
decrease current staff size.

Projections for the first quarter of
1984 showed 55% of the companies will be
hiring additional personnel.

A closer look at the survey shows
that the New England and Middle Atlantic
states are in the eye of the hiring storm.

For the complete survey, contact
Management Recruiters International Inc.,
1015 Euclid Ave., Cleveland, OH 44115,
(216) 696-1122.

VP VS. DP
On another front, a survey by Accountemps
(the New York City-based accounting,
bookkeeping, and dp temp agency) has
dpers and their bosses facing off as they rate
computer jobs and opportunities.

Burke Marketing Research Inc.,
which conducted the survey on behalf of
Accountemps, interviewed 100 Fortune
1,000 vps and dp managers. Here are some
of the results:

While 66% of the respondents felt
that dp offered excellent opportunities for
men who wanted to advance quickly, 77% of the same group felt that this also applied
to women.

The biggest beef dp managers had
about top management was that the managers’ functions and value in the organization
were not fully understood or appreciated.

On the other hand, 76% of the top
executives felt dpers were too computer
language and machine oriented. (Then
again, 66% of the dpers felt the same way.)

Seventy-six percent of the vps and
60% of the managers felt that top management
should have a working knowledge of dp.

While technical skill is a require­
ment for success as a dper, the managers
and vps both agreed that the ability to get
along with people was even more impor­
tant. When hiring, dp managers look for, in
order of their importance: prior computer

ATTRACTIVE OFFERS
AT IPA, SAUDI ARABIA
Institute of Public Administration (IPA) has im­
mediate openings for very experienced and quali­
cified Computer Specialists, as:-

- Senior System Programmers (MVS/JES 2,
  VM/CMS)
- TELEPROCESSING SPECIALISTS
  NCP, NCP/EP, VTAM

BENEFITS:-
IPA OFFERS:-
- Attractive salaries (in the range of
  US$ 36,000 - 70,000 Per year depends on
  qualification and experience).
- Furnished Apartment.
- Airline Tickets for the Specialist and his fam­
  ily.
- 45-days paid vacation.
- Free Medical Treatment at Public Hospitals.
- Etc . . .

Tax-free income in Saudi Arabia.
THOSE WHO ARE INTERESTED SHOULD
WRITE TO:-
INSTITUTE OF PUBLIC ADMINISTRATION,
P.O. BOX 205,
RIYADH, 11141
SAUDI ARABIA.

TELEPHONE: 4777959
TELEX: 201160 IPADSMIN

Payroll Savings really works
...and that's no CROCK!
Challenges for experienced systems professionals.

Creating software for very large systems, and opportunities to match.

A new complex devoted to large systems programming.

Technical Life at IBM-Poughkeepsie: shaping the future in high performance products.

Our Data Systems Division plans, designs, develops, tests, documents and evaluates the performance of IBM's largest computer programming systems. Investigate the future of large systems development at IBM in Poughkeepsie. The openings include:

**MVS Systems Designers**
Will develop new system architectures and apply advanced technologies to produce an MVS operating system offering new capabilities, capacity, performance, reliability and availability.

**JES2/JES3 Systems Designers**
Will work on system components that manage resources and work flows for IBM's largest computer systems, and develop mechanisms to control and coordinate multisystem environments.

For above positions you must have at least 4 years in MVS/JES systems, and be familiar with their externals and internals, and preferably with subsystems such as CICS, IMS or VTAM. BS, MS or PhD in CS, knowledge of IBM System/370 Assembler programming preferred.

**Data Base Designers**
Will develop data base technology necessary to handle data involved in managing large and complex computer system environments. Will have key role in IBM strategic applications support products. Familiarity with relational products or concepts desirable. Must have at least 4 years in development of data base systems, working knowledge of IBM's Data Dictionary, DL1 or comparable products; knowledge of System/370 Assembler programming, and preferably MVS or VM systems background.

**Other Attractions**
Poughkeepsie, in the mid-Hudson River area, is less than 2 hours from New York City. It's home to 6 colleges and universities that make the area ideal for pursuit of graduate degrees. A country club is available to employees. So are a wealth of cultural and recreational resources. The IBM benefits package is outstanding.

For prompt, confidential consideration, please send resume to: IBM Corporation, Experienced Professional Recruiting Department Y14-B, Building 415, P.O. Box 950, Poughkeepsie, New York 12602.

---

An equal opportunity employer
ON THE JOB

experience, technical expertise, education, personality, job stability, and appearance.

All in all, said 80% of the managers, if they had to do it all over again, they'd still choose dp as their profession, while only 10% had a negative attitude on this subject. For more information on the survey, contact Accountemps, 522 Fifth Ave., New York, NY 10036, (212) 221-6500.

HARD TO HOLD

What does it take to keep good dp personnel? Charles D. LaBelle attempts to answer that question with the help of Susan Bookbinder, Barbara Dalton, John DeMarino, Denise Kreiger, Lynette Mayne, Len Smith, John Tangney, and Michael Krawetz. Their manual explains the human resource management techniques that worked for Manufacturers Hanover Trust, with the hope that these methods will help other dp operations run smoothly. The publishers claim readers will learn to achieve and maintain dp/human resources equilibrium, stay within recruitment budgets, cope with personnel transfers and reorganizations, and combat dp burnout. The authors (all MHT employees with the exceptions of Smith and Krawetz, who are independent consultants) also cover some of the management techniques designed to improve productivity. The 304-page book, Finding, Selecting, Developing, Retaining Dp Professional Human Resources, costs $28.95, and is available from Van Nostrand Reinhold, 135 W. 50th St., New York, NY 10020, (212) 265-8700.

AND MORE SURVEYS...

A survey, jointly conducted by Graduating Engineer (a McGraw-Hill publication) and Deutsch, Shea & Evans (a recruitment advertising agency), lists 25 companies that engineering students would most like to be employed by the survey was based on the responses of 2,684 technical students who answered questionnaires in the March and September 1983 issues of Graduating Engineer.

In addition to listing the overall preferences, the survey breaks down the responses according to seven different engineering disciplines. The disciplines and the percentage of students in each were: mechanical engineering, 24%; electrical, 18%; electronic, 12%; chemical, civil, and computer science/engineering, 11% each; industrial, 8%. Then came astronautical/aeronautical engineering and materials science/metalurgical engineering with 3% each; petroleum/geological engineering and bioengineering, 2% each; and nuclear and general engineering, 1% each. An additional 3% accounted for various other fields. Percentages total more than 100% because students listed more than one major.

IBM made it into the top four in all categories with the exception of civil engineering, in which it placed ninth. In the 1981 survey, IBM didn't show up in this category at all.

The top five employer choices in the category of “All Disciplines” were 1. IBM, 2. General Electric, 3. Hewlett-Packard, 4. Rockwell, 5. Texas Instruments.

The survey also asked respondents how they formed their employer images. The most influential sources (53%) were students’ contacts with people from the company (interviewers, managers, or other representatives). The second source (44%) was news reports and articles. Next came company career brochures (41%), company experience with products or services (40%), and recruitment advertising (35%).


—Lauren D’Attilio

For 26 years Datamation has been the number 1 way to reach top information processing professionals. And now it’s also one of the best ways to hire them. Because when we increased our frequency to 24 issues a year, we also increased the size of our recruitment section. Offering expanded editorial, as well as the latest listings. For complete information, call Kathy Monaghan or Shirley Stirling at 1-800-223-0743. In NY, 212-605-9732/33.

Datamation has started publishing classified information.

Datamation
Find out in our new Survey of 55 areas. It's free!

So whether you are interested in learning what your peers are making—or you are evaluating salary levels for people you plan to hire—our new Survey will give you the most timely, accurate and thorough information available.

Call for your free copy

There's no cost or obligation. Call the Source Edp office nearest you, and we'll mail a copy to you in complete confidence. If you're unable to call, write, Source Edp, Department D2, P.O. Box 7100, Mountain View, California 94039.

---

### United States

- **Alabama**: Birmingham: 205-322-8745
- **Arizona**: Phoenix: 602-257-4010
- **California**: San Francisco: 415-431-2410
- **Colorado**: Denver: 303-773-3700
- **Connecticut**: Danbury: 203-797-0590
- **Delaware**: Dover: 302-739-5690
- **Florida**: Fort Lauderdale: 305-491-0145
- **Georgia**: Atlanta: 404-588-9550
- **Illinois**: Chicago: 312-823-4300
- **Indiana**: Fort Wayne: 219-432-3233
- **Kentucky**: Louisville: 502-364-9920
- **Louisiana**: New Orleans: 504-924-7163
- **Maryland**: Balitmore: 301-697-5055
- **Massachusetts**: Boston: 617-482-8670
- **Michigan**: Detroit: 313-359-7607
- **Minnesota**: Minneapolis: 612-832-1000
- **Missouri**: Kansas City: 816-474-1398
- **New Jersey**: Trenton: 609-981-1181
- **New Mexico**: Santa Fe: 505-827-4815
- **New York**: New York: 518-482-2236
- **Ohio**: Cincinnati: 513-728-1040
- **Oklahoma**: Oklahoma City: 405-722-7200
- **Pennsylvania**: Philadelphia: 215-682-2600
- **South Carolina**: Columbia: 803-766-8611
- **Tennessee**: Nashville: 615-356-0625
- **Texas**: Austin: 512-717-0700
- **Virginia**: Richmond: 804-786-7700
- **Washington**: Seattle: 206-835-8787
- **Wisconsin**: Madison: 608-255-3100
- **Wyoming**: Cheyenne: 307-772-3245

### 1984 Local Metropolitan Computer Salary Survey

To get a copy of the latest survey, call your nearest Source Edp office or the source number below:

- **Texas**: Austin: 512-452-7200
- **California**: San Francisco: 415-431-2410
- **New York**: New York: 212-832-1000
- **Los Angeles**: Los Angeles: 213-540-1000
- **Chicago**: Chicago: 312-823-4300
- **Boston**: Boston: 617-482-2236
- **San Francisco**: San Francisco: 415-431-2410
- **Philadelphia**: Philadelphia: 215-682-2600
- **Washington**: Washington: 202-335-5300
- **New York**: New York: 518-482-2236
- **Los Angeles**: Los Angeles: 213-540-1000
- **Chicago**: Chicago: 312-823-4300
- **Boston**: Boston: 617-482-2236
- **San Francisco**: San Francisco: 415-431-2410
- **Philadelphia**: Philadelphia: 215-682-2600
- **Washington**: Washington: 202-335-5300

---

### Please note:

- The world's largest placement firm devoted exclusively to the computer profession. Client companies assume our charges.

---

**Source Edp**

Personnel Services

The world's largest placement firm devoted exclusively to the computer profession. Client companies assume our charges.
EVERYONE WHO WANTS TO USE THE COMPANY MAINFRAME RAISE YOUR HAND.
Introducing power to the people.
Better known as the Data Pipeline™ from Intel.
It's based on our iDIS™ Database Information System. A powerful, integrated package of hardware and software with multi-user capability built right in. And now, through iDIS, just about any pc or terminal can easily share data with just about any mainframe.

With the iDIS Pipeline, you'll be able to establish and manage your pc-to-mainframe connections in a way never before possible. Yet you'll still be able to offer department users a fair degree of independence. Since iDIS comes with all the software they need. Starting with the Xenix* operating system, built around a relational DBMS. Plus the Multiplan* spreadsheet, word processing, electronic mail, and a forms/menu development tool.

The iDIS Pipeline is powerful, too. Each one will handle 5 full-time users, or between 12 and 15 on dial-up. And you can even network with other iDIS systems.

But you're always in control. You decide which data are accessible, and extract only those to your iDIS system. Users then access their data sets from iDIS's hard disk.

Actually, using the iDIS Pipeline is a lot like giving users their own little mainframe.

Which is a lot better than giving them yours.

It's also a lot cheaper. Less than half the cost of a direct pc-to-mainframe connection.

**According to the Gartner Group, who took the time to figure out all the hidden costs, each direct pc-to-mainframe connection costs approximately $22,000. Each *Xenix and Multiplan are trademarks of Microsoft Corporation. © 1984 Intel Corporation.
We'll tell you where to look. Inside the CIE-7800 and CIE-7850.

The 7800 terminal is plug compatible with the IBM 3178 and all five models of the 3278 series. That accounts for six IBMs.

Now, when you add in the CIE-7850, you also get 100% IBM PC compatibility. That makes seven.

Even more remarkable, the CIE-7800 costs less than any single one of those IBM terminals.

It's more compact, too. Over 40% smaller. But the screen is larger. By 36%.

The monitor tilts, rotates and weighs less than 20 pounds. Move it where you need it.

The detached keyboard has an 87-key IBM compatible layout. It can be user configured into any of 22 different U.S. and international keyboards.

The CIE-7800 is also available with concurrent alternate personalities that include DEC VT100®, IBM 3275/3276-2 (bisynch single station) and HP 2622, while still retaining IBM 3178/3278 compatibility.

And with the CIE-7850 plugged into the coax-A line, you have access to both online mainframe processing power and local IBM PC intelligence.

To learn more (and there are more advantages we haven't even touched on), just write or call our Distributed Systems Division Sales Representative: Alternate Channel Marketing, Inc., Suite 540, 3857 Birch Street, Newport Beach, CA 92660. Call toll-free 1-800-854-5959. In California, call 1-800-432-3687.

See us at NCC Booth #C-3574

Alternate Channel Marketing, Inc. Exclusive Sales Representative
© DEC VT100 is a Registered Trademark of Digital Equipment Corp. © 1984 CIE Systems, Inc.

CIRCLE 83 ON READER CARD
TAMING LARGE PROJECTS

The trouble with data processing is that as soon as we professionals are within a whisker of knowing it all, someone changes the rules. At root it is always the users’ fault, although the rate of change of technology and techniques does little to help.

How many dp departments that were just getting good at developing batch systems came a cropper when users started demanding on-line access to data? How many that were building real strength on mainframe computers were wrong-footed when users wanted systems developed on minis?

Today, dp departments face a new and different problem. And, as always, dp professionals are reliably slow to recognize it as a major obstacle to progress. The problem is the management of big projects—25-plus man-years of effort at a time, and anything over $1 million in cost.

But why should this be a current problem and why has it been inevitable from the start? To find the answer, we must look at the way computer systems have developed over the last 10 years. Systems built several years ago may not have started off big and complex but over time they have grown into real behemoths. The dp department has been aware of it, the users often much less so. Perhaps the only sign the user has is the slowness of the dp department to implement amendments.

But what causes the real problem is these systems do not have infinite lives. The time will come when they have to be replaced either because of structural design weaknesses that do not allow the system to meet a major new business requirement, or simply because they become so labyrinthine through repeated modification that new changes start to take an unacceptable amount of time to implement.

And so the time comes to replace the system. But it is not just the eight man-year system built in 1973 that needs replacing: it is also another nine calendar years’ worth of modifications and enhancements. What we have now is a big project.

Ah, says the dp manager, a 30 man-year project is only five projects of six man-years each, and we know how to control them. But this is to say that attending a chimp’s tea party is like lunching with King Kong. There might be the same volume of monkey at each occasion, but most of us would feel the giant gorilla was the riskier option.

It is certainly true that all systems lend themselves to logical breakdown into subsystems for development purposes; some go further and can be implemented in sections. Classic examples are the integrated accounting systems being replaced by packaged purchase, sales, and nominal ledgers. Here, so long as the right interfaces can be built between the new purchase ledger and the old nominal, for example, there is no reason why purchases should not go in first, with user benefits flowing from the day it is installed.

Sadly, though, such an option is often not available. The new system may be very different from the one it replaces. It may adopt a different coding structure for its data—indeed, this might be the reason the old system is being replaced. Interfacing parts of the new to the old might be next to impossible.

Furthermore, although a large development can be subdivided into sections, these sections always interact with one another. Developing a five man-year subsystem in this environment is much more difficult than carrying out the same task where the surrounding systems are stable.

So what then, more particularly, are the problems of big projects, the areas we should focus on? I shall highlight four:

- User involvement.
- Project organization.
- Project control, and
- Quality assurance.

Slowly, ever so slowly, the lip service dp has paid to user involvement is becoming sincere. Surprisingly enough, some good computer systems are being produced as a result. But if we accept that such involvement was important for small projects, think how much more so it must be for big ones. The areas in which users should be involved are not new but the amount of effort users must put in may be. In several recent experiences that have gone well, the user involvement amounted to around 20% of the dp effort. To spell it out, that would be 10 man-years’ effort from the user on a 50 man-year dp project. The level of commitment users must give to make a large project a success simply cannot be squeezed in alongside full-time line responsibilities.

Over and above the actual time spent, the attitude of the user manager responsible for the project is crucial. It is not a computer system being developed and installed by the dp department, it is his system and dp is doing the technical parts. He is responsible for its being a success and his job is on the line if it fails.

There is no one correct structure for a large project—the right structure for you will depend upon the nature of the project, your existing organization, and the strengths and weaknesses of your people. But there are some common considerations that apply. Resources must be built into the project to allow time to manage. On small projects you can get by with an enthusiastic team and long hours; on a large project you can’t. At the lowest level, for example, this means that for each team of four or five programmers you will have a full-time programming team leader who does nothing but plan, monitor, and control the quality of his programmers’ work. Similar manager/staff ratios will apply across the project.

Further, you must plan the project so that as far as possible one person does only one thing at a time. High caliber people can keep many balls in the air at once, but on a large project you will have many mediocre or average people. They’re simply not as good at juggling. So, for instance, don’t have the systems analyst manage programmers and plan the systems tests at the same time.

For the same reason, you shouldn’t have mainstream applications programmers developing common routines, utilities, etc. It will be difficult enough for them to manage their principle workloads without having to cope with change requests.
Full SNA capability for your DEC computer! Comboard™/SNA gives your terminals access to IBM interactive applications. Data can be transferred between systems, all in the complete fully supported package. Comboard/SNA from Software Results.

Proven and reliable, Comboard/SNA is a single-board 256kb communications computer that plugs into your DEC Unibus. Teamed with Comboard software the system is a cost-effective solution to troublesome SNA communications problems.

Your DEC emulates an IBM PU Type 2 communication node. You have a full gateway into your SNA without passing through a secondary network.

For further information call or write Software Results... the leader in DEC to IBM communications.

**COMBOARD™**

Communications Results from

**SOFTWARE RESULTS CORPORATION**

Call Toll-free

1-800-SRC-DATA

1-800-772-3282

In Ohio call collect, 1-614-287-2203

3897 Silver Drive  Columbus, Ohio 43211  Telex: 687-485 SRC DATA CI

---

**READERS’ FORUM**

You must also build quality control considerations into the organization. Quality assurance is one of the biggest problems in a large project and if you have the same group of people following through one part of the development for too long, quality will suffer. Structure the project so that subsystem testing is planned and managed by a team separate from the original developers; the same for full system testing, and so on.

Finally, make the project as self-sufficient as possible. Providing support for job control, telecommunications, database, etc., from the department’s central technical group is all very well in theory. In practice, it is much less efficient and more difficult to manage than having these skills in the project team. If you do have a project of the scale discussed here, ensuring its success will have number one priority in the computer department, after the production service.

Throw away your sophisticated PERT networks, your float analyses, and your dummy events—you don’t need them. If they happen to be embodied in a computerized project control system, then you have an excellent opportunity to save machine time, too. Such systems are appropriate for building towns, railway systems, or Concorde jets. They are as out of place on a computer project as a dolphin in a sentry box.

The reasons are quite simple. The number of tasks involved at any one time is not that great, rarely exceeding 100 at the height of activity. These will group together into 15 or so sets of closely related tasks, as happens during development of one subsystem’s programs. Many of these sets will have no resourcing interdependencies and you really do not need sophisticated methods to sort out those that do. You most certainly do not need a computer.

But the worst thing about such sophisticated systems is they are inflexible and inhibit thought. Project control becomes a form filling, number totalling, chart drawing exercise, when its essence should be the critical review and reporting of progress by each tier.

**DIGITS BY ROY MENGOT**

**CONGRATULATIONS FELLOWS. YOU JUST BROKE THE RECORD FOR THE MOST CONSECUTIVE BOMB PROGRAMS.**

**SO MANY PROGRAMS HAVE CRATERED TODAY, YOU COULD ENTER MY CPU IN THE "MOS MOSALIKE CONTEST!"**

**HERE'S ANOTHER ONE...**

**...OH NO! DON'T EXECUTE THAT STAT!!**

**AT TIMES LIKE THIS, I ENVY THE GUIDANCE COMPUTERS ON NUKES' BOMBS!!**
A printer should complement your computer, not compromise it.

It's a simple fact that your small computer can compute a lot faster than your printer can print. A problem that becomes even more frustrating in business, when your computer is tied up with your printer while you're ready to move on to other work.

Of course, the only thing more frustrating than waiting on a slow printer is waiting on a printer that's down. Unfortunately, chances are the initial printer you purchased with your computer system just isn't designed to work on continuous cycle high volume printing.

More than likely, you've already experienced one, if not both of these frustrations. But now, you can turn printer frustration into printing satisfaction with the new Genicom 3014, 3024, 3184, 3304 or 3404. Professional printers for personal computers... price/performance matched for small business systems.

Designed and built to increase productivity and maximize the value of your personal computer, the range of 3000 PC printers offers 160-400 cps draft, 80-200 cps memo, and 32-100 cps NLQ printing... performance for both high productivity and high quality printing.

The 3014/3024 models print 132 columns. The 3184, 3304 and 3404 models give you a full 136 column width, and offer color printing as well.

Each printer is easy to use, lightweight, functionally styled and attractive. And you can choose options from pedestals and paper racks to document inserters, sheet feeders and 8K character buffer expansion, plus more.

Genicom 3000 PC printers feature switch selectable hardware, dual connectors and dual parallel or serial interfaces. Plus the 3014 and 3024 emulate popular protocols for both Epson MX with GRAFTRAX-PLUS™ and Okidata Microline 84 Step 2™, while the 3184, 3304 and 3404 emulate popular protocols for Epson MX with GRAFTRAX-PLUS™. So your current system is most likely already capable of working with these Genicom printers without modification.

Most important, the Genicom 3000 PC printers are quality-built, highly durable printers designed for rapid, continuous duty cycle printing.

So why wait? And wait. And wait. Get a Genicom 3000 PC printer now.


For the solution to your printing needs call TOLL FREE 1-800-437-7468 In Virginia, call 1-703-949-1170.

CIRCLE 85 ON READER CARD
Get involved with drugs before your children do.

Sooner or later, someone's going to offer to turn your children on. It could be their best friends. And chances are, you won't be anywhere in sight.

So what can you do? Obviously, the time to talk to your children about drugs is before they have to make a decision on their own.

Which means you have to learn something about drugs. Learn the dangers. And learn to recognize the signs of drug use. Listlessness in your child. Sudden drop in school grades. Temper flares and staying out late a lot.

Learn about peer pressure on a twelve-year-old. Then show them you understand how important their friends are to them. But also tell them that real friends won't insist they do drugs.

Check your own personal habits. You can't tell a child about the dangers of drugs with booze on your breath.

But it's through love and understanding that you can be the most effective. Threatening to tear their arms off just won't work.

You can get a lot more ideas from the booklet, "Parents: What You Can Do About Drug Abuse." Write: Get Involved, P.O. Box 1706, Rockville, Maryland 20850.

Remember, it doesn't always happen to someone else's kids. After all, there are over 35 million drug users in America. And they're all someone's children.

---

READERS' FORUM

of management, with each management level thinking about the reasons for slippage and the corrective action that can be taken. This can, and should, take place around simple, hand-drawn bar charts (and that conclusion is based on experience with computer projects up to 100 man-years in scale).

The project control system should work on target dates. It is a waste of time to measure progress on a task by the proportion of the task estimate spent to date. Measuring historical effort expended has value, apart from giving a view of costs to date, only in confirming or refuting the basis on which estimates have been prepared. It has no place in bringing the project in on time. What matters is how we are doing against our target dates.

More could be said about the methodology of planning and controlling big computer projects, but these are the essentials:

- keep the planning and reporting system simple;
- have each management level in the project critically review the weekly progress reports of their subordinates;
- base the reporting system on target, not estimated, dates and actual to-date effort.

We must make the assumption that you have a reasonably comprehensive set of standards in place before you lay the keel of your big project. Quality assurance, however, even within a well-defined standards framework, is really very difficult.

These days, your standards will almost certainly contain a review element à la structured design/programming. This is essential, but be very careful throughout the project that reviews are well-planned, participants well-briefed, and the priority of reviews does not suffer as the deadline pressures grow.

As outlined earlier, build quality assurance into the organization. Count to 10 and then take one or two of your very best people out of the doing part of the project and give them an independent audit role.

If you identify problems in a design, in a program, anywhere—stop and sort them out. It's a lesson that's been learned and relearned countless times. There really is nothing worse than going into systems testing with a set of "reasonably well tested" programs, or going into programming with a design that "just needs a bit more work on the file structures."

Be prepared to redesign subsystems, or to rewrite programs. You are bound to end up with some programs that worked when they went into system testing but that are almost unmaintainable today, and certainly will not be in three years' time. Don't breathe a sigh of relief just because you finally have code that works—rewrite it.

Going back once more to user involvement, involve them heavily from program testing onwards. Set up joint user-dp testing teams to prepare test data and expected results and to check the outputs from the test runs.

The real message is that if you're doing the right things, it is difficult to have too much quality assurance. Everyone knows about the graphs that show how the effort to correct an error increases geometrically the longer it lies hidden. Quality assurance is all about finding those errors early.

This has been a whirlwind tour of some of the major iced bergs. If you know dp, you'll know there were many other deserving cases, omitted only for lack of space. But take heart: at the end of the day as some big projects do come in more or less on time, more or less within budget, and almost recognizable by the user as what he asked for two years previously. Which leads us to change control. Now there's a difficult area. . . .

—David Evans
London, England

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 875 Third Ave., New York, NY 10022. We welcome essays, poems, humorous pieces, or short stories.
The CalComp line of electrostatic plotters.

You already know CalComp as the leader in pen plotters. Now, we've taken our reputation for reliability, commitment and support, and placed it on our complete line of electrostatic plotters.

CalComp's line of electrostatics gives you a choice of 11", 22" and 36" plotter/printers. Each is perfect for plot previewing at an affordable price, and is ideal for mapping, business charts, graphics and a wide range of other applications. And by using clear mylar media, you can also produce finished-quality drawings.

To make it as easy as possible for electrostatics and pen plotters to work together, CalComp also offers a family of controllers. These unique and versatile controllers can drive up to eight electrostatic plotters with a pen plotter, freeing your host computer for more cost-efficient tasks.

Let CalComp's sales representatives and graphic consultants find the right electrostatic to fit your needs. Write us now, because we're placing our reputation on the line—for you.

CalComp, 2411 West La Palma Ave., P.O. Box 3250, Anaheim, California 92803. Or call (800) 556-1234, ext. 156. In California call (800) 441-2345, ext. 156.

CALCOMP
A Sanders Company
The freedom some birds have to migrate is remarkably similar to the freedom you have with software for the System 8000.

<table>
<thead>
<tr>
<th>Moving your application program with Zilog's System 8000 is as easy as the migration of Canadian geese.</th>
<th>Zilog's high performance, multi-user, UNIX*-based System 8000 supermicros give you a proven way to quickly port your minicomputer software onto affordable micros. For instance, we offer compatible migration tools for Basic Four BB III, DEC* DIBOL* and DG ICOS* COBOL and Proxi*.* And with the UNIX operating system, you can take advantage of one of the fastest-growing business opportunities in the industry.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zilog's solutions free you from the constraints of traditional systems.</td>
<td>GSA schedule for Federal government applications. For the whole story, call Zilog Systems Division at (800) 841-2255. Or write: Zilog Systems Division, Corporate Publications, 1315 Dell Avenue, MS C2-6, Campbell, CA 95008. *UNIX is a trademark of Bell Laboratories. Zilog is licensed by AT&amp;T. DEC and DIBOL are registered trademarks of Digital Equipment Corporation. ICOS and Proxi are trademarks of Data General Corporation.</td>
</tr>
<tr>
<td>Outdated proprietary languages and operating systems limit your movement from vendor to vendor, much like the restricted flight of the albatross.</td>
<td>Get a level of service, support and company stability not found from other microcomputer vendors. Find out what it's like to free yourself from expensive minicomputers, and get a level of service, support and company stability not found from other microcomputer vendors. Ask about our RSVP Referred Software Vendor Program, too, where you can find the applications software and tools you need as well as list your software. Zilog is also on the</td>
</tr>
</tbody>
</table>

---

Moving your application program with Zilog's System 8000 is as easy as the migration of Canadian geese.

Zilog's high performance, multi-user, UNIX*-based System 8000 supermicros give you a proven way to quickly port your minicomputer software onto affordable micros. For instance, we offer compatible migration tools for Basic Four BB III, DEC* DIBOL* and DG ICOS* COBOL and Proxi.* And with the UNIX operating system, you can take advantage of one of the fastest-growing business opportunities in the industry. Get a level of service, support and company stability not found from other microcomputer vendors. Find out what it's like to free yourself from expensive minicomputers, and get a level of service, support and company stability not found from other microcomputer vendors. Ask about our RSVP Referred Software Vendor Program, too, where you can find the applications software and tools you need as well as list your software. Zilog is also on the GSA schedule for Federal government applications. For the whole story, call Zilog Systems Division at (800) 841-2255. Or write: Zilog Systems Division, Corporate Publications, 1315 Dell Avenue, MS C2-6, Campbell, CA 95008. *UNIX is a trademark of Bell Laboratories. Zilog is licensed by AT&T. DEC and DIBOL are registered trademarks of Digital Equipment Corporation. ICOS and Proxi are trademarks of Data General Corporation.

---

CIRCLE 97 ON READER CARD

See us at NCC, Booth #C4408.
The Future. Every piece of Office Automation equipment from Philips Information Systems includes the future. We’ve developed a total Office Automation strategy to assure you that the decisions you make today will be right for tomorrow.

It’s a strategy that lets you expand your Office Automation capabilities at your own pace. A strategy that makes sure the products you need are ready when you need them. A strategy that incorporates hardware and software solutions from standalone word processing to sophisticated local area networks and beyond.

Resources. Our parent, N.V. Philips, a 16-billion-dollar multinational corporation, is the third largest corporation specializing in communications and electronics, with 200 factories in over 100 countries and 300,000 employees worldwide.

We put the power of over one billion dollars in research behind our Office Automation systems. Technological firsts, from the original cassette recorder, to the videodisc and digital optical recorder, allow us to expand our Office Automation strategy in the future, while keeping compatibility intact.

Support. All products in the Philips Office Automation strategy are backed with an extensive guarantee and comprehensive user training and service.

To find out more about including Philips in your future, call 1-800-828-6211. In New York State 1-800-462-6432. Or, send the coupon.

Helping you solve the mysteries of Office Automation.

PHILIPS INFORMATION SYSTEMS

PHILIPS

Yes! I want to include Philips Office Automation in my future.
Please send me further information on your Office Automation strategy.

Name ____________________________
Title ____________________________
Company ____________________________
Address ____________________________
City ______ State ______ Zip ________

Mail to: Philips Information Systems, Inc., Marketing Services, 4040 McEwen, Dallas, TX 75234

CIRCLE 87 ON READER CARD
How to complete more computer projects without over staffing.

You’re faced with several short-term projects. But adding staff with the added salary and benefit costs is too expensive a solution. Consider Advanced Programming Resources, Inc. APR consultants work on a short-term basis and under a contract arrangement so all your costs are kept to a minimum.

Experience at every level for your every need. APR’s professionals provide expertise in a wide range of business and high technology applications. Our personnel can assist in systems design and development, modifications, project management, standards development, training, database management, conversions and package enhancements.

And APR works with many computer languages applied to large mainframes as well as micro and mini environments. What’s more, APR personnel possess solid skills in high technology systems like UNIX™ and C-Language.

So why take on the extra overhead when expert computer consultants are available? Call collect or write APR today.

ADVANCED PROGRAMMING RESOURCES, INC.
6800 North High Street • Worthington, Ohio 43085 • (614) 888-3968

CIRCLE 98 ON READER CARD
MANUFACTURING TECHNOLOGY:
TOMORROW COMES TO THE PLANT

A SPECIAL SUPPLEMENT APPEARING IN 5 LEADING INDUSTRIAL MAGAZINES AND REACHING OVER 400,000 KEY SPECIFIERS

An audience of managers, engineers, consultants, EDP professionals—all in the manufacturing SIC's (20-39)

This special section, to appear in October, is a rare advertising opportunity—bringing together over 400,000 technical decision-makers. The buying influences most essential to manufacturers of:
- Computer/peripheral hardware and systems
- Manufacturing Resource Planning (MRP II) software and services
- CAD/CAM systems and CAE workstations
- Robotics equipment
- Programmable controllers
- Data Collection and factory automation systems and equipment
- Material handling systems

MANUFACTURING TECHNOLOGY: Tomorrow Comes to the Plant describes the productivity improvements possible through MRP II software coupled with fact-packed databases, electronic communication networks, robotics and automated quality control monitors; computer-guided material handling systems; and automation service bureaus.

AD CLOSING AUGUST 17

All 5 magazines—Control Engineering, Datamation, Dun's Business Month, Plant Engineering and Software News—will publish this landmark supplement in their October issues. At special rates far less than the combined advertising rates of these outstanding publications.


Take advantage of this unique sales vehicle. One efficient buy brings you manufacturing's key decision-makers!

Technical Publishing

A MAGAZINE WITHIN A MAGAZINE WITHIN A MAGAZINE WITHIN A MAGAZINE WITHIN A MAGAZINE.

Business Month

Plant Engineering

Software News

Human Resource Management Systems

Process control valves
       Computerized numerical control
       Servo design

How Management can use computers
The Surest Way to Get From Here to There

is Keeping Fit.

Whatever your age, wherever you live, you can make your journey through life healthier and happier and live longer by taking part in a regular program of vigorous exercise. Run, jog, walk, swim, play tennis, bicycle, work-out. Watch your diet. Changing your life-style will change your life. Try it.

Write Fitness,
Washington, DC 20201

Remember, Fitness is for everyone. For life!

President's Council
on Physical Fitness and Sports.

Datagraphix......................65
Digital Communications Assoc.138-137
Digital Equipment Corp........124-127
Digital Pathways..............48
Digital Research..............40-41
Dow Jones News/Retriever......157
Fibronics Int'l................128-5
Four Phase....................101-103
Fortune Systems...............185
Genicom.......................179
Hewlett-Packard.............90-91
Honeywell.....................130-131
IBM........................6-7
IBM........................84-85
IT&T/Telecom................44-45
Intodata Systems, Inc.........146
Integrated Technologies, Inc..50-51
Institute of Public Admin. 164
Int'l........................168-169
Intertec, Inc...................81
Kennedy Co........................CV 2
LXE..............................59
Leer Siegler, Inc...............138
Lee Data Corp..................66-67
MSA............................119
MSP..............................4
MacNeal Schwendler Corp.....89
Mannesmann Tally...............109
Mathematica...................97
McCormack & Dodge............31
Memorex Communications......54-55
Micom Systems, Inc...........128-7
Micro Data Base Systems......128-7
Motorola, Inc..................76-77
NCR..............................34-35
Network Systems Corp.........83
Northern Telecom...............144-145
On-Line Software Int'l......33
Opocode.......................32
Persyst........................18-19
Philips Information Systems..177
Printronix......................11
Qume...........................56-57
Qume...........................59
Racal-Milgo...................114-115
Racal-Vadic...................76
Rolin Corp......................106-107
SAS Institute..................5
Sharp............................47
Software AG....................151
Software Corp. of America....61
Software Results...............172
Source EDP......................167
Sperry Corp....................110-111
Star Europe.....................128-89
Sytek............................60
TRAX Softworks Inc............52
TRT..............................20
TRT..............................128-13
Tandem.........................176-177
Teledyne-Brown Engineering...113
Telexen Corp...................105
Teletype.......................CV 4
Televideo Systems, Inc.......71
Televideo Systems, Inc.......120-121
3Com...........................98-99
3M Co., Bus. Communications..141
UCCEL........................94-95
Visual Computer Inc...........62-63
Wyse Technology..............CV 3
Zilog............................176

*International Edition
How did Codex come up with the 2600 Series, a new generation of modems running at speeds from 4800 to 16,800 bps that's so much more advanced than the competition?

By designing a revolutionary VLSI-based signal processing architecture teamed with the powerful Motorola MC68000 microprocessor.

A design that incorporates a unique Adaptive Rate System, which continuously adjusts the transmission speed of the Codex 2660 to the maximum rate the line will support. Allowing you to optimize throughput all the way up to 16,800 bps, without having to lift a finger.

A design that ensures data reliability with Trellis Code Modulation (TCM)—a significant advancement over uncoded modulation techniques in common use today.

In multipoint applications, the Codex 2640 can even handle mixed 9600, 7200 and 4800 bps inbound rates. So each drop can operate independently at maximum speed and efficiency.

Of course, with the Codex 2600 Series, network control is standard. So you can monitor line and modem performance from the front panel or from a central Codex DNCS system. Plus there's an optional downline-loading feature that lets you conveniently modify or enhance the functionality of remote, unattended modems.

The Codex 2600 Series.

In three or four years, our competitors will probably have modems just like them.

If you'd rather not wait, contact Codex today. We'll send you detailed information about these 2600 features and more.

Much more.

Call 1-800-821-7700 Ext. 886. Or write:
Codex Corporation, Dept. 707-86, 20 Cabot Boulevard, Mansfield, MA 02048.
It looks like an IBM 3278,
It feels like an IBM 3278,
But it's a good deal better!

It's the inexpensive Cybernex XM 3270.
Combine our XM 3270, a smart ASCII terminal with any approved protocol converter (software or hardware), and you'll have a more flexible and less costly alternative to expanding your IBM terminal network.

Think of it as a compact version of a 3278.
The real value of our XM 3270 can be seen. It has an exact IBM 3278 keyboard layout, exact IBM screen presentation and exact IBM character fonts. Also standard is a 14-inch green screen, 1920 character display, extended highlighting and operator information area. Thus, you can begin using the terminal immediately without relearning keyboards or flipping through manuals.

Faster, less costly to communicate with IBM hosts.
The XM 3270 communicates in asynchronous mode with a protocol converter which translates the data stream into SNA or Bisync for the IBM hosts. This allows remote users to economically access IBM using dial-up lines—a significant saving when compared to the cost of IBM coax connections, cluster controllers, synchronous data lines, coax connections, cluster controllers, and synchronous modems.

It will also talk to your VAX. With a few simple keystrokes, you can configure the terminal to operate in ANSI 3.01 mode. Thus, allows you to communicate with your DEC (similar to a VT-100ii) or access a variety of other non-IBM hosts.

To learn more about the Cybernex XM 3270 contact us toll free at 1-800-357-8290, or Telex 089-22909.

*IBM 3278 is a registered trademark.
**VAX and VT 100 are trademarks of Digital Equipment Corporation.

Making a good thing better.

CIRCLE 32 ON READER CARD
Acorn Computer Corp.
Learning the Education Market, Donna Lee Dowdney, OEM, June 15, 210-25.

Advanced Information Management Inc.
Pirates on the Boards, Edith Myers, NIP, May 1, 61.

Aetna Life & Casualty
Aetna Plans for No-Fault OA, Richard Tellesca, FEA, April 15, 93

Allied Corp.
The Datamation 100, #79, FEA, June 1, 52.

Amdahl Corp.
The Datamation 100, #22, FEA, June 1, 52.

American Express
Total Project Planning, Kenneth D. Meyers, FEA, April 1, 143.

American Minicomputer Association
Cushioning the Blow, Lorraine King, OEM, May 15, 182-3.

Apple Computer Inc.
The Asian Micro Pirates, Daniel Burstein, FEA, May 15, 123.
The Datamation 100, #11, FEA, June 1, 52.

Is the Oem Market Maturing?, OEM, June 15, 210-11.

Applications
Total Project Planning, Kenneth D. Meyers, FEA, April 1, 143.
Major League Dp, Lee Froelich, Willie Schatz, Ken Klee, FEA, April 15, 30.
Hi Tech at the Olympics, Edith Myers, NIP, April 15, 57.

The New Political Machine, Rodney N. Smith, FEA, June 1, 22.
Anatomy of Decision Support, Michael W. Davis, FEA, June 15, 201.
The Electronic Cops, Charles Bruno, FEA, June 15, 114.
Learning the Education Market, Donna Lee Dowdney, OEM, June 15, 210-25.

Applications Development
Communications is the Key, Melinda Thedens, FEA, May 15, 147.
Superior Prototypes, T.R. Young, FEA, May 15, 152.

Apollo Computer Inc.
The Next Generation, OEM, April 15, 136-13.

Arc Ventures
The New Competitors, Lorraine King, OEM, June 15, 210-3.

Artificial Intelligence
Intelligence in the Factory, James Etheridge, INT, April 1, 166-23.
Moving Beyond Lisp, Edith Myers, NIP, June 15, 64.

Artificial Intelligence Corp.
Easy Does It, Jan Johnson, NIP, June 15, 48.

Ashton-Tate
The Selling of Software, Efrem Sigel, FEA, April 15, 125.

Asia
The Asian Micro Pirates, Daniel Burstein, FEA, May 15, 123.
The Far East Factor, Daniel Burstein, INT, June 1, 144-15.

AT&T
Hi Tech at the Olympics, Edith Myers, NIP, April 15, 57.
The Datamation 100, #20, FEA, June 1, 52.
Videotex Hits the Office, Jan Johnson, NIP, June 15, 44.

Automatic Data Processing Inc.
The Datamation 100, #19, FEA, June 1, 52.

Banking
A Chip in Your Wallet, James Etheridge, NIP, June 1, 38.

Baseball Analysis Co.
Major League Dp, Lee Froelich, Willie Schatz, Ken Klee, FEA, April 15, 30.

BASF Systems Corp.
The Datamation 100, #70, FEA, June 1, 52.

Boeing Co.
The Datamation 100, #48, FEA, June 1, 52.

Bradford National Corp.
The Datamation 100, #87, FEA, June 1, 52.

Bull Group
A Chip in Your Wallet, James Etheridge, NIP, June 1, 38.

Burroughs Corp.
The Datamation 100, #3, FEA, June 1, 52.

Cable & Wireless
A Noisy Turf Battle, Willie Schatz, NIP, May 1, 39.

CAD/CAM
The Midas Touch in Manufacturing, Paul Tate, INT, April 1, 166-3.
CIM as a Strategic Tool, Peter Stokes, INT, April 1, 166-13.
Intelligence in the Factory, James Etheridge, INT, April 1, 166-23.

Callan Data Systems
The Call to Callan, Edith Myers, PPL, May 1, 140.

Calma

Campaign Software
The New Political Machine, Rodney N. Smith, FEA, June 1, 22.

Canada Systems Group
The Datamation 100, #92, FEA, June 1, 52.

Centronics Data Computer Corp.
The Datamation 100, #71, FEA, June 1, 52.

Charles River Data Systems
The Next Generation, OEM, April 15, 136-13.

Chatham Ventures Corp.
Venture Capital Cooling, R. Emmett Carlyle, NIP, June 15, 78.

Cipher Data Products
Is the Oem Market Maturing?, OEM, June 15, 210-11.

C. Itho Electronics Inc.
The Datamation 100, #39, FEA, June 1, 52.

Comdex
A Comdex Preview, OEM, May 15, 182-11.

Comdisco Inc.
Lessors on Leasing, Hesh Wiener, FEA, May 15, 103.
The Datamation 100, #30, FEA, June 1, 52.

Commodore International Ltd.
The Datamation 100, #14, FEA, June 1, 52.

Is the Oem Market Maturing?, OEM, June 15, 210-11.

Communications
A High-Speed Race, Jan Johnson, NIP, April 15, 42.
Securing the Network, Jan Johnson, NIP, May 1, 52.
Running Out of Steam, Michael Tyler, NIP, May 15, 57.

Videoex a la Francais, James Etheridge, NIP, May 15, 60.
The Little Handshake Machines, Eric D. Siegel, FEA, June 15, 102.

Compag Computer Corp.
The Datamation 100, #91, FEA, June 1, 52.

Compression Labs Inc.
Running Out of Steam, Michael Tyler, NIP, May 15, 57.
"...and trust me, when your information needs grow, you can always connect all your PCs together."

There's a lot of optimistic talk going on about networking today. Not lies, but perhaps wishful thinking.

Talk, in fact, that's making those in the know very nervous.

An alarming lack of standards among manufacturers has stalled the development of software applications packages for networked personal computers.

As a result, offices that attempt to connect their existing personal computers together find an appalling absence of programs that really share data.

Personal computers were simply designed for individual use, not for sharing information among each other within an office.

So, meanwhile, countless department heads, data processing managers and small business owners are indefinitely stuck with various personal computers that won't talk to each other - a predicament only acceptable in offices where no one works together.

But that's rarely the case.

**Why should your employees work together on computers that don't?**

We have a solution. A cost-effective, high performance solution renowned for its straightforward simplicity: the Fortune 32:16™ multi-user computer system.

It has all the capabilities of personal computers, but without the complication.

It's a computer for sharing information among users. Sharing printers, memory devices and communications facilities. And best of all, sharing existing multi-user applications software designed to allow users to work together.

**Did your PCs cost you more than a Fortune?**

Economically, the Fortune 32:16 multi-user system lets you buy only as many workstations as you initially need, adding more later. Depending on configuration and application, it handles up to twelve users simultaneously.

It also requires no more than one printer, memory device or communication facility - eliminating much unnecessary duplication.

Because we don't think you should have to equip four or six or eight users with four or six or eight sets of personal computers, printers, disk drives and applications packages.

The Fortune solution comes as a complete, ready to use package - including software - designed from the beginning as a multi-user system.

The Fortune 32:16 runs on the industry standard Unix™ operating system. Unix affords you a wide variety of powerful business programs.

It's also an operating system developed for multi-user computers and programming flexibility.

The Fortune 32:16 multi-user system was made specifically for the constantly growing needs within businesses. It's simple, flexible and cost-effective.

And best yet, it's here now.

Someday, networking may become as easy as a multi-user solution. And then you'll see networked Fortune systems.

But until that day, a lot of people will be keeping their fingers crossed.

**FORTUNE SYSTEMS**

Fortune Systems Corporation, 101 Twin Dolphin Drive, Redwood City, California 94065. (415) 592-5140

Dealer inquiries invited.

Fortune 32:16 is a trademark of Fortune Systems Corporation. Unix is a trademark of Bell Labs.
The micro invasion has begun. And, chances are, you've now got a lot of different people in a lot of different departments using a lot of different micros.

Now there's a way for you to control and maximize the benefits of all the different micros in your domain.

**Fight back with dBASE II.**

dBASE II is the relational database management system from Ashton-Tate that enables you to manage your micro-based corporate data resources with the high level of consistency and sophistication you've enjoyed with mainframe and minicomputer systems.

Armed with dBASE II and the dBASE II RunTime™ program development module, you can write programs which will enable micro users in each department to "do their own thing" while creating complete database consistency throughout the company.

dBASE II is a powerful, flexible way for you to effectively manage the micro proliferation.

**Help is here.**

If you'd like to know more about how dBASE II and RunTime can help you win the micro management battle, contact Ashton-Tate today. 10150 West Jefferson Boulevard, Culver City, CA 90230. (800) 437-4329, ext. 217. In Colorado (303) 799-4900. In the U.K. (0908) 568866.

*CIRCLE 95 ON READER CARD*
<table>
<thead>
<tr>
<th>SUBJECT INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintenance</strong></td>
</tr>
<tr>
<td><strong>Management</strong></td>
</tr>
<tr>
<td>The Micro Marshall Hits Town, Theresa M. Engstrom, FEA, April 1, 81.</td>
</tr>
<tr>
<td>Total Project Planning, Kenneth D. Meyers, FEA, April 1, 143.</td>
</tr>
<tr>
<td>Synchronizing Systems with Business Values, David G. Robinson, FEA, June 15, 152.</td>
</tr>
<tr>
<td>In Praise of Operations Managers, Shirley F. Prutch, FEA, June 15, 139.</td>
</tr>
<tr>
<td>Dp Move Changes Mood, Edith Myers, NIP, June 15, 94.</td>
</tr>
<tr>
<td><strong>Management Assistance Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #36, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Management Science America Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #81, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
</tr>
<tr>
<td>The Midas Touch in Manufacturing, INT, Paul Tate, April 1, 166-3.</td>
</tr>
<tr>
<td>CIM as a Strategic Tool, Peter Stokes, INT, April 1, 166-13.</td>
</tr>
<tr>
<td>Intelligence in the Factory, James Etheridge, INT, April 1, 166-23.</td>
</tr>
<tr>
<td><strong>Manufacturers Hanover Financial Management Systems Inc.</strong></td>
</tr>
<tr>
<td>The New Competitors, Lorraine King, OEM, June 15, 210-3.</td>
</tr>
<tr>
<td><strong>Market Research</strong></td>
</tr>
<tr>
<td>Forecasts from Teacups?, Jon Zonderman, FEA, May 1, 28.</td>
</tr>
<tr>
<td><strong>Martin Marietta Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #76, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Mastor Systems Corp.</strong></td>
</tr>
<tr>
<td>A High-Speed Race, Jan Johnson, NIP, April 15, 42.</td>
</tr>
<tr>
<td><strong>Mathematica Products</strong></td>
</tr>
<tr>
<td>Easy Does It, Jan Johnson, NIP, June 15, 48.</td>
</tr>
<tr>
<td><strong>McDonnell Douglas Automation Co.</strong></td>
</tr>
<tr>
<td>Hi Tech at the Olympics, Edith Myers, NIP, April 15, 57.</td>
</tr>
<tr>
<td><strong>McDonnell Douglas Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #29, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Mead Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #100, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Mesa Graphics</strong></td>
</tr>
<tr>
<td>Mainframe Business Graphics, Maxine D. Brown, FEA, May 1, 89.</td>
</tr>
<tr>
<td><strong>Michie, Donald</strong></td>
</tr>
<tr>
<td>In Pursuit of AI, John Lamb, PPL, May 1, 139.</td>
</tr>
<tr>
<td><strong>Micom Systems Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #90, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Microelectronics and Computer Technology Corp.</strong></td>
</tr>
<tr>
<td>America Answers Back, Jan Johnson, NIP, May 15, 40.</td>
</tr>
<tr>
<td><strong>MicroPro International Corp.</strong></td>
</tr>
<tr>
<td>The Selling of Software, Efrem Sigel, FEA, April 15, 125.</td>
</tr>
<tr>
<td><strong>Microsoft Corp.</strong></td>
</tr>
<tr>
<td>The Selling of Software, Efrem Sigel, FEA, April 15, 125.</td>
</tr>
<tr>
<td><strong>Minicomputers</strong></td>
</tr>
<tr>
<td>IBM’s New Sys/36, R. Emmett Carlyle, NIP, May 15, 71.</td>
</tr>
<tr>
<td><strong>Mitel Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #49, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Mohawk Data Sciences Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #38, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Motorola Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #32, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>National Bureau of Standards</strong></td>
</tr>
<tr>
<td>The Graphics Standards Battle, Jan A. Meads, FEA, May 1, 76.</td>
</tr>
<tr>
<td>A Dozen Electrical Mistakes, Warren H. Lewis, FEA, May 1, 109.</td>
</tr>
<tr>
<td><strong>National Computer Conference</strong></td>
</tr>
<tr>
<td>IBM’s New Sys/36, R. Emmett Carlyle, NIP, May 15, 71.</td>
</tr>
<tr>
<td><strong>National Computer Conference NCC’84</strong></td>
</tr>
<tr>
<td>The Venue is Vegas, Ken Klee, Linda Runyan, FEA, June 15, 144.</td>
</tr>
<tr>
<td><strong>National Computer Graphics Association</strong></td>
</tr>
<tr>
<td>Addicted to Graphics, Edith Myers, PPL, June 1, 145.</td>
</tr>
<tr>
<td><strong>National Data Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #88, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>National Semiconductor Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #34, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>NBI Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #84, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>NEC America Inc.</strong></td>
</tr>
<tr>
<td>Running Out of Steam, Michael Tyler, NIP, May 15, 57.</td>
</tr>
<tr>
<td><strong>NEC Information Systems Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #50, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Nestor</strong></td>
</tr>
<tr>
<td>Securing the Network, Jan Johnson, NIP, May 1, 52.</td>
</tr>
<tr>
<td><strong>Network Systems Corp.</strong></td>
</tr>
<tr>
<td>A High-Speed Race, Jan Johnson, NIP, April 15, 42.</td>
</tr>
<tr>
<td><strong>Northern Telecom Inc.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #21, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Oems</strong></td>
</tr>
<tr>
<td>What It’s Like Working with IBM, Lorraine King, OEM, April 15, 136-1.</td>
</tr>
<tr>
<td>The Keyboard Question, Lisa DiRocco, OEM, April 15, 139-19.</td>
</tr>
<tr>
<td><strong>Optical Disks</strong></td>
</tr>
<tr>
<td>Optical Disks Foreseen, Edith Myers, NIP, April 15, 30.</td>
</tr>
<tr>
<td><strong>Oracle Corp.</strong></td>
</tr>
<tr>
<td>The Pcs Make Friends, R. Emmett Carlyle, NIP, May 15, 71.</td>
</tr>
<tr>
<td><strong>Organization for Economic Cooperation &amp; Development (Oecd)</strong></td>
</tr>
<tr>
<td>The U.S. Shuns IBI, Willie Schatz, NIP, June 1, 42.</td>
</tr>
<tr>
<td><strong>Paradyne Corp.</strong></td>
</tr>
<tr>
<td>The Datamation 100, #57, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Peripherals</strong></td>
</tr>
<tr>
<td>Optical Disks Foreseen, Edith Myers, NIP, June 1, 30.</td>
</tr>
<tr>
<td>Perkin-Elmer Corp.</td>
</tr>
<tr>
<td>Philips Data Systems</td>
</tr>
<tr>
<td>Philips Information Systems</td>
</tr>
<tr>
<td>Planning Research Corp.</td>
</tr>
<tr>
<td>Point of Sale</td>
</tr>
<tr>
<td>Policy</td>
</tr>
<tr>
<td>Cracking Down on Software, Willie Schatz, NIP, June 1, 42</td>
</tr>
<tr>
<td>Powerful Words for</td>
</tr>
<tr>
<td>Politics</td>
</tr>
<tr>
<td>Prelude Development Corp.</td>
</tr>
<tr>
<td>Prime Computer Inc.</td>
</tr>
<tr>
<td>Printers</td>
</tr>
<tr>
<td>Printronics Inc.</td>
</tr>
<tr>
<td>Privacy</td>
</tr>
<tr>
<td>Productivity</td>
</tr>
<tr>
<td>Professional Drug Systems Inc.</td>
</tr>
<tr>
<td>Programming</td>
</tr>
<tr>
<td>Protocol Converters</td>
</tr>
<tr>
<td>Prototyping</td>
</tr>
<tr>
<td>Quint Database Corp.</td>
</tr>
<tr>
<td>Quotron Systems Inc.</td>
</tr>
<tr>
<td>Racial-Milgo</td>
</tr>
<tr>
<td>Racial Data Communications Inc.</td>
</tr>
<tr>
<td>Raytheon Corp.</td>
</tr>
<tr>
<td>Recognition Equipment</td>
</tr>
<tr>
<td>Reynolds &amp; Reynolds</td>
</tr>
<tr>
<td>Rolm Corp.</td>
</tr>
<tr>
<td>Safeguard Business Systems Corp.</td>
</tr>
<tr>
<td>Sanders Associates</td>
</tr>
<tr>
<td>Schlumberger Ltd.</td>
</tr>
<tr>
<td>SCI Systems Inc.</td>
</tr>
<tr>
<td>Seagate Technology</td>
</tr>
<tr>
<td>Security</td>
</tr>
<tr>
<td>Pirates on the Boards, Edith Myers, NIP, May 1, 61</td>
</tr>
<tr>
<td>Semiconductor Research Corp.</td>
</tr>
<tr>
<td>What is SRC?, Jan Johnson, NIP, May 15, 46</td>
</tr>
<tr>
<td>Sentry Database Publishing</td>
</tr>
<tr>
<td>Shared Medical Systems Corp.</td>
</tr>
<tr>
<td>Shugart Associates</td>
</tr>
</tbody>
</table>

**Signal Cos.** The Datamation 100, #74, FEA, June 1, 52

**Software** Breaking the Locks, R. Emmett Carlyle, NIP, April 1, 64
Making Software "Easy," Michael Tyler, NIP, April 15, 40
Taking the Low Road, Michael Tyler, NIP, April 15, 40
Only One Per Customer, Michael Tyler, NIP, April 15, 49
The Selling of Software, Ehem Sigel, FEA, April 15, 125
Data Conversion Without Tears, John G. Seddon, FEA, April 15, 130
Looking for Generics, R. Emmett Carlyle, NIP, May 1, 42
The End of the Hardware Era, Stephen T. McClintock, FEA, May 1, 122
Ada Fans Say Now's the Time, Edith Myers, NIP, May 15, 40
The PC Makes Friends, R. Emmett Carlyle, NIP, May 15, 40
Mending Crazy Quilt Systems, Gary L. Richardson, Charles W. Butler, Earl D. Hodis, FEA, May 15, 130
Communications is the Key, Melinda Theodora, NIP, May 15, 147
The New Political Machine, Rodney N. Smith, FEA, June 1, 22
Cracking Down on Software, Willie Schatz, NIP, June 1, 45
The Long and Short of Schedules, Robert W. DePree, FEA, June 15, 131
Immortal Software, Nicholas Zwegintzov, FEA, June 15, 170
Making a Name for Itself, Michael Tyler, NIP, June 15, 88

**Software Development** Rethinking Productivity, Bill Inmon, FEA, June 15, 185

**Sports**
- Major League Dp, Léon Froelich, FEA, April 15, 72
- Hi Tech at the Olympics, Edith Myers, NIP, April 15, 57

**Spur Products** Giving the 1403 New Life, Tom McCusker, NIP, April 15, 72

**Standards**
- The Graphics Standards Battle, Jon A. Meads, FEA, April 15, 72
- NBS Push ISO Plan, Willie Schatz, NIP, June 15, 66

**State Department**
- The U.S. Shuns IBI, Willie Schatz, NIP, June 1, 42

**Storage Technology Corp.**
- The Datamation 100, #15, FEA, June 1, 52
- Optical Disks Foreseen, Edith Myers, NIP, June 1, 30

**Strategy Inc.** Forecasts from Teacups?, Jon Zonderman, FEA, May 1, 28

**Surveys**
- The Dp Budget Survey, Pcs Make Waves, Larry Marion, FEA, April 15, 82
- Surveying the Mainframe Landscape, John W. Verity, FEA, May 15, 89
- The Datamation 100, FEA, June 1, 52
- Is the OEM Market Maturing?, OEM, June 15, 210-11

**Sytek Inc.**
- Securing the Network, Jan Johnson, NIP, May 1, 52

**Taiwan**
- The Asian Micro Pirates, Daniel Burstein, FEA, May 15, 123
- The Far East Factor, Daniel Burstein, INT, June 1, 144-15

**Tandem Computers Inc.**
- The Datamation 100, #33, FEA, June 1, 52

**Tandon Corp.**
- The Datamation 100, #40, FEA, June 1, 52

**Tandy Corp.**
- When the Chips are Down, Charles Bruno, NIP, May 1, 47
- The Asian Micro Pirates, Daniel Burstein, FEA, May 15, 123
- The Datamation 100, #13, FEA, June 1, 52

**Tape Drives**
- Is the OEM Market Maturing?, OEM, June 15, 210-11

**Taxes**
- Spelling Relief for R&D, Willie Schatz, NIP, May 1, 64

**Technology**
- Micro-Based Business Graphics, Michael S. Cooper, FEA, May 1, 98
- Heading for a Revolution, Fred La-mond, INT, May 1, 144-19
Today, the world of business computing is being introduced to a system featuring over two-and-a-half times the performance and twice the price/performance of its nearest competitor.

A versatile system. Able to compile the information of the largest corporations into a single relational data base. Instantaneously updated and fully available across the entire system.

An expandable and compatible system. Allowing the simple addition of future programs and equipment, without sacrificing past investments.

And most importantly, a system that won't let you down. Because its fault-tolerant design won't let itself down. Even if a major component fails.

This system isn't from IBM. It's from Tandem. Introducing the NonStop TXP system. TXP: 32-bit transaction processing.

The TXP system processes high volume loads faster and more economically than any other system. Executing over 100 transactions per second now and thousands of transactions in the near future.

It's built around multiple parallel 32-bit processors. Each addressing 16 MB of physical memory and over a gigabyte of virtual memory.

To help memory keep pace with that kind of processing, TXP pulls 64 bits on each memory access.

The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle, two 16-bit operations in the same cycle.

So it can get to it faster.

And our tests have shown that the TXP cache memory has a 98% "hit rate." Which means the requested data is virtually always nearby for fast access.

The result? Larger volumes of work can be processed in shorter amounts of time. Helping TXP to be even more productive.

Making cache memory pay big dividend.

A system you'll expand, not disband.

Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

Selecting and buying a larger and more expensive system.

Then reprogramming.

Then re-training.

Plus all the chaotic disruption and massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system. It can expand from two to 16 processors.
Increasing its power by a factor of eight.
That's more power than any of the largest
mainframes.
And the additional processors can be
talled while TXP is running at full speed.
No downtime. No reprogramming.
Still not enough power? Up to 14 TXP
systems can be joined together by high-speed
optics. Linking the systems together as
a computer with 224 processors.
But that still isn't the full potential of
TXP.
TXP systems at up to 255 sites can be
ned in a worldwide network. Generating the
power of over 4,000 processors.
And that gives TXP the most powerful
-line computer capacity in business.
Expandability our competition wishes they
could disband.
NonStop™ system compatibility from
people who started it all.
TXP can process more information and
port more programs, users and devices than
any other computer designed for on-line
transaction processing.
Devices you most likely already have.
Even devices made by IBM.
But what if your company isn't quite
ready for the TXP system's awesome power?
We suggest the Tandem NonStop II™
system. The second most powerful on-line
computer in business today. The cost effec-
tive solution for medium to large corporations.
What if your company is somewhere
between a NonStop II and a TXP?
No problem. They can be combined.
They can share the same data and
programs. In fact, NonStop II and TXP
processors can coexist in the same cabinets.
And what if your company needs even a
smaller computer?
We make a smaller computer. The Tandem
NonStop 1+ system. Perfect for those low-
volume sites where less processing power
is needed.
Tandem literally wrote the book on
NonStop™ transaction processing. That's
because we introduced the first NonStop
system.
Over eight years ago.
And for over eight straight years, despite
attempts by others, we've continued to lead
the industry.
Learn all about TXP, ASAP.
For complete literature, contact your local
Tandem Sales Office.
Or write Tandem Computers Incorporated,
19333 Vallco Parkway, Cupertino,
California 95014.
Or call us, toll-free. (800) 482-6336.
TXP is the most powerful on-line computer
in business today.
Without question.

TANDEM
NonStop Transaction Processing

CIRCLE 96 ON READER CARD

© 1983 Tandem Computers Incorporated.
leukemia

is a malignancy that arises in the body's blood-forming tissues. Its symptoms can include easy bruising, fever, continual weakness, chronic fatigue, bone and joint pain, and loss of appetite and weight.

Consult a physician if such problems persist. Early detection is the best medicine.

For more information, including the free booklet "What Everyone Should Know About Leukemia," write to:

leukemia
society of america, inc.
800 Second Avenue
New York, NY 10017

---

<table>
<thead>
<tr>
<th>SUBJECT INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Little Handshake Machines, Eric D. Siegel, FEA, June 15, 102.</strong></td>
</tr>
<tr>
<td><strong>Teleconferencing</strong> Running out of Steam, Michael Tyler, NIP, May 15, 57.</td>
</tr>
<tr>
<td><strong>TeleVideo Systems Inc.</strong> The Datamation 100, #69, FEA, June 1, 52. Is the Oem Market Maturing?, OEM, June 15, 210-11.</td>
</tr>
<tr>
<td><strong>Telex Corp.</strong> The Datamation 100, #53, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Texas Instruments Inc.</strong> Bouncing Back, OEM, May 15, 182-4. The Datamation 100, #17, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Tektronix Inc.</strong> The Datamation 100, #43, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Third World</strong> The U.S. Shuns IBI, Willie Schatz, June 1, 42.</td>
</tr>
<tr>
<td><strong>3M</strong> The Datamation 100, #46, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Training</strong> Training + Technology = Profits, Janet Dights, FEA, April 1, 161</td>
</tr>
<tr>
<td><strong>Transborder Data Flow</strong> The U.S. Shuns IBI, Willie Schatz, NIP, June 1, 42.</td>
</tr>
<tr>
<td><strong>Trilogy Corp.</strong> Heading for a Revolution, Fred La mond, INT, May 1, 144-19.</td>
</tr>
<tr>
<td><strong>TRW Inc.</strong> The Datamation 100, #12, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Tyman Inc.</strong> The Datamation 100, #44, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Ungermann-Bass Inc.</strong> A High-Speed Race, Jan Johnson, NIP, April 15, 42.</td>
</tr>
<tr>
<td><strong>United Kingdom</strong> Alvey Is on Its Way, John Lamb, NIP, June 15, 60.</td>
</tr>
<tr>
<td><strong>United Nations</strong> The U.S. Shuns IBI, Willie Schatz, NIP, June 1, 42. Alvey Is on Its Way, John Lamb, NIP, June 15, 60.</td>
</tr>
<tr>
<td><strong>User Groups</strong> Cries for Help, Philipp Maranoff, FEA, April 1, 30. United We Stand, Edith Myers, FEA, April 1, 95.</td>
</tr>
<tr>
<td><strong>Valcom</strong> The New Competitors, Lorraine King, OEM, June 15, 210-3.</td>
</tr>
<tr>
<td><strong>Value Added Resellers</strong> The New Competitors, Lorraine King, OEM, June 15, 210-3.</td>
</tr>
<tr>
<td><strong>Verbatim Corp.</strong> The Datamation 100, #80, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Victor Technologies</strong> Cushioning the Blow, Lorraine King, OEM, May 15, 182-4.</td>
</tr>
<tr>
<td><strong>Videotex</strong> Videotex a la Francais, James Etheridge, NIP, May 15, 60. Using Videotex as a Micro-Mainframe Link, Jan Johnson, NIP, June 15, 81. Videotex Hits the Office, Jan Johnson, NIP, June 15, 44.</td>
</tr>
<tr>
<td><strong>Wang Laboratories Co.</strong> The Datamation 100, #8, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>West Germany</strong> The Keyboard Question, Lisa Di Rocco, OEM, April 15, 136-19. In the Melding Pot, Fred Lamond, INT, June 1, 144-20.</td>
</tr>
<tr>
<td><strong>WICAT Systems</strong> Learning the Education Market, Donna Lee Dowdney, OEM, June 15, 210-25.</td>
</tr>
<tr>
<td><strong>Word Processing</strong> Mendacious Machines, Tom Parrett, FEA, April 1, 134.</td>
</tr>
<tr>
<td><strong>Workstations</strong> The Next Generation, OEM, April 15, 136-13. Working with Workstations, Fred Lamond, INT, May 1, 144-10.</td>
</tr>
<tr>
<td><strong>Wyly Corp.</strong> The Datamation 100, #78, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>Xerox Corp.</strong> Hi Tech at the Olympics, Edith Myers, NIP, April 15, 57. The Datamation 100, #10, FEA, June 1, 52.</td>
</tr>
<tr>
<td><strong>XRT Inc.</strong> Making a Name for Itself, Michael Tyler, NIP, June 15, 88.</td>
</tr>
<tr>
<td><strong>Yankee Group</strong> Forecasts from Teacups?, Jon Zonderman, FEA, May 1, 28.</td>
</tr>
<tr>
<td><strong>Zenith Data Systems</strong> Is the Oem Market Maturing?, OEM, June 15, 210-11.</td>
</tr>
</tbody>
</table>
Announcing the WY-75.

Our new WY-75, VT-100 software-compatible terminal has a style that's truly impressive.

It offers a combination of features you can't find in any other VT-100 software-compatible terminal. Like a compact, ergonomic design. A sculpted, low-profile keyboard. And a swivel and tilt non-glare 14” screen, tailored with an 80/132 column format.

Priced in a class by itself, the WY-75 lists for only $795.

Contact Wyse Technology for more information. And discover a great new outfit.

$795

All DEC'd out and ready to go.
WE'RE BUILDING ON OUR GREAT REPUTATION.

Introducing the T300, a line printer with the reliability we're famous for, plus the flexibility you need...all at an attractive low price.

Coming up with a better printer than our existing model 40 was no easy task. Especially when you consider its reputation for outstanding reliability.

So in designing the T300, Teletype Corporation's primary goal was to add more features without sacrificing reliability. What we've come up with is one of the most flexible printers available. One that offers a great value and should even surpass the reliability of our model 40.

You see, we've added a microprocessor-based controller for increased capability. We also replaced complex mechanical assemblies with MOS/LSI circuitry that adds to reliability. The result: the T300 withstands the abuse of our rigorous testing that includes printing 500,000 full lines over a 16 hour period.

On top of greater reliability, the T300 is also easier to use. Instead of flipping DIP switches, the operator conveniently enters options from a keypad. A 4-digit LCD display verifies entered options and provides printer status information.

We've also given the T300 an appealing type font. You can choose popular fonts including "Prestige Elite." There's even a new stylized tabletop cabinet that helps minimize noise.

The T300 is available with an RS232C interface, operates at up to 9600 bps, and prints up to 300 lines per minute. The serial interface has a 2000 character buffer which helps handle a heavy burst of data. The T300 is also available with Centronics or Dataproducts parallel interfaces. The printer adapts to many OEM applications and is compatible with popular mini-computers.

Another T300 plus is that it handles virtually any business form, from small labels to wide format computer reports. It also features electronic VFU. You can program and store up to five different formats that can be down-line loaded, or invoked locally.

Self diagnostics on the T300 help prevent unnecessary service calls. But in the unlikely event it needs repairs, you can count on our established nationwide service organization.

We admit it was a tough act to follow, but we'd bet our reputation on the T300. For more information, write Teletype Corporation, 5555 Touhy Ave., Dept. 3223-A, Skokie, IL 60077. Or call 1 800 323-1229, Extension 304.

"Teletype" is a registered trademark and service mark of Teletype Corporation.

TELETYPE: VALUE SETS US APART.

CIRCLE 3 ON READER CARD