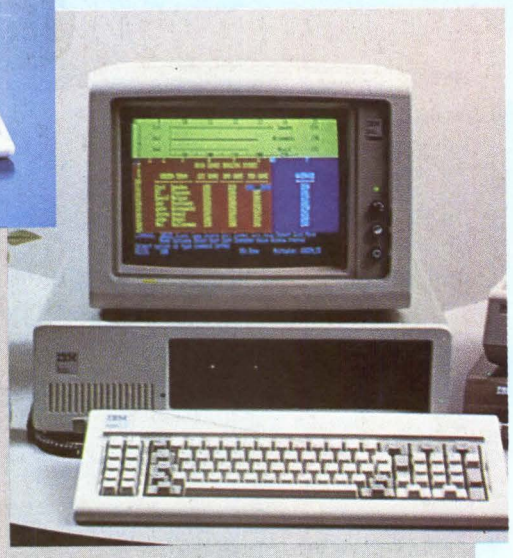
Mini-Micro Systems

A CAHNERS PUBLICATION

JUNE 15, 1984/$15.00

Computer Digest



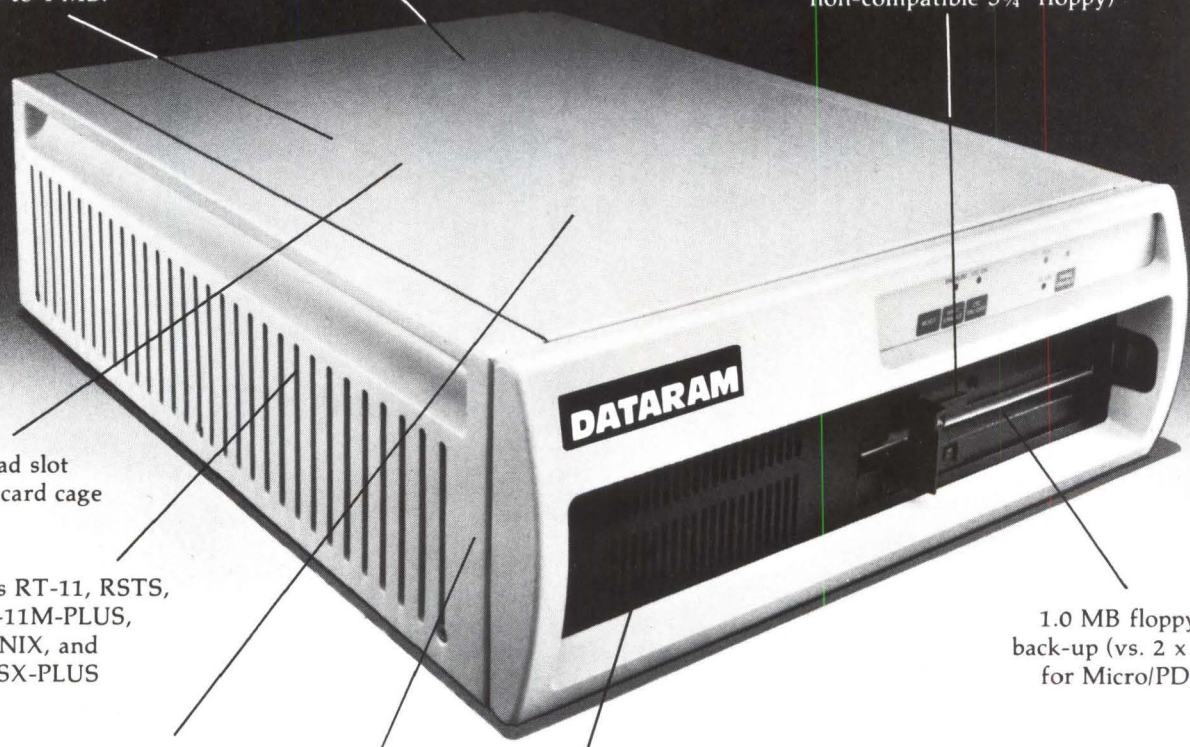
The source book for system integrators

Like DEC's.

$8,845 system price*

256 KB minimum... up to 4 MB!

Media and software compatibility with DEC's RX02 8" floppy (vs. Micro/PDP-11's non-compatible 5¼" floppy)



8-quad slot Q-BUS card cage

Supports RT-11, RSTS, RSX-11M-PLUS, UNIX, and TSX-PLUS

Two fans in card cage area (vs. one in Micro/PDP-11)

RL02-compatible 5¼" Winchester disk; 10 MB, 20 MB, or 40 MB capability

Cartridge tape capability

1.0 MB floppy disk back-up (vs. 2 x 400 KB for Micro/PDP-11)

Only better.

You can buy DEC's Micro/PDP-11 with its impressive array of features...or you can get Dataram's A22 —an LSI-11/23 based minicomputer that gives you a whole lot more...for a lot less dollars! Like an 8" RX02-compatible floppy. 40 MB 5¼" Winchester and ¼" cartridge tape capability. And two fans that provide push-pull air flow in the card cage area.

For more information, forward this coupon to us, or, for faster response, call (609) 799-0071.

☐ Send information. ☐ Contact me immediately.

Name

Company

Address

City State Zip Phone

Dataram Corporation, Princeton Road, Cranbury, NJ 08512

MM615

*$8,845 is single-quantity domestic price for A22 with LSI-11/23, 256 KB, 10 MB Winchester and RX02-compatible 8" floppy.

DEC, LSI-11, Micro/PDP, PDP, RSTS, RSX, and RT-11 are trademarks of Digital Equipment Corporation.
TSX-PLUS is a trademark of s&h computer systems, inc.
UNIX is a trademark of Bell Laboratories.

DATARAM

Dataram Corporation ☐ Princeton Road ☐ Cranbury, New Jersey 08512 ☐ Tel: 609-799-0071 ☐ TWX: 510-685-2542

CIRCLE NO. 1 ON INQUIRY CARD

ABLE's ATTACH customers enjoy their spaghetti in the dining room, not the computer room.

ABLE's ATTACH, the breakthrough multi-host terminal switching system for DEC UNIBUS computers that eliminates the spaghetti-like mess of cables in your computer room.

One ATTACH host board and a *single* cable replaces 16 DEC interfaces, and their associated "spaghetti." And it still supports up to 128 terminals on your system without the endless tangle of cables that tie-up your computer room.

One ATTACH host board does the work of many multiplexers. The immediate advantage is a dramatic reduction in mounting space and expansion cabinetry, resulting in significant cost savings. And ATTACH can be located up to a kilometer away from your computer room.

Cook up a system to meet your present data communication requirements with ATTACH. At the touch of a keyboard, terminals can be dynamically *switched* among any combination of VAX and PDP-11 UNIBUS systems. And, ATTACH is compatible with RSX, RSTS/E, VMS and UNIX operating systems.

Expanding your capabilities, or adding terminals is easy with ATTACH. As your requirements grow, simply add modular ATTACH units to your system.

Whether you have 28, or 128 or more terminals, ATTACH has the right recipe for cost-effective connectivity.

ABLE Computer's ATTACH is the most efficient terminal interconnection system on the table.

Contact the ABLE representative near you, or call ABLE toll-free at 800-332-2253.

ABLE COMPUTER

The communication specialists

1732 Reynolds Avenue, Irvine, California 92714. In the Irvine area: (714) 979-7030. Or, TWX: 910-595-1729.

DEC, PDP, RSTS, RSX, UNIBUS, VAX and VMS are trademarks of Digital Equipment Corporation. UNIX is a trademark of Bell Laboratories. ATTACH is patent pending.

CIRCLE NO. 4 ON INQUIRY CARD

Now you don't have to be rich to be powerful.

Riches and power don't always go together. Take Plexus, for instance. The world's most powerful UNIX*-based supermicros.

Powerful because multiple processors share the UNIX load. So processing power is distributed to where it does the most good.

Terminal I/O. Disk I/O. Data communications. And, of course, data processing.

Our unique architecture also lets us bring you the world's first UNIX Network Operating System (NOS). So you can combine Plexus systems in an Ethernet network for even more power.

NOS gives you real time, continuous access to files. From anywhere in the network.

Files are also updated on the same basis. So everyone in the network works with up-to-the-minute data. Automatically.

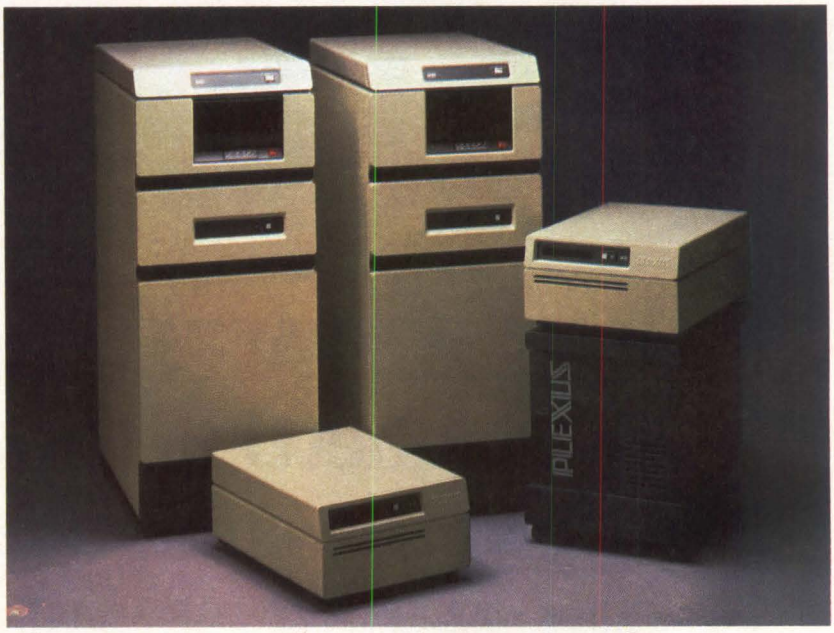
No waiting for file transfers. And that's a decided improvement over everything else that's out there.

You also get to save money on powerful UNIX-based software, including COBOL, FORTRAN, Pascal, BASIC, and C. Database management and word processing, too. As well as hundreds of third party UNIX packages.

Plus our own software and maintenance support. And even a software referral service for your OEM programs.

Does all this make us expensive? Absolutely not.

In fact, Plexus systems cost thousands of dollars less than the minicomputers we outperform.



To get a better idea of just how good that performance is, come get a demonstration. Call *800-528-6050*, ext. *1444*. In Arizona, *800-352-0458*, ext. *1444*. Or write Ralph Mele at Plexus Computers, Inc., 2230 Martin Avenue, Santa Clara, CA 95050.

You see? You don't have to be rich to be powerful. Just smart.

PLEXUS

Built for speed.

© Plexus Computers, Inc., 1983
*UNIX is a trademark of Bell Laboratories.

CIRCLE NO. 5 ON INQUIRY CARD

Mini-Micro Systems Computer Digest

A Cahners Publication

Vol. XVII No. 8 June 15, 1984

9 **How to use the Computer Digest**

13 **Editorial**

17 **SINGLE BOARDS . . . Interface buses dominate single-board computer market**

Four major buses—Multibus, Q-bus, STD-bus and VMEbus—compete vigorously for single-board computer integration

22 SINGLE-BOARD MICROCOMPUTERS Product guide

47 **SINGLE-USER MICROS . . . Personal-computer spotlight shifts to portables**

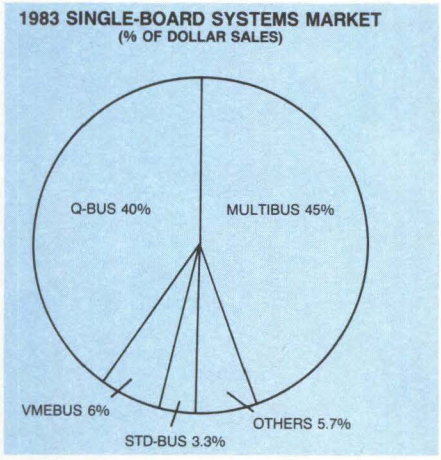
To gain a foothold in an emerging market, major computer manufacturers introduce portable, transportable and hand-held microcomputers

51 SINGLE-USER MICROCOMPUTER SYSTEMS Product guide

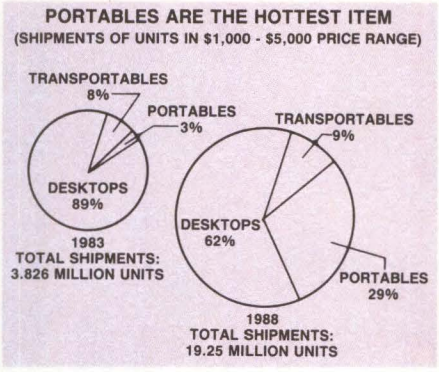
71 **MULTIUSER MICROS . . . Hardware, software trends expand multiuser system performance**

Multiuser systems gain favor via software compatibility, distributed processing and host communications

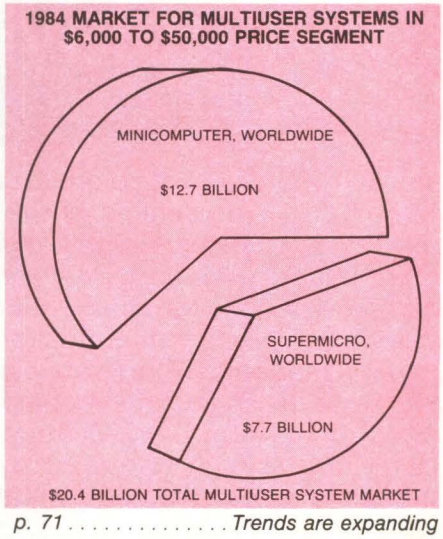
77 MULTIUSER MICROCOMPUTER SYSTEMS Product guide



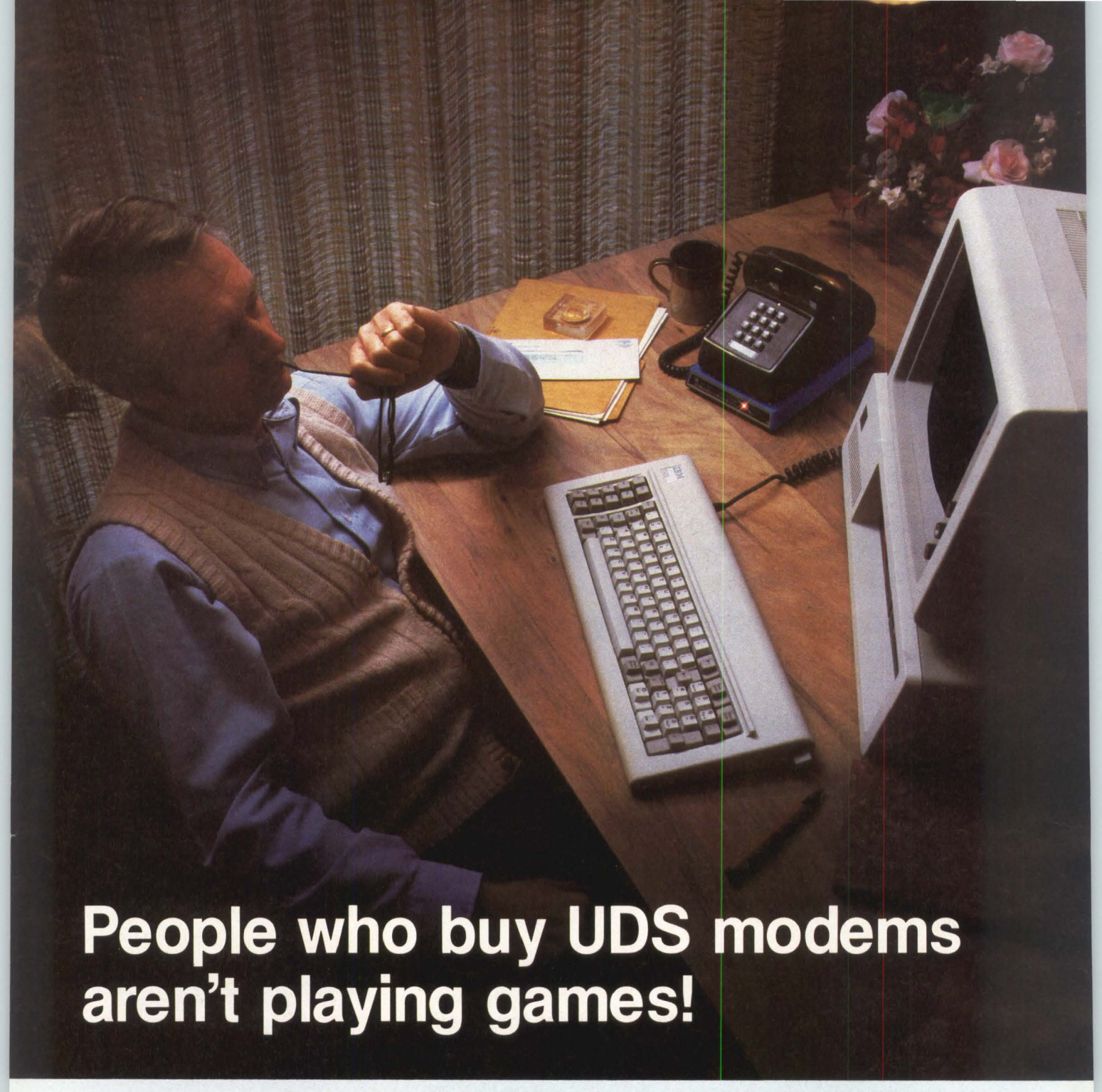
p. 17 . . . . . Buses dominate



p. 47 . . . . . PC spotlight shifts



p. 71 . . . . . Trends are expanding



People who buy UDS modems aren't playing games!

You can often judge a personal computer user by the hardware he selects. If the modem comes from UDS, chances are he has a serious investment in computer and software, a serious data communications requirement and serious computer-based decisions to make.

UDS modems offer true pro-quality performance to the serious microcomputer owner. Data rates range from 0 to 9600bps. Depending on data rate, synchronous and asynchronous models may be selected for half- or full-duplex communications. Their prices put them within easy reach of the serious user.

If data communication has progressed beyond the game-playing stage in your microcomputer system, it's time to investigate UDS. The efficiency, reliability and potential for faster data transfer can add real professional capability. Contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/837-8100; TWX 810-726-2100.

Universal Data Systems

MOTOROLA INC.
Information Systems Group

NCC '84
Booth #B-3238

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

CIRCLE NO. 6 ON INQUIRY CARD

99 **MINIS . . . Superminicomputers defy microcomputer and mainframe intrusions**

Recent superminicomputers challenge multiuser microcomputers in price and mainframes in performance

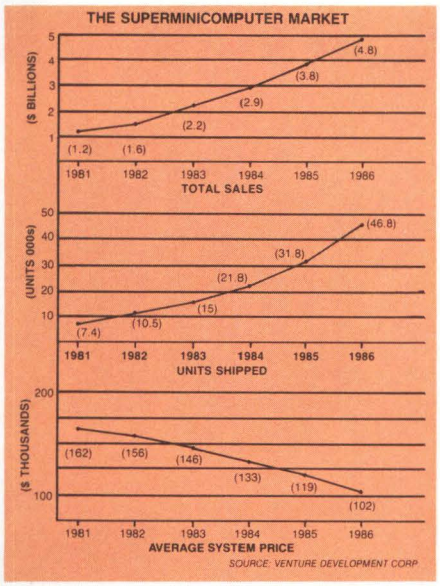
105 MINICOMPUTER SYSTEMS Product guide

113 **OEM COMPUTERS . . . Software portability issues confront computer OEMs**

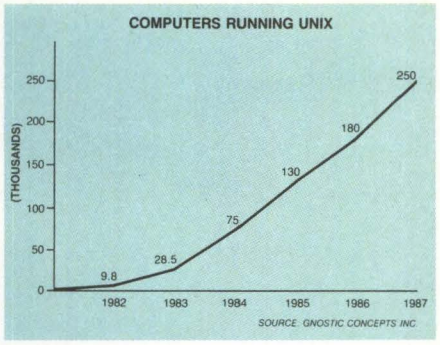
UNIX appears to be the unifying theme—but how and when?

119 OEM COMPUTERS Configuration guide

134 **DIRECTORY OF MANUFACTURERS** . . . Alphabetical listings of company addresses and phone numbers



p. 99 . . . . . Superminis make a stand



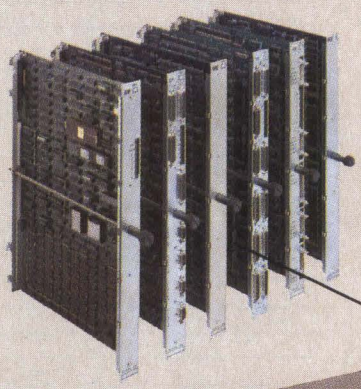
p. 113 . . . . . UNIX unifies

MINI-MICRO SYSTEMS (ISSN 0364-9342) is published monthly (with additional issues in spring, summer and fall) by Cahners Publishing Company, Division of Reed Holdings, Inc., 221 Columbus Avenue, Boston, MA 02116. Norman L. Cahners, Chairman; Saul Goldweitz, President; Ronald G. Segel, Financial Vice President and Treasurer. MINI-MICRO SYSTEMS is published by the Cahners Magazine Division: J. A. Sheehan, President; William Platt, Executive Vice President. Circulation records are maintained at Cahners Publishing Co., 270 St. Paul St., Denver, CO 80206. Second class postage paid at Denver, CO 80202 and additional mailing offices. Postmaster: Send address changes to MINI-MICRO SYSTEMS, 270 St. Paul St., Denver, CO 80206. MINI-MICRO SYSTEMS is circulated without charge by name and title to U.S. and Western Europe based corporate and technical management, systems engineers, and other personnel who meet qualification procedures. Available to others at the rate of $55.00 per year in the U.S.; $60.00 in Canada and Mexico; $75.00 surface mail in all other countries; $120 foreign air mail (15 issues). Single issues $4.00 in the U.S.; $5.00 in Canada and Mexico; $6.00 in all other countries.

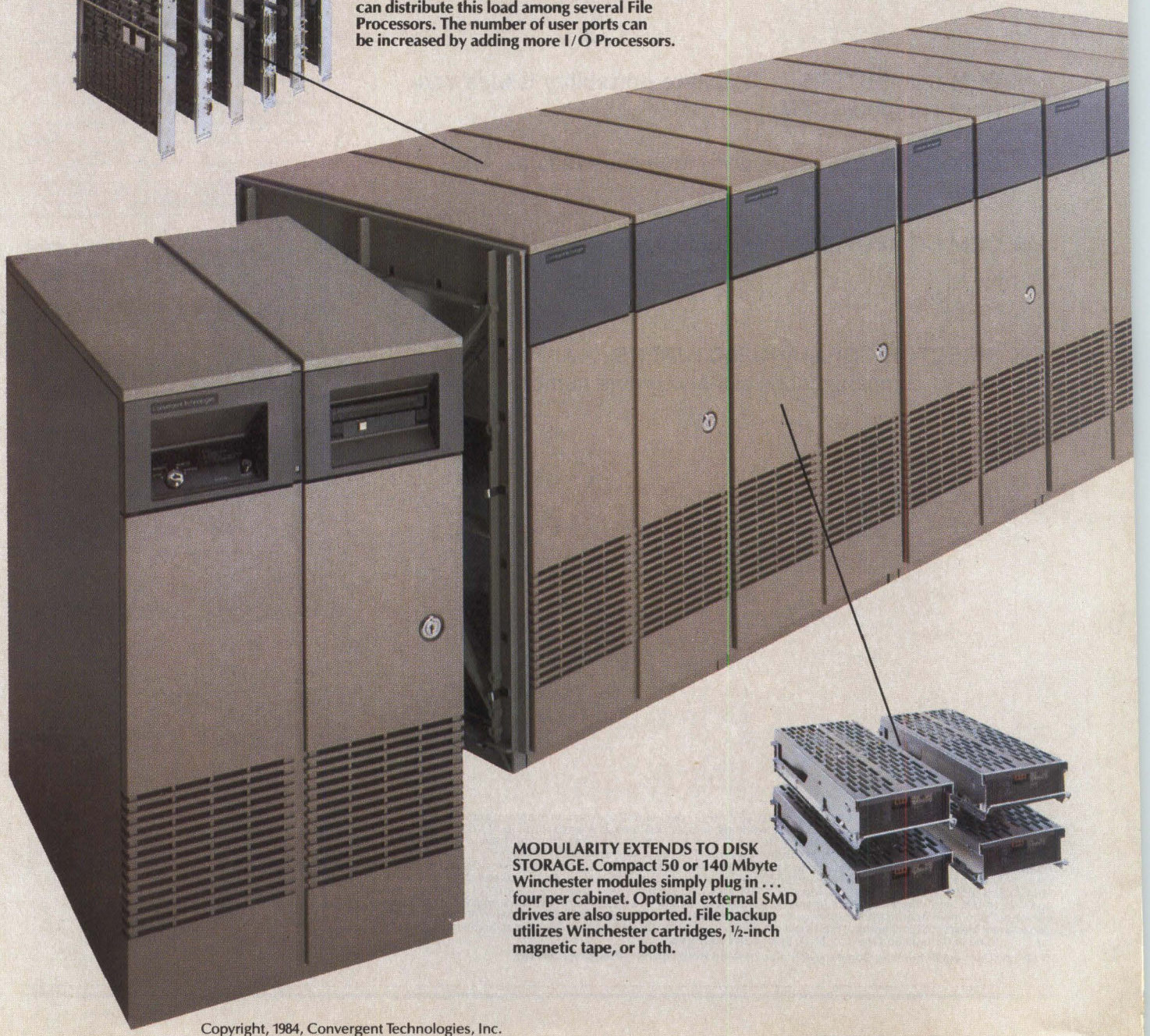
©1984 by Cahners Publishing Company, Division of Reed Holdings, Inc. All rights reserved.

BPA ABP

IT WILL GROW ON YOU.



CONFIGURABLE ACCORDING TO USER NEEDS. As many as six processors can be installed in each enclosure. CPU-intensive jobs utilize multiple Applications Processors. Systems with heavy disk usage can distribute this load among several File Processors. The number of user ports can be increased by adding more I/O Processors.



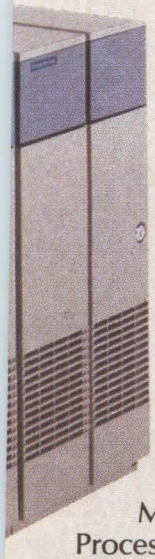
MODULARITY EXTENDS TO DISK STORAGE. Compact 50 or 140 Mbyte Winchester modules simply plug in . . . four per cabinet. Optional external SMD drives are also supported. File backup utilizes Winchester cartridges, ½-inch magnetic tape, or both.

Copyright, 1984, Convergent Technologies, Inc.

MegaFrame™. Now OEMs can offer a high-performance UNIX™-based system that can't run out of performance.

OEMS can now deal cost-effectively with the problems encountered when user applications produce computing demands that outstrip the capabilities of conventional systems.

Convergent Technologies' MegaFrame is a revolutionary new UNIX-based super-minicomputer—so innovative in its architecture that it represents the ultimate in multiuser systems design. It grows exponentially from a system offering minicomputer-level performance to an enormously powerful engine serving as many as 128 users with 36 parallel processors, 24 megabytes of RAM and gigabytes of disk storage.



No other system can match the MegaFrame's potential for field expansion. It enables manufacturers and systems builders to keep pace with today's requirements for more and more computing services . . . but *not* at the cost of discarding hardware or performing expensive CPU upgrades.

MegaFrame's architectural breakthrough. Dependence on traditional single-CPU shared-logic architecture is the root of systems bottlenecks.

Convergent's response: a novel system utilizing *multiple* specialized processors to distribute workloads for optimum performance—even if user needs are unpredictable or subject to rapid change.

MegaFrame's virtual memory Applications Processors each have a 32-bit CPU, up to 4 Mbytes of RAM and run a demand-paged version of UNIX System V. Up to 16 of them can operate in parallel.

The File Processors effectively function as back-end machines providing DBMS, ISAM and other disk-related services. Up to six File Processors each with four disks can operate in parallel.

Terminal and Cluster Processors can also be added—the latter serving front-end communications needs. They off-load communications from the other processors by running protocols such as SNA and X25 networks.

MegaFrame's daisy-chained cabinets offer total expansion potential of up to 36 slots. OEMs configure the system needed for specific applications simply by adding the correct number/combination of processors.

Flexibility in applications development. Inclusion of one or more Applications Processors allows running UNIX System V. All standard UNIX tools are provided, along with COBOL, FORTRAN-77, BASIC interpreter and compiler, plus Pascal.

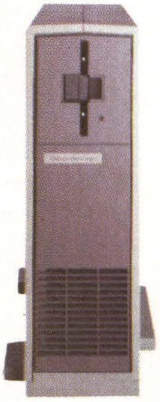
The "least-cost solution" to serving a wide range of UNIX-systems needs, MegaFrame has won acceptance from OEMs in the U.S. and abroad. The uniqueness of its modular design, its versatility in providing upgrade-path options and its price/performance advantages give it market-share potential of outstanding dimensions.

The system that will grow on you starts at a very attractive price: about $20,000 for a system that effectively supports 16 users. Send now for a comprehensive Information Package including reprints of magazine articles. It explains how MegaFrame's growth potential can impact favorably on your plans for growth in the UNIX market.

Convergent Technologies, Data Systems Division, 3055 Patrick Henry Drive, Santa Clara, CA 95050. Phone: 408/980-0850. Telex: 176-825.

MiniFrame™: the entry-level multiuser UNIX system.

Starting at under $5,000 for a single-user system, Convergent's MiniFrame offers outstanding capabilities for small to medium sized organizations running large UNIX-based applications. Utilizing an MC68010 microprocessor operating at 10Mhz, with no wait states, it provides impressive CPU speed—comparable to VAX™-11/750 running the AIM™ Benchmark. MiniFrame features virtual memory management, with demand-paged implementation of UNIX System V. It runs as many as eight terminals, with up to 50 Mbytes of integral mass storage. MiniFrame and MegaFrame are object-code compatible, allowing OEMs to offer a *complete family* of systems unrivaled in price/performance characteristics.



Convergent Technologies

Where great ideas come together

CIRCLE NO. 7 ON INQUIRY CARD

MiniFrame and MegaFrame are trademarks of Convergent Technologies, Inc. UNIX is a trademark of Bell Telephone Laboratories, Inc., VAX is a trademark of Digital Equipment Corp., and AIM is a trademark of Aim Technology.

The Perfect Complement

Now you can capture the NCR, IBM® PC/XT and compatible tape backup market with a complete Tape Subsystem Kit.

DEI® offers the complete package ... software, controller board, drive, cable and data cartridge.

The DEI *File Selectable*™ Streaming Tape Subsystem Kit is your complete answer to getting into the pent-up, but emerging demand for tape backup for NCR, IBM PC/XTs and compatibles. Just wrap the appropriate cover and you're ready to enter today's fastest growing market.

You may have hesitated getting into the dynamic tape backup market because of the uncertainty of buying parts from numerous vendors. DEI has eliminated that problem because an order from us provides you the complete subsystem kit.

When using a PC, good practice dictates periodic storage from RAM to hard disk, and this same practice calls for periodic saves from disk to tape.

When the end user transfers an average 16KB file (8 pages) from disk to a *mirror-image* streaming tape drive, it takes at least two minutes. In fact, to backup a single key stroke would take two minutes!

For the industry standard 10MB hard disk, saving a file of 3 MB or less on our *file selectable* streamer will virtually always be faster than a mirror image streamer. With DEI's subsystem you can backup and work with individual files or you can backup the entire disk.

Start complementing your sales by calling your DEI representative today!

DATA ELECTRONICS, INC.

10150 Sorrento Valley Road ▪ San Diego, CA 92121-1699

San Diego, CA (619) 452-7840 ▪ Nashua, NH (603) 888-6262 ▪ Red Bank, NJ (201) 530-1822 ▪ Houston, TX (713) 280-8273 ▪ Huntsville, AL (205) 881-5778 ▪ Irvine, CA (714) 752-0659 ▪ Sunnyvale, CA (408) 739-7882

File Selectable is a trademark of Data Electronics, Inc. ▪ IBM is a Registered trademark of International Business Machines ▪ DEI and DEI are registered trademarks of Data Electronics, Inc.

CIRCLE NO. 8 ON INQUIRY CARD

How to use the Computer Digest

The *Computer Digest* contains five sections and a directory of computer manufacturers. Each section contains a market-overview article and a product table. The five digest tables are:

- Single-board microcomputers
- Single-user microcomputer systems (including portable computers);
- Multiuser microcomputer systems (including supermicrocomputers and multiple microprocessor-based fault-tolerant systems);
- Minicomputer systems (including superminicomputers);
- OEM computers (computer configuration options).

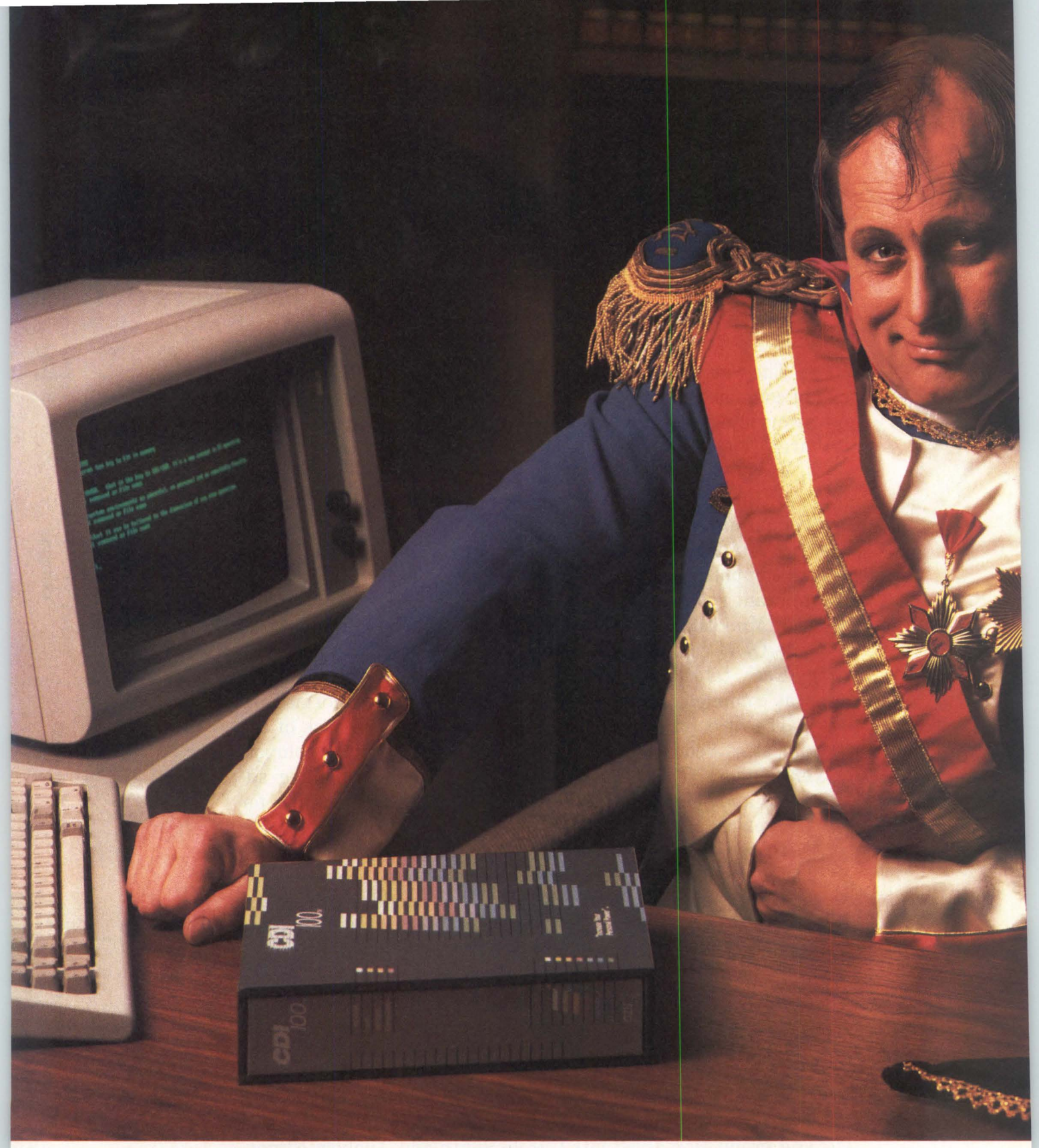
Each table, arranged alphabetically by company name, was compiled from mail- and telephone-survey information.

The directory of manufacturers, found in the back of the digest, is a consolidated alphabetical listing of all the computer vendors. Each entry provides the vendor's mailing address and telephone number, as well as a circle number for the reader service card.

To use the *Computer Digest* effectively, use the tabs to locate sections. To find addresses or phone numbers, use the directory of manufacturers. To check product prices and specifications, tab to the appropriate section and find the alphabetically listed vendor.

To comment on the *Computer Digest* or suggest future product coverage, contact the Editor in Chief, *Mini-Micro Systems*, *Computer Digest*, 221 Columbus Ave., Boston, Mass. 02116.

The *Computer Digest* data research and editing staff includes assistant editors Adrienne DeLeonardo and Steve Frann, editorial assistants Eileen Milauskas and Sheila Rao and production assistants Carole Smith and Anabela Nunes.

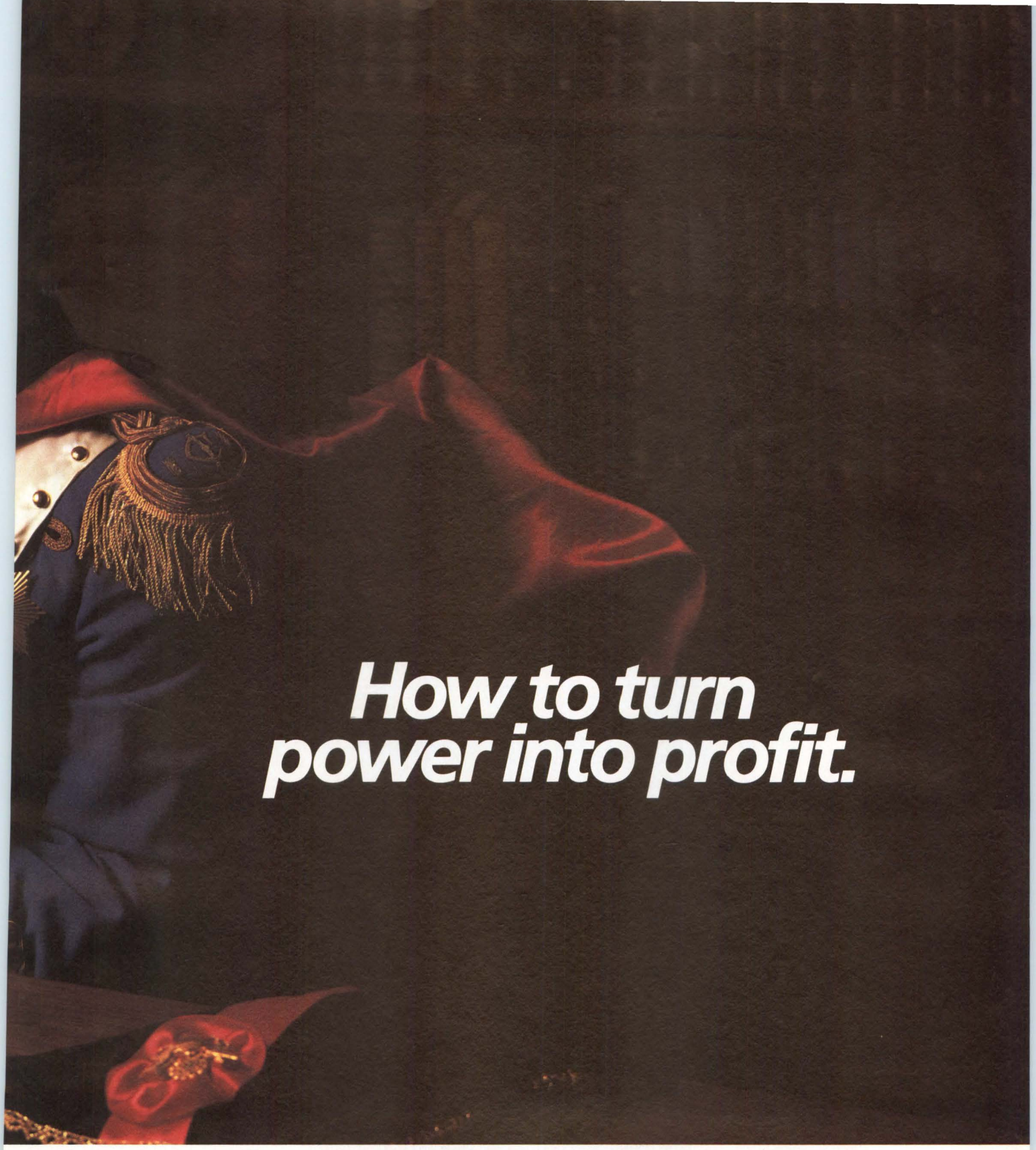


How do you sell power? You don't. Power sells itself. That's why you need to know about CDI/100, the powerful information management system.

Suddenly your customer, whether novice or sophisticate, has the power to control and focus the computer, to get it to do what it was meant to. And the dynamic menu system makes it all so easy.

Our relational data base management system features variable length fields as well as a unique, open-ended file structure. The result is tailored formatting with virtually limitless record keeping and information management capability.

And CDI/100 allows the operator to use a host of existing application programs, maximizing the computer's efficiency and



How to turn power into profit.

effectiveness.

Try CDI/100 for yourself. If you haven't received one of our free trade kits, call 1-800-426-8931 today. Go ahead, put CDI/100 through *your* paces. We think you'll be pretty enthusiastic. And enthusiasm, like power, sells itself.

Exceptional New Software Concept

- Everyone's Filing System
- English-like Inquiry Language
- Dynamic Menu System
- Integrated Help Features
- Relational Data Management
- Enhanced Basic Compiler
- Dictionary Supported Data Base
- Task Master

CIRCLE NO. 9 ON INQUIRY CARD

CDI 100™

CDI Information Systems, Inc.
1309 114th Ave. S.E.
Bellevue, WA 98004
(206) 455-5117

INCREASE YOUR PERSONAL POWER.™

You won't get over what this 350 CPS printer does for under $2,000.

When you see what the CI-3500 Serial Printer can do, you might not believe it's priced under $2,000.

Besides giving you data processing printing at 350 CPS, the CI-3500 delivers letter quality printing at a rapid 87 CPS—more than twice the speed of most daisy wheel printers.

And you also get the capability for high resolution graphics, up to 240 X 144 DPI.

The office friendly CI-3500 is as flexible as it is versatile, especially for a table top, workstation printer. For example, a convenient interface cartridge system allows you to change your printer interface simply by changing cartridges. A DEC-LA100® compatible cartridge is standard, but additional cartridges are available for interfacing with other systems, such as the IBM PC.

A similar font cartridge system accommodates multiple fonts and character sets, so you can avoid costly PROM installations.

The CI-3500 Serial Printer for under $2,000. Whatever you need in a printer, you won't get over what it will do for you. To find out more, just write or call CIE Terminals, 2505 McCabe Way, Irvine, Ca. 92714-6297. (714) 660-1421.
Or call toll-free 1-800-854-5959.
In California, call 1-800-432-3687.

CIE TERMINALS
A CITOH ELECTRONICS COMPANY

® DEC LA100 is a Registered Trademark of Digital Equipment Corp.
© CIE TERMINALS, INC. 1984

Digest consolidates computer product information

This, our first *Computer Digest*, is the second of three special *Mini-Micro Systems* issues to be published this year. Like the Spring *Peripherals Digest* you received in April and the Fall *Peripherals Digest* that will arrive in November, the *Computer Digest* presents new and reliable computer product information complemented by our staff-written market-overview articles.

In 1977, when this magazine began publication as *MMS*, three characteristics separated minicomputers from microcomputers: bit size, processor performance and price. Applying those criteria today causes only confusion. A criterion that still works, however, is processor type. If a microprocessor performs the central processing function, the system is a microcomputer; if the system uses a bit-slice architecture, it's a minicomputer.

The *Computer Digest* contains an OEM computer section, a minicomputer section and three microcomputer sections: single-board, single-user and multiuser. Although the first two microcomputer sections are self-explanatory, the third is not. The category "multiuser microcomputers" includes computers based on multiple microprocessor designs. This means that readers will find the new multiuser supermicrocomputers and fault-tolerant systems in that section and find superminicomputers in the minicomputer section.

In the last section, OEM computers, the coverage shifts from products to configurations—options offered by computer manufacturers that sell products to OEMs. The OEM computer section answers various configuration questions, such as whether board and cage versions are offered, what expansion boards are available and whether the manufacturer offers a printer.

Like both *Peripherals Digests*, the *Computer Digest* is a source of computer product information for system integrators. It will be published once a year, and we hope readers will find it a welcome addition to the computer coverage in the regular monthly issues of *Mini-Micro Systems*. As always, we welcome your suggestions. If you have an idea on how to improve our product coverage, please let us know.

Rick Dalrymple

Rick Dalrymple
Senior Editor

HIGH SPEED
LOCAL COMMUNICATIONS
Network Products Dependability

Localmux gives you high speed communication - 19.2 kb async and 38.4 kb synchronous - over eight channels and up to 10,000 feet over just two twisted pair lines. It's ideal for cost-effective communications in any clustered building environment. Localmux - you can depend on it because it comes from Network Products.

Network Products, Inc.
Research Triangle Park, NC 27709
919/549-8210

Network Products, Ltd.
387 Sykes Road
Slough, Berkshire SL14SJ
United Kingdom (0753) 821898

network products

CIRCLE NO. 11 ON INQUIRY CARD

STAFF

Vice President/Publisher
S. Henry Sacks

Editor-in-Chief
George V. Kotelly

Managing Editor
James F. Donohue

Assistant Managing Editor
Bruce J. MacDonald

Senior Editor: **Sarah Glazer**
Senior Editor: **Ron Shinn,** Irvine, (714)851-9422
Senior Editor: **Paul Sniger**
Senior Editor: **Lori Valigra**
Senior Projects Editor: **Rick Dalrymple**

Western Editor: **Chris Bailey,** San Jose, (408)296-0868
Western Editor: **Carl Warren,** Los Angeles, (213)826-5818
Associate Editor: **Tom Moran,** San Jose, (408)296-0868
Associate Editor: **David R. Simpson**
Associate Editor: **Marjorie Stenzler-Centonze,** New York, (516)595-2737
Associate Editor: **Jesse Victor**
Assistant Editor: **David Bright**
Assistant Editor/News Products: **Steven F. Frann**
Assistant Editor/Research: **Adrienne DeLeonardo**

Contributing Editors:

London: **Keith Jones,** (011-441-661-3040)
Data Communications: **Walter A. Levy**
Computer Architecture: **Efrem Mallach**
Office Automation: **John Murphy**
Frankfurt: **Maureen O'Gara**
Artificial Intelligence: **Steven Roberts**
Washington, D.C.: **Stephen J. Shaw,** (301)320-2273
Database Systems: **Harvey Weiss**

Editorial Production

Senior Copy Editor: **Frances T. Granville**
Production Editor: **Mary Anne Weeks**
Copy Editor: **Susan A. English**
Word Processing: **Kathleen Appignani**
Administrative Assistant: **Frances C. Michalski**

Editorial Services

Eileen Milauskas, Robin Sheehan

Assistant to the Publisher: **Linda L. Lovett**

Executive Editor:
Alan R. Kaplan

Art Staff

Art Director: **Vicki Blake**
Assistant Art Director: **Douglas Glen**
Artist: **Anne Tregay**

Director of Art Dept.: **Lee Addington**
Associate Director: **Norm Graf**

Production Staff

VP Production: **Wayne Hulitzky**
Supervisor: **William Tomaselli**
Production Manager: **Nancy Norton**
Composition: **Diane Malone**

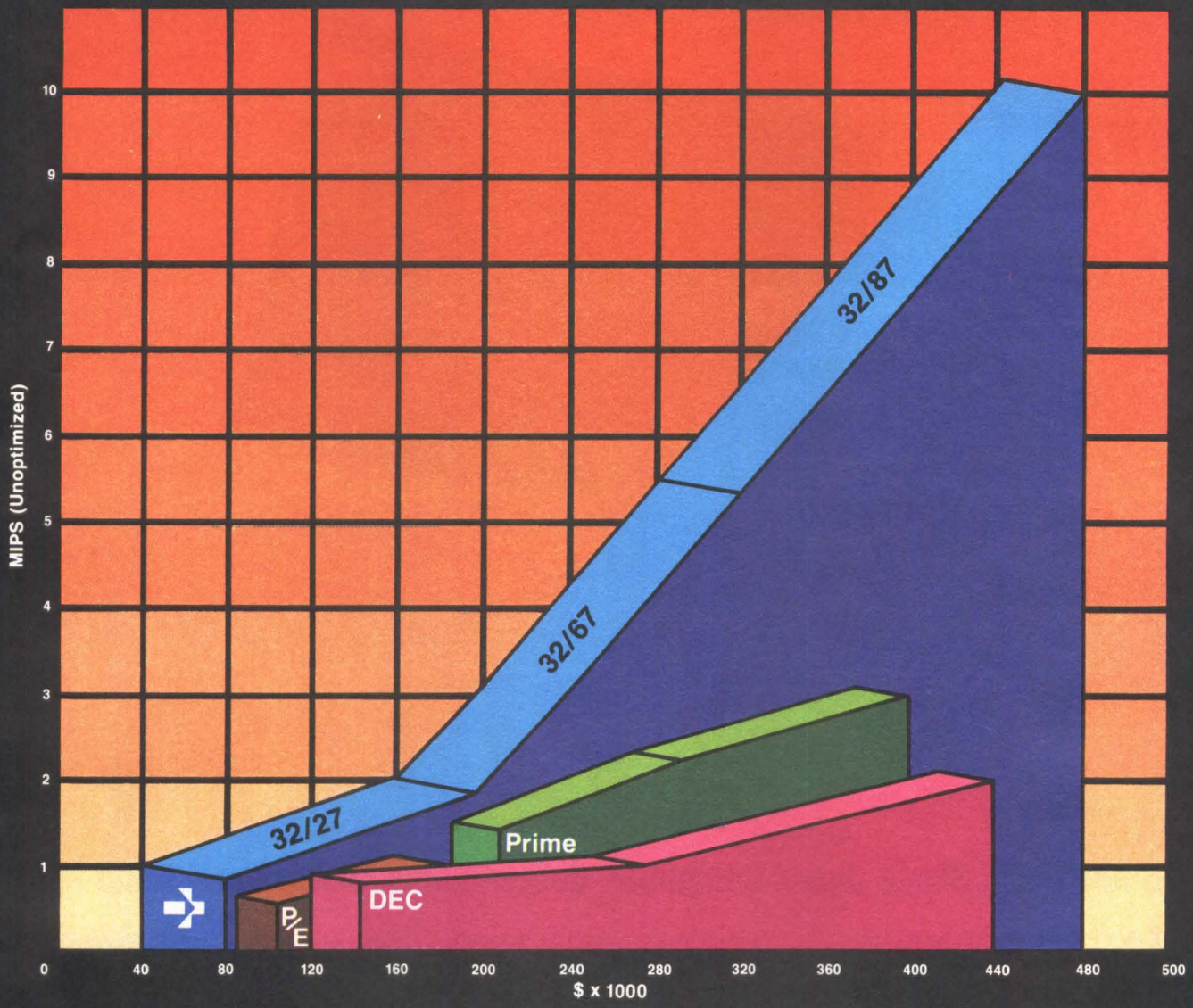
Editorial Offices

Boston: 221 Columbus Ave., Boston, MA 02116. (617)536-7780. **Irvine:** 2041 Business Center Dr., Suite 109, Irvine, CA 92715. **Los Angeles:** 12233 W. Olympic Blvd., Los Angeles, CA 90064. **San Jose:** 3031 Tisch Way, San Jose, CA 95128. **New York:** 33 Arcadia Dr., Dix Hills, NY 11746. **London:** Business Press International, Quadrant House, The Quadrant, Sutton Surrey, SM2 5AS, England.

Reprints of Mini-Micro Systems articles are available on a custom printing basis at reasonable prices in quantities of 500 or more. For an exact quote, contact Art Lehmann, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., Box 5080, Des Plaines, IL 60018. Phone (312)635-8800.

Gould...Innovation and Quality in Superminicomputers

We've drawn the line on computer price/performance.



Gould has set new supermini-computer performance standards with its CONCEPT/32™ family of 32-bit machines. The cost-effective, wide-ranging capabilities of Gould minicomputers make Gould Computer Systems the dominant source for the compute power you need, at a price you can afford.

The competition just doesn't tow the line in either price or performance. Whatever the requirement. The Gould CONCEPT/32 family offers the widest range of superior performance while keeping the price in line. Our low-end CONCEPT 32/27 incorporates high density packaging for lower cost. The mid-range 32/67 combines a minimal footprint and cost with superior computational power. For heavy duty scientific and engineering applications, the Gould CONCEPT 32/8780 offers mainframe performance at a fraction of the cost. And if you're worried about where your application falls on the line, don't be. Upward compatibility and software transportability allow you to move up our line as far as you need to go.

Gould has drawn a new price/performance line. One that shows it takes more than 32-bits to make a supermini. A line the competition can't cross. Call or write for more information.

Gould Inc., Computer Systems Division
High Performance Systems Operation
6901 West Sunrise Boulevard
Ft. Lauderdale, Florida 33313
1-800-327-9716

All chart data from published competitive information.
™ CONCEPT/32 is a trademark of Gould Inc.

GOULD
Electronics

CIRCLE NO. 12 ON INQUIRY CARD

UNBEATABLE VALUE

WAVE MATE SUPER BULLET

8MHz Z-80H Single Board Computer. Outperforms All Micros & Most Minis

DON'T PAY MORE TO GET LESS
You get more for your money with the Wave Mate Super Bullet. Much more than any micro on the market. It outperforms most minis, too. You just can't find a better value. OEMs and systems integraters are finding that they pay *less* for Super Bullet and offer *more* to their customers. This makes better business sense, and bigger margins, too!

THE ONLY 8MHz Z-80H MACHINE OF ITS KIND
Super Bullet is unique. Wave Mate's exclusive enhancements of the basic Z-80H architecture offers 8MHz operation with flexible DMA facility, enhanced C-BIOS, fully interrupt-driven I/O and high-speed floppy disk controller. The CPU is utilized with a full complement of Zilog-compatible peripheral chips. Never so much sophistication and flexibility on a single board.

POWER/FLEXIBILITY
For years, the Wave Mate Bullet SBC has been recognized as the most sophisticated and cost-effective Z-80A, CPM-based single-board microcomputer on the market. A truly unbeatable price-performance package for the single user. Now, the "Super Bullet" adds a new dimension to Wave Mate's state-of-the-art technology. Our new 8-bit, 8MHz machine beats every 16-bit micro we've tested it against and there's documentation to prove it. "Super Bullet" has been designed especially for multi-user systems.

MULTI-USER ORIENTED
You get both CP/M 3.0 and MP/M II operation. You get an exclusively enhanced Z-80H-based CPU at a full 8MHz. You get 256K RAM and four serial ports. High-speed floppy disk with track-buffered controller. Plus SCSI port and LAN option. All of the above and more with the tested and proven Super Bullet. It's an unbeatable value.

WAVE MATE INC. • 14009 S. Crenshaw Blvd. • Hawthorne, CA 90250 • Tel: (213) 978-8600 • Telex: 194369
WAVE MATE EUROPE • 159 Chee de Vleurgat • 1050 Brussels, Belgium • Tel: (02) 649 10 70 • Telex: 24050

CIRCLE NO. 13 ON INQUIRY CARD

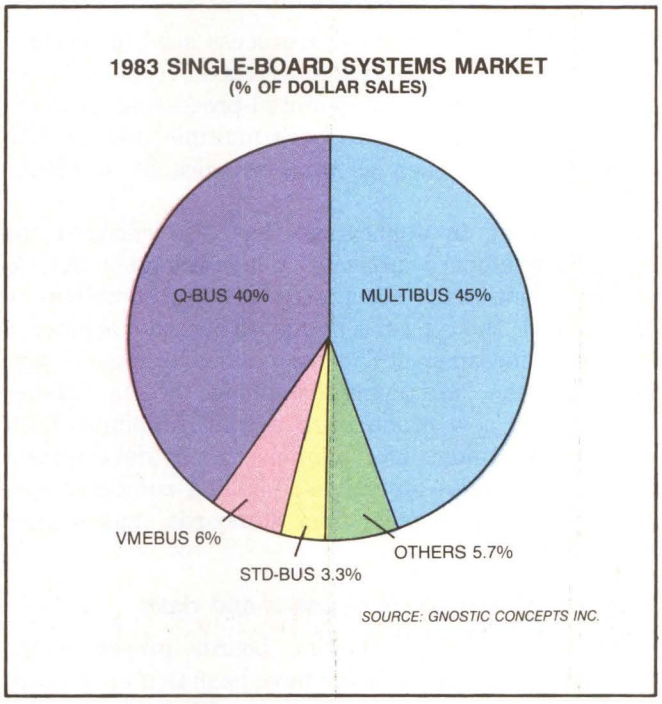
Interface buses dominate single-board computer market

Four major buses—
Multibus, Q-bus, STD-bus and VMEbus—
compete vigorously for single-board computer integration

Rick Dalrymple, Senior Editor

With their fortunes tied to the success of the bus standards they support, single-board computer vendors have discovered it pays to sell the bus standard first and the product second. For example, STD-bus proponents are touting the latest plank in their low-cost platform, 16-bit single-board computers based on the same microprocessors previously found only on more expensive Multibus products. Meanwhile, new vendors have been rapidly joining the VMEbus bandwagon. In fact, the new VMEbus-compatible product directory lists 96 companies offering various VMEbus products.

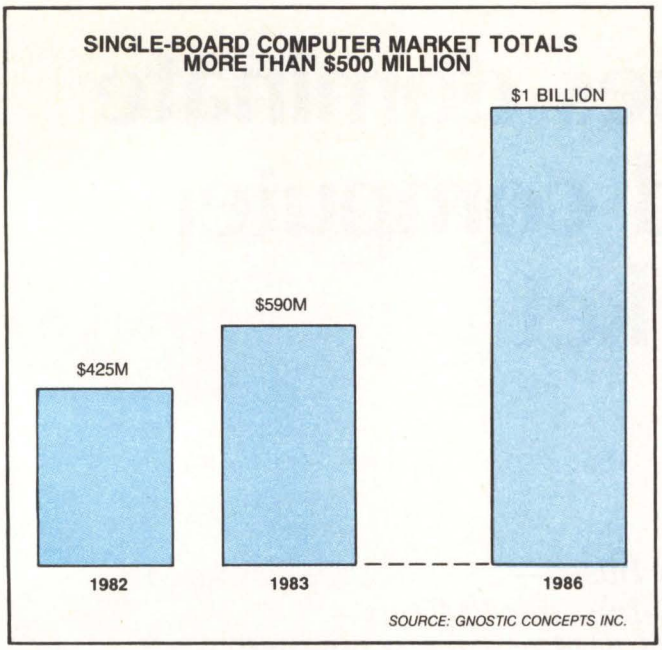
Four bus standards dominate the single-board computer market: Multibus, Q-bus, VMEbus and STD-bus. With more than 100 mostly proprietary bus designs in use, it is clear that not every application is best served by adopting one of the popular buses. However, during 1983, nearly 95 percent of the money spent on single-board computers went to products conforming to one of the four dominant bus standards. And looking at the forces reveals why only a few bus standards will probably continue to control this market.



A fundamental shift in usage

Over the last few years, there has been a fundamental change in the way system integrators use single-board computers. "Today, the market has shifted from dedicated computing toward reprogrammable applications," observes Tom Kinhan, general manager of the OEM Modules Operation at Intel Corp., Hillsboro, Ore. Kinhan points out that early single-boards were suitable only as dedicated controllers, not computers. "However, with the powerful microprocessors found on today's products," says Kinhan, "single-boards can now outperform yesterday's minicomputer."

No longer limited to control, single-board computers are being used as building blocks in the construction of sophisticated computer-based systems. Some are found in configurations in which several single-board computers are linked to perform a complex task, such as for



electron-beam lithography, a process used in the production of very-large-scale-integrated (VLSI) devices. Others are found in distributed-processing environments in which there are both multiple masters and multiple slaves, such as in a network of automatic tellers.

The change in applications has also changed the typical single-board customer. Whereas engineers looking for a solution to a specific problem still contribute to this market, the typical customer is now the technically astute businessman. "The customers we meet," says Intel's Kinhan, "are trying to minimize the time it takes to get their new products to market, minimize their capital investment and minimize their development risk." With those objectives, building computer systems based on popular bus standards makes good sense.

Minimizing development costs and risks

For manufacturers, buying boards preserves the capital that otherwise would have been tied up in board manufacturing and test equipment. With the adoption of popular bus standards, some other major up-front investments are avoided as well. For example, significant design time is saved because bus standards provide those mechanical, electrical and protocol specifications that establish a single-board computer's communication links to its peripherals and other computers. Thus system integrators are free to concentrate on the system configuration.

Another important cost-saving factor centers on wide peripheral board selection. Each of the four popular bus standards has spawned a group of manufacturers offering such boards as add-on memory, printer spoolers, analog-to-digital and digital-to-analog conversion logic, graphics processors and disk and tape drive controllers. Rather than create an expensive, time-consuming custom board design, system integrators choose those board-level products that best fit the price/performance requirements of the system design. System integrators can also select backup products to serve as second sources of supply or to provide an alternative should the first choice develop problems.

These same cost-saving items also reduce risk. Shorter design cycles increase the probability of getting to market with the right product at the right time. Broader selection and product availability provide the options necessary to avoid a "critical path" roadblock. Risk is reduced not only for the system builder but also for the system end user.

New product in a familiar package

The rapid pace of computer technology has shortened the life cycles of many computer-based products—a problem shared by end users and system builders alike. Both groups would like to take advantage of new technology without redesigning or replacing systems. Now, to a large extent, bus standards are making this objective possible. In just the last 12 months, products that significantly expand the processing capability of the Multibus, STD-bus and Q-bus have come onto the market. Because they conform to these popular standards, they offer an upgrade path for existing systems.

These new products are following a familiar pattern: improved price/performance in the same size package. The result in the case of single-board computers is that the Q-bus, introduced in the early 1970s, and the STD-bus and Multibus, introduced in the mid-1970s, are still viable bus standards. Only when a system integrator moves to a 32-bit bus must these three standards be, at least partly, left behind.

STD-bus goes 16 bits

Whereas the Multibus was designed to accommodate both 8- and 16-bit processors, the STD-bus was not. The STD-bus standard has adapted well over the years and, this year, new products have taken the STD-bus into the world of today's 16-bit processors.

The STD-bus was designed for control systems and instrumentation. Its small form factor—4½ by 6½ inches—finds favor in industrial control. Then, as control applications moved to distributed systems, the STD Manufacturers Group responded by working out an arbitration scheme that allowed master and slave boards. However, if 16-bit boards had not come along, STD-bus customers would have been forced to adopt

the Multibus. Promoting 16-bit STD-bus boards are companies such as Ziatech Corp., San Luis Obispo, Calif., and Colex America Inc., Dallas.

Excited about the prospects for the STD-bus is John Mills, product marketing manager of Analog Devices, Norwood, Mass., which sells both STD-bus and Multibus products. Says Mills, "These new 16-bit boards put the STD-bus on an equal footing with the current generation of Multibus products." Mills says he sees some Multibus customers taking a new look at the STD-bus.

"What we offer the customer," states Ziatech marketing manager Jim Eckford, "is a 16-bit product that is half Multibus' size and half Multibus' typical price." Eckford sees his product finding a home in compact dedicated applications such as blood analyzers, oil-well loggers and machine tools.

Even without converting Multibus customers, the STD-bus continues to see brisk sales. One reason is new customers. According to Analog Devices' Mills, "Control engineers are less afraid of building their own systems." He sees this group buying single-board computers to replace systems built by process-control vendors. Another reason for continued sales in STD-bus products is the use of complementary-metal-oxide-semiconductor (CMOS) devices. CMOS devices are starting to price those using transistor-to-transistor logic out of the market. CMOS' low power and high immunity to noise fit well in STD-bus industrial-control applications. The STD Manufacturers Group is working on a CMOS STD-bus specification, and CMOS STD-bus cards are on the market.

Multibus leads the pack

Of the leading bus standards, Multibus enjoys the largest market share. Multibus vendors are not expecting the STD-bus to cut much into their sizable customer base. "Sure, they have a temporary advantage," admits Norman Kool, vice president of engineering at Multibus products vendor Forward Technology Inc., Santa Clara, Calif., "but that advantage may last only three to six months." Kool says that his company and other Multibus vendors will introduce a new generation of Multibus single-board computers. An example of what that new generation may hold in store are Intel Corp.'s expectations that small computer systems interface controllers and the Centronics parallel printer interface will find their way onto Multibus boards.

Q-bus gets a shot in the arm

The Q-bus, oldest of the bus standards, began as a minicomputer bus. Although developed by Digital Equipment Corp., which offers Q-bus board products as an alternative to buying "boxed" computers, the Q-bus market is mostly populated by DEC-compatible manufacturers. DEC recently introduced new Q-bus products—to the delight of the other Q-bus manufacturers, which feared that customers would start to view the Q-bus as a fading bus standard.

For example, DEC's new LSI-11/73 and the 11/23 replacement board from Alcyon Corp., San Diego, both slide into the DEC PDP-11/23 CPU slot, offering a fully compatible upgrade path for 11/23 users. DEC also offers a board-level version of the new MicroVAX I. The product comes on two boards and sells for less than $10,000. The MicroVAX implements the MicroVAX architecture, a strict subset of the VAX architecture that contains a 4G-byte virtual-address space, a 32-bit word size and full memory management.

"These products give DEC customers alternatives," notes Bob Maiorana, product marketing manager at DEC's Hudson, Mass., facility. Maiorana claims that DEC's LSI-11/73 will outperform 68000-based products. "Our customers must ask, 'What is the cost of the time and labor required to shift from Q-bus-based products to some other bus?' We think they will figure that it is good business to stick with the Q-bus."

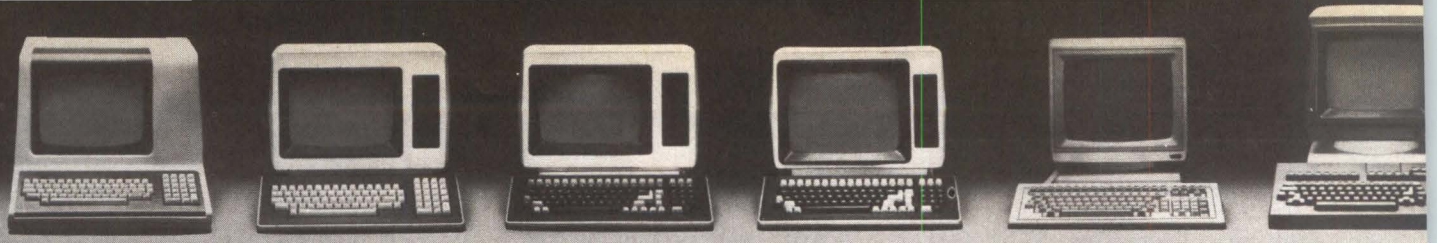
VMEbus makes its mark

What is it like to start a new bus standard? Ask the early vendors promoting the VMEbus. The VMEbus has evolved from the VERSAbus, developed in 1979 by Motorola Inc., Phoenix, Ariz., for its 68000 family of chips. In 1980 the VMEbus was adapted to the Eurocard format in Europe. In 1981, it received the additional support of Mostek Corp., Signetics Corp. and Thompson CSF, which announced VME support chips. The International Standards Organization announced the formal VMEbus specification in October 1981, and a manufacturers group was formed a year later.

The high-performance 16-/32-bit VMEbus offers 20M- to 40M-byte-per-second data-transfer rates, flexible data and address paths, multiprocessor support, non-multiplexed and asynchronous data transfers, a powerful interrupt structure and support for quick failure detection.

With its growing market share and swelling number of vendors, the VMEbus seems to be well on its way. The only cloud on the horizon is Intel's announcement that it will introduce Multibus II boards in the fourth quarter of this year. Many vendors are waiting until then to see what Multibus II has to offer. But, with 96 vendors offering VME products, Intel and its Multibus II partners will have a tough time catching up. □

Interest Quotient (Circle One)
High 801 Medium 802 Low 803



Esprit I *Esprit II* *Esprit III* *Esprit III Color* *ESP-6310* *Executive 10*

ESPRIT. WE GIVE YOU MORE THAN TECHNOLOGY, WE GIVE YOU PEACE OF MIND.

Executive 10/25 *Executive 10/51* *Executive 10/78* *Executive 10/102* *Executive 10/102G.*

Nowadays, technology is advancing so rapidly that today's latest breakthrough may be replaced as soon as tomorrow by something even more revolutionary.

PEACE OF MIND A NEW DIMENSION.

To the rapidly-changing world of high technology, Esprit—the company with more experience in terminal technology than any other—would like to introduce a new and un-changing dimension: peace of mind.

Designed right into every terminal in Esprit's complete line are the features, the functions and the flexibility that make it not only user-friendly but systems-friendly. In other words, the kind of comfort, quality and trouble-free technology that can provide real peace of mind.

Backed up with an extensive nationwide service force and our own special toll free service number (800-645-4508)—so you can reach us about anything that concerns you—to insure your own peace of mind.

PEACE OF MIND FOR THE NEXT GENERATION IN TERMINALS.

One look at the Esprit ESP 6310™ and you'll recognize the next generation of terminals. With performance and features far superior to other terminals in its price category. And the kind of quality you can feel comfortable with.

DESIGNED FOR PEACE OF MIND.

From the sleek and stylish lines of its ergonomic design to the sculptured lines of its low-profile keyboard with its 11 user-programmable function keys—shiftable to 22—in non-volatile memory back-up, that can be programmed directly or down-line loaded from the host computer.

From its high resolution, green phosphor display with a well defined character font, in a large 7 x 11 dot matrix, in an 80 column x 25 line format to its screen saver feature which deactivates the screen after 20 minutes of inactivity.

From its tilt and swivel monitor to its smooth scrolling and line graphics capabilities.

Our ESP 6310 provides enhanced performance and incorporates emulations of the TeleVideo 925/910 PLUS*, ADDS Regent 25/Viewpoint*and Lear Siegler ADM3A*, as well as the popular Esprit series.

But at $695, it's priced below many terminals with far less features.

That means even our low price is designed to give you peace of mind. And so for your own peace of mind, please fill out the coupon below or call.

800-645-4508

Esprit Systems, Inc.
100 Marcus Drive
Melville, N.Y. 11747

☐ Yes, for my own peace of mind I would like to receive a brochure on your complete line of Esprit terminals.

NAME_____

TITLE_____

COMPANY NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

MM6/15

Esprit Systems, Inc.

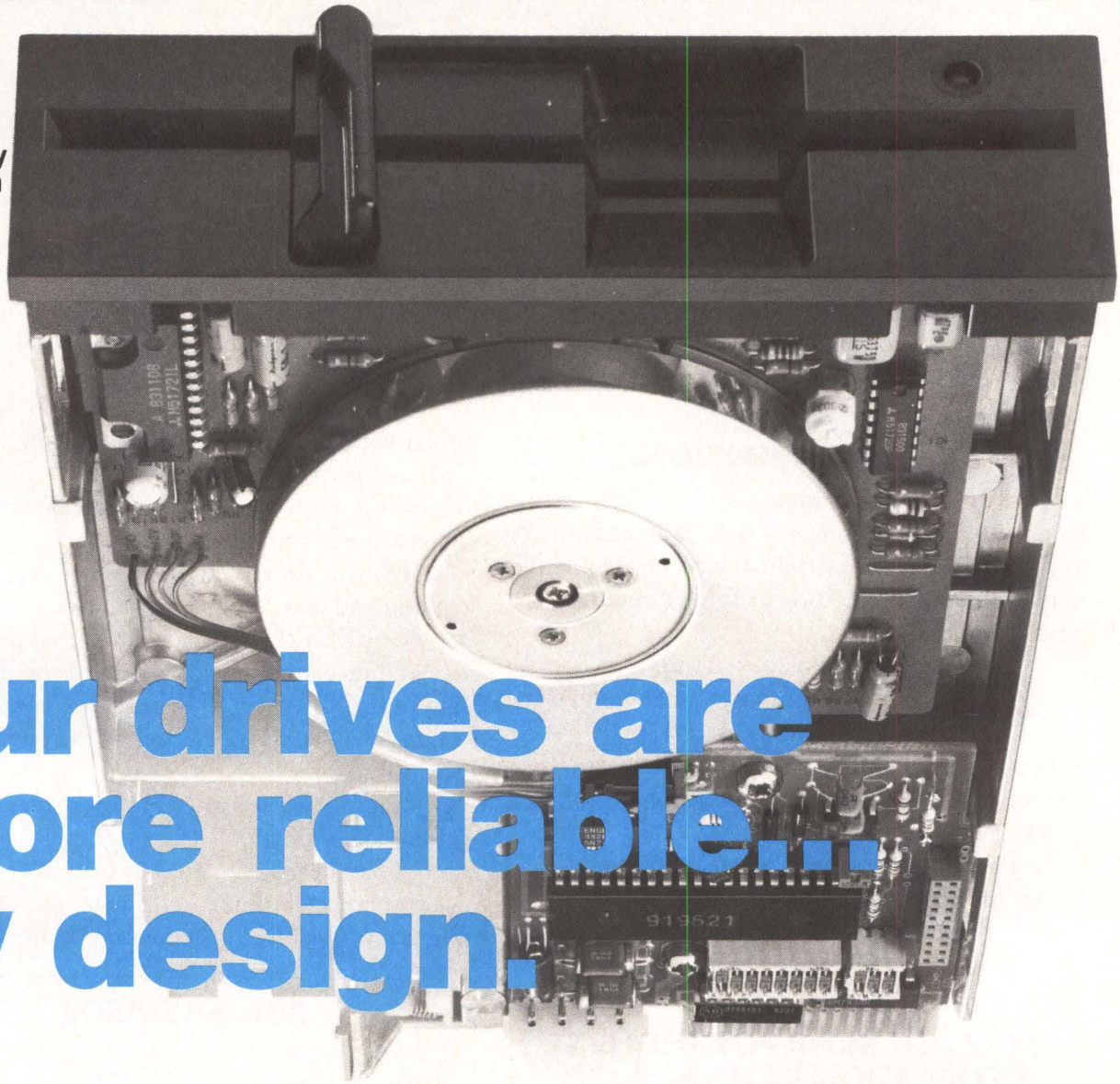
PEACE OF MIND TECHNOLOGY.

*(TeleVideo 925/910 Plus is the registered trademark of TeleVideo Systems, Inc. Regent 25/Viewpoint is the registered trademark of Applied Digital Data Systems, Inc. ADM3A is the registered trademark of Lear Siegler, Inc.)

CIRCLE NO. 14 ON INQUIRY CARD

PHILIPS

Half-Height Family of High-Capacity 5.25″ Floppy Drives From Philips



Our drives are more reliable... by design.

We met Europe's exacting standards and became the leader in 96 tpi 5.25″ flexible disk drives.

Now we're bringing you our field-proven technology, Philips' patents, and manufacturing experience in our latest 5.25″, Half-height 96 and 48 tpi drives.

- **Design simplicity**—our drive design uses 20% fewer mechanical and electrical parts. They run longer (10,000 hrs MTBF), cooler, and use less power.
- **Dynamic disk registration**—Philips' proprietary double-clutch clamping cone ensures diskette interchange, repeatable centering, and prevents media damage even after 50,000 insertions.
- **Dip switch configurable**—easy programming in production environment, decreased chance of configuration change, and no jumpers required.
- **Precise, split-band actuator**—highest track positioning accuracy in the industry for increased data recovery.
- **Manganese/zinc, glass-bonded, ceramic heads**—high resolution, low noise R/W signal, and extended media/head life.

Rigorous testing will prove our drives are unsurpassed in performance.

And unequaled in reliability.

All made possible by Philips' technology and 100% tested premium components.

SPECIFICATIONS	X3131 (SSDD)	X3132 (DSDD)	X3133 (SSDD)	X3134 (DSDD)
Capacity (unformatted)	250 KB	500 KB	500 KB	1 MB
Track density	48 tpi	48 tpi	96 tpi	96 tpi
Positioning time (track to track)	6 msec.	6 msec.	3 msec.	3 msec.
Interface	ANSI/INDUSTRY STANDARD			
Media	ECMA 66	ECMA 66/70	ECMA 78	ECMA 78

Warranty: One year on all parts and labor (seldom used).

Available in volume for immediate shipment.

Call or write today for a FREE report on Disk Drive Evaluation Techniques and more information on our family of flexible 5.25″ drives.

Philips Peripherals, Inc.
385 Oyster Point Blvd. Unit 12
South San Francisco, CA 94080
(415) 952-3000

See us at NCC, Booth D4226, 4228.

PHILIPS

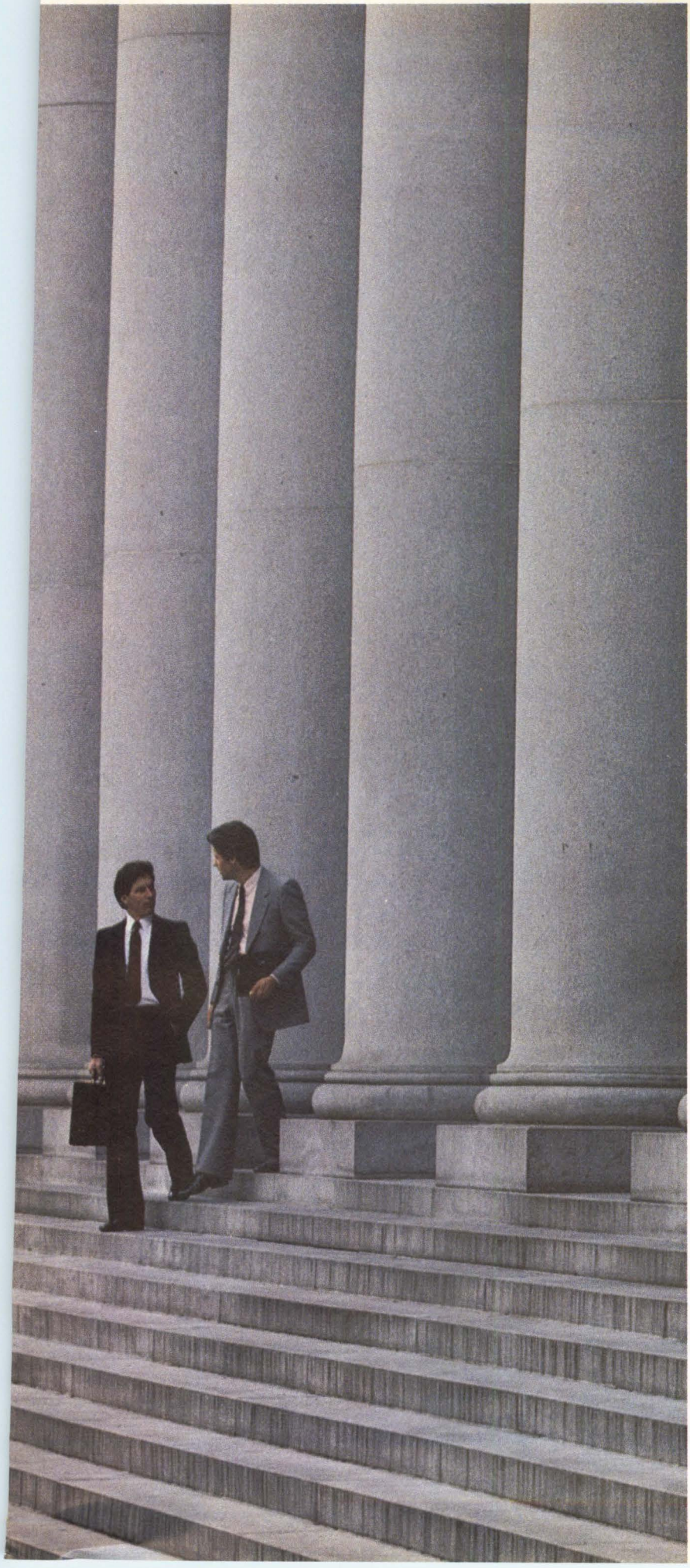
CIRCLE NO. 15 ON INQUIRY CARD

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
ACKERMAN DIGITAL SYSTEMS INC.									
MC68010	68010 10 MHz (32)	Multibus	CP/M-68K	debugger, editor	C, CBASIC-68K	2M (384K)			
MC6809	6809 (8)	S-100	OS9 Level 1	debugger, editor, assembler, UNIX-like utilities	C, Pascal, BASIC09, COBOL	2K (16K)		449.95	position independent code
A.D.P.S.									
ID-80	Z80 (8)	self-contained	CP/M 2.2	CP/M utilities, communications	CP/M 2.2 languages	66K (up to 10K)	9.375x7x.5	598(Q1); 350(Q100)	floppy disk controller, two serial ports, three parallel ports
ADVANCED MICRO DEVICES									
Am97/8605	8086 (16)	Multibus		monitor		8K (64K)	6.5x12x.5	1,645	5-, 8- and 10-MHz versions, one serial port, opt. 8087 math coprocessor
ALCYON CORP.									
A68KPM	68000 (16)	Q-bus	UNIX	editor, debugger, loader, word processing, spreadsheet	C, BASIC, FORTRAN, Pascal, DIBOL, COBOL	512K (128K)		3,900(Q1); 2,418(Q100)	four serial ports, one parallel port, battery-day/date clock
AMPRO									
The Little Board	Z80A (8)		CP/M 2.2, ZCPR3	support CP/M 2.2 software	BASIC, C, FORTRAN, Pascal, COBOL, Assembly	64K (4K)	7.75x5.75	349(Q1); 245(Q50)	includes two RS232C ports, one Centronics port, screws directly onto minifloppy drive
APPLIED BUSINESS COMPUTER CO.									
ASBC-65-8 6502	6502 (8)	EXORciser bus	A-DOS	debuggers, editor, monitor	BASIC, Assembly, FORTH, PL-65	8K (24K)	6x9.75x.62	295(Q1); 265(Q100)	AIM 65 software compatibility, 2K refresh memory, 2K bytes on-board software
ASBC-09-08 6809	6809 (8)	EXORciser bus	A-DOS	debugger, editor, monitor	BASIC, Assembly, FORTH	8K (24K)	6x9.75x.62	315(Q1); 280(Q100)	AIM 65 software compatibility, 2K refresh memory, 2K bytes on-board software
APPLIED MICRO TECHNOLOGY INC.									
ST4102	Z80A (8)	STD	CP/M-80	BIOS, monitor	CP/M compatible languages	2K (8K)	4.5x6.5x.5	495(Q1); 396(Q100)	one RS232C port, 2.5-, 4-MHz versions, host/slave handshake available
BUBBL-TEC									
BBC-128	Z80A (8)	Multibus	CP/M, FORTH	FORTH tools	FORTH	64K (128K-bubble)	12x16x.7	1,689(Q1); 949(Q100)	two serial ports, two parallel ports, 128K bytes non-volatile on-board bubble storage
BBC-128	Z80A	Multibus	CP/M, FORTH		FORTH	64K (64K)		1,500	two serial ports, two parallel ports, four counter/timer channels, vectored prioritized interrupt structure
CENTURY COMPUTER CORP.									
V-8003	8085 and 8088 (8/16)	Multibus	CP/M, CP/M-86, MP/M	relocatable assembler, editor, terminal emulator	BASIC, COBOL, Pascal, C	128K (16K)	6.75x12x.6	2,000(Q1); 1,800(Q100)	128K bytes add-on memory
COLEX AMERICA INC.									
STD-68000 (4 MHz)	68000 4 MHz (8/16/32)	STD	CP/M-68K, UNIX System III	UNIX with Berkeley enhancements	C, BASIC+, Pascal, FORTRAN 77, COBOL	(4K)	4.5x6.5x.6	595	power restart, refresh generator
STD-68000-8	68000 8 MHz (8/16/32)	STD	CP/M-68K, UNIX System III	UNIX with Berkeley enhancements	C, BASIC+, FORTRAN 77, COBOL	(4K)	4.5x6.5x.6	649	power restart, refresh generator

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
STD-CPUE	Z80A 4 MHz (8)	STD	CP/M Plus	CP/M utilities	CP/M-80-compatible languages	32K (64K)	4.5x6.5x.6	165	power restart, refresh generator
STD-CPU2	Z80A (8)	STD	CP/M Plus	CP/M utilities	CP/M-80-compatible language	32K (64K)	4.5x6.5x.6	235	power restart, refresh memory
STD-CPU2-2.5	Z80 (8)	STD	CP/M Plus	CP/M utilities	CP/M-80-compatible languages	32K (64K)	4.5x6.5x.6	195	power restart, refresh memory, four-channel counter/timer
STD-SLAVE	Z80A (8)	STD	CP/M	CP/M utilities	CP/M-80-compatible languages	64K	4.5x6.5x.6	549	two RS232C ports, power restart, refresh memory, slave processor
COMPUPRO									
CPU 8085/88	8085 and 8088 (8)	S-100	CP/M, MP/M			16M		495	2-, 6-, 8-MHz versions
CPU 86/87	8086 and 8087 10 MHz (16)	S-100	CP/M-86, MP/M-86			16M		1,050	
CPU 286	286/10 iAPX (16)	S-100	CP/M-86, MP/M-86			16M		1,595	6-, 8-MHz versions
CPU 16032	16032 (16)	S-100	UNIX		C	32K		695	
CPU 68K	68000 (16)	S-100	CP/M-68K, FORTH		C, FORTH	(32K)		695	
CPU Z	Z80B (8)	S-100	CP/M					325	
COMPUTER AUTOMATION INC.									
NM 4/04	custom (16)	proprietary (Scout bus)	proprietary OS4, OPUS	debugger, editor, interrupt	Pascal, FORTRAN IV, BCPL, COBOL	128K (92K)	6.25x8.3	1,380(Q1); 1,173(Q100)	self-test, upward-compatible with Computer Automation's NAKED MINI computers, real-time clock
NM 4/08	custom (16)	proprietary (Scout bus)	proprietary OS4, OPUS	interrupt, isolate, self-test	Pascal, FORTRAN IV, BCPL, COBOL	128K (92K)	6.25x8.3	1,170(Q1); 995(Q100)	RAM battery backup, 6 interrupt levels, real-time clock
NM 4/12	custom (16)	proprietary, Maxibus	OS4, UNIX	debug, editor	C, COBOL, FORTRAN, BCPL, Coral 66	128K (32K)	7.5x16.9	980(Q1); 833(Q100)	upward-compatible with Computer Automation's NAKED MINI computers, real-time clock, power-fail detect
NM 4/22	custom (16)	proprietary, Maxibus	OS4, UNIX	debug, editor	C, COBOL, FORTRAN 77, Pascal, Coral 66	128K (32K)	7.5x16.9	1,250(Q1); 1,062(Q100)	upward-compatible with Computer Automation's NAKED MINI computers, real-time clock, power-fail detect
COMPUTER SYSTEMS									
PC/XT 8088	8088 (8/16)	IBM PC bus	MS/DOS	IBM PC software compatible, DOS utilities	BASIC, Pascal, COBOL, FORTRAN	64K (128K)		529	IBM PC/XT compatible, one serial port, one parallel port; opt. QUNIX operating system
CUBIT-DIV. OF PROTEUS INDUSTRIES									
6500	6502 (8)	KIM bus	AIM-65	editor	FORTH, BASIC, Pascal, PL-65	4K (20K)	4.5x6.5x.6	195	four RS232C ports
DATRICON CORP.									
ACS-09	6809 (8)	STD	OS9	debugger, editor, loader, terminal emulation	BASIC, C, Pascal, D-FORTH, SPHERE	64K (64K)	4.5x6.5x.5	195(Q1); 158(Q100)	1-, 2-MHz versions, two serial ports, push-button restart
ACS-2A	Z80A (8)	STD	CP/M-86	debugger, editor, loader, terminal emulation	BASIC, C, Pascal, SPHERE	128K (128K)	4.5x6.5x.5	195(Q1); 158(Q100)	2.5-, 4-, 6-MHz versions
DIGITAL EQUIPMENT CORP.									
Falcon + KXTII-AB	PDP-11 (16)	Q-bus	RT11	debugger, editor, loader	FORTRAN, Pascal, MACRO	16K (32K)	5x8	790	7.5-MHz clock rate



Q Why is FARADAY the logical choice for IBM® PC compatibility?

A A complete family of PC compatible products.

PC compatibility has never been easier thanks to Faraday's complete family of board-level computers and supporting software.

Faraday's full line of products provides the OEM with 100% PC compatibility, MS™-DOS operating software and support products to assist in design implementation.

Faraday's family of products includes:

- FE6400: The first standard format board-level computer that is hardware/software/form factor compatible with the IBM PC.
- FE6410: An IBM PC compatible CPU board with integrated floppy disk and monochrome video controllers.
- MS9200: The MS-DOS operating system, fully compatible with PC-DOS and complete with hard disk utilities.
- FE5140: An IBM PC compatible double density floppy disk controller board.
- Future products include a compatible BASIC, an integrated monochrome video controller board, and a family of custom VLSI integrated circuits designed for use in IBM PC compatible products.

Because of Faraday's capability to manufacture in high volume at low costs, the company is an important supplier to major OEMs. By incorporating Faraday's standard format products, OEMs are reducing their design costs as well as their time to market.

So if you're an OEM and need IBM PC compatibility for your product, choose Faraday. Faraday will help take you to market with a competitive product faster than anyone today and in the future.

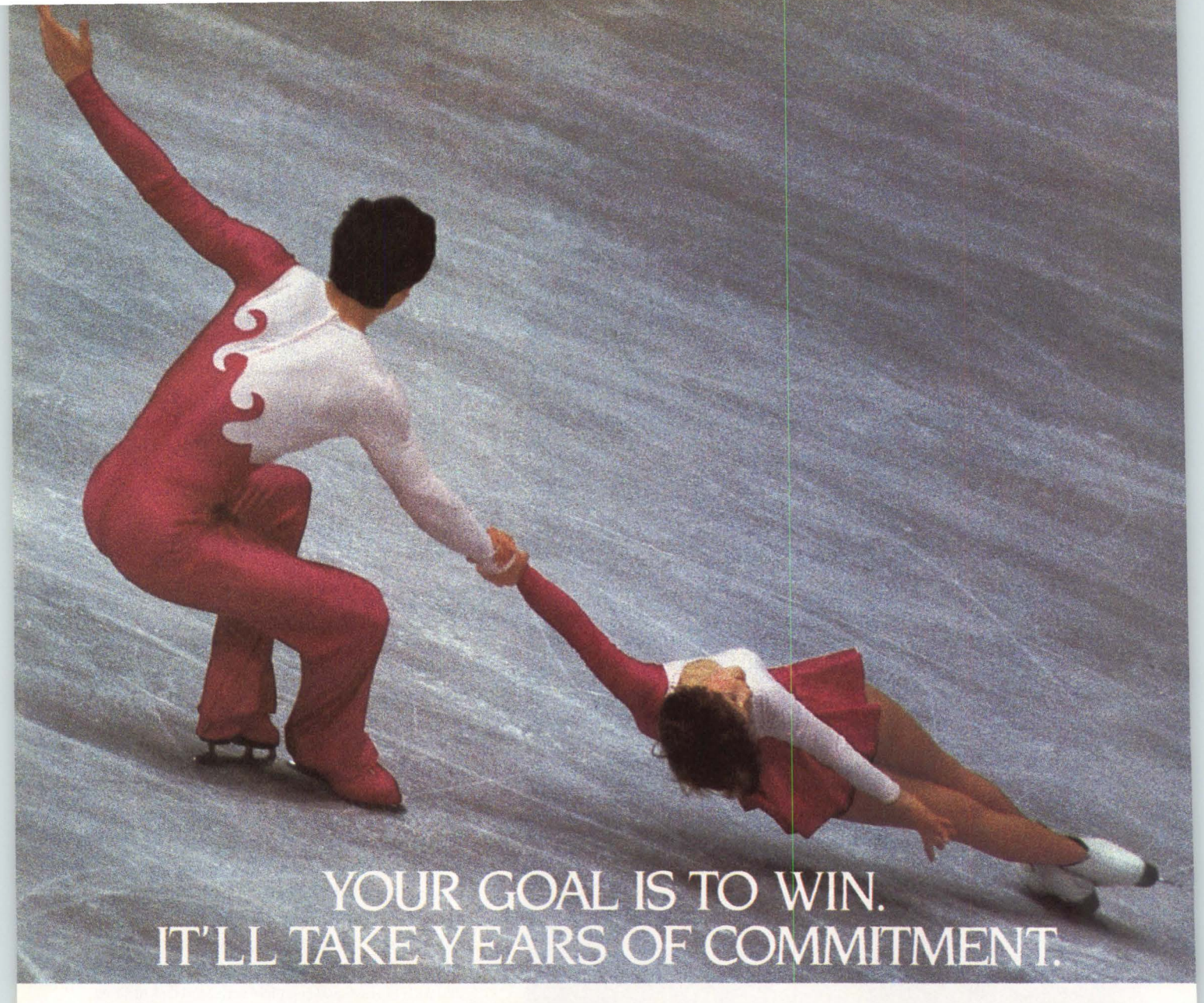
Contact Faraday Electronics today at 743 Pastoria Ave., Sunnyvale, CA 94086, (408) 749-1900.

MS-DOS is a trademark of Microsoft Corporation. IBM is a trademark of International Business Machines.

FARADAY

The OEM PC Compatible Company.

CIRCLE NO. 16 ON INQUIRY CARD



YOU'LL NEED A PARTNER WHO CAN CUT IT.

How We Look At The Future. Designing information systems for the business office of the future is a lot like planning the flawless performance in ice skating.

Choosing the right printer partner can be critical.

Are the same strong goals for success shared? Is the necessary talent, commitment, and dedication to meeting and exceeding those goals present?

As a major designer and manufacturer of state-of-the-art printers, worldwide, Okidata knows the importance of goals and commitment. And living up to them.

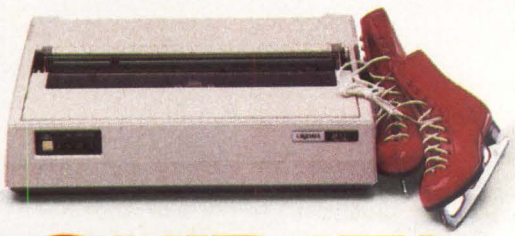
What We're Doing Today. For Tomorrow. Right now, our dedicated research and new product design teams are pushing and testing the limits of present technology to find better ways to build better printers.

Through an on-going and expensive commitment to robotic assembly, we're assuring smoother and faster-than-ever product flow.

And, elsewhere, we're streamlining our customization and modification turnaround times to respond even more quickly to your rapid startups.

We'll Be There When You Need Us. In OEM system building, just like in the Olympics, commitment is everything.

If your audience will be looking to you for more flawless performances in the future, we're the printer company who'd like to join you. In fact, we're already working on it. Call 1-800-OKIDATA. Or write OKIDATA, Mt. Laurel, NJ 08054.



OKIDATA
an OKI AMERICA company

CIRCLE NO. 17 ON INQUIRY CARD

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type; Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
Peripheral Processor KXT 11-CA	PDP-11 (16)	Q-bus	RT11	debugger, editor, loader	FORTRAN, Pascal, MACRO	32K (32K)	10x8	1,785	can be used as a co-processor
DISTRIBUTED COMPUTER SYSTEMS									
DCS 86/16	8086 (16)	Multibus	CP/M-86, RT EXEC	debugger, editor, loader, assembler, compiler for FORTRAN, Pascal, C, BASIC	BASIC, FORTRAN, C, Pascal, Assembly	8K (24K)	6.75x12x.5	1,200(Q1); 900(Q100)	opt. 8-, 10-MHz versions
DCS S108	8088 (8, 16)	Multibus		debugger, editor, loader, assembler, compiler	BASIC, FORTRAN, C, Pascal, Assembly	5K (16K)	6.75x12x.5	2,800(Q1); 2,100(Q100)	5-MHz standard; opt. 8-MHz, 8087 math co-processor, 17K RAM
DCS IWW/88	8088 (8, 16)	Multibus	CP/M-86, MS-DOS	debugger, editor, loader, assembler, compiler	BASIC, FORTRAN, C, Pascal, Assembly		13.75x12x.5	995(Q1); 745(Q100)	opt. bootstrap PROM, 8-, 10-MHz clocks, four 28-pin sockets, C kernel, 3 programmable 16-bit timers/event counter
DCS 8010A	8080 (8)	Multibus	CP/M	monitor, drivers		1K (1K)	6.75x12x.5	425(Q1); 320(Q100)	opt. on-board memory up to 4K bytes RAM, 16K ROM
DCS SERVO	8086 (16)	Multibus	CP/M-86	SERVO 16K with System		4K (16K)	6.75x12x.5	1,400	opt. 8087 math co-processor
DIVERSIFIED TECHNOLOGY INC.									
CBC 86C/05	80C86 (16)	Multibus				48K	6.75x12x.5	1,395	CMOS circuitry
CBC 80C/24	NSC800 (8)	Multibus				32K	6.75x12x.5	950	CMOS circuitry
DUAL SYSTEMS CORP.									
CPU 68000M	68000 10 MHz (32)	S-100	UNIX System V, UNIX Version 7	debuggers, editor, loader	C, Pascal, FORTRAN, COBOL, FORTH, BASIC, LISP		5.5x10x.7	1,195	on-board 68451 MMU
CPU 68000	68000 (32)	S-100	MACS-BUG monitor	loader, debugger	FORTH	(8K)	5.5x10x.7	895	
DY-4 SYSTEMS									
DSTD-101	Z80 (8)	STD	CP/M-86	monitor, debugger	CP/M languages	64 (1K)	4.5x6.5x.5		2.5-, 4-MHz versions, two parallel ports, refresh generator
DSTD-102	Z80 (8)	STD	CP/M-86	monitor, debugger	CP/M languages	64K (1K)	4.5x6.5x.5		two RS232C ports, 4 counter/timer channels, refresh generator
DSTD-103	Z80 (8)	STD	CP/M-86	monitor, debugger	CP/M languages	64K (1K)	4.5x6.5x.5		2.5-, 4-MHz versions, two programmable parallel I/O channels, 4 counter/timer channels
DVME-102	68000	VME	UNIX			256K (1M)	8.7x9.21x.062		includes two RS232C ports, 7 interrupt levels, 3 programmable counter/timer channels, 68451 MMU
DVME-105	68000	VME	UNIX			4K (512K)	8.7x9.2x.062		two RS232C channels, 3 programmable counter/timer channels, 7 interrupt levels, up to 16K RAM
DSTD-168	68008 (8, 16)	STD	CP/M-68K	monitor, debugger	CP/M languages	8K (32K)	4.5x6.5x.5		includes two RS232C ports, 3 counter/timer channels; 8-, 10-, 12-MHz versions available
DSTD-187	8088 (8, 16)	STD	CP/M-86, MS-DOS	monitor, debugger	CP/M languages	8K (128K)	4.5x6.5x.5		includes two RS232C ports; opt. 8087 math co-processor
DSTD-188	8088 (16)	STD	CP/M-86, MS-DOS	monitor, debugger	CP/M languages	8K (128K)	4.5x6.5x.5		8-, 10-, 12-MHz versions available; includes two RS232C ports, counter/timer channels, RAM refresh
EDUCATIONAL MICROCOMPUTER SYSTEMS									
M 68K	68000 (16)	proprietary		debugger		20K (16K)		650(Q1); 450(Q100)	dual RS232C ports, one 16-bit parallel port, five 16-bit counter/timers
VC8024	Z80A (8)	S-100				4K (8K)		350(Q1); 225(Q100)	two parallel ports, video out 80x24

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
ENTERPRISE SYSTEMS CORP.									
10804A	6502, 6502A (8)	STD		monitor, debugger	FORTH	2K (8K)	4.5x6.5	295(Q1)	one RS232C serial port, 32 I/O lines, 4 timers; runs standalone in multiprocessor applications
10812	6502, 6502A (8)	STD		monitor, debugger	FORTH	up to 24K (up to 48K)	4.5x6.5	295(Q1)	one RS232C, RS422 port, 32 I/O lines, 4 timers, CMOS RAM with battery backup
10809	6809 (E), 68B09 (E) (8)	STD		monitor, debugger	FORTH, BASIC	up to 24K (up to 48K)	4.5x6.5	295(Q1)	one RS232C, RS422 serial port, 32 I/O lines, 4 timers, CMOS RAM with battery backup
FORCE COMPUTERS INC.									
SYS68K/ CPU-1B	68000 (8/16)	VME	P-DOS, COHERENT PSOS, UNIX V	debugger, single-line, and full-screen editor	FORTH, BASIC, C, Pascal, FORTRAN	512K (128K)		1,450(Q1); 995(Q100)	8-, 10-MHz versions, three RS232C ports, one parallel port, real-time clock with battery backup
SYS68K/CPU-2	68000 or 68010 (8/16)	VME	P-DOS, COHERENT PSOS, UNIX V	debugger, single-line and full-screen editor	FORTH, BASIC, C, Pascal, FORTRAN	16K (64K EPROM)		1,795(Q1); 1,432(Q100)	8-, 10-MHz versions, one RS232C port, one parallel port, on-board 5.25-inch floppy disk controller
SYS68K/CPU-3	68000 or 68010 (8/16)	VME	P-DOS, COHERENT PSOS, UNIX V	debugger; single-line and full-screen editor	FORTH, BASIC, C, Pascal, FORTRAN	16K (static) (64K EPROM)		2,200(Q1); 1,760(Q100)	8-, 10-MHz versions
FORWARD TECHNOLOGY INC.									
FT68X	68000 (16)	Multibus	XENIX	full diagnostics monitor	C, FORTRAN 77, Pascal, BASIC, APL	256K (128K)	6.75x12x.55	3,145(Q1); 1,890(Q100)	additional 768K RAM available, on-board MMU
GENERAL MICRO SYSTEMS INC.									
GMS6506	6502 (8)	EXORbus	Rockwell 6502	debugger, editor, loader, disassembler	Tiny BASIC, FORTH	32K (4K)	6.9x9.75x.07	490(Q1); 350(Q100)	1-, 2-MHz versions, one parallel port, one serial port
GMS6525	6802 (8)	EXORbus	OS9, Flex	debugger, editor, loader, disassembler	Tiny BASIC, FORTH	32K (4K)	6.9x9.75x.07	536(Q1); 380(Q100)	1-, 2-MHz versions, one parallel port, one serial port
GMS6526	6809 (8)	EXORbus	OS9, Flex	debugger, editor, loader, disassembler	Tiny BASIC, FORTH	32K (4K)	6.9x9.75x.07	536(Q1); 380(Q100)	4-, 8-MHz versions, one parallel port, one serial port
GMS6527	Z80 (8)	EXORbus	CP/M	debugger, editor, loader, disassembler	Tiny BASIC, FORTH	32K (4K)	6.9x9.75x.07	536(Q1); 380(Q100)	4-, 6-MHz versions, one serial port, one parallel port, two 16-bit timers
GMS6507	68008 (8/16)	EXORbus	UNIX-like	debugger, loader, editor, disassembler	Tiny BASIC, FORTH	64K (64K)	6.9x9.75x.07	583(Q1); 422(Q100)	8-, 10-MHz versions, two serial ports, one parallel port, four 16-bit timers, 10 user I/O lines
HEWLETT-PACKARD									
A600+	2901C 4.4 MHz	proprietary		real-time OS		512K (16K)		3,410	includes extended addressing, battery, memory, DMA, vectored interrupt, programmable memory mapping; peripheral and I/O interfaces available through the use of opt. cards
INDUSTRIAL MICRO									
SBC 651	6502 (8)	Aim 65, proprietary			Assembly	3K (4K)	4.5x6.5	185(Q1); 120(Q100)	memory map and pin-out compatible with Rockwell AIM-65 development support; 2-MHz version available
SBC 681	6802 (8)	proprietary			Assembly	3K (10K)	4.5x6.5	170(Q1); 105(Q100)	
INFOSPHERE INC.									
SPHERE-ECB	68000 (16)		SPHERE	interpreter, compiler, assembler, editor, printer utility	SPHERE	32K (16K)	10.5x7.5x1.5	1,495(Q1); 1,195(Q100)	two serial ports, 16 parallel lines, on-board audio cassette interface

COMMITTED TO DEC?

So are we. And, we're committed to the individual systems buyer, too. We give the little guy the edge he just can't get anywhere else. We understand the system builder's time constraints, and we're flexible enough to work with them.

We bring the latest technology to our added value DEC systems long before anyone else. And, we relieve you of the complex, time-consuming task of searching for and evaluating new high-performance products and system possibilities.

Plus, we give you considerably faster turn-around. With the Cambridge Digital "Edge" you can get many fully integrated, PDP or VAX systems in as little as 10 days. And, your system will be up and running upon delivery with your entire complement of fully supported software and peripherals. The best, most advanced products on the market today. All tested and ready to go.

So, whether you want a fully integrated pre-packaged system or you want to mix and match system components, Cambridge Digital can give you the performance you need in an economical package, ready to go the day you get it. That's what the Cambridge Digital "Edge," is all about.

To receive our DEC PDP-11 based system catalog including a description of the seven guarantees you get when you get The Edge, call or write. Main Office, Dept. 7401, P.O. Box 568, 65 Bent Street, Cambridge, Massachusetts 02139. Telex 92-1401/COMPUMART CAM. 800-343-5504. In Mass. call 617-491-2700. New York District Office 516-935-3111.

I want The Edge:

Name_____ Title_____

Organization/Company_____

Address_____

City_____ State/Province_____

Zip/Postal Code_____ Country_____

Phone No. ( )_____

7401

Cambridge Digital

DIVISION OF COMPUMART

The Edge in System Integration

800-343-5504

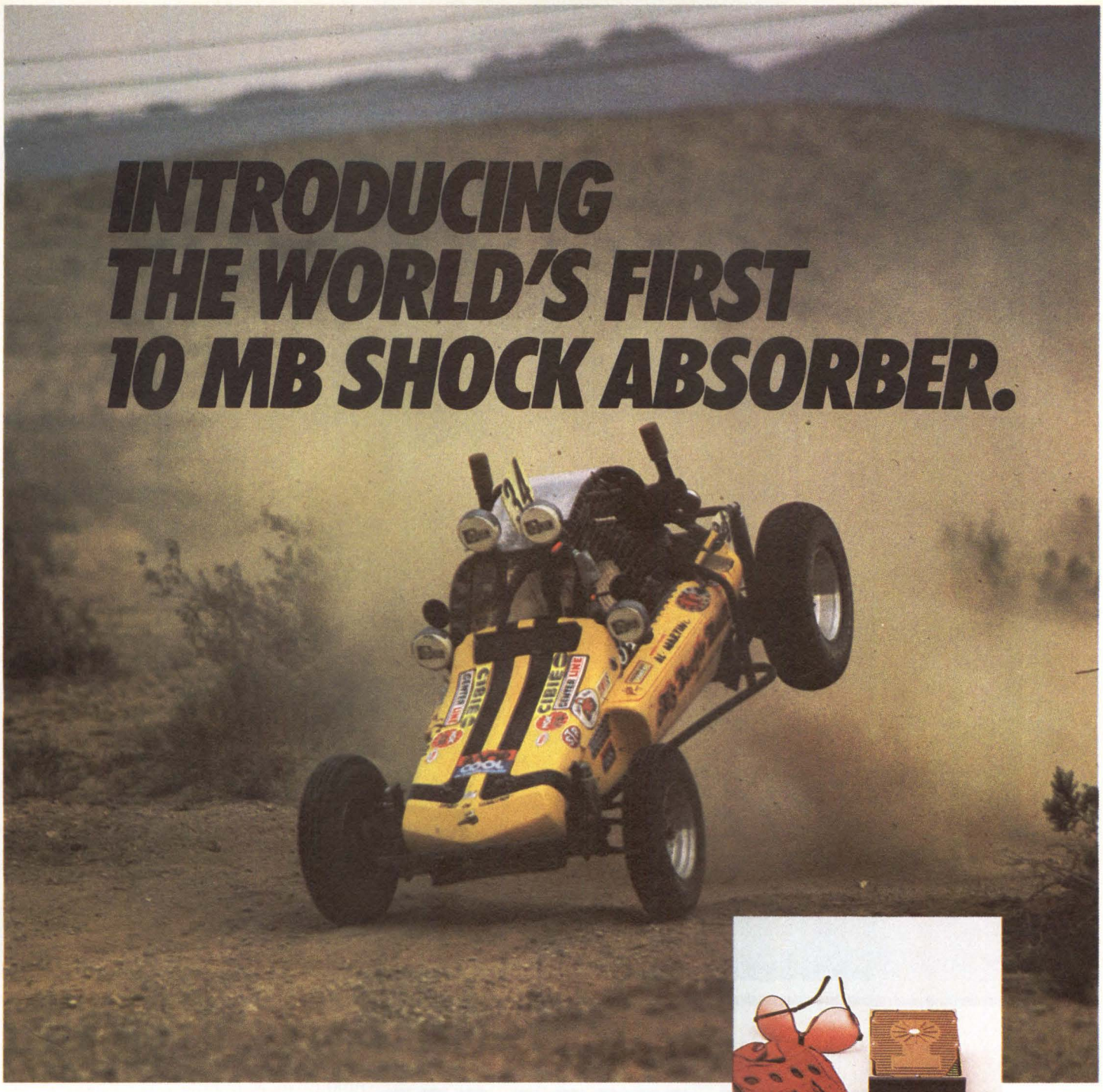
In Massachusetts call 617-491-2700

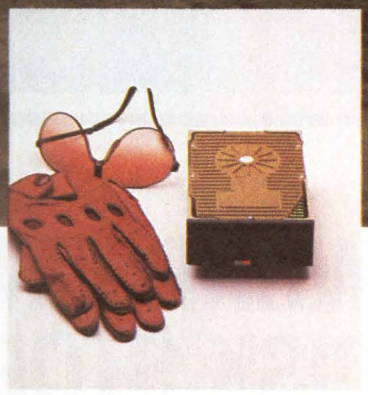
CIRCLE NO. 18 ON INQUIRY CARD

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
ACS09-RTS	6809 (8)	STD	SPHERE	interpreter, compiler, assembler, editor, printer utility	SPHERE	2–24K (16–32K)	6.5x4.5x.4		one serial port
PCP-11E	Z80A (8)	Q-bus	SPHERE	interpreter, compiler, assembler, terminal emulation for RSX-11M and RT-11	SPHERE	16K (24K)	8.5x5.2x.5	995(Q1); 795(Q100)	dual serial ports, eight parallel lines
FALCON-RTS	T-11 (LSI-11) (16)	Q-bus	SPHERE	compiler, assembler, editor	SPHERE	4–20K (16–48K)	8.9x5.2x.5	1,695(Q1); 1,185(Q100)	dual serial ports, 24 parallel lines
7806-RTS	Z80A (8)	STD	SPHERE	compiler, assembler, editor	SPHERE	2–24K (16–48K)	6.5x4.5x.37	995(Q1); 695(Q100)	dual serial ports, floating point library
INNER ACCESS CORP.									
68000-P	68000 (16)	IEEE-696	CP/M-68K		C, FORTH	8K			three 16-bit timers, 10-, 12-MHz versions
INNOVATIVE RESEARCH INC.									
SBC90A	Z80A (8)	Multibus	CP/M	monitor		128K (32K)	6.75x12x.062		two serial ports, two parallel ports, floppy controller, three counter/timers
INTEGRATED SOLUTIONS INC.									
IS-68K (Q-bus)	68000, 68010 (32)	Q-bus	UNIX System III	standard UNIX utilities	FORTRAN, COBOL, Pascal, Ada	256K		2,595	two serial ports, battery backup, on-board diagnostics, 8-, 10- and 12-MHz versions
IS-68K (VME)	68010 (32)	VME	UNIX System III	standard UNIX utilities	COBOL, FORTRAN, Pascal, Ada	256K		2,595	two serial ports, battery backup, on-board diagnostics
INTEL CORP.									
iSBC 80/05	8085A (8)	Multibus		monitor		512K (4K)			includes programmable RS232C I/O ports, TTL, 22 programmable parallel I/O lines, 4 vectored interrupts, programmable memory mapping
iSBC 80/10B	8085A (8)	Multibus		monitor, RMX		1K (16K)			includes programmable RS232C I/O ports, 48 programmable parallel I/O lines, 1.04 msec timer, 11 vectored interrupts; opt. programmable TTL
iSBC 80/20-4	8080A (8)	Multibus				4K (8K)			includes programmable RS232C serial I/O ports, 48 programmable parallel lines, extended addressing, 8 vectored interrupts
iSBC 80/24	8085A-2 (8)	Multibus				4K (32K)			includes programmable RS232C I/O ports, 48 programmable parallel lines, 12 vectored interrupts
iSBC 80/30	8085A (8)	Multibus				16K (8K)			includes programmable RS232C I/O ports, 24 programmable parallel lines, 12 vectored interrupts
iSBC 86/05	8086 (16)	Multibus		monitor		8K (64K)		1,500	includes two programmable RS232C I/O ports, 24 programmable parallel lines, extended addressing, 9 vectored interrupts, programmable memory mapping
iSBC 86/12A	8086 (16)	Multibus		monitor		32K (32K)		1,900	includes programmable RS232C I/O ports, 24 programmable parallel lines, extended addressing, 9 vectored interrupts, programmable memory mapping
iSBC 86/14	8086 (16)	Multibus		monitor		32K (64K)		2,290	includes programmable RS232C I/O ports, 24 programmable parallel lines, 9 vectored interrupts, programmable memory mapping

INTRODUCING THE WORLD'S FIRST 10 MB SHOCK ABSORBER.





IN A CLASS BY ITSELF

Ranger is the first truly environment-independent Winchester. With its unique shock and vibration resistant suspension and proprietary head retraction system, Ranger can go just about anywhere and perform under conditions never thought possible for a hard disk. Air freight it, throw it in the back of your car, even send it through (shudder), airport baggage handling – it's tough enough to take it and keep on performing.

DESIGNER LIBERATION

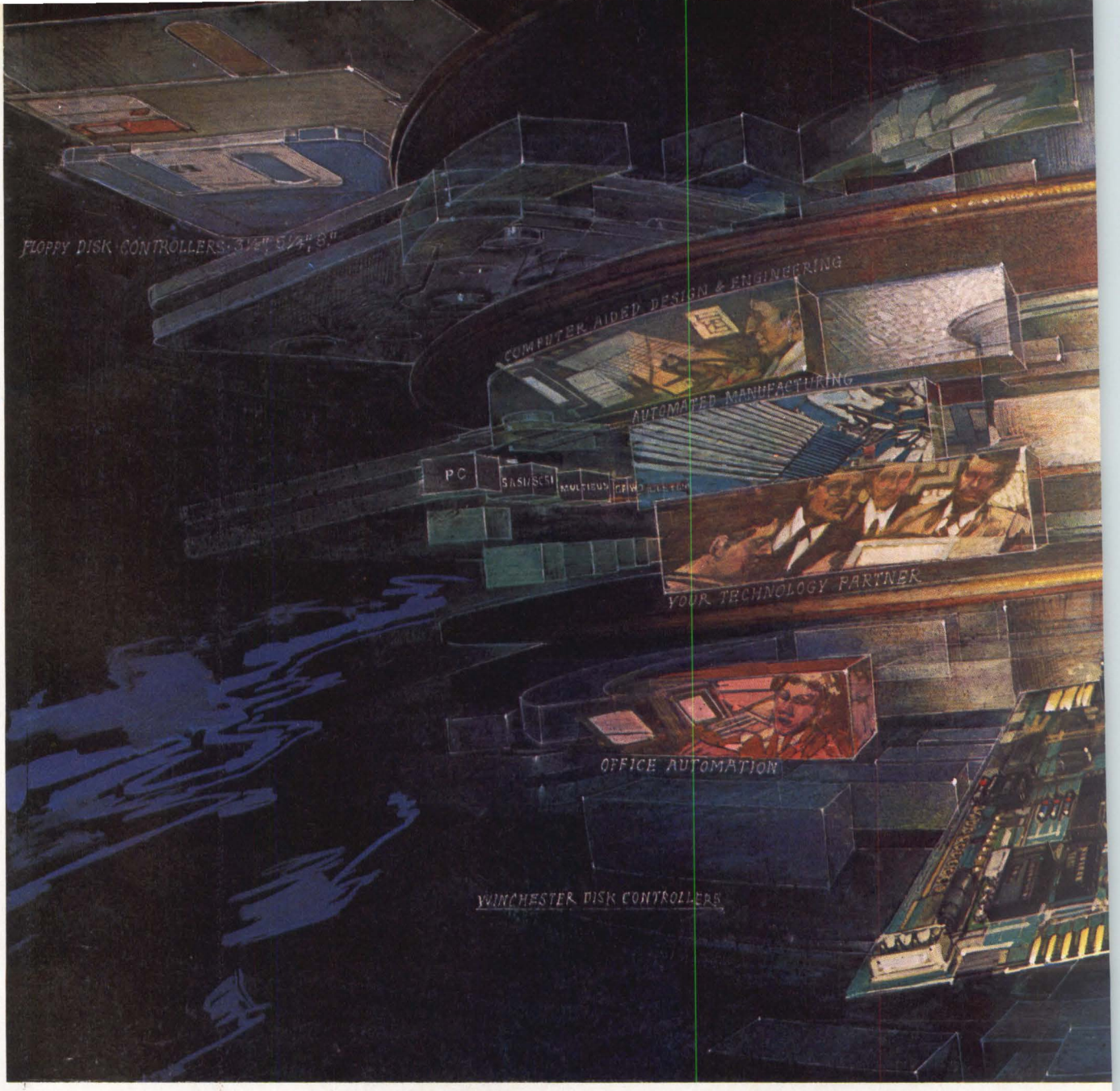
For the first time, Winchester-backed portable PCs and other data acquisition, communication and processing devices are a practical reality. And because Ranger packs its 10 rugged MBs into a miniscule 3.5", 2-lb, ST-412/506 compatible package, you can enhance data capability or design-in new features while tightening up on product size and weight.

Take aim at bringing rugged Ranger reliability to your product design. Write us at: 1111 Space Park Dr., Santa Clara, CA 95050. Or for quicker action, please call 408-986-8676.

See us at NCC, Booth #H352.

LAPINE TECHNOLOGY

CIRCLE NO. 19 ON INQUIRY CARD



WHAT'S IN STORE FOR DISK STORAGE?

THE FUTURE...

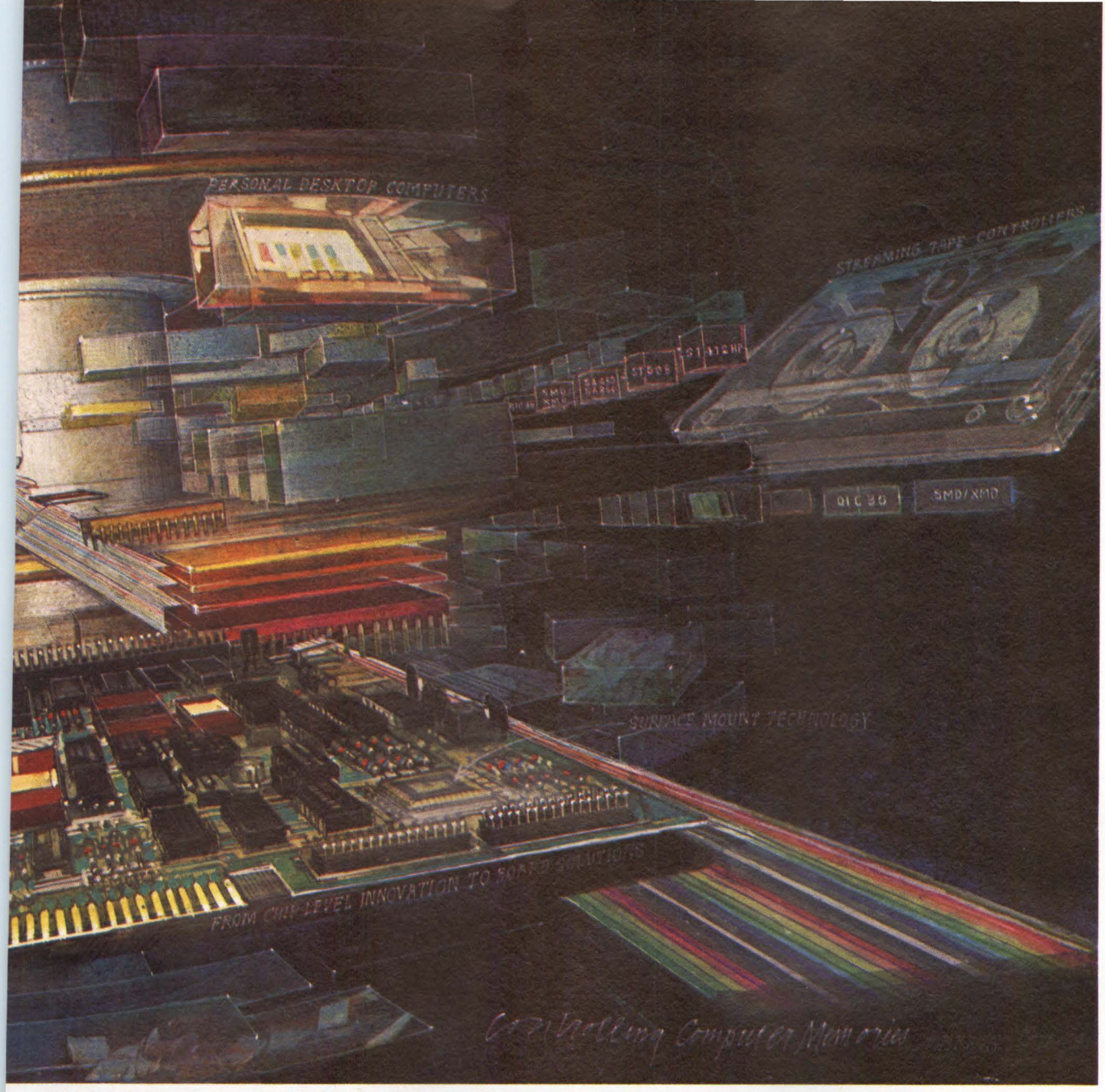
Your future is ensured when you make Western Digital your partner in storage management technology. We've led the way with non-stop innovation, from the first single chip floppy disk controller nearly a decade ago to the broadest offering of chip and board-level floppy, Winchester and tape controllers today.

Systems in Silicon.

What makes us unique are our extensive VLSI capabilities. Designing and manufacturing our own proprietary chips enables us to 1) pack more performance into our controllers than is possible using general purpose LSI, 2) continuously integrate more and more functionality into fewer and fewer devices, 3) and provide you with an unending path to lower cost and higher performance as we ride the experience curve.

Chip-to-board synergy.

Solutions are what we offer systems builders. Having us build you a board-level disk controller



based on our chips does more than get you to market more quickly. It enables you to make us your technology partner at the systems integration level.

Whether you choose one of our standard boards, with more than a dozen combinations of host and drive interfaces, or have us design and build a custom, proprietary version for your system's special needs, our engineers work as a virtual extension of your own engineering capabilities.

Leading edge manufacturing.

To meet your high volume needs, we've invested in new, state-of-the-art automated board manufacturing and test facilities in the U.S. and Europe.

To keep you competitive, we're constantly integrating more functionality onto our board-level products, driving down cost while we boost performance. Our investments in surface-mount technology, and commitment to stay at the leading edge of this revolutionary approach to board manufacturing, will accelerate the integration process, enabling us to pack dramatically more into dramatically less space.

Take control of the future.

More leading manufacturers of personal computers and office automation systems buy storage management controllers from Western Digital than from any other company. Make us your source for disk and tape controllers and you get more than high technology products. You get a corporate commitment to do all we can to see you succeed. Take control of the future. Call our Controller Hotline, 714/863-7827. And ensure *your* success.

...STARTS HERE.

For the complete story of our storage management capabilities and a poster-size reproduction of the illustration above, send your business card to Western Digital, SM Literature, 2445 McCabe Way, Irvine, CA 92714.

WESTERN DIGITAL
CORPORATION

We've Earned The Right To Be #1

By Being First So Often

When it comes to being FIRST with technology-leading products, ***Advanced Digital*** wears its #1 button with pride. We were ***FIRST*** to introduce an 8-Bit, single board S-100 computer... We were ***FIRST*** to introduce a 6MHz, 128KByte single board computer ... We were ***FIRST*** to introduce a 6MHz, 128KByte Slave Processor board. And our record for being FIRST continues with...

- The introduction of SUPER EIGHT – an 8MHz master with Winchester and Floppy disk controller on one board.
- The introduction of SUPER SLAVE II – A dual slave processor that will support two users under TurboDOS.
- The introduction of our new SUPER 186 – the ***FIRST*** 16-Bit, single board S-100 computer that performs at twice the speed of older technologies. Loaded with features such as on-board floppy disk controller and up to 1MByte of RAM, the SUPER 186 is designed to function as a bus Slave or Master. Advanced Digital's SUPER 186 permits you to take advantage of vast libraries of sophisticated applications software.

Advanced Digital boards are IEEE 696 compatible, run under a variety of operating systems such as CP/M 2.2,* CP/M 3.0, Concurrent CP/M, MP/M,* OASIS,* and TurboDOS*

(Top row L to R: Super Slave 128, HDC-1001, Super Slave 64, Bottom row L to R: Super Quad, Super 186, Super Six)

and are available with CPU speeds of 4, 6, or 8MHz. On-board memory capacities range from 64KBytes to 1 MByte.

When it comes to selecting your S-100 boards, go with Advanced Digital – The Company that earned the right to be #1.

See your local computer dealer or contact Advanced Digital today... We'll help you become #1.

ADVANCED DIGITAL CORPORATION

Leading the Microcomputer Technology

Advanced Digital
5432 Production Drive, Huntington Beach, CA 92649
Tel. (714) 891-4004 • Telex 183210 ADVANCED HTBH

In Europe:
Advanced Digital U.K. Ltd.
27 Princess St., Hanover Square
London WIR8NQ • United Kingdom
409-0077 • 409-3351 Telex 265840 FINEST

CIRCLE NO. 20 ON INQUIRY CARD

*CP/M is a trademark of Digital Research
*TurboDOS is a trademark of Software 2000
*MP/M is a trademark of Digital Research
*Oasis is a trademark of Phase One-Systems

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
iSBC 86/30	8086 (16)	Multibus				128K (64K)		2,990	includes programmable RS232C I/O ports, 24 programmable parallel lines, extended addressing, 4 vectored interrupts, programmable memory mapping
iSBC 88/25	8088 (16)	Multibus				4K (128K)			includes programmable RS232C I/O ports, 24 programmable lines, extended addressing, 4 vectored interrupts
iSBC 88/45	8088 (16)	Multibus				16K (32K)		1,895	includes 3 programmable RS232C and RS422 I/O ports, RS-499, DMA
iSBC 186/03	80186 (16)	Multibus	80130 real-time OS			64K (128K)		1,650	includes programmable RS232C I/O ports, programmable RS422 port, 24 programmable parallel lines, extended addressing, battery, Centronics port, DMA, 27 vectored interrupts, programmable memory mapping
iSBC 186/51	80186, 82586 (16)	Multibus	RMX 86 kernel			128K (192K)		3,000	includes programmable RS232C, RS422 I/O ports, Ethernet, extended addressing, DMA, 8 vectored interrupts, programmable memory mapping
iSBC 286/10	80286, opt. 80287 (16)	Multibus				64K (128K)		3,300	includes extended addressing, DMA, 16 vectored interrupts, programmable memory mapping; virtual memory addresses 1G byte
iSBC 544	8085A (8)	Multibus				16K (8K)		1,780	includes 4 programmable RS232C I/O ports, 10 programmable parallel lines, extended addressing, programmable memory mapping, intelligent communications controller
iSBC 576	8086, 8048, 2920 (16)	Multibus				128K (64K)		2,900	includes programmable RS232C I/O ports, 8 programmable parallel lines, 15 vectored interrupts, programmable memory mapping
INTELLIMAC INC.									
IN/MP68	68000 (16)	Multibus	ROS 2.1 UNIX System V		Ada, Assembly, C, COBOL, FORTRAN, Pascal	16K (64K)	6x12x.4	3,995(Q1); 2,795(Q100)	
IRONICS INC.									
IV-1600	68000, 68010 (16/32)	VME	CP/M-68K, UNIX Systems III, V	IMON68-debug, VRTX, PSOS-compatible	Pascal, Ada, C, FORTRAN, COBOL, BASIC, B-Net	256K (1M)	9.19x11	2,995	10-, 12.5-MHz versions, up to four serial ports, one parallel port, 3-channel counter/timer
ISI INTERNATIONAL									
ISB-3101/3111	Z80A, 8085 (8)	STD	CP/M	Standard CP/M Utilities, MACRO Assembler	BASIC, C, FORTRAN, Pascal/MT+	12K (24K)	4.5x.5x6.5	190(Q1); 162(Q100)	2- or 4-MHz versions available; includes ¾ channel counter/timer
ISB-3103	Z80A (8)	STD	CP/M	Standard CP/M Utilities, MACRO Assembler	BASIC, FORTRAN, Pascal/MT+, C	64K (16K)	4.5x.5x6.5	715(Q1); 615(Q100)	includes 3 counter/timer channels, Centronics printer interface, programmable serial port, memory map
ISB-3130	8088 (8, 16)	STD				2K (4K)	4.5x.5x6.5	445(Q1); 382(Q100)	includes 8087 co-processor socket
MATROX ELECTRONIC SYSTEMS LTD.									
MBC-86/12	8086 (16)	Multibus	CP/M-86	EPROM monitor, bootstrap loader		128K (32K)	6.75x12x.5	1,610(Q1); 1,320(Q100)	5-, 8-, or 10-MHz versions available with 24 programmable parallel I/O lines, one RS232C serial port, expansion socket for 8087 co-processor

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
PBC-80	Z80A (8)	Multibus	CP/M-80	EPROM monitor, bootstrap loader		64K (128K)	6.75x12x.5	1,405(Q1); 1,150(Q100)	includes 24 programmable parallel I/O lines, two RS232C serial ports, 5 programmable counter/timers, on-board MMU, 16-level interrupt
ZBC-80	Z80A (8)	Multibus	CP/M-80	EPROM monitor, bootstrap loader		64K (40K)	6.75x12x.5	1,190(Q1); 975(Q100)	4- or 6-MHz versions available with 48 programmable parallel I/O lines, one RS232C serial port, expansion socket for 8087 co-processor
MICROBAR SYSTEMS INC.									
DBC 68K2	68000 (16)	Multibus	XENIX, UNIPlus	monitor, debugger	BASIC, C, Pascal, FORTRAN	128K–512K (128K)	12x6.75	1,995	opt. 2-level page oriented memory mapping and protection
DBC86	68000 (16)	Multibus	XENIX, UNIPlus	monitor, debugger	BASIC, C, Pascal, FORTRAN	4K (32K)	12x6.75	1,225	opt. memory management module
DBR50	(16)	Multibus				512K	12x6.75	1,455	
MICRO-LINK									
STD 147	Z80A (8)	STD	CP/M	monitor, debugger, bootstrap loader	CP/M languages	64K (32K)	4.5x6.5	395	real-time clock/calendar, one RS232C port, one DMA port, programmable counter/timers
STD 145	8085 (8)	STD	CP/M	monitor, debugger, bootstrap loader	CP/M languages	32K (32K)	4.5x6.5	425	battery-backed RAM, real-time clock/calendar, one RS232C port, one DMA port, programmable counter/timers
MICROLOG INC.									
BABY BLUE	Z80B (8)	IBM PC	emulates CP/M under MS-DOS	file transfer utilities		64K			one parallel port, two serial ports, clock/calendar with battery backup
BABY BLUE II	Z80B (8)	IBM PC	emulates CP/M under MS-DOS	file transfer utilities, terminal emulation		256K		695	one parallel port, two serial ports, clock/calendar with battery backup
BABY TEX	Z80B (8)	TI Professional Computer	emulates CP/M under MS-DOS	file transfer utilities		64K	11x14		
MICROCOMPUTER SYSTEMS INC.									
MSI-C800	NSC800 (8)	STD		execution monitor		8K (8K)	.5x4.5x6.5	350(Q1); 297(Q100)	30 I/O lines, four real-time clocks, five interrupts
MSI-C850	NSC800 (8)	STD		execution monitor		32K (32K)	.5x4.5x6.5	295(Q1); 250(Q100)	real-time clock, five interrupts
MSI-7888A	8088 (16)	STD				(32K)	.5x4.5x6	295(Q1); 250(Q100)	
MILLER TECHNOLOGY INC.									
MCPU-800-02	Z80A (8)	STD	CP/M	monitor	2K/8K BASIC, C COMPILER	16K (32K)	.4x4.5x7	595(Q1); 445(Q100)	programmable serial port, 4 ROM sockets, I/O port expansion, memory mapper
MCPU-800-03	Z80A (8)	STD	CP/M	monitor	2K/8K BASIC, C COMPILER	64K (32K)	.4x4.5x7	645(Q1); 535(Q100)	programmable serial port, 4 ROM sockets, I/O port expansion, memory mapper
MCPU-900	Z80A (8)	STD	CP/M	monitor	8K BASIC, C COMPILER	64K (16K)	.4x4.5x7	795(Q1); 675(Q100)	programmable serial port, floppy disk controller, I/O port expansion
MIZAR INC.									
VME8105	68000 (16)	VME	CP/M-68K, IDRIS, 0S9			16K (64K)	3.9x6.3x.5	600(Q1); 425(Q100)	10 MHz opt.
VME7100	68010 (16)	VME	CP/M-68K, IDRIS, 0S9			512K (128K)	9.2x6.3x.5	1,495(Q1); 1,150(Q100)	two serial ports, two parallel ports, 10 MHz opt.

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type; Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
MODULAR COMPUTER SYSTEMS INC. (MODCOMP)									
Model 1815	AMD 29116 (16)	custom	MAX IV	editor, debugger, loader	FORTRAN, COBOL, COBOL 86, Pascal	512K	14.1x19.5	8,500(Q1)	integral I/O processor, floating point processor, memory-mapped addressing, power-up diagnostics; opt. rackmount
MONOLITHIC SYSTEMS CORP.									
MSC 8009	Z80A (8)	Multibus				64K			two RS232C ports, floppy disk controller
MSC 8014	Z80B 6 MHz (8)	Multibus				128K (6–32K)			one RS232C port, 48 parallel lines, quad memory map
MSC 8017	Z80B 6 MHz (8)	Multibus				128K (0–32K)			three RS232C ports, 24 parallel lines, quad memory map
MSC 8186	80186 8 MHz (16)	Multibus				128K or 512K (0–128K)			one RS232C port, 24 parallel lines, two iSBX connectors, six 16-bit counter/timers
MSC 8001	Z80A (8)	Multibus				8K (0–32K)			one RS232C port, 48 parallel I/O lines, three 16-bit counter/timers
MSC 8004	Z80A (8)	Multibus				64K (0–32K)			one RS232C port, 48 parallel I/O lines, three 16-bit counter/timers, power/restart circuit, dual memory map
MSC 8007	Z80A (8)	Multibus				64K			three RS232C ports, 24 parallel I/O lines
MOSTEK CORP.									
MDX-CPU 3	Z80 (8)	STD	M/OS-80			64K (32K)		614	includes programmable RS232C I/O ports, extended addressing, Centronics port, DMA, vectored interrupt, programmable memory mapping
MDX-CPU 4	Z80 (8)	STD	M/OS-80			40K (64K)		303	includes programmable RS232C ports, extended addressing, Centronics port, vectored interrupt, programmable memory mapping
MD-SBC 1	Z80 (8)	STD				1K (8K)			
MOTOROLA INC. — MICROSYSTEMS									
M68MM17	6809 (8)	EXORbus	M-DOS	Superbug		64K	9.75x6x.062	495	two serial ports, 16 parallel I/O lines, three 16-bit timers
M68MM19A1	6809 (8)	EXORbus	M-DOS	Superbug		2K (32K)	9.75x6x.062	695	one serial port, 16 parallel I/O lines, three 16-bit timers
M68MM01D	6800 (8)	EXORbus	M-DOS	monitor		(20K)	9.75x6x.6	515	one serial port, three 16-bit timers
M68MM01B1A	6802 (8)	EXORbus	M-DOS	monitor		384K (4K)	9.75x6x.062	495	one serial port, 16 parallel I/O lines, three 16-bit timers
M68MM01A2	6800 (8)	EXORbus	M-DOS	monitor		1K (8K)	9.75x6x.062	495	two serial ports, 36 parallel I/O lines
M68KVM01A1,2	68000 (16)	Versabus	VERSA-dos, RMS-68K	VERSAbug	Pascal, FORTRAN	32/64K (64K)	9.25x14.5x.6	2,095; 2,795	two serial ports, 32 parallel I/O lines, three 16-bit timers
M68KVM02-3	68000 (16)	Versabus	VERSA-dos, RMS-68K	VERSAbug	Pascal, FORTRAN	128K (64K)	9.25x14.5x.6	3,295	two serial ports, three 16-bit timers
M68KVM03	68010/ 68451 (16)	Versabus	VERSA-dos, RMS-68K	VERSAbug	Pascal, FORTRAN	256K (64K)	9.25x14.5x.6		two serial ports, three 16-bit timers
MVME101	68000 (16)	VME	VERSA-dos, RMS-68K	VMEbug		up to 128K (up to 128K)	9.2x6.3x.79	1,495	two serial ports, two parallel I/O ports, three timers
MVME110-1	68000 (16)	VME	VERSA-dos, RMS-68K	VMEbug		up to 64K (up to 128K)	9.2x6.3x.79	1,495	three timers

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
MVME115	68010/ 68451 (16)	VME	VERSA-dos, RMS-68K	VMEbug		up to 64K (up to 64K)	9.2x6.3x.79	1,695	two serial ports, printer port or I/O port, three timers
MRC SYSTEMS INC.									
MBK6801	6801 (8)	EXORbus	EXPRES multi-tasking executive, RTX01 real-time executive	assembler, debugger	Assembly, FORTH	11K (10K)		545	two serial ports, three-function timer/counter, five modem control signals, eight vectored interrupts
MBK8073	8073 (8)	STD	Tiny BASIC	Assembler, BASIC Interpreter, editor	Assembly, BASIC	8K (14.5K)		395	two serial ports, two interrupt levels, three 16-bit timer/counters, real-time clock with battery backup
MUSYS CORP.									
NET/82-128K	Z80A (8)	S-100	Turbo-DOS	assembler, debugger	CB-80, R/M COBOL	128K (4K)	5.5x10x.7	850(Q1); 455(Q100)	opt. floating point processor chip
NET/82-64K	Z80A (8)	S-100	Turbo-DOS	assembler, debugger	CB-80, R/M COBOL	64K (4K)	5.5x10x.7	750(Q1); 390(Q100)	opt. floating point processor chip
NET/81	Z80A (8)	S-100	Turbo-DOS	assembler, debugger	CB-80, R/M COBOL	64K (2K)	5.5x10x.7	550(Q1); 310(Q100)	
NATIONAL SEMICONDUCTOR									
80/05	8085 (8)	Multibus	BLMX-80	monitor	BLC/SBC-compatible	512K (8K)	6.75x12x.5	405	includes one serial I/O port, 22 parallel I/O lines, 4 vectored interrupts
80/10	8080A (8)	Multibus	BLMX-80		BLC/SBC-compatible	1K (4K)	6.75x12x.5	448	includes RS232C serial interface, 48 parallel I/O lines, 6 interrupt sources
80/11	8080A (8)	Multibus	BLMX-80		BLC/SBC-compatible	1K (8K)	6.75x12x.5	395	includes 48 parallel I/O lines, one RS232C serial interface
80/14	8080A (8)	Multibus	BLMX-80		BLC/SBC-compatible	4K (8K)	6.75x12x.5	465	includes 48 parallel I/O lines, one RS232C serial interface
80/11A	8080A (8)	Multibus	BLMX-80		BLC/SBC-compatible	1K (32K)	6.75x12x.5	395(Q1)	includes two BLX expansion connectors, 48 programmable parallel I/O lines, single-level interrupt with 16 interrupt sources
80/14A	8080A (8)	Multibus	BLMX-80		BLC/SBC-compatible	4K (32K)	6.75x12x.5	465	includes two BLX expansion connectors, 48 programmable parallel I/O lines, single-level interrupt with 16 interrupt sources
80/204	8080A-2 (8)	Multibus	BLMX-80		BLC/SBC-compatible	4K (8K)	6.75x12x.5	760	includes 48 programmable parallel I/O lines, one RS232C serial I/O port, 8 vectored interrupts, 3 programmable clocks
80/24	8085A-2 (8)	Multibus	BLMX-80		BLC/SBC-compatible	4K (32K)	6.75x12x.5	875	includes 48 programmable parallel I/O lines, programmable synch/asynch RS232C serial interface, two programmable 16-bit timers, two BLX expansion connectors
80/28	8085A-2 (8)	Multibus	BLMX-80		BLC/SBC-compatible	8K (32K)	6.75x12x.5	945	includes 48 programmable parallel I/O lines, programmable synch/asynch RS232C serial interface, two programmable 16-bit timers, two BLX expansion connectors
80/30	8605 (16)	Multibus	BLMX-80	monitor	BLC/SBC-compatible	128K (256K)	6.75x12x.5	2,300	
80/316	Z80A (8)	Multibus	BLMX-80	monitor	BLC/SBC-compatible	16K (84K)	6.75x12x.5	760	includes dual port RAM, 48 programmable parallel I/O lines, one RS232C port, 3 counter/timers, 9 level interrupts

SyQuest Removable and Fixed Disk Drives Doing more in more applications.

SyQuest Winchester drives—with removable cartridge or fixed media—are working in more applications than any other half-height Winchester. They are giving microcomputers and add-on storage systems a competitive edge. Increasing the utility of portables. Adding another dimension to telecommunications systems. Giving database systems unlimited off-line storage. Helping local networks and multi-user systems share resources.

Increasingly, OEMs and systems integrators are specifying SyQuest half-height drives. Because they get reliable Winchester performance—with fixed disk drives or cartridge disk drives. They fit almost anyplace and are designed to work most anywhere. They use standard Winchester controllers and interfaces.

SyQuest can help your system applications do more for less. For product information, circle our reader's service number. For delivery and pricing information, call us direct.

SyQuest Technology
47923 Warm Springs Blvd.
Fremont, California 94539
Telephone: 415-490-7511
Telex: 910-381-7027

See us at NCC, Las Vegas, Booth H-910

Distributed by Hamilton/Avnet

CIRCLE NO. 21 ON INQUIRY CARD

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
86/05	8086-2 (16)	Multibus	BLMX-80		BLC-86/12B-compatible	8K (64K)	6.75x12x.5	1,600	includes two BLX expansion connectors, 24 programmable parallel I/O lines, programmable synch/asynch RS232C serial interface, two 16-bit counter/timers
86/12B	8086 (16)	Multibus	BLMX-80	monitor	BLC/SBC-compatible	32K (64K)	6.75x12x.5	1,700	includes 24 programmable parallel I/O lines, programmable synch/asynch RS232C serial interface, two 16-bit counter/timers, two BLX expansion connectors
OMNIBYTE CORP.									
OB68K1A	68000 (16/32)	Multibus	IDRIS, VRTX, MTOS	VERSAbug, MACSbug	C, FORTRAN, FORTH, Pascal, BASIC	32/128K (192K)	6.75x12	1,495(Q1); 1,121(Q100)	two RS232C ports, two 16-bit parallel ports, three 16-bit timer/counters, seven prioritized interrupt levels
OB68K/MMU	68010 (16/32)	Multibus	IDRIS	VERSAbug	C	4K/16K (up to 60K)	6.75x12	1,995(Q1); 1,496(Q100)	up to four MMUs, two serial ports, seven auto-vectored interrupts, one 16-bit timer/counter
OB68K/VME1	68000 (16/32)	VME		VERSAbug		up to 112K (up to 448K)	6.3x9.2	1,195(Q1); 896(Q100)	two serial ports, one 16-bit timer/counter, one 24-bit timer/counter
ONSET COMPUTER CORP.									
CPU-6805A	146805E2 (8)	C-44	monitor	monitor, debugger		1K (2K)	4.5x5.5x.5	360(Q1); 255(Q100)	CMOS circuitry, real-time clock
CPU-8085	80C85 (8)	C-44	monitor	monitor, debugger		2K (2K)	4.5x5.5x.5	275(Q1); 210(Q100)	CMOS circuitry
CPU-801	NSC800 (8)	C-44	monitor, CP/M-80	monitor, debugger, CP/M BIOS		2K (6K)	4.5x5.5x.5	445	CMOS circuitry, real-time clock
PACIFIC MICROCOMPUTERS INC.									
PM68K	68000/ 68010 (16/32)	Multibus	UNIX, System III, V	ED and VI Editor, NROFF, TROFF, SPELL	BASIC, C, Pascal, FORTRAN, COBOL, Ada	128/ 256K (up to 32K)	12x6.75x.5	1,795(Q1); 1,440(Q100)	two serial ports, 8- or 10-MHz clock, five 16-bit counter/timers
PM68D	68000/ 68010 (16/32)	Multibus	UNIX, System III, V	ED and VI Editor, NROFF, TROFF, SPELL	BASIC, C, Pascal, FORTRAN, COBOL, Ada	256K (up to 128K)	12x6.75x.5	2,475(Q1); 1,980(Q100)	two serial ports, one parallel port, 10- or 12-MHz clock, five 16-bit counter/timers
PEOPLEWARE SYSTEMS INC.									
10017A P-FORTH	6801	STD			FORTH	2K (10K)	.5x4.5x6.5	495	one RS232C port, 2 parallel ports, automatic EEROM programming
10042A	68008	STD		monitor		16K (32K)	.5x4.5x6.5	595	two RS232C ports, one parallel port, one 16-bit timer
PHOENIX DIGITAL CORP.									
PCU 6809	6809 (8/16)	Motorola Ebus	OS9	debugger, editor, loader, GRAFPAC	C, BASIC, Pascal	16K (32K)	6x9.75x1	1,080(Q1); 600(Q100)	20 parallel I/O lines, one RS232C port, three 16-bit counter/timers, power-fail automatic restart
NCM 6809	6809 (8/16)	Motorola Ebus	OS9	debugger, editor, loader, GRAFPAC	C, BASIC, Pascal	8K (16K)	6x9.75x1	1,150(Q1); 690(Q100)	three 16-bit counter/timers, programmable baud rates
DPU-50	6809E (8)	Motorola Ebus	OS9	debugger, editor, loader, GRAFPAC	C, BASIC, Pascal	16K (64K)	6x9.75x1	1,285(Q1); 790(Q100)	two serial ports, three 16-bit counter/timers
POLYMORPHIC SYSTEMS									
Poly186	80186 (16)	S-100	Concurrent CP/M-86, MS-DOS, UNIX	editor	BASIC, Assembly C, Pascal, FORTH	256K (8K)		1,495(Q1); 897(Q100)	includes two serial ports, one parallel port
PRO-LOG CORP.									
7804A	Z80 (8)	STD				32K (32K)	6.5x4.5	265(Q1); 210(Q100)	
7806	Z80 (8)	STD	CP/M			128K (128K)	4.5x6.5	395(Q1); 325(Q100)	2.5-, 3.68- and 4-MHz versions available

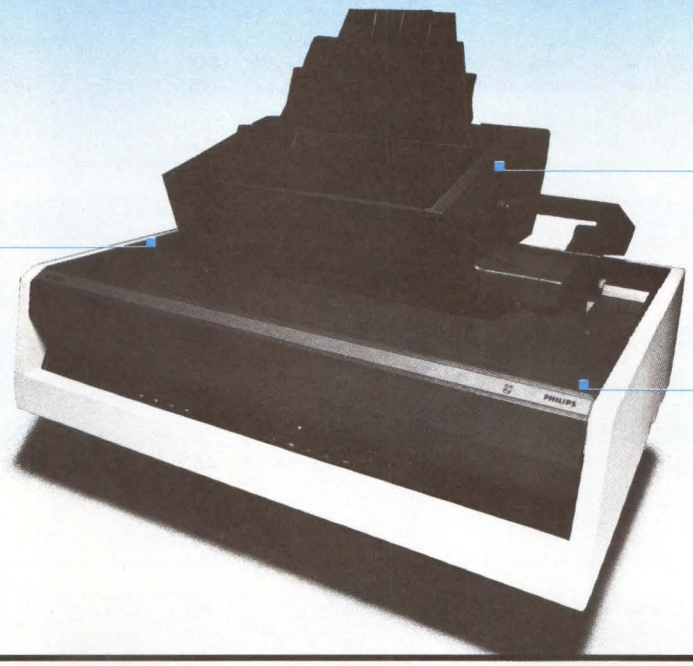
WORLD CLASS

PHILIPS GP 300 PRINTERS

GP 300, GP 300L

High speed (300 cps) output for drafting, and 120 cps for high resolution letter quality.

Text: 9 x 9 matrix: Letter quality: 18 x 25 matrix. High resolution graphics, dot addressable.



Fully integrated paper handling provides letterhead, second sheet and envelope printing; features both tractor and front feed.

The GP 300L prints colors, graphics and over 95 type fonts available; 144 x 144 dots per inch resolution.

Our Prices Make the Competition Look Cheap... But Then So Does Our Quality. And Our Performance.

Philips GP 300 printers. World-class quality and performance. The products of innovative German engineering and craftsmanship. The first true multi-speed, multi-function, integrated letter quality and graphics printers available in the USA.

Compare Philips GP 300 printers with any other printers. At any price. Compare our quality. Compare our versatility. Compare our performance. You'll see that we've redefined "top-of-the-line." Contact us today for complete details.

World-Class Electronics from Philips.

Philips Peripherals, Inc.
385 Oyster Point Blvd.
South San Francisco, California 94080
(415) 952-3000

See us at NCC, Booth D4226, 4228.

PHILIPS

CIRCLE NO. 22 ON INQUIRY CARD

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type; Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
7885A	8085A (8)	STD				2K (4K)	6.5x4.5	215(Q1); 170(Q100)	
QDP COMPUTER SYSTEMS, QUASAR DATA PRODUCTS, INC.									
SCS-I	Z80B CPU, Z80A DMA (8)	S-100	CP/M, MP/M II	monitor, loader	CBASIC, others	256K (16K)	9.5x10	1,895(Q1); 1,325(Q100)	battery real-time clock, dual-floppy controller, CIO, PIO, two SIO's with RS232C output
QUAY CORP.									
90/MPS	Z80A (8)	Z80 Bus	Quay monitor	debugger, snap, loader, trace	Assembly, BASIC	64K (14K)	1.36x 16.175x7.85	750(Q1); 565(Q100)	PROM programmer, power restart, add-on memory, PIO, SIO, direct bus access, CTC channels
90F/MPS	Z80A (8)	Z80 Bus	CP/M, MP/M	debugger, editor, boot, monitor	BASIC, FORTRAN, COBOL, Pascal	64K (14K)	1.36x 16.175x7.85	895(Q1); 670(Q100)	PROM programmer, power restart, add-on memory, PIO, SIO, direct bus access, CTC channels, on-board floppy controller
RASTER GRAPHICS INC.									
801	Z80A (8)	Multibus		debugger, disassembler	trace, execution	8K (16K)		495	two RS232C and one parallel port
802	Z80A (8)	Multibus	CP/M			64K (4K)		695	two RS232C and one parallel port; opt. boot prom
R. J. BRACHMAN ASSOCIATES INC.									
MMC/02	6502 (A) (8)	proprietary	any 6502-based system	in-circuit emulator	Assembly, PL/65	1K (6K)	4.5x6.5x.5	166(Q1); 124.50 (Q100)	1- or 2-MHz versions, memory-mapped I/O, power-on/manual rest; opt. add-on EPROM programmer, 32K RAM board, 6551 ACIA adaptor
MMC/03	6503 (8)	proprietary	any 6502-based system	in-circuit emulator	Assembly, PL/65	1K (2K)	4.5x6.5x.5	119(Q1); 89.25(Q100)	1- or 2-MHz versions, memory-mapped I/O, power-on/manual rest; opt. add-on EPROM programmer, 32K RAM board, 6551 ACIA adaptor
SBE INC.									
M68K10	68000 (16, 32)	Multibus	CP/M-68K, poly-FORTH/32, REGULUS	PROBUG debugger	Assembly, C, BASIC, FORTRAN, Pascal, COBOL, FORTH	128K (up to 256K)	7x12x.5	1,695	8-, 10- or 12-MHz versions, dual async/sync serial port, triple timer, 24-bit parallel port
SERVO COMPUTER CORP.									
Servo 8	Z80B (8)		CP/M, Oasis	monitor, debugger		64K (2K)	5.75x8	495	two RS232C ports, one parallel printer port, controls as many as four 5.25- and four 8-inch floppy disk drives concurrently
SMOKE SIGNAL BROADCASTING									
SCB-69	6809 (8, 16)	SS-50	DOS69, OS-9 (UNIX-like)	monitor		1K (20K)	5x9	399(Q1); 239.40 (Q100)	date/time clock, 4-battery backup, 20-address line MMU, FPLA
SOLARCOM TECHNOLOGY INC.									
SCMT-85	8085 (8)	STD		custom software		.25K (8K)	4.5x6.5x.5	194(Q1); 137(Q100)	22 I/O ports, serial I/O lines, 14-bit counter/timer, 8 analog inputs; opt. ROM
SCMT-88	8088 (16)	STD		custom software		32K (64K)	4.5x6.5x.5	435(Q1); 275(Q100)	2K-bytes RAM, 4.7-MHz CPU clock; opt. ROM
SCMT-11	8085 (8)	44 PIN		custom software		.25K (8K)	4.5x6.5x.5	145(Q1); 105(Q100)	22 I/O ports, serial I/O lines, 14-bit counter/timer, 8 analog inputs; opt. ROM
SPURRIER PERIPHERALS CORP.									
SPC-STD-68008	68008 (16)	STD	CP/M-86	monitor	BASIC, C, COBOL, FORTRAN	128K (128K)			power restart, full signal buffering
SPC-STD-Z80II	Z80 (8)	STD	CP/M	monitor	BASIC, FORTRAN, COBOL	64K (64K)			one serial port, power restart, memory and I/O mapped

SINGLE-BOARD MICROCOMPUTERS

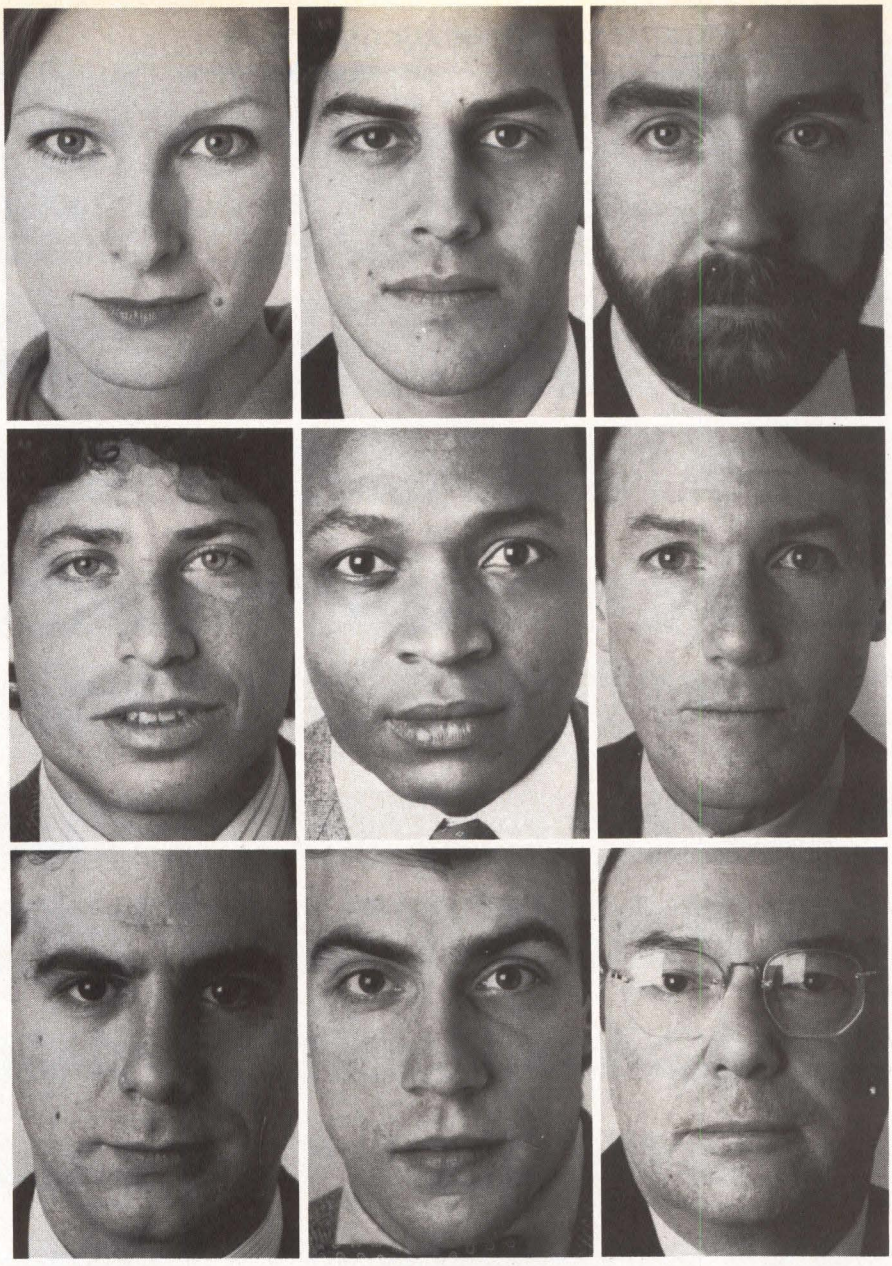
Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
SPC-STD-6809II	6809 (8)	STD	FLEX, UNI-FLEX	monitor	BASIC, C, FORTRAN, COBOL	64K (64K)			one serial port, power restart, memory and I/O mapped
STD MICROSYSTEMS									
05510	6502 (8)	STD				64K		495–695	DMA; 1-, 2-, 3-, 4-MHz versions available
05520	6502 (8)	STD				16K		195–275	PTM; 1-, 2-, 3-, 4-MHz versions available
05521	6502 (8)	STD				64K		295–400	PTM; 1-, 2-, 3-, 4-MHz versions available
05522	6502 (8)	STD						295–400	parallel, serial interface; 1-, 2-, 3-, 4-MHz versions available
05523	6502 (8)	STD						295–400	PIA serial interface; 1-, 2-, 3-, 4-MHz versions available
05524	6502 (8)	STD						295–400	dual RS232C/449 interface; 1-, 2-, 3-, 4-MHz versions available
05525	6502 (8)	STD						695–800	FFT with dual RS232C/449 serial interface; 1-, 2-, 3-, 4-MHz versions available
05526	6502 (8)	STD						395–500	DMA with RS232C/449 serial interface; 1-, 2-, 3-, 4-MHz versions available
05527	6502 (8)	STD						295–400	clock/calendar, serial interface; 1-, 2-, 3-, 4-MHz versions available
05528, 9	6502 (8)	STD						595–700	serial parallel interface; 1-, 2-, 3-, 4-MHz versions available
05373	Z80 (16)	STD						195–255	triple RS232C/449 interface; 2.5-, 4-, 6-MHz versions available
05374	Z80 (16)	STD						185–245	RS232C/449, Centronics interface; 2.5-, 4-, 6-MHz versions available
SYNALTA SYSTEMS									
8085	8085A (8)	STD	CP/M	monitor, debugger, assembler, disassembler		64K (4K)	.375x4.5x6.5	395(Q1); 316(Q100)	three parallel ports, one serial port, programmable counter/timer
DCIC-2	8085A (8)	proprietary	CP/M	monitor, debugger	CP/M languages	4K (4K)	1x4.5x6.5	495(Q1); 396(Q100)	two RS232C ports, two parallel ports, programmable communications controller
MCG-85	8085A (8)	proprietary	CP/M	assembler, disassembler	CP/M languages	4K (4K)	1x4.5x6.5	99(kit) 135(A&T) (Q1); 84(kit) 108(A&T) (Q100)	one serial port, one bidirectional port, programmable counter/timer
TEXAS INSTRUMENTS									
TM990/100MA-1	TMS 9900 (16)	TM 990	TI BUG custom system			2K (8K)	11x7.5	595(Q1); 476(Q100)	includes 16 vectored interrupts, 16 parallel I/O ports; addresses 64K bytes of memory
TM990/100MA-2	TMS 9900 (16)	TM 990	TI BUG custom system			2K	11x7.5	598(Q1); 478(Q100)	includes 16 vectored interrupts, 16 parallel I/O ports; addresses 64K bytes of memory
TM990/101MA-1	TMS 9900 (16)	TM 990	TI BUG, PDOS, UCSD P-System, Power BASIC		BASIC, Pascal, FORTH	1K (1K)	11x7.5	750(Q1); 600(Q100)	includes two RS232C serial ports and one parallel I/O port
TM990/101MA-2	TMS 9900 (16)	TM 990	TI BUG, PDOS, UCSD P-System, Power BASIC		BASIC, Pascal, FORTH	2K (1K)	11x7.5	780(Q1); 625(Q100)	includes two RS232C serial ports and one parallel I/O port

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
TM990/101MA-3	TMS 9900 (16)	TM 990	TI BUG, PDOS, UCSD P-System, Power BASIC		BASIC, Pascal, FORTH	4K (2K)	11x7.5	895(Q1); 716(Q100)	includes two RS232C serial ports and one parallel I/O port
TM990/102-1	TMS 9900 (16)	TM 990	PDOS, Power BASIC	PDOS-compatible	9900 Assembly, BASIC, FORTH, FIG FORTH	(16K)	11x7.5	600(Q1); 1,230(Q100)	includes memory mapping, 10-MHz clock, 16 vectored interrupts, RS232C port
TM990/102-3	TMS 9900 (16)	TM 990	PDOS, Power BASIC	PDOS-compatible	9900 Assembly, BASIC, FORTH, FIG FORTH	128K (16K)	11x7.5	480(Q1); 984(Q100)	
TM990/103-1	TMS 99105 (16)	TM 990	PDOS, Assembler		BASIC, FORTH, Pascal	4K (12K)	11x7.5	1,830(Q1); 1,464(Q100)	includes 64K RAM, 24-MHz clock, memory mapping, 16 vectored interrupts; opt. plug-in module, addresses 16M-bytes of memory
TM990/103-2	TMS 99105 (16)	TM 990	PDOS, Assembler			(4K)	11x7.5	1,660(Q1); 1,328(Q100)	includes 64K RAM, 24-MHz clock, memory mapping, 16 vectored interrupts; opt. plug-in module, addresses 16M-bytes of memory
TL INDUSTRIES INC.									
6809-2	6809 (8)	EXORciser, Micromodule		monitor-debugger with T9 BUG		2K (8K)	9.75x6x.5	410	selectable baud rates, programmable memory mapping
6809-3	6809 (8)	EXORbus, Micromodule		monitor-debugger with T9 BUG		12K (16K)	9.75x6x.5	425	1.5- or 2-MHz, programmable memory mapping, selectable baud rates
901	9900 (16)	TM990				12K (32K)	11x7.5x.5	675	enhanced replacement for TM990/IDIM
509	6809 (16)	STD		monitor-debugger with T9BUG		4K (12K)	4.5x6.5x.5	160	memory map
580	Z80A (8)	STD		monitor-debugger with MDX-DEBUG		2K (8K)	4.5x7.56x.8	160	prioritized vector interrupt, memory mapping
585	8085AH (8)	STD		monitor-debugger with DEBUG-85		56K (62K)	4.5x6.5x.5	160	3-, 5-, 6-MHz versions, memory mapping, extended addressing
TELETEK ENTERPRISES INC.									
HD/CTC	Z80A (8)	S-100	CP/M, Turbo-DOS			4K–8K (6K–16K)		795(Q1); 461(Q100)	hard disk and cartridge tape controller, 2K FIFO buffer
Systemaster	Z80A (8)	S-100	CP/M, Turbo-DOS	RAM Drive		64K (2K–32K)	IEEE-696 standards	895(Q1); 519(Q100)	NEC 765 floppy controller chip, counter/timer chip, MMU
SBC I	Z80A (8)	S-100	Turbo-DOS			64K–128K (2K–8K)	IEEE-696 standards	875(Q1); 507(Q100)	2K FIFO buffer, two serial ports, opt. Z80B processor
SBC II	Z80A (two) (8)	S-100	Turbo-DOS			64K/CPU (2K–8K/CPU)	IEEE-696 standards	1,395(Q1); 809(Q100)	dual processors, two serial ports, 2K FIFO buffer
TRIANGLE DIGITAL SERVICES LTD.									
TDS900/6303	6303 (8)	single Eurocard	FORTH	cassette interface, PROM programmer	FORTH	12K (8K)	6.3x3.9	270(Q1); 180(Q100)	CMOS circuitry
TDS900/6803	6803 (8)	single Eurocard	FORTH	cassette interface, PROM programmer	FORTH	12K (8K)	6.3x3.9	225(Q1); 150(Q100)	CMOS circuitry
WAVE MATE INC.									
BULLET SBC	Z80A 4 MHz (8)	proprietary	CP/M 3.0, MP/M-II	CP/M software	CP/M languages	128K	8x10.7x.625	595(Q1); 417(Q100)	floppy disk controller, two serial ports, one parallel port
SUPER BULLET SBC	Z80A 8 MHz (8)	proprietary	CP/M 3.0, MP/M-II, OASIS	CP/M software	CP/M languages	256K (16K)	8x10.7x.625	1,350(Q1); 945(Q100)	floppy disk controller, four serial ports, one parallel port

SINGLE-BOARD MICROCOMPUTERS

Company Model	CPU type, Word size (in bits)	Bus	Operating system	Software support	Programming languages supported	On-board memory in bytes RAM (ROM)	Dimensions (inches)	Unit price ($)	Notes, features, options
WINTEK CORP.									
MCH68	6809 (8)	Wintek 44-pin		debuggers, monitor, assemblers	BASIC, C, PL/W, Assembly	up to 24K (up to 64K)	4.5x6.5x.5	195(Q1); 117(Q100)	two RS232C ports, four parallel ports, real-time clock interrupt
WINTECH SYSTEMS INC.									
MCM-SBC	Z80 (8)	STD	CP/M-80	monitor		64K (64K)	.5x4.5x7.5	695	floppy disk controller, two RS232C ports, programmable counter/timer
MCM-SBC2	Z80A (8)	STD		monitor		64K (16K)	.5x4.5x7.5	495	two RS232C ports, 20 programmable parallel I/O lines, programmable counter/timer
LPM-CPU3	NSC800 (8)	STD		monitor		24K (24K)	.5x4.5x6.5	345	22 programmable parallel I/O lines, two 16-bit counter/timers
XYCOM									
1862 Plus	Z80-based (8)	proprietary		debugger, editor, loader	BASIC, IDS	128K	8.5x10.5x.6		
1874 Plus	(8)	proprietary		debugger, editor, loader	BASIC, IDS	128K	8.5x10.5x.6		includes on-board industrial BASIC
1864	Z80-based (8)	proprietary		debugger, editor, loader	BASIC, IDS	128K	8.5x10.5x.6		
ZENDEX CORP.									
ZX-86-02	8086/8087 (16)	Multibus	CP/M-86, RMX-86	monitor		16K (64K)	.5x12x6.5	1,595(Q1); 1,000(Q100)	dual serial ports, 5-, 8-, 10-MHz versions, two 16-bit time/event counters
ZX-86/26-528	8086 (16)	Multibus		monitor		128K (32K)	.7x12x6.75	1,995	24 programmable parallel I/O lines
ZX-186-802	80186 (16)	Multibus	CP/M-86, RMX-86	monitor		256K (128K)	.5x12x6.75	2,395	two DMA channels, two SBX connectors
ZX-80/15A	8085 (8)	Multibus	CP/M-80, ISIS-II			16K (32K)	.5x12x6.5	550(Q1); 375(Q100)	full Multibus arbitration logic
ZX-82	8002 (16)	Multibus				32K (8K)	.5x12x6.5	1,995	
ZX-85	8085 (8)	Multibus	CP/M-80, ISIS-II	monitor, boot		64K (4K)	.5x12x6.5	2,660(Q1); 1,900(Q100)	
ZX-88/32	8088 (16)	Multibus	CP/M-86	boot/monitor		64K (32K)	.5x12x6.5	1,095(Q1); 750(Q100)	two programmable USARTS
ZX-88/50-532	8088 (16)	Multibus	CP/M-86	monitor		32K (48K)	.7x12x6.75	1,695	serial expansion to 8 channels
ZX-88/50-528	(16)	Multibus	CP/M-86	monitor		128 (48K)	.7x12x6.75	1,995	serial expansion to 8 channels
ZIATECH CORP.									
ZT 8812	8088 (16)	STD	CP/M-86, iRMX-86	debugger development system	CP/M languages	(16K)	STD standard	445	direct addressing of 1M-byte main memory
ZT 8810	8088 (16)	STD		debugger development system		(16K)	STD standard	449	on-board interrupt controller, one serial I/O port
ZT 7805	8085A (8)	STD		debugger monitor		1K (8K)	STD standard	550	two serial I/O lines
ZT 8814/8815	80188 (16)	STD, iSBX		DBUG monitor kit, development system		34 (32K)	STD standard	650	MULTIMODULE I/O connector, interrupt controller
ZT 8830	8088 (16)	STD, iSBX		DBUG monitor kit, development system		32K (32K)	STD standard	475	one serial port, two 8-bit parallel I/O ports, five 8-bit counter/timers



WHERE TO MEET THE MOST OEM'S AND SYSTEMS INTEGRATORS FACE TO FACE TO FACE TO FACE...

Meet them at a Mini/Micro.

It's the one computer trade event that focuses entirely on computer design needs. That means you, as an exhibitor, can deal face to face with a prime concentration of OEM's, designers, systems integrators and software developers. On your own turf, but in their backyard; Mini/Micros are held regularly in the prime markets.

What's more, many Mini/Micros run concurrently with high-tech electronics shows like Electro, Midcon, Southcon and Northcon. That means extra value for you, because attendance statistics show that 27% of these attendees go to Mini/Micro as well.

So if you're after OEM's and systems integrators, be at a Mini/Micro. For complete information, call toll-free: 800-421-6816. In California, 800-262-4208.

Meet OEM's and systems integrators where they live.

Sept. 11-13 1984	Mini/Micro Southwest Midcon	Dallas Dallas
Oct. 2-4 1984	Mini/Micro Northwest Northcon	Seattle Seattle
Feb. 5-7 1985	Mini/Micro West	Anaheim
Mar. 5-7 1985	Mini/Micro Southeast Southcon	Atlanta Atlanta
May 23-25 1985	Mini/Micro Northeast Electro	New York New York

Mini/Micro
FOCUSING ON THE OEM

Sponsored by regional chapters of IEEE and the Electronic Representatives Association

CIRCLE NO. 23 ON INQUIRY CARD

Personal computer spotlight shifts to portables

To gain a foothold in an emerging market, major computer manufacturers introduce portable, transportable and hand-held microcomputers

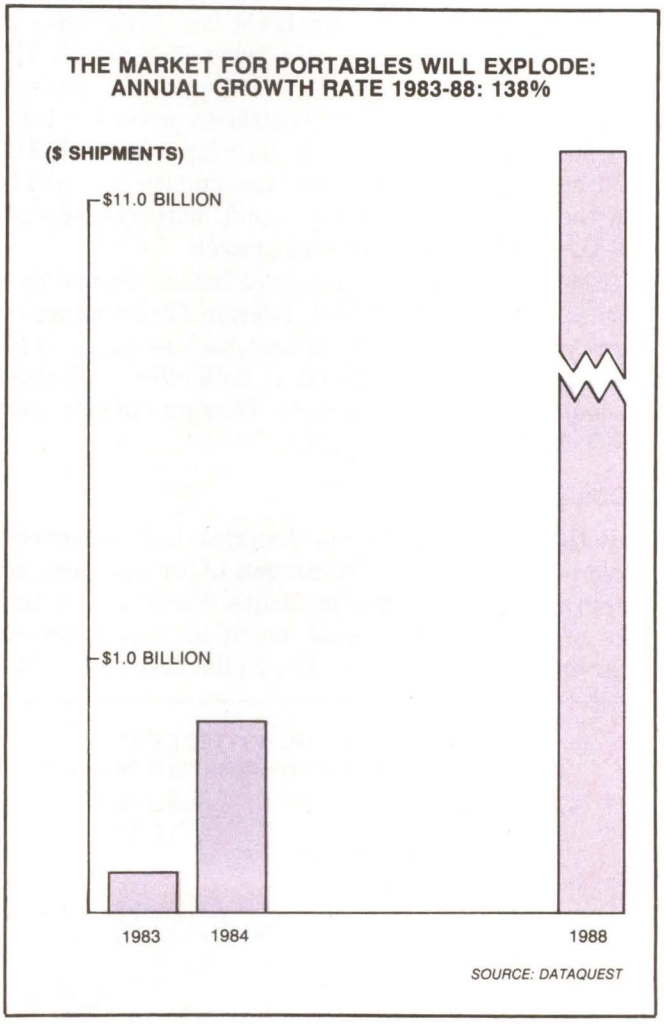
Tom Moran, Associate Editor

The major manufacturers of single-user microcomputers are now poised for a market share battle in two new fast-growing market segments—portable and transportable microcomputers. The portable computer market is gaining momentum because of improved displays, smaller storage devices and falling component prices. Significant recent introductions by major players include Apple Computer Inc.'s Macintosh, IBM Corp.'s Portable Personal Computer and Hewlett-Packard Co.'s Portable HP110.

In the past two years, the portable computer market has divided into three areas—transportable computers, "true" portables and hand-held units. A transportable computer typically weighs more than 20 pounds and offers a CRT, one or two 5¼-inch floppy disk drives, a detachable keyboard and varying amounts of standard bundled software. These powerful machines appeal to users more because of integration than mobility. A transportable usually stays on a user's desktop or is carried between home and work.

True portables, also called "briefcase," "knee-top" or "lap-size" computers, typically weigh 4 to 20 pounds and offer flat-panel displays, battery operation and less RAM and secondary storage than their bulkier cousins. Their keyboards range from "full-travel" devices to pressure-sensitive membranes, and many of these systems use non-standard software. However, technological innovations such as microfloppy disk drives, better flat-panel displays and less expensive RAM, ROM and bubble-memory devices are conspiring to create knee-top systems with almost as much functionality as transportables.

The third market segment, hand-held computers, includes very small, very light machines that lack full keyboards and full displays. Hand-held units are distinguished from calculators by their ability to run at least one high-level language.



True portables grow fastest

Of these three market segments, the most dynamic growth will occur in the true portables, as lightweight machines gain power and versatility. By 1988, new full-function knee-top computers and their successors may largely supplant today's bulky transportable machines. Ken Lim, an analyst for market research company Dataquest Inc., San Jose, Calif., says, "We project a compound annual growth rate for true portables of 116.3 percent from 1983 through 1988. That's the largest growth rate we see for any of our segments, which covers home computers up to but not including mainframes."

In May, HP introduced the Portable HP110, a 9-pound complementary-metal-oxide-semiconductor (CMOS) system with a 16-line, 80-column liquid-crystal display (LCD), which runs the MS-DOS operating system, and Lotus Development Corp.'s 1-2-3 integrated software package in ROM. Because the HP110 has 272K bytes of static system RAM and 384K bytes of socketed custom ROM, it uses fewer disk drives. HP also recently introduced the 9114 portable 3½-inch microfloppy drive. Lead-acid batteries power the Portable and the 9114, which can be interfaced using the HP interface loop (HP-IL). Users can employ the HP110 and the 9114 with HP's 5½-pound, battery-powered, HP-IL version of its ThinkJet printer.

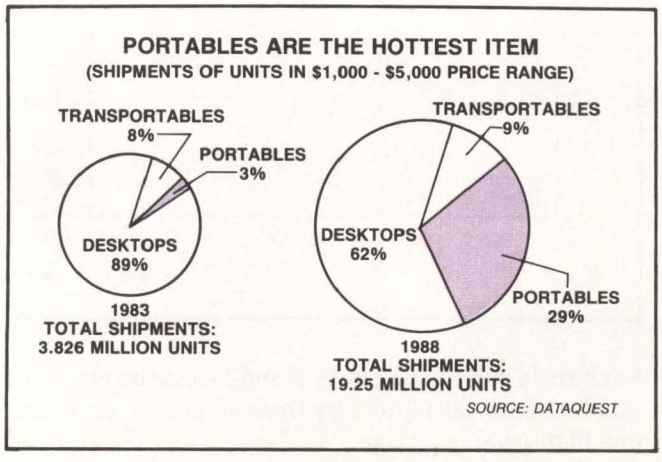
Other promising true portables include Sharp Electronics Corp.'s PC5000 and Teleram Communications Corp.'s T-5000. Although neither machine has as much ROM or RAM as HP's Portable, both offer 128K bytes of non-volatile bubble memory. Teleram officials claim the T-5000 has a 16-line LCD.

LCDs get larger

Both Sharp and Hitachi America Ltd. reportedly have prototype 24-line, 80-column LCDs that they are integrating into portable machines. Production quantities of these LCDs should begin to appear around year-end or in early 1985. The 24-line LCDs will offer the same size screen as that of most desktop systems and thus will eliminate one problem of porting standard software packages to knee-top portables. Because of their ability to display entire paragraphs, graphs and spreadsheets without scrolling, systems with 24-line LCDs should severely impact sales of machines with 1- to 4-line LCDs. Price reductions on 8- and 16-line models will occur as manufacturers become more experienced in producing them.

Electroluminescent flat-panel displays such as those used in Grid Systems Corp.'s Compass unit are slowly becoming less expensive, but they consume so much power that systems incorporating them can be run only on AC power. Although Grid has recently reduced the Compass' price to about $6,000 without software, the price is not low enough for the broad markets soon to be created by powerful knee-tops with standard software for $3,000 or less. LCDs should continue to be the choice for briefcase-sized machines because of their low power requirements and relatively low price. However, they require adjustable viewing angles and ambient light to be legible and they perform slower than CRTs.

Above all, true portables will appeal to users because of their mobility, low price and functional integration of peripherals, whether the peripherals are modular or packaged in one unit. For the foreseeable future, powerful general-purpose machines will not shrink below briefcase size because flat-panel displays and full-travel keyboards must be large enough for easy reading and typing.

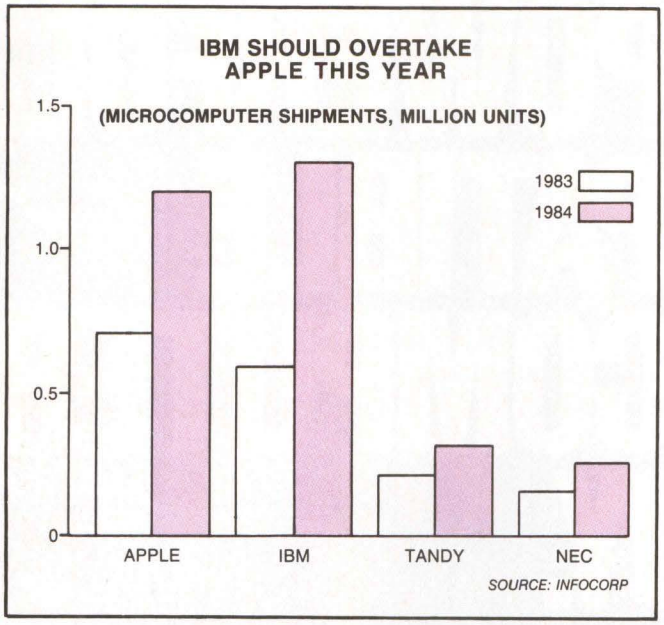


Macintosh sales skyrocket

Sandy Gant, analyst for InfoCorp, Cupertino, Calif., estimates that Apple will sell 350,000 Macintosh microcomputers in 1984. The 22-pound transportable unit should fare well because of its small footprint, high-resolution monochrome screen, 32-/16-bit 68000 processor and its mouse-driven, Lisa-like application software. Customers for the Macintosh will include first-time computer users, Apple II owners ready to migrate to a more powerful system, small businesses and departments of large corporations.

Apple's initial supply of Macintoshes disappeared rapidly, and dealers report a large number of customer inquiries. However, Apple has not been able to get its automated factory in Fremont, Calif., operating near its rated capacity of one finished system every 27 seconds. As a result, the company could lose customers to the next interesting machine to come along.

IBM's $2,795 Portable PC puts IBM's seal of approval on the transportable computer market. "This product was introduced primarily in response to requests from our customers and dealers [who asked for] the IBM PC but in a more transportable, lighter version," says Rick Scott, spokesman for IBM's Entry-Level Systems Divi-



sion in Boca Raton, Fla.

Scott denies reports that the Portable PC would not be immediately available nor distributed through retail dealers. "We said supplies would be limited initially, but I would not want to be any more specific than that. Production will be increasing and already is." He says the unit will be available through the more than 1,400 authorized IBM personal computer retail dealers.

InfoCorp's Gant says the Portable PC will not directly affect other manufacturers' sales. "I think more transportables will be shipped."

However, on the verge of entering the transportable market, IBM began court proceedings against several makers of IBM-compatible machines it felt were infringing on its copyrighted ROM basic input/output system (BIOS) software. Several disputes were resolved by consent of the defendants on the same day IBM filed the lawsuits. Paul Saunders, a partner in New York law firm Cravath, Swain and Moore, representing IBM, stated that the agreements resulted in permanent injunctions against the defendants for the use of IBM-copyrighted materials. One of the affected companies, Eagle, Los Gatos, Calif., posted a $7 million loss partly as a result of having to stop shipments while rewriting the BIOS.

IBM and the leading maker of IBM-compatible transportables, Compaq, agree that IBM did not contemplate taking action against Compaq. Ken Price, director of corporate communications for Compaq, says, "We felt from the very beginning that there was no reason for concern because we designed [our] ROM BIOS from scratch.

Compaq shipped $111 million worth of systems in its first year, which, Price claims "no other corporation in the history of American business has ever done. Yet some people attribute that to luck. The product filled a void in the marketplace which no one else at the time was offering—the combination of true compatibility, transportability, full function and delivery of those points."

According to Margaret Phanes, publicity director at Kaypro, which introduced the first transportable machine with an integral hard-disk drive, Kaypro is responding to the IBM PC standard by marketing a knee-top MS-DOS machine from Mitsui and Co. (USA) Inc. Designed in part by Microsoft Corp.'s Kazuhiko Nishi, who worked on the Radio Shack model 100, the machine should be shipped in October. Kaypro planned to show prototypes of the system at the National Computer Conference. The notebook-sized, IBM PC-compatible unit will plug into a desktop module with IBM-compatible expansion slots. Kaypro will introduce various versions of the desktop system, including one with two 5¼-inch floppy disk drives and one with a hard disk in place of one floppy drive.

Kaypro also plans to announce a transportable IBM PC-compatible that will incorporate a Winchester disk drive. Phanes denies that production delays of Kaypro's transportable design led to the marketing agreement with Mitsui. "In the summer, there was a shortage of drives, but we have brought several new suppliers on board, so we are not suffering from a shortage at this time." Phanes states that Mitsui was seeking a strong retail-dealer network to market its notebook-sized machine and felt that the company could benefit from the expanded product line. "If there's an industry standard, we want to support it, and we want to continue being a technological innovator," she says. According to Phanes, Kaypro's CP/M market is "alive and well." Phanes adds that Kaypro reduced the price of the Kaypro 2 to $1,295 to target the electronic typewriter market. "We can do well when people spend their own money for a computer, especially small businesses." However, analysts agree that, although the 8-bit CP/M after-market will thrive on the large number of user installations, such systems will give way to 16- and 32-bit systems over the next five years.

Although many companies will begin to introduce systems as portables or transportables, Kaypro is reversing that trend and broadening its product line with a desktop system called Robie. Robie offers two 2.6M-byte (formatted), 5¼-inch floppy disk drives from DriveTec Inc., San Jose, Calif. Kaypro has purchased manufacturing rights to the high-capacity floppy drives, which it will begin to manufacture. □

Interest Quotient (Circle One)
High 804 Medium 805 Low 806

DIMENSION. THE MOST POWERFUL, MOST COMPATIBLE PERSONAL COMPUTER YOU CAN BUY.

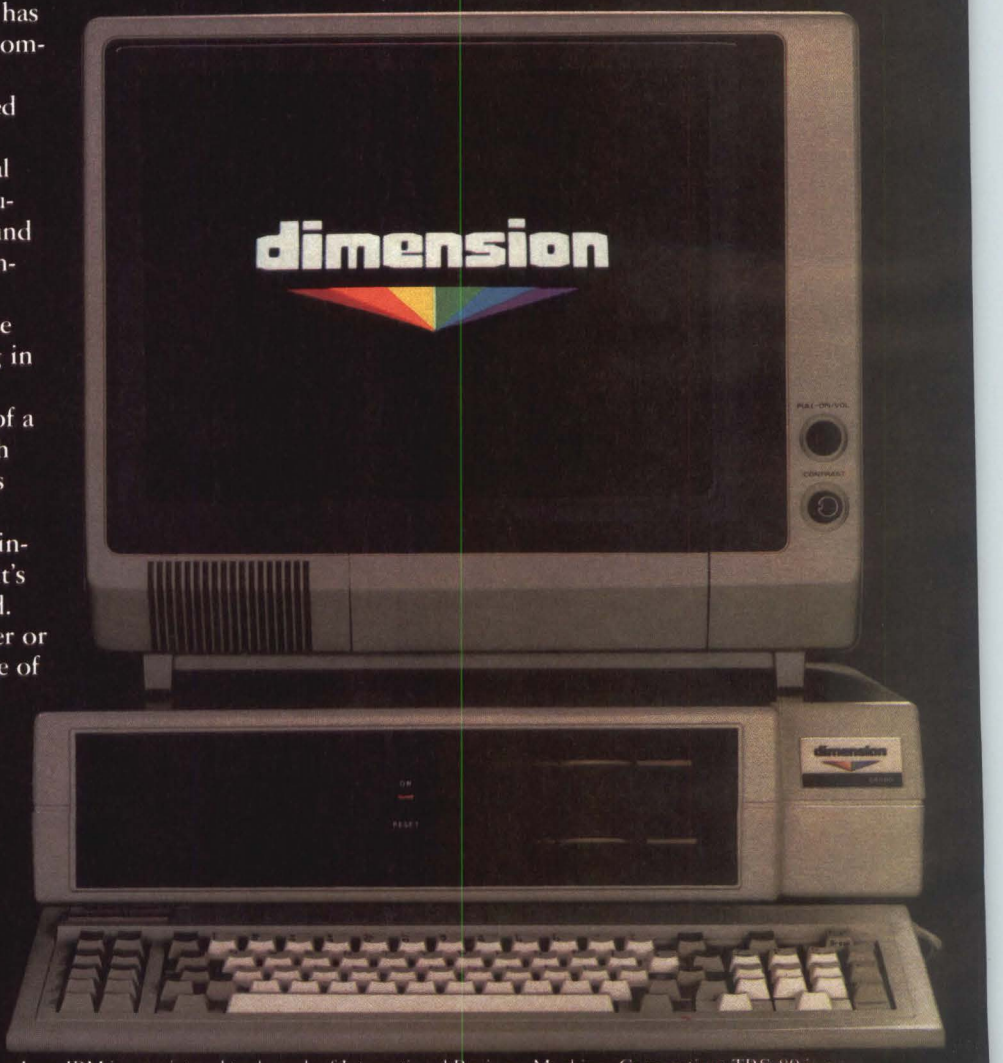
Introducing the capability the world has been waiting for. A single personal computer able to handle Apple,® IBM,® TRS-80,® UNIX™ and CP/M® based software.

The Dimension 68000 Professional Personal Computer does it all. It actually contains the microprocessors found in all of today's popular personal computers. And a dramatic innovation creates the environment that lets these systems function merely by plugging in the software.

Add to this the incredible power of a 32 bit MC68000 microprocessor with up to 16 megabytes of random access memory.

Dimension has the power of a mainframe at a personal computer price. It's obviously the best value you can find. For more information ask your dealer or call us at (214) 630-2562 for the name of your nearest dealer.

(CRT not included)



dimension™
68000

A product of
Micro Craft Corporation
4747 Irving Blvd., Suite 241
Dallas, Texas 75247. ©1983

CIRCLE NO. 24 ON INQUIRY CARD

Apple is a registered trademark of Apple Computer, Inc.; IBM is a registered trademark of International Business Machines Corporation; TRS-80 is a registered trademark of Radio Shack, a Tandy Corporation company; UNIX is a trademark of Bell Laboratories, Inc.; CP/M is a registered trademark of Digital Research Corporation.

DEALER INQUIRIES INVITED

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
ALCYON CORP.							
APS	12-inch, monochrome (80x25)	68000	256K (2M)	REGULUS	COBOL, BASIC, FORTRAN, Pascal, C	9,950	includes one 3.9-inch, 5M-byte hard disk cartridge, one 5M- to 112M-byte hard disk drive, real-time clock, 4 ports
ALSPA COMPUTER INC.							
ACI-1/DS		Z80A	64K (64K)	CP/M	Pascal, COBOL, FORTRAN	2,495	includes three RS232C and two parallel ports, one 8-inch, 1212K-byte diskette drive; opt. clock/calendar, 10M-, 20M-, 35M- or 50M-byte hard disk drives
ACI-2/SS		Z80A	64K (64K)	CP/M	Pascal, COBOL, FORTRAN	2,995	includes three RS232C and two parallel ports, one 8-inch, 1212K-byte diskette drive; opt. clock/calendar, 10M-, 20M-, 35M- or 50M-byte hard disk drives
ACI-1/SS		Z80A	64K (64K)	CP/M	Pascal, COBOL, FORTRAN	1,995	includes three RS232C and two parallel ports, one 8-inch, 596K-byte diskette drive; opt. clock/calendar, 10M-, 20M-, 35M- or 50M-byte hard disk drives
ACI-2/DS		Z80A	64K (64K)	CP/M	Pascal, COBOL, FORTRAN	3,695	includes three RS232C and two parallel ports, two 8-inch, 2424K-byte diskette drives; opt. clock/calendar, 10M-, 20M-, 35M- or 50M-byte hard disk drives
AMPRO							
AMPRO Series 100	any ASCII terminal	Z80A	64K	CP/M 2.2, ZCPR 3	BASIC, C, FORTRAN, Pascal, COBOL, Assembly	1,295 (800K); 1,495 (1.6M)	includes one 800K-byte or 1.6M-byte diskette drive, bundled software, two serial I/O ports, one parallel I/O port
ANALOG DEVICES							
MACSYM-150	12-inch, 8-color (24x80)	8086, 8087	256K (512K)	MP/M, Concurrent CP/M	BASIC, Pascal	7,500	includes two 5.25-inch, 320K-byte diskette drives, one 10M-byte hard disk drive, I/O ports
MACSYM-350	12-inch, 8-color (24x80)	8086, 8087	256K (512K)	MP/M, Concurrent CP/M	BASIC, Pascal	11,000	includes two 5.25-inch, 320K-byte diskette drives, one 10M-byte hard disk drive, I/O ports
APPLE COMPUTER							
IIe	12-inch, b&w or green (80x24)	6502	64K (128K)	Apple DOS, ProDOS, Pascal, CP/M, MS-DOS	BASIC, Pascal, Pilot, Logo, Assembly, COBOL, FORTRAN	1,295	includes system software, keyboard; opt. monitor, 148K-byte diskette drive, 5M-byte hard disk drive
III+	12-inch, b&w or green (80x24)	6502	256K (256K)	SOS, Pascal, CP/M, MS-DOS	BASIC, Pascal, Assembly, COBOL, FORTRAN	2,995	includes system software, keyboard; opt. monitor, 140K-byte diskette drive
MacIntosh	9-inch, b&w	68000	128K (128K)	proprietary	BASIC, Pascal	2,495	includes one 400K-byte diskette drive, systems software; opt. 400K-byte diskette drive
Lisa 2	12-inch, b&w (80x24)	68000	512K (1M)	proprietary, UNIX, CP/M, Pascal	BASIC, Pascal, COBOL	3,495	includes one 400K-byte diskette drive
APPLIED MICRO TECHNOLOGY INC.							
MS4000	12-inch, P4, P31 phosphor (80x24)	780A, 780B	16K (128K)	CP/M-80	BASIC, Pascal, FORTRAN	6,500	includes two 5.25-inch, 370-byte diskette drives and one 5M-, 10M-, or 20M-byte hard disk drive
AVATAR TECHNOLOGIES INC.							
TC1/10		Z80A	64K (64K)	CP/M	MBASIC, CBASIC, Assembly	1,595	converts asynchronous terminals into intelligent workstations with local processing capability; includes one or two 5.25-inch, 410K-byte diskette drives and one 12M-byte hard disk drive
TC100/110		8088-2, Z80A	128K (256K)	CP/M, MS-DOS, PC-DOS emulation	MBASIC, CBASIC, Assembly	1,995	converts asynchronous terminals into intelligent workstations with local processing capability; includes one or two 5.25-inch, 320K- or 360K-byte diskette drives and one 12M-byte hard disk drive

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
TC3278		8088-2, Z80A	128K (256K)	CP/M, MS-DOS, PC-DOS emulation	MBASIC, CBASIC, Assembly	1,995	converts asynchronous terminals into intelligent workstations with local processing capability; includes one or two 5.25-inch, 320K- or 360K-byte diskette drives and one 12M-byte hard disk drive
ATV SYSTEMS INC.							
ATV Jacquard 500	12-inch, white or green (80x24)		128K				two 250K- or 500K-byte diskette drives, applications software, two RS232C ports; opt. one or two 12- or 24M-byte cartridge hard disk drives
BEEHIVE INTERNATIONAL							
TOPPER II	12-inch, green (80x25)	Z80	64K	CP/M	COBOL, BASIC	3,595	includes two 5.25-inch, 512K-byte diskette drives
TOPPER	12-inch, green (80x25)	8085	64K	CP/M	COBOL, BASIC, WSL	2,995	includes two 5.25-inch, 512K-byte diskette drives
CALIFORNIA COMPUTER SYSTEMS							
Echelon-I	12-inch, monochrome (132x44)	8088, Z80B	256K (1M)	PC-DOS, MS-DOS, CP/M-86	BASIC, FORTRAN, COBOL	3,600	includes two 5.25-inch, 1.2M-byte diskette drives, one 100M-byte hard disk drive; opt. 8-color screen
Calstar II	12-inch, monochrome (80x25)	Z80B	128K (256K)	CP/M 2.2, OASIS	BASIC, FORTRAN, COBOL	2,795	includes two 8-inch, 2.4M-byte diskette drives, one 30M-byte hard disk drive, bundled software
Calstar III		Z80B	128K	CP/M, OASIS	CP/M, OASIS languages	4,395 (Q1); 2,856 (Q100)	
Mega-5516-1/2	14-inch, monochrome (132x24)	80186 8 MHz	256K (1M)	CP/M-86, MOS-DOS, Turbo-DOS	BASIC, COBOL, FORTRAN	5,500	includes two 5.25-inch, 1.2M-byte diskette drives, one 60M-byte hard disk drive, math-processor, Turbo-DOS slave board
CALLAN DATA SYSTEMS							
UNISTAR 100	12-inch, green (80x25)	68000 8 MHz	512K (2M)	UNIX System V	C, FORTRAN 77, Pascal, Ada, BASIC, COBOL, Assembly	11,450	includes one parallel port, two serial ports, one 5.25-inch, 616K-byte diskette drive and one 21M- or 43M-byte disk drive
CANON U.S.A. INC.							
AS-100M	12-inch, green (80x25)	8088	128K (512K)	CP/M-86, MS-DOS	GN-BASIC, AS-BASIC, RM COBOL, LII COBOL	2,995	includes dual 5.25-inch diskette drive
AS-100C	8-color out of 27 (80x25)	8088	128K (512K)	MS-DOS, CP/M-86	GN-BASIC, AS-BASIC, RM COBOL, LII COBOL	3,495	includes two 5.25-inch diskette drives
CASIO INC.							
FP-200	LCD, b&w (20x8)	80C85	8K (32K)	Casio BASIC	Casio BASIC	700	includes built-in spreadsheet, RS232C and Centronics ports, one 5.25-inch, 70K-byte diskette drive; opt. plotter
PB-700	LCD, b&w (20x4)	8-bit proprietary	4K (16K)	Casio BASIC	Casio BASIC		opt. 4-color plotter, Centronics port, microcassette, memory modules
CENTURY COMPUTER CORP.							
Vanguard 800		8085, 8088	256K (64K)	CP/M, CP/M-86, MP/M, UNIX	CP/M, MP/M languages	5,150 (Q1); 4,570 (Q100)	memory mapping, reset circuitry, real-time clock, dual processor
Vanguard 8000		8085, 8086	128K	CP/M-86, Concurrent MP/M	BASIC, COBOL, Pascal, C	3,000	includes real-time clock, memory mapping, six interrupt levels
CIFER PLC							
2887	12-inch, green or orange (132x30)	68000, Z80A	64K (256K, 1M)	UNIPLUS+, CP/M Plus	COBOL, FORTRAN, BASIC, Pascal, C, ALGOL, PL/1	4,750	includes one 5.25-inch, 800K-byte diskette drive and one 10M-byte disk drive
CLUB	9-inch, green or orange (132x30)	68000, Z80A	64K (256K, 1M)	UNIPLUS+, CP/M Plus	COBOL, FORTRAN, BASIC, Pascal, C, ALGOL, PL/1	4,750	includes one 5.25-inch, 800K-byte diskette drive and one 21M-byte disk drive

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
CODATA							
3300		68000	320K (1.5M)	UNIX	FORTRAN, Pascal, BASIC, APL, COBOL	7,700	includes one 12M-byte hard disk drive, one 1M-byte diskette drive, 2 ports
COLEX AMERICA INC.							
820		Z80A	128K (512K)	CP/M 3.0	CP/M languages	3,995	includes two serial and two parallel ports, real-time clock, two 5.25-inch 800K-byte diskette drives; opt. CRT card
850		Z80A	128K (512K)	CP/M 3.0	CP/M languages	5,495	includes two serial and two parallel ports, real-time clock, one 5.25-inch, 800K-byte diskette drive and one 10M-byte hard disk drive; opt. CRT card
3250		68000, Z80A	512K (1.5M)	UNIX System III; opt. CP/M-80 2.2	FORTRAN 77, C, Pascal, BASIC Plus, RM COBOL, Ada	7,495	includes two serial and two parallel ports, one 5.25-inch, 720K- or 800K-byte diskette drive and one 10M-byte hard disk drive; opt. CRT card
COLUMBIA DATA PRODUCTS INC.							
1600-1	12-inch, 16-color (80x25)	8088	128K (640K)	MS-DOS 1.25, MS-DOS 2.0, CP/M-86	BASIC, Pascal, COBOL, FORTRAN, C, MACRO 86	3,170	includes two 5.25-inch, 320K-byte diskette drives, bundled software
1600-VP	9-inch, green or amber (80x25)	8088	128K (640K)	MS-DOS 1.25, MS-DOS 2.0, CP/M-86	BASIC, Pascal, COBOL, FORTRAN, C, MACRO 86	2,995	includes two 5.25-inch, 320K-byte diskette drives, bundled software
COMMODORE BUSINESS MACHINES							
C8096	12-inch	6502	96K (96K)	proprietary	BASIC 2.0		includes one 170K-byte to 2.1M-byte diskette drive
C Super Pet	12-inch	6502, 6809	96K (96K)	proprietary	exception BASIC, FORTRAN, Pascal, APL, COBOL		includes one 170K-byte to 2.1M-byte diskette drive
C B128-80	12-inch	6509	128K (1M)	proprietary	BASIC 2.0		includes one 170K-byte to 2.1M-byte diskette drive
VIC 20	16-color (23x20)	6502	5K (32K)	proprietary	BASIC 2.0		includes one 5.25-inch, 170K-byte diskette drive
COMMODORE 64	16-color (40x24)	6510	64K (64K)	proprietary	BASIC 2.0		includes one 5.25-inch, 170K-byte diskette drive
Executive 64	5-inch, 16-color (40x24)	6510	64K (64K)	proprietary	BASIC 2.0		includes one 5.25-inch, 170K-byte diskette drive
PET 64	12-inch, b&w (80x24)	6510	64K (64K)	proprietary	BASIC 2.0		includes one 5.25-inch, 170K-byte diskette drive
COMMODORE 4032	12-inch, b&w (80x24)	6502	32K (32K)	proprietary	BASIC 2.0		includes one 170K-byte to 2.1M-byte diskette drive
C 8032	12-inch, b&w (80x24)	6502	32K (96K)	proprietary	BASIC 4.0		includes one 170K-byte to 2.1M-byte diskette drive
COMPANION COMPUTER CORP.							
Metamorph	15-inch, b&w (80x66, 132x55)	8088	64K (256K)			3,495	includes 10M-byte disk, 3.5-, 5.25- or 8-inch diskette drives; DEC VT100, VT125 and Tektronix 401X emulation
COMPAQ COMPUTER CORP.							
Compaq Plus	9-inch, monochrome (80x25)	8088	128K (640K)	MS-DOS 2.0	BASIC 2.0, BASICA 2.0	4,995	IBM compatible; includes monitor interfaces to RGB color and composite video, one 5.25-inch, 360K-byte diskette drive and one 10M-byte hard disk drive
Compaq Portable Computer	9-inch, monochrome (80x25)	8088	128K (256K)	MS-DOS	BASIC	2,995	IBM compatible; includes one 5.25-inch diskette and one upgradable 10M-byte fixed disk drive, monitor interfaces for RGB color, composite video and TV set RF
COMPUCORP							
775	12-inch, (80x24)	Z80A	64K (256K)	Zebra, CP/M	BASIC, FORTRAN	7,620	includes two 5.25-inch, 655K-byte diskette drives; opt. monitor and printer
785	12-inch (80x24)	Z80A	64K (256K)	Zebra, CP/M	BASIC, FORTRAN	10,495	includes one 5.25-inch, 655K-byte diskette drive and one 5M-byte hard disk drive; opt. monitor and printer

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
790	12-inch (80x24)	Z80A	64K (256K)	Zebra, CP/M	BASIC, FORTRAN	11,995	includes one 5.25-inch, 655K-byte diskette drive and one 10M-byte hard disk drive; opt. monitor and printer
795	12-inch (80x24)	Z80A	64K (256K)	Zebra, CP/M	BASIC, FORTRAN	13,495	includes one 5.25-inch, 655K-byte diskette drive and one 15M-byte hard disk drive; opt. monitor and printer
799	12-inch (80x24)	Z80A	64K (256K)	Zebra, CP/M	BASIC, FORTRAN	22,995	includes one 5.25-inch, 655K-byte diskette drive and one 45M-byte hard disk drive; opt. monitor and printer
Omegamite	9-inch, amber (80x24)	Z80A	128K (256K)	Zebra, CP/M	BASIC, FORTRAN	3,995	includes two 3.5-inch, 320K-byte diskette drives, built-in 300-baud modem; opt. monitor and printer
Simplifier 700	12-inch (80x24)	Z80A	128K (256K)	Zebra, CP/M	BASIC, FORTRAN	4,795	includes one or two 5.25-inch, 328K-byte diskette drives; opt. monitor and printer
COMPUPRO							
816/Z		Z80B	64K (4.8M)	CP/M 2.2		4,995	includes three serial, one parallel and one Centronics port, two 8-inch, 2.4M-byte diskette drives and one 40M-byte hard disk drive, bundled software
COMPUTER AUTOMATION INC.							
MicroSyFA	15-inch, green, amber (80x24)	proprietary	64K (256K)	SyCLOPS	SyBol, CP/M-86	6,000	includes four 655K-byte diskette drives and one 5.25-inch, 10M-byte hard disk drive
COMPUTER SYSTEMS							
PC/8088	13-inch, monochrome (80x40)	8088	64K (256K)	DOS, MP/M	BASIC, Pascal, MACRO, COBOL, FORTRAN	1,988	IBM PC compatible; includes two 5.25-inch, 320K-byte diskette drives and 10M-to-100M-byte hard disk drives; opt. 25-inch display and RGB color monitor
CONTROL DATA CORP.							
CDC 110	15-inch, green (132x30)	Z80A	64K (64K)	CP/M	CP/M languages	4,600	1200/1200 internal modem, 3270 protocol converter, one or two 8-inch 1.2M-byte diskette drives and one to four 12.5M- or 25M-byte hard disk drives
Cyber 120-10	12-inch, green (135x24)	Eclipse, 8086	128K (768K)	AOS, CP/M-86, MS-DOS	CP/M languages	3,100	includes one or two 5.25-inch, 368K-byte diskette drives and one or two 15M-byte hard disk drives
CONVERGENT TECHNOLOGIES INC.							
AWS TURBO	15-inch, green (80x28)	8086 8 MHz	256K (512K)	CTOS, MS-DOS, CP/M-86, UNIX V	FORTRAN, BASIC, Pascal, COBOL, C, Assembly	7,000	includes one 5.25-inch, 630K-byte diskette drive, one 10M-, 16M- or 40M-byte hard disk drive
AWS COLOR	15-inch, 8 out of 64 (80x28)	8086 8 MHz	256K (512K)	CTOS, MS-DOS, CP/M-86, UNIX V	FORTRAN, BASIC, Pascal, COBOL, C, Assembly	8,000	includes one 5.25-inch, 630K-byte diskette drive, one 10M-, 16M-, or 40M-byte hard disk drive
IWS	15-inch, green (132x34)	8086 5 MHz	256K (1M)	CTOS, MS-DOS, CP/M-86, UNIX V	FORTRAN, BASIC, Pascal, COBOL, C, Assembly	15,000	includes one 8-inch, 500K-byte diskette drive, three 10M-, 20M- or 40M-byte hard disk drives
CORONA DATA SYSTEMS INC.							
Corona Portable PC	9-inch, green (80x25)	8088	128K (512K)	MS-DOS 1.25	GW BASIC	2,495	IBM compatible; includes bundled software, serial and parallel ports, four expansion slots, two 5.25-inch, 320K-byte diskette drives
Corona PC	12-inch, green (80x25)	8088	128K (512K)	MS-DOS 1.25	GW BASIC	2,995	IBM compatible; includes bundled software, serial and parallel ports, controller, four expansion slots, two 5.25-inch, 320K-byte diskette drives
Corona PCHD	12-inch, green (80x25)	8088	128K (512K)	MS-DOS 1.25	GW BASIC	4,495	IBM compatible; includes bundled software, serial and parallel ports, four expansion slots, two 5.25-inch, 320K-byte diskette drives
CORVUS SYSTEMS INC.							
Concept (256)	15-inch, b&w (120x72)	68000	256K (512K)	CCOS, UCSD P-System	FORTRAN 77, Pascal, BASIC, C	6,995	includes word processing network, one 5.25-inch, 720K-byte diskette drive and one 5.9M-byte hard disk drive
Concept (512)	15-inch, b&w (120x72)	68000	512K (512K)	CCOS, UCSD P-System	FORTRAN 77, Pascal, BASIC, C	7,695	includes word processing network, one 5.25-inch, 720K-byte diskette drive and one 5.9M-byte hard disk drive

READ. WRITE.

It is the highest performance, most reliable 5¼" cartridge disk drive in the industry.

It features more resistance to shock and vibration than any other disk drive, fixed or removable.

Its cartridge is the least expensive among formatted 5-megabyte cartridges on the market today.

Its cartridge interchangeability from drive to drive is absolute. Its start/stop time is the fastest available of any high-performance disk drive.

It is the Beta 5 Cartridge Disk Drive from IOMEGA. And it is, in a word, superlative.

IOMEGA Corporation
1821 West 4000 South
Roy, Utah 84067
Or call (801) 776-7330

IOMEGA™
High Performance Cartridge Disk Drives

REGIONAL AND DISTRICT SALES OFFICES: SOUTHEASTERN REGION, (305) 755-1060; **SOUTHCENTRAL REGION,** (214) 458-2534; **WESTERN REGION,** (714) 855-1211, (408) 263-4476; **NORTHEASTERN REGION,** (617) 933-2000; **MIDWEST REGION,** (414) 782-5229; **EASTERN OFFICE,** (203) 359-9858.

CIRCLE NO. 25 ON INQUIRY CARD

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
Concept (256)	15-inch, b&w (120x72)	68000	256K (512K)	CCOS, UCSD P-System	FORTRAN 77, Pascal, BASIC, C	7,695	includes word processing network, one 8-inch, 1200K-byte diskette drive and one 5.9M-byte hard disk drive
CROMEMCO INC.							
C-10	12-inch, green (80x25)	Z80A	64K	C-DOS	MACRO, Assembly, COBOL, RPG-II, structured BASIC		includes two to four 5.25- or 8-inch, 390K- or 1200K-byte diskette drives and up to three 20M- to 60M-byte hard disk drives
CS-1	12-inch, b&w (80x25)	Z80A	64K	C-DOS	MACRO, Assembly, COBOL, RPG-II, structured BASIC		includes two to four 5.25- or 8-inch, 390K- or 1200K-byte diskette drives and up to three 20M- to 60M-byte hard disk drives
CS-2	12-inch, b&w (80x25)	Z80A	64K	C-DOS	FORTRAN-IV, RATFOR, LISP		includes two to four 5.25- or 8-inch, 390K- or 1200K-byte diskette drives and up to three 20M- to 60M-byte hard disk drives
CS-3	12-inch, b&w (80x25)	Z80A	64K	C-DOS	FORTRAN 11, RATFOR, LISP		includes two to four 5.25- or 8-inch, 390K- or 1200K-byte diskette drives and up to three 20M- to 60M-byte hard disk drives
DATA GENERAL CORP.							
10	12-inch	8086, D9 Micro Eclipse	128K	CP/M, MS-DOS, AOS, RDOS		3,165	supports X.25 and XODIAC protocols; includes one 5.25-inch, 368.6K-byte diskette drive
DATAPOINT CORP.							
1560	10-inch, monochrome (80x24)	Z80A	64K (128K)	Datapoint DOS, CP/M	FORTRAN, BASIC Plus, Databus (Datapoint COBOL)	5,750	includes one 1M-byte diskette drive; opt. printer
DATAVUE CORP.							
DU 2462	13-inch, 16-color (80x25)	Z80	64K (64K)	CP/M	CP/M languages	2,895	includes two 5.25-inch, 1M-byte diskette drives and 6M- to 19M-byte hard disk drives
DAVIDGE CORP.							
DS1		Z80A, Z80B	64K (256K)	CP/M 2.2, CP/M 3.0, CP NET	BASIC, COBOL, Ada, Pascal	537	includes two 5.25-inch, 1.6M-byte diskette drives
DS3		Z80A, Z80B	64K (256K)	CP/M 2.2, CP/M 3.0, CP NET	M BASIC, C BASIC, FORTRAN, PL 1	1,317	includes two 5.25-inch, 1.6M-byte diskette drives and two 12M-byte hard disk drives
DS4		Z80A, Z80B	64K (256K)	CP/M 2.2, CP/M 3.0, CP NET		2,347	includes two 5.25-inch, 1M-byte diskette drives and two 12M-byte hard disk drives
DELTA DATA SYSTEMS CORP.							
8365T	14-inch, green (80x28)	8088	128K (640K)	Concurrent CP/M, CP/M, MS-DOS			includes four expansion slots, programmable function keys; opt. 5.25-inch, 360K-byte diskette drives, detachable 10M- or 20M-byte hard disk drives or 5M-byte removable hard disk drive
8400T	14-inch, green (80x28)	8088	128K (640K)	Concurrent CP/M, CP/M, MS-DOS			includes seven expansion slots, programmable function keys; opt. 5.25-inch, 360K-byte diskette drives, detachable 10M- or 20M-byte hard disk drives or 5M-byte removable hard disk drive
DIGITAL EQUIPMENT CORP.							
Professional 325	12-inch, monochrome (132x24)	F-11	256K (256K)	P/OS, RT-11	BASIC, FORTRAN, DIBOL, Assembly	3,995	includes two 5.25-inch, 400K-byte diskette drives, bit-mapped graphics, one RS232C serial port; opt. CP/M card interface
Professional 350	12-inch, monochrome (132x24)	F-11	256K (256K)	P/OS, RT-11	BASIC, FORTRAN, DIBOL, Assembly	4,995	includes two 5.25-inch, 400K-byte diskette drives, bit-mapped graphics, one RS232C serial port; opt. 10M-byte hard disk drive, CP/M card interface
Decmate II	12-inch, monochrome (132x24)	6120	96K (96K)	COS 310	DIBOL	3,745	includes two 5.25-inch, 400K-byte diskette drives, one RS232C port; WCS-8 word processing system; opt. 10M-byte hard disk drive, graphics
Rainbow 100	12-inch, monochrome (132x24)	8088, Z80	64K (256K)	MS-DOS, CP/M-86/80	FORTRAN, BASIC, COBOL, Pascal, C	3,495	includes two 5.25-inch, 400K-byte diskette drives, one RS232C port; opt. 10M-byte hard disk drive, graphics, 13-inch color monitor
Rainbow 100 Plus				MS-DOS, CP/M-80/86	FORTRAN, BASIC, COBOL, Pascal C		includes two 5.25-inch, 400K-byte diskette drives, one 5.25-inch 10M-byte hard disk drive; opt. graphics, 13-inch color monitor

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
DIGITEX							
1100	green or amber (80x25)	6502	128K (896K)	OASIS, CP/M Turbo-DOS	BASIC, FORTRAN, COBOL, C, DATABUS, DATAPLUS	5,995	includes one 5.25-inch, 1M-byte diskette drive, one 5M- (removable), 20M-or 40M-byte hard disk drive; opt. 128K RAM disk
1200	green or amber (80x25)	6502	128K (896K)	OASIS, CP/M, Turbo-DOS	BASIC, FORTRAN, COBOL, C, DATABUS, DATAPLUS	8,695	includes up to two 5.25-inch, 1M-byte diskette drives, one 5M- (removable), 20M- or 40M- byte hard disk drive; opt. 128K RAM disk
	green or amber (80x25)		128K (740K)	OASIS, CP/M, Turbo-DOS	BASIC, FORTRAN, COBOL, C, DATABUS, DATAPLUS	6,995	includes one 8-inch, 1M-byte diskette drive, and one 10M- (removable), 10M-, 20M- or 40M-byte hard disk drive
DY-4 SYSTEMS INC.							
ORION-0422		8088	128K (1M)	MS-DOS 2.0			includes two serial ports, three card slots, two 5.25-inch, 720K-byte diskette drives; opt. 1M-byte RAM disk, 8087 coprocessor
ORION-0423		8088	128K (1M)	MS-DOS 2.0			includes two serial ports, two card slots, one 5.25-inch, 360K-byte diskette drive, one 20M-byte hard disk; opt. 1M-byte RAM disk, 8087 coprocessor
ORION-0512-S		Z80A	64K (2.4M)	CP/M 2.2			includes two serial ports, 4 card slots, two 8-inch, 2.4M-byte diskette drives; opt. 1.5M-byte RAM disk
ORION-0513		Z80A	64K (35.6M)	CP/M 2.2			includes two serial ports, 3 card slots, one 8-inch, 1.2M-byte diskette drive, 10M-, 20M- or 35.6M-byte hard disk drive; opt. 1.5M-byte RAM disk
EAGLE COMPUTER INC.							
PC PLUS-1		8088	128K (640K)	MS-DOS, CP/M-86	BASIC	2,395	IBM compatible; includes two serial and one parallel port, one 5.25-inch, 320K- or 360K-byte diskette drive; opt. b&w or color monitor
PC PLUS-2		8088	128K (640K)	MS-DOS, CP/M-86	BASIC	2,795	IBM compatible; includes two serial and one parallel port, two 5.25-inch, 320K- or 360K-byte diskette drives; opt b&w or color monitor
PC PLUS-XL		8088	128K (640K)	MS-DOS, CP/M-86	BASIC	4,295	IBM compatible; includes two serial and one parallel port, one 5.25-inch, 320K- or 360K-byte diskette drive and one 10M-byte hard disk drive; opt. monitor
SPIRIT-2	9-inch, green P31 phosphor (80x25)	8088	128K (640K)	MS-DOS, CP/M-86	BASIC A	3,295	IBM compatible and portable; includes color graphics, two serial and one parallel port and two 5.25-inch, 320K- or 360K-byte diskette drives
SPIRIT-XL	9-inch, green P31 phosphor (80x25)	8088	128K (640K)	MS-DOS, CP/M-86	BASIC A	4,795	IBM compatible and portable; includes color graphics, expansion slots, two serial and one parallel port, one 5.25-inch, 320K- or 360K-byte diskette drive and one 10M-byte hard disk drive
EPSON AMERICA INC.							
HX-20 Portable Computer	3.687-inch, LCD (20x4)	CMOS 8-bit 6301	16K (64K)		BASIC	795	includes 120x32 dot-addressable graphics, word processing, clock/calendar, RS232C port, external cassette, bar code reader and CX-20 acoustic coupler
QX-10	12-inch, monochrome (80x25)	Z80A	64K (256K)	TPM, CP/M	BASIC, Pascal, FORTH, Assembly, C, FORTRAN, COBOL	2,995	includes parallel interface, two 5.25-inch, 380K-byte diskette drives and one 10M-byte hard disk drive, bundled software; opt. serial interface
FACIT INC.							
6500 Series	15-inch, amber on brown (80x24)	Z80A	64K (160K)	FACIT-DOS, CP/M 2.2	BASIC	2,495	includes two 320K-byte diskette drives, two RS232C ports
FRANKLIN COMPUTER CORP.							
ACE 1000	(40x24)	6502	64K	FDOS			includes 80-color card, bundled software; opt. 5.25-inch 143K-byte diskette drive, 10M-byte hard disk drive and 12-inch green monitor

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
ACE 1200	(40x24)	6502, Z80	64K per processor	FDOS, CP/M 2.2	CBASIC	1,995	includes bundled software, serial and parallel ports, one 5.25-inch, 143K-byte diskette drive; opt. 10M-byte hard disk drive, 12-inch green monitor
FUJITSU MICROELECTRONICS INC.							
Micro 16s	12-inch, 8-color (80x25)	8086, Z80A	128K (1M)	MS-DOS, CP/M-86, Concurrent CP/M-86	COBOL, Personal BASIC, PL/1, Pascal/MT Plus, CBASIC, MACRO, Assembly	3,995	includes RS232C port, Centronics interface, two 5.25-inch, 320K-byte diskette drives, 10M- or 20M-byte hard disk drive, monitor port, A/D converter
GAVILAN COMPUTER CORP.							
Mobile	LCD (80x16)	8088	64K (160K)	MS-DOS, Gavilan applications environment	MBASIC Interpreter; opt. MBASIC Compiler, Pascal, C, MS-BASIC	3,995	one 3.5-inch, 360K-byte diskette drive, 300-baud modem, Gavilan integrated software package; opt. 50 cps thermal matrix printer, 5.25-inch file transfer drive
SC	LCD (80x8)	8088	64K (160K)	MS-DOS	opt. MBASIC Compiler, Pascal, C, MS-BASIC	2,995	one 3.5-inch, 360K-byte diskette drive, 300-baud modem; opt. 5.25-inch file transfer drive, Gavilan integrated software package, 50-cps thermal matrix printer
GRID SYSTEMS							
1100		8086, 8087	256K	MS-DOS, GRID-DOS	FORTRAN, Pascal, PLM, BASIC, COBOL	6,795	one 384K-byte diskette drive
1101		8086, 8087	256K	MS-DOS, GRID-DOS	C, ASM 86-88	5,995	one 384K-byte diskette drive
1109		8086, 8087	512K	MS-DOS, GRID-DOS		7,995	one 384K-byte diskette drive
HEWLETT-PACKARD CO.							
HP 150	9-inch, green (80x24)	8088 8 MHz	256K (640K)	MS-DOS	BASIC, Pascal, COBOL, MS-FORTRAN	1,270-3,650	includes one to two 3.5-inch, 270K-byte diskette drives, 5M- or 15M-byte hard disk drives, two RS232C ports, HP-IB port, 2 accessory slots
HP-110 Portable PC	flip-up, LCD (80x16)	8086 5.33 MHz	272K	MS-DOS	MS-DOS based languages	3,000	dimensions: 10x13x3 inches, weight: 9 lbs, built-in modem, battery, AC adapter/charger, RS232C port, HP-IL port; opt. 270K-byte, 3.5-inch diskette drive
HONEYWELL INFORMATION SYSTEMS							
MicroSystem 6/10		proprietary, 8086	128K (512K)	GCOS 6, MOD400, MS-DOS, CP/M-86	GW BASIC, C BASIC, COBOL, FORTRAN, BASIC, Pascal, Assembler	6,370	includes two 650K-byte, 5.25-inch diskette drives, bundled software, keyboard, monitor; opt. 20M-byte hard disk drive, workstation, printer, integrated modem
IBM CORP.							
IBM PC	11.5-inch, monochrome (80x25)	8088; 8087 opt.	64K (640K)	PC-DOS, CP/M, PC-IX, UCSD System	BASIC, FORTRAN, Pascal, COBOL, APL	2,209	includes 160K-byte diskette drive; opt. 16-color monitor
Portable PC	9-inch, amber (80x25)	8088; 8087 opt.	256K (512K)	PC-DOS, CP/M, PC-IX, UCSD System	BASIC, FORTRAN, Pascal, COBOL, APL		
PCjr	(80x25)	8088; 8087 opt.	64K (128K)	PC-DOS, CP/M, PC-IX, UCSD System	BASIC, FORTRAN, Pascal, COBOL, APL		includes two cartridge program ports
IBM-PC/XT	11.5-inch, monochrome (80x25)	8088, 8087 opt.	64K (640K)	PC-DOS, CP/M, PC-IX, UCSD System	BASIC, FORTRAN, Pascal, COBOL, APL		includes 320K-byte diskette drive, 10M-byte hard disk; opt. 16-color monitor
3270-PC	14-inch, 8-color		256K (640K)	PC-DOS, 3270 functions	Level II COBOL, Pascal MT+, CBASIC, PL-1	5,585	two diskette drives, 3270 systems adapter; opt. 10M-byte hard disk drive, printer
IMS INTERNATIONAL							
5000DS	12-inch, P-31 or P-42 green (80x24)	8086, Z80	64K (256K)	CP/M-86, MS-DOS		4,200	includes two 5.25-inch, 410K-byte diskette drives, one 6M-byte hard disk drive
INTECOLOR CORP.							
E 3651	13-inch, 16-color (64x32)	8080A	32K	File Control System	Extended BASIC	2,945	includes bundled software, systems utilities, one 5.25-inch, 90K-byte diskette drive
E 8053	19-inch, 16-color (80x48)	8080A	8K (24K)	File Control System	Extended BASIC	5,745	includes two 8-inch, 580K-byte diskette drives

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
E 8063	19-inch, 16-color (80x48)	8080A	32K (48K)	CP/M	Microsoft Business BASIC, COBOL, FORTRAN	6,205	includes two 8-inch, 960K-byte diskette drives
INTERTEC DATA SYSTEMS							
Headstart Model 512	12-inch, green (132x25)	8086, Z80A	512K (1000K)	CP/M 2.2, MS-DOS, LAN DOS	MBASIC	3,495	includes one 3.5-inch, 500K-byte diskette drive; opt. 10M- to 200M-byte hard disk drive and 5.25-inch external floppy disk
ISI INTERNATIONAL							
ISB 80/85	12-inch, green (80x24)	8085, Z80A	64K (64K)	CP/M	C, Pascal, FORTRAN, BASIC	4,750 or 7,100	includes one or two 5.25-inch, 315K-byte diskette drives, one 10M-byte hard disk drive, STD bus, 10-slot card cage, 5 expansion slots
ISB-80DS-3020, ISB-80DS-3030		8085, Z80A	64K (64K)	CP/M	C, Pascal, FORTRAN, BASIC	4,750	includes two 8-inch diskette drives, one 2M-byte hard disk drive, STD bus, 16-slot card cage, serial port, 3 parallel ports, 10 expansion slots
LOGICAL BUSINESS MACHINES							
L-XT		8088	192K (320K)	MS-DOS 2.11	natural language, GW BASIC	5,985	includes one parallel and two serial ports, one 320K-byte diskette drive, one 10M-byte hard disk, bundled software
MAD COMPUTER INC.							
MAD-1 (floppy disk version)	12-inch, amber or green (80x25)	80186	256K (512K)	MS-DOS	GW BASIC	4,195	includes two 5.25-inch, 360K-byte diskette drives; IBM PC-, XT software-compatible
MAD-1 (hard disk version)	12-inch, amber or green (80x25)	80186	256K (512K)	MS-DOS	GW BASIC	6,295	includes one 5.25-inch, 360K-byte diskette drive and one 10M-byte hard disk drive; IBM PC-, XT software-compatible
MAI/BASIC FOUR INFORMATION SYSTEMS DIV.							
S/10	12-inch, green, blue (132x28)	Z80A	128K	CP/M, Business BASIC/Micro	Business BASIC	2,795	includes one or two 5.25-inch, 655K-byte diskette drives, one 10M- or 10M-byte hard disk drive
MDB SYSTEMS							
Micro/11		Q-bus compatible	256K (4M)	RT-11, RSX, RSTS/E, TSX Plus, UNIX	COBOL, FORTRAN, BASIC, Pascal		includes two 500K-byte diskette drives
MICRO CRAFT CORP.							
Dimension 68000		68000	128K (512K)	CP/M-68K	UNIBASIC, C BASIC, FORTH Plus	3,995	includes two 5.25-inch, 400K-byte diskette drives, 6 expansion slots, one RS232C duplex serial port, counter/timer, 10 programmable function keys, one terminal
MICRO-LINK							
Approach 1	13-inch, green (80x24)	Z80A	64K (256K)	CP/M	CP/M-based languages	3,650	includes two 5.25-inch, 370K-byte diskette drives, peripheral drivers
MONROE SYSTEMS FOR BUSINESS							
System 2000 (2211)	12-inch, amber (80x25)	80186	128K (896K)	CP/M-86, MS-DOS	BASIC	4,295	includes two 5.25-inch, 720K-byte diskette drives and one 10M-byte hard disk drive; 14-inch, 16-color screen available
2221	14-inch, 16-color (80x25)	80186	128K (896K)	CP/M-86, MS-DOS	BASIC	5,195	includes two 5.25-inch, 720K-byte diskette drives
2312	12-inch, amber (80x25)	80186	256K (896K)	CP/M-86, MS-DOS		6,325	includes one 5.25-inch, 720K-byte diskette drive and one 10M-byte hard disk drive
OC8820	9-inch, amber (80x24)	Z80	128K (256K)	CP/M-80, MS-10	BASIC, Pascal	3,895	includes two 5.25-inch, 640K-byte diskette drives
MORROW DESIGNS							
Micro Decision	12-inch, green (80x24)	Z80	64K (64K)	CP/M	BASIC, Pilot	1,899	includes two 372K-byte diskette drives, terminal, bundled software
MULTITECH ELECTRONICS INC.							
MIC 504	12-inch, green (80x24)	Z80A	64K	CP/M 2.2	CBASIC	2,250; 1,745 (w/o terminal)	includes two 5.25-inch, 700K-byte diskette drives; opt. 33M-byte hard disk drive

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
MIC 501	12-inch, green (80x24)	Z80A	64K	CP/M 2.2	CBASIC	1,815; 1,310 (w/o terminal)	includes two 5.25-inch, 170K-byte diskette drives; opt. 33M-byte hard disk drive
NCR CORP.							
NCR Personal Computer	12-inch, monochrome (80x24)	Z80A, 8088	64K (512K)	CP/M-80, CP/M-86, MS-DOS	BASIC, Pascal, RM-COBOL	2,650	includes two 5.25-inch, 320K- to 340K-byte diskette drives, one 10M- to 30M-byte hard disk drive; opt. color monitor, graphics chip with dedicated memory
DM V 8/16 10MB	12-inch, green (80x24)	Z80A, 8088	64K (512K)	CP/M-80, CP/M-86, MS-DOS, UCSD-P	BASIC, FORTRAN, COBOL, C	5,140	includes one 5.25-inch, 500K-byte diskette drive and one 10M-byte hard disk drive; opt. 120-cps printer, integrated modem, 2- and 6-pen plotter, communications adapters
DM V 8/16 color	12-inch, 8-color (80x24)	Z80A, 8088	64K (512K)	CP/M-80, CP/M-86, MS-DOS, UCSD-P	BASIC, FORTRAN, COBOL, C	3,440	includes two 5.25-inch, 1M-byte diskette drives; opt. 120-cps printer, integrated modem, 2- and 6-pen plotter, communications adapter
DM V 8/16 Flex	12-inch, green (80x24)	Z80A, 8088	64K (512K)	CP/M-80, CP/M-86, MS-DOS, UCSD-P	BASIC, FORTRAN, COBOL, C	3,090	includes two 5.25-inch, 1M-byte diskette drives; opt. 120-cps printer, integrated modem, 2- and 6-pen plotter, communications adapter
NEC HOME ELECTRONICS							
PC-8200 portable	LCD (40x8)	80C85	16K (96K)	proprietary	N82 BASIC	799	includes 14 cassette programs and one or two 3.5-inch diskette drives
PC-8800	14-inch, b&w (80x25)	Z80A, 8086	64K (256K)	CP/M 2.2 MS-DOS	NBASIC, N88 BASIC	1,995	includes 5.25-inch, 720K-byte or 8-inch, 2.4M-byte dual diskette drive and 5M-, 10M- and 15M-byte hard disk drives, bundled software
ONYX SYSTEMS INC.							
Sundance	12-inch, green (80x24 or 132x24)	Z80A	64K	CP/M, OASIS	BASIC, COBOL	6,950–9,450	includes tape backup, 7M-, 14M- and 21M-byte hard disk drives; opt. disk expansion box
OSBORNE COMPUTER CORP.							
Executive	7-inch, amber	Z80A	128K	CP/M PLUS	FORTRAN, Pascal, BASIC	1,600	includes two 5.25-inch, 200K-byte diskette drives, bundled software
Osborne 1	5-inch, green (52x102)	Z80A	64K	CP/M	FORTRAN, Pascal, BASIC	1,300	includes two 5.25-inch, 200K-byte diskette drives, bundled software
OTRONA ADVANCED SYSTEMS CORP.							
Attache	5.5-inch, green (80x24)	Z80A	64K	CP/M 2.2		2,995	includes two 5.25-inch, 360K-byte diskette drives and one 10M-byte hard disk drive, bundled software; opt. monitor, printer
Attache "S"	5.5-inch, green (80x24)	Z80A	64K	CP/M 2.2		2,695	includes one 5.25-inch, 360K-byte diskette drive, bundled software; opt. monitor, printer
Attache 8:16	5.5-inch, green (80x24)	8086	256K	CP/M 2.2, MS-DOS 2.0		3,795	includes two 5.25-inch, 320K-byte diskette drives, synchronous communications port, GPIB interface, bundled software; opt. 10M-byte hard disk drive
PERSONAL MICRO COMPUTERS INC.							
PMC-101		Z80A	128K (128K)	CP/M 3.0	MBASIC, C, CBASIC, FORTH, FORTRAN, MUMPS, Pascal, COBOL	1,000	includes four 5.25-inch, 400K-byte diskette drives and one 10M-byte hard disk drive, bundled software; works with optional terminal
PERTEC COMPUTER CORP.							
3205	14-inch, green (132x25)	68000	256K (1M)	OS/3200, CP/M	BASIC, COBOL	6,370	includes three RS232C I/O ports, two 5.25-inch, 2M-byte diskette drives, Model 100 intelligent workstation, keyboard; opt. hard disk drive up to 53M bytes
POINT 4 DATA CORP.							
Mark 1A	12-inch, green (80x25)	Z80A	64K (64K)	CP/M, MS-DOS		3,390	includes two 5.25-inch, 410K-byte diskette drives, WS-100 terminal, bundled software
PRO LOG							
ABL-1		Z80A, 8085	16K (64K)	CP/M-compatible		4,995	includes two 8-inch, 1.6M-byte diskette drives, auto-bios, terminal and printer port, 13-slot STD bus

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
ABL-2		Z80A, 8085	16K (64K)	CP/M-compatible			includes two 8-inch, 3.2M-byte diskette drives, auto-bios, terminal and printer port, 13-slot STD bus
PRONTO COMPUTERS INC.							
Desktop 16/10	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		3,200	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive, 10 programmable function keys
Desktop 16/20	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		3,950	includes two RS232C ports, one Centronics port, two 5.25-inch, 800K-byte diskette drives and one 1.6M-byte hard disk drive
Desktop 16/110	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		5,190	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive and one 5.6M-byte hard disk drive
Desktop 16/200	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		6,190	includes two RS232C ports, one Centronics port, two 5.6M-byte removable hard disks, 10 programmable function keys
Graphics 16/25	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		4,950	includes two RS232C ports, one Centronics port, two 5.25-inch, 800K-byte diskette drives and one 1.6M-byte hard disk drive
Graphics 16/115	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		5,950	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive and one 5.6M-byte hard disk drive
Graphics 16/205	12-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		6,950	includes two RS232C ports, one Centronics port, two 5.6M-byte hard disk drives, 10 programmable function keys
Color Graphics 16/30	12-inch, 8-color (80x25)	80186	256K (1M)	MS-DOS 2.11		6,250	includes two RS232C ports, one Centronics port, two 800K-byte diskette drives, 10 programmable function keys
Color Graphics 16/130	12-inch, 8-color (80x25)	80186	256K (1M)	MS-DOS 2.11		7,250	includes two RS232C ports, one Centronics port, one 800K-byte diskette drive and one 5.6M-byte removable hard disk drive, 10 programmable function keys
Color Graphics 16/230	12-inch, 8-color (80x25)	80186	256K (1M)	MS-DOS 2.11		8,250	includes two RS232C ports, one Centronics port, two 5.6M-byte removable hard disk drives, 10 programmable function keys
Transportable 16/2020	9-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		3,950	includes two RS232C ports, one Centronics port, two 5.25-inch, 800K-byte diskette drives, 10 programmable function keys
Transportable 16/2110	9-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		5,190	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive and one 5.6M-byte removable cartridge
Transportable 16/2200	9-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		6,190	includes two RS232C ports, one Centronics port, two 5.6M-byte removable hard disk drives
Transportable 16/2300	9-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		7,190	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive and one 23.5M-byte hard disk drive
Transportable 16/2400	9-inch, amber or green (80x25)	80186	256K (1M)	MS-DOS 2.11		8,190	includes two RS232C ports, one Centronics port, one 5.25-inch, 800K-byte diskette drive and one 35.3M-byte hard disk drive
Q1 CORP.							
Q1/COMPANION	12-inch, green (80x24)	Z80A	64K	Q10S, CP/M	Q1, PL/1, MBASIC, CBASIC	3,250	includes two 5.25-inch, 350K-byte diskette drives; opt. hard disk drive, software, printer
Q1/68000 Desktop	12-inch, green (80x24)	68000	256K	IDRIS	C		includes one 5.25-inch, 700K-byte diskette drive, one 5.25-inch, 10M-byte hard disk drive; opt. software, printer
QDP COMPUTER SYSTEMS, QUASAR DATA PRODUCTS INC.							
QDP-300		Z80B CPU, Z80A DMA	128K (512K)	CP/M	CBASIC	3,495	includes two 8-inch, 2.4M-byte diskette drives, monitor, bundled software
QDP-300H		Z80B CPU, Z80A DMA	128K (512K)	CP/M	CBASIC	5,495	includes two 8-inch, 2.4M-byte diskette drives, 15M- to 32M-byte hard disk drive, monitor, bundled software
QUAY CORP.							
500		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	1,995	includes two 5.25-inch, 400K-byte diskette drives; opt. 5M- and 20M-byte hard disks

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
520		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	2,395	includes two 5.25-inch, 800K-byte diskette drives; opt. 5M- and 20M-byte hard disks
540		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	2,995	includes two 5.25-inch, 1.6M-byte diskette drives; opt. 5M- and 20M-byte hard disks
550		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	4,595	includes one 5.25-inch, 1.25M-byte diskette drive and one 5M-byte hard disk drive; opt. 10M- and 20M-byte hard disk
900		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	3,795	includes two 8-inch, 2.5M-byte diskette drives; opt. 33M-byte hard disk
900/33		Z80A	64K (64K)	CP/M, UCSD	FORTRAN, BASIC, COBOL, Pascal	10,995	includes two 8-inch, 2.5M-byte diskette drives and one 33M-byte hard disk drive
RADIO SHACK/TANDY							
Personal Desktop Computer	9-inch, b&w (80x24)	Z80A	64K (128K)	TRS-DOS 6, BASIC	BASIC, FORTRAN, COBOL, Pascal	1,999	includes two 64K-byte diskette drives, RS232C serial interface, numeric keypad
4P "Transportable"	9-inch, b&w (80x24)	Z80A	64K (128K)	TRS-DOS 6, BASIC	BASIC, FORTRAN, COBOL, Pascal	1,799	includes two 5.25-inch, 184K-byte diskette drives, terminal RS232C interface
Model 12	12-inch, green (80x24)	Z80A	80K	TRS-DOS, BASIC	BASIC, FORTRAN, COBOL, Pascal	2,799	includes one 8-inch, 1.25M-byte diskette drive, monitor, two RS232C serial interfaces
TRS-80 Model 16B	12-inch, green (80x24)	68000	256K (768K)	TRS-DOS, TRS-XENIX	BASIC, FORTRAN, COBOL, Pascal	6,499	includes one 8-inch, 1.25M-byte diskette drive, one 15M-byte hard disk drive, two RS232C interfaces, terminal, detachable keyboard
2000 HD	monochrome	80186	128K	MS-DOS	BASIC, FORTRAN, COBOL, Pascal	4,250	includes one 10M-byte hard disk drive
Tandy Model 2000	monochrome	80186	128K	MS-DOS	BASIC, FORTRAN, COBOL, Pascal	2,750	includes two 720K-byte diskette drives, RS232C port
SAND TECHNOLOGY SYSTEMS INC.							
PROFESSIONAL/I	12-inch, b&w (80x25)	8086	640K (640K)	MS-DOS, CP/M-86 UCSD-P	BASIC, FORTRAN, COBOL, Pascal, RM-COBOL	4,500	includes two 8-inch, 1.2M-byte diskette drives, bundled software; opt. 10M-byte hard disk drive
SANYO BUSINESS SYSTEMS							
MBC 1100	12-inch, green (80x25)	Z80A	64K	CP/M	Sanyo BASIC, Pascal/M, COBOL-80, FORTRAN-80, BASIC-80	1,699	includes RS232C, Centronics, parallel ports, one 5.25-inch, 320K-byte diskette drive, bundled software, 15 programmable function keys; opt. 10M-byte hard disk
MBC 1150	12-inch, green (80x25)	Z80A	64K	CP/M	Sanyo BASIC, Pascal/M, COBOL-80, FORTRAN-80, BASIC-80	2,099	includes RS232C, Centronics, parallel ports, two 5.25-inch, 320K-byte diskette drives, bundled software, 15 programmable keys; opt. 10M-byte hard disk
MBC 1200	12-inch, green (80x25)	Z80A	64K	CP/M	Sanyo BASIC II	1,999	includes RS232C, Centronics, parallel ports, one 5.25-inch, 640K-byte diskette drive, bundled software, 15 programmable keys; opt. 10M-byte hard disk
MBC/250	12-inch, green (80x25)	Z80A	64K	CP/M	Sanyo BASIC II	2,449	includes RS232C, Centronics, parallel ports, two 5.25-inch, 640K-byte diskette drives, bundled software, programmable function keys; opt. 10M-byte hard disk drive
MBC 550/555 Dual Drive	12-inch, monochrome (80x25)		128K (256K)	MS-DOS 1.25	SBASIC, FORTRAN 77, MACRO Assembly, Pascal MT+	999 (550); 1,399 (555)	includes 160K-byte single diskette drive (555); 160K-byte dual diskette drive (550), bundled software; opt. 10M-byte hard disk drive, RGB color monitor
MBC 4000/4050 Dual Drive	12-inch, green (80x25)		128K (512K)	CP/M-86	BASIC 8086	2,199 (4000); 2,599 (4050)	includes 640K-byte single diskette drive (4000); 640K-byte dual diskette drive (4050), bundled software; opt. 10M-byte hard disk drive
SBE INC.							
SBE 200		68000	128K (9M)	REGULUS, polyFORTH/32, CPM-68	Assembly, C, FORTRAN, COBOL, BASIC, Pascal	6,000	includes one 5.25-inch, 320K-byte diskette drive, one or two 10M- to 80M-byte hard disk drives
SBE 250		68000	128K (5M)	REGULUS, polyFORTH/32, CP/M-68	Assembly, C, FORTRAN, COBOL, BASIC, Pascal	6,000	includes one 5.25-inch, 320K-byte diskette drive, one 10M- to 40M-byte hard disk drive

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
SEATTLE COMPUTER PRODUCTS INC.							
GAZELLE II	14-inch	8086	256K (1M)	MS-DOS	COBOL, MS-MACRO-86	5,995	includes two 8-inch, 1.25M-byte diskette drives
EZ-DRAFTER	14-inch	8086	384K (1M)	MS-DOS	FORTRAN, Assembly, Pascal, BASIC 86	24,500	CAD system or general purpose computer; includes one 8-inch, 1.25M-byte diskette drive
SHARP ELECTRONICS CORP.							
PC-5000	9-inch, b&w LCD (80x8)	8088	128K (bubble) (256K)	MS-DOS	GW-BASIC	1,995	includes two 5.25-inch, 360K-byte diskette drives, bundled software; opt. 37 cps thermal transfer printer, 300-baud modem
SMOKE SIGNAL BROADCASTING							
VAR/68	12-inch, green, amber (80x29)	6809	128K (1M)	OS-9	BASIC, Pascal, COBOL, C	8,585	includes two 5.25-inch, 750K-byte diskette drives, one 5M-byte hard disk drive, 8 serial and one parallel port
VAR/68K	12-inch, green, amber (80x29)	68008	512K (1M)	REGULUS (UNIX III)	C, BASIC, COBOL, Pascal	8,775	includes one 5.25-inch, 750K-byte diskette drive, one 20M-byte hard disk drive, 8 serial and one parallel port
VAR/68-524	12-inch, green, amber (80x29)	6809	128K (1M)	OS-9	BASIC, Pascal, COBOL, C	4,325	includes two 5.25-inch, 750K-byte diskette drives, 8 serial and one parallel port
SOLO SYSTEMS							
1116 Solo Station	15-inch, green	68000	1M (1M)	proprietary	OS/VS COBOL	25,000	includes two 5M-byte hard disk drives; opt. 50M-byte hard disk, printer, software development microcomputer
SONY INFORMATION PRODUCTS							
SMC-70	8-inch (80x25)	Z80A	64K (256K)	CP/M, CP/M-86	CB-80, SONY DISK BASIC, PILOT PLUS	995	includes two 3.5-inch, 280K-byte diskette drives, one 6M-, 11M- or 20M-byte hard disk; opt. 12-, 19-, or 25-inch RGB monitor, printer
SOUTHWEST TECHNICAL PRODUCTS CORP.							
/09	12-inch, green, amber (123x66)	68B09	64K (64K)	FLEX	BASIC, Pascal, Assembly, C, FORTRAN	7,080	includes two 8-inch, 1.25M-byte diskette drives; opt. 20M-byte hard disk drive
X12 Plus	12-inch, green, amber (123x66)	68B09	256K (256K)	FLEX	BASIC, Pascal, FORTRAN, C, Assembly	6,000	includes one 5.25-inch, 1.25M-byte diskette drive, one 20M-byte hard disk drive
SPERRY CORP.							
10	12-inch, monochrome (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	2,643	includes one 5.25-inch, 320K-byte diskette drive, async communications port, 10 programmable function keys, ROM, clock/calendar; opt. IBM, Sperry UNISCOPE interface
20	12-inch, monochrome (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1	BASIC, FORTRAN, COBOL, Pascal, C	3,119	includes two 5.25-inch, 320K-byte diskette drives, async communications port, 10 programmable function keys, ROM, clock/calendar; opt. IBM, Sperry UNISCOPE interface
25	14-inch (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	3,338	includes two 5.25-inch, 320K-byte diskette drives, ROM, clock/calendar; opt. tilt and swivel display base
30	12-inch, color/graphics (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	3,773	includes two 5.25-inch, 320K-byte diskette drives, async communications port, 10 programmable function keys; opt. IBM, Sperry UNISCOPE interface
40	12-inch, monochrome (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	5,099	includes one 5.25-inch, 320K-byte diskette drive and one 10M-byte hard disk, async communications port, clock/calendar; opt. IBM, Sperry UNISCOPE interface
45	14-inch (80x25)	8088-2	128K (640K)	MS/DOS 1.25, MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	5,318	includes one 5.25-inch, 320K-byte diskette drive and one 10M-byte hard disk, clock/calendar; opt. tilt and swivel display
50	14-inch, color/graphics (80x25)	8088-2	128K (640K)	MS/DOS 2.1, Concurrent CP/M	BASIC, FORTRAN, COBOL, Pascal, C	5,753	includes one 5.25-inch, 320K-byte diskette drive, one 10M-byte hard disk, async communications, ROM; opt. tilt and swivel display base

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
UTS 30	12-inch, monochrome (80x24)	Z80A (4 MHz)	128K (256K)	UTS 30 SCS, CP/M Plus	COBOL, BASIC, PASCAL, PL/1	5,700	includes four 5.25-inch, 737K-byte diskette drives, screen bypass for I/O, two logical screens, serial printers; opt. graphics
UTS 40	12-inch, monochrome (80x24)	Z80A (3 MHz)	32K (128K)	UTS 40 FIRMWARE, CP/M Plus	COBOL, BASIC, Pascal, PL/1	8,116	includes four 8-inch, 1M-byte diskette drives, two logical screens; opt. line printer
UTS 60	14.5-inch, 8- or 16-color (80x24)	68010	128K (2M)	UTS 60 TCP, CP/M-68K	COBOL, BASIC, Pascal, PL/1	7,748	includes four 5.25-inch, 737K-byte diskette drives, ECC memory, two logical screens, multi-pen plotter; opt. 30M-byte hard disk drive up to 7 per system
SUN ELECTRONICS CORP.							
Suntac PC	12-inch, green (80x25)	8088	128K (16K)	CP/M-86, MS-DOS	IBM PC-compatible		includes one or two 5.25-inch 320K-byte diskette drives, RS232C and Centronics interface, three IBM-compatible expansion slots
TELERAM COMMUNICATIONS CORP.							
T 3000	LCD (80x4)	Z80L	64K (64K)	CP/M, P-System	CP/M-80 languages	1,595	includes RS232C port, four 5.25-inch, 320K-byte diskette drives, software, text editor
T 4000	LCD (80x8)	Z80L	64K (64K)	CP/M, P-System	CP/M-80 languages	1,995	includes RS232C port, four 5.25-inch, 320K-byte diskette drives, communications software, text editor
T 5000	LCD (80x16)	Z80L	64K (64K)	CP/M, P-System	CP/M-80 languages	2,495	includes RS232C port, four 5.25-inch, 320K-byte diskette drives, communications software, text editor
TELEVIDEO SYSTEMS							
TS 803	14-inch, green (80x24)	Z80A	64K (128K)	CP/M-80	RM-COBOL	2,495	includes two RS232C serial ports, two 5.25-inch, 360K-byte diskette drives, bundled software
TPCI (portable)	9-inch, yellow (80x24)	Z80A	64K (128K)	CP/M-80	RM-COBOL	1,999	includes two RS232C serial ports, two 5.25-inch, 360K-byte diskette drives, bundled software
TS 803H	14-inch, green (80x24)	Z80A	64K (128K)	CP/M-80	RM-COBOL	3,995	includes two RS233C serial ports, one 5.25-inch, 360K-byte diskette drive, one 10M-byte hard disk drive, bundled software
Tele PC	14-inch, green (80x25)	8088	128K (640K)	MS-DOS 2.1	GW-BASIC, RM-COBOL, FORTRAN	2,995	includes RS232C modem port, parallel printer port, two 5.25-inch, 360K-byte diskette drives, RGB color monitor port, composite video port, IBM PC compatible
Tele XT	14-inch, green (80x25)	8088	128K (640K)	MS-DOS 2.1	GW-BASIC, RM-COBOL, FORTRAN	4,995	includes RS232C modem port, parallel printer port, one 5.25-inch, 360K-byte diskette drive, one 10M-byte hard disk drive, IBM PC compatible
TPL II	9-inch, yellow (80x25)	8088	128K (640K)	MS-DOS 2.1	GW-BASIC, RM-COBOL, FORTRAN	2,995	includes RS232C modem port, parallel printer port, two 5.25-inch, 360K-byte diskette drives, RGB color monitor port, IBM PC compatible
TEXAS INSTRUMENTS							
PROFESSIONAL COMPUTER	12-inch, 8-color (80x25)	8088	64K (768K)	MS-DOS 1.25, MS-DOS 2.1, CPM-86, Concurrent CPM-86, UCSD P-System	BASIC, Pascal, FORTRAN, COBOL	2,395 (monochrome): 2,565 (color)	includes two 5.25-inch, 360K-byte diskette drives, one 10M-byte hard disk, voice recognition, DOW JONES Natural Link, 855 dual mode printer
PORTABLE PROFESSIONAL COMPUTER	9-inch, 8-color (80x25)	8088	64K (768K)	MS-DOS 1.25, MS-DOS 2.1, CP/M-86, Concurrent CP/M-86, UCSD P-System	BASIC, Pascal, FORTRAN, COBOL	2,395 (monochrome): 2,965 (color)	includes two 5.25-inch, 360K-byte diskette drives, one 10M-byte hard disk, voice recognition, DOW JONES Natural Link, 855 dual mode printer
TOSHIBA AMERICA INC.							
T 300	12-inch, green (80x25)	8088	192K (512K)	MS-DOS, CP/M-86	T-BASIC 16, CBASIC-86	2,495	includes RS232C port, Centronics, two 5.25-inch, 640K-byte diskette drives; opt. 14-, 16-inch color display
VECTOR GRAPHIC INC.							
SX-2000	12-inch, green (80x24)	Z80B, 8086	128K (896K)	CP/M, CP/M-86 CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	4,295	includes two 5.25-inch, 1.5M-byte diskette drives, 15 programmable function keys; opt. async/bisync communications software

Quality 5¼ Inch Drives.

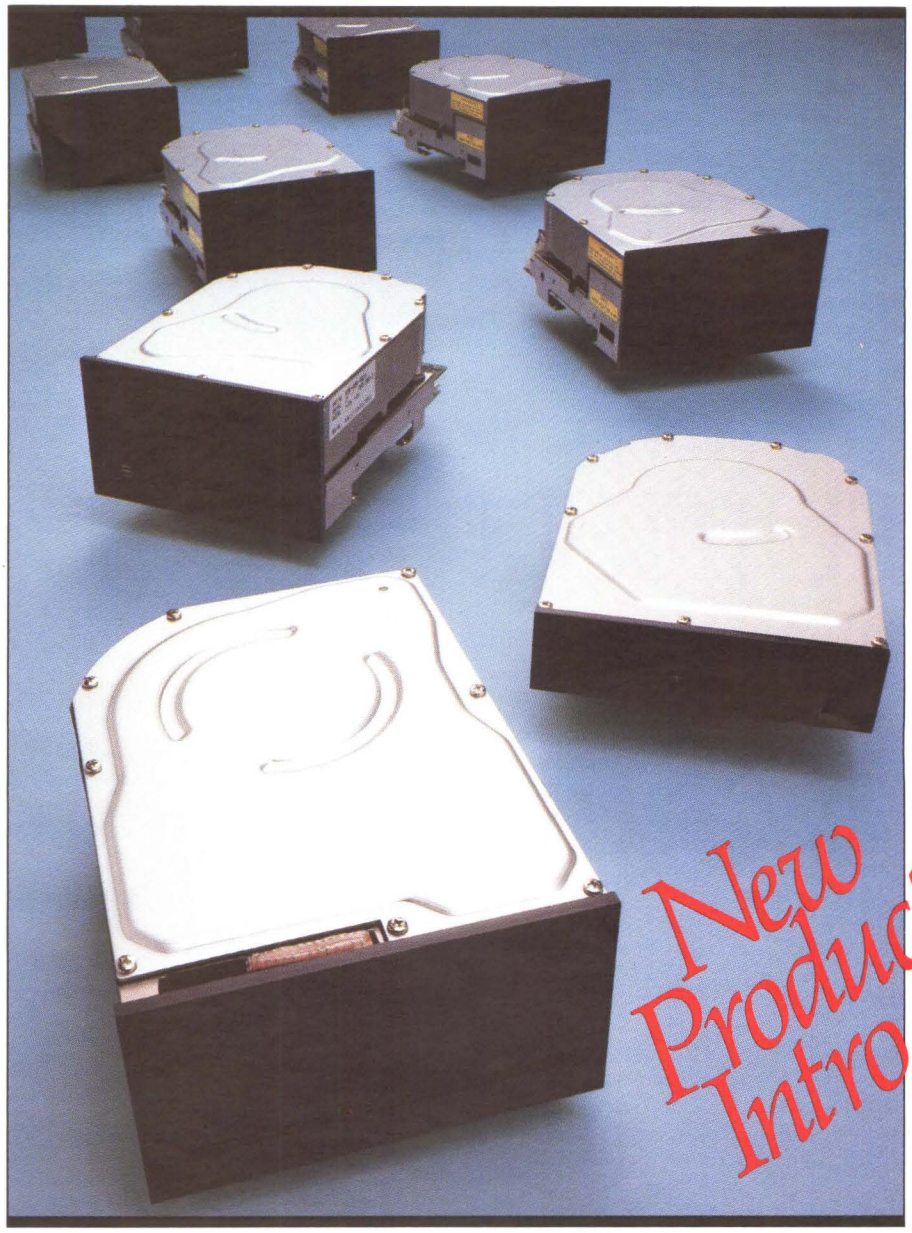
From FUJITSU.

Fujitsu quality has come to mean a lot of things to a lot of people. High performance, unparalleled reliability, and technical expertise, built on more than 15 years experience.

This consistent quality is reflected in Fujitsu's complete line of 5¼-inch drives. The product line includes half high drives ideally suited for compact applications, standard ST506 drives for general applications, and high performance drives for applications where greater capacities and faster access times are required.

Fujitsu's complete 5¼-inch product line. Quality that's exclusively Fujitsu.

For more information contact the Fujitsu America Sales Office nearest you. Northwest: (408) 946-8777, Central: (612) 835-7025, East Coast: (617) 229-6310, Southwest: (714) 476-0852, Europe: 44-1/493-1138.



	HALF HIGH	STANDARD	HIGH PERFORMANCE
CAPACITY (MBytes)	7 / 13	7 / 13 / 20 / 27	31 / 55 / 86
AVERAGE POSITIONING TIME (ms)	95	83	35
DIMENSIONS (inch) (HxWxD)	1.6x5.7x8.0	3.3x5.7x8.0	3.3x5.7x8.0
INTERFACE	ST506 / SA4000	ST506 / SA4000	ST506 / SA4000
POSITIONING METHOD	Buffered Stepper	Buffered Stepper	Rotary Voice-Coil

New products are indicated in red.

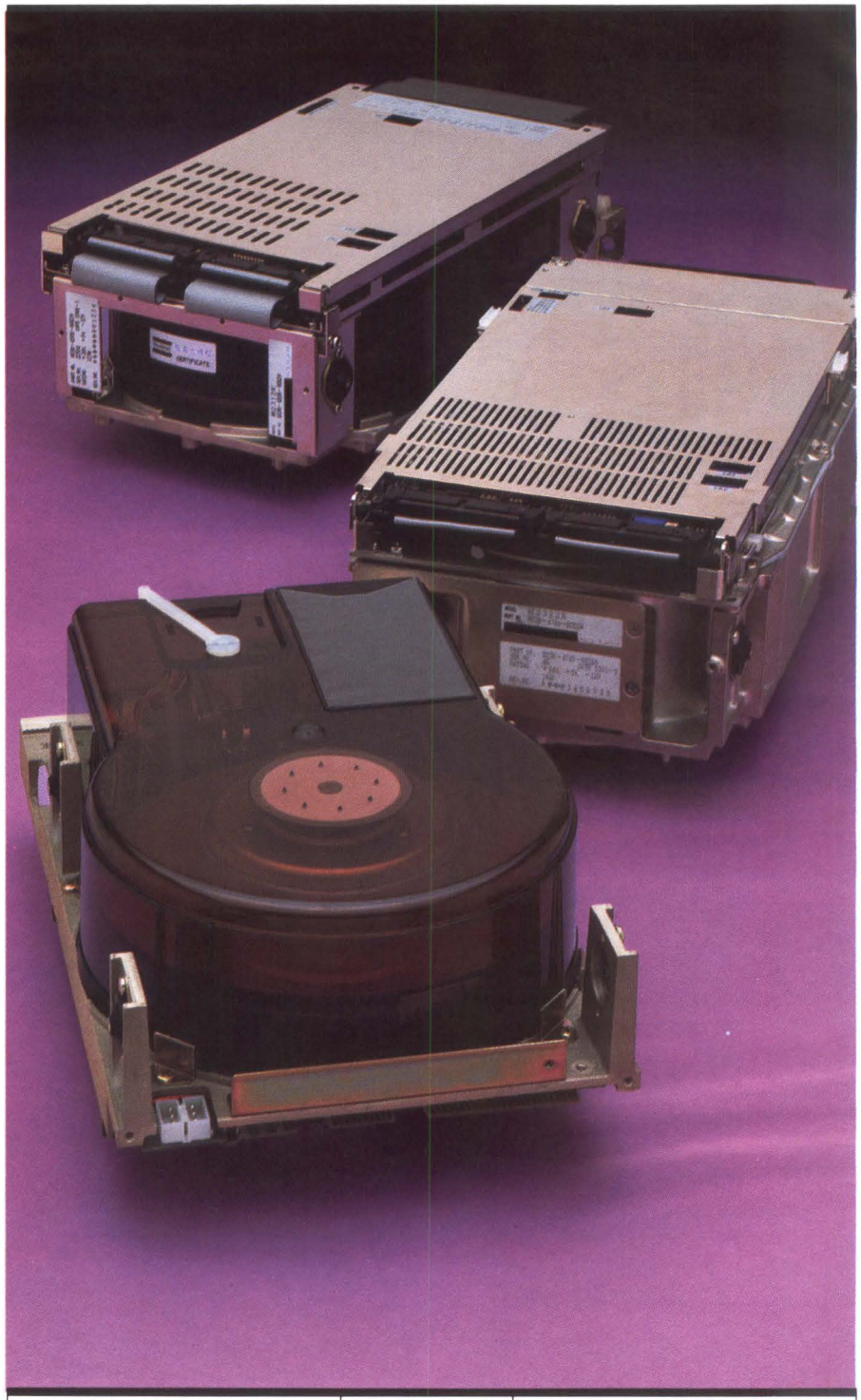
STORAGE PRODUCTS DIVISION

Quality Lives

FUJITSU

CIRCLE NO. 60 ON INQUIRY CARD

Quality 8 Inch Drives



From FUJITSU

Look no further. Because anywhere you look, Fujitsu America covers your needs for quality, high reliability disk drives.

Broad selection—choose from four different drives with capacities ranging from 24 to 168 megabytes.

Rotary voice coil or Stepper actuator—whether you need high performance or economical drives, Fujitsu can provide either.

Fujitsu's rotary voice coil drives offer you high capacity, fast head positioning, and SMD transfer rates. Fujitsu's stepper motor drives offer you medium capacities and economy.

Unsurpassed quality—a Fujitsu hallmark. From design to final burn-in, every Fujitsu drive earns its 10,000 MTBF rating.

Field service support—access to Fujitsu America engineers and product specialists is as close as your telephone.

For more information on the Fujitsu line of 8-Inch Quality Drives, contact the sales office nearest you. Northwest: (408) 946-8777, Central: (612) 835-7025, East Coast: (617) 229-6310, Southwest: (714) 476-0852, Europe: 441/493-1138.

	STANDARD	HIGH PERFORMANCE	
CAPACITY (M Bytes)	24/48	84	168
AVG. POSITIONING TIME (ms)	70	20	20
TRANSFER RATE (M Bytes/s)	1.2	1.22	1.22
INTERFACE	SA4000	SMD	SMD
POSITIONING METHOD	Buffered Stepper	Rotary Voice Coil	Rotary Voice Coil

STORAGE PRODUCTS DIVISION

Quality Lives

FUJITSU

CIRCLE NO. 61 ON INQUIRY CARD

Quality High Capacity Drives

From FUJITSU

With every high-capacity drive from Fujitsu America you get something more than just faster access speeds, greater capacities and superior price/performance. You also get the Fujitsu quality and reliability that only comes from 16 years experience as a leading OEM disk drive supplier.

Fujitsu's quality is built into every disk drive through a completely integrated manufacturing operation. Ninety-five percent of all components used in the disk drives are Fujitsu manufactured. The other 5% are purchased according to Fujitsu's strict quality standards.

Fujitsu's 14 inch line offers the *lowest* cost per megabyte storage. The Fujitsu 10½ inch Eagle is a state-of-the-art drive for fast positioning time.

All Fujitsu drives are backed by excellent service and field support, available through Fujitsu America regional offices and Fujitsu's network of authorized regional distributors.

For more information or assistance in selecting the right Fujitsu disk drive for you, contact the Fujitsu America sales office nearest you. Northwest: (408) 946-8777, Central: (612) 835-7025, East Coast: (617) 229-6310, Southwest: (714) 476-0852, Europe: 441/493-1138.

	10½"	14"	
CAPACITY (M Bytes)	474	168/336	671
AVG. POSITIONING TIME (ms)	18	27	27
TRANSFER RATE (M Bytes/s)	1.86	1.01	1.86
INTERFACE	SMD (MOD)	SMD	SMD (MOD)
POSITIONING METHOD	Rotary Voice Coil	Rotary Voice Coil	Rotary Voice Coil

New product is indicated in red.

STORAGE PRODUCTS DIVISION

Quality Lives

FUJITSU

CIRCLE NO. 62 ON INQUIRY CARD

The Buyer's Guide to Quality Disk Drives. From FUJITSU.

A major OEM peripheral procurement involves a substantial commitment of your company's resources. You should choose a supplier who is able to make an equivalent commitment in return.

Fujitsu America is one of the few disk drive suppliers with both the experience and the resources to stand behind such a commitment.

Fujitsu offers a complete family of disk drives, from 5¼ to 14 inch, with capacities ranging from 7 to 671 megabytes. Fujitsu drives provide access speeds among the fastest available today.

Of even more importance to you is Fujitsu's absolute dedication to product quality and customer support.

For more information on Fujitsu's complete family of quality disk drives, contact the Fujitsu America sales office nearest you. Northwest: (408) 946-8777, Central: (612) 835-7025, East Coast: (617) 229-6310, Southwest: (714) 476-0852, Europe: 441/493-1138.

OR CONTACT: **S & S Electronics,** 150 Industrial Avenue East, Lowell, MA 01852, (617) 273-0115; **Cameron Computers, Inc.,** 29 Goodway Drive, Rochester, NY 14624, (716) 473-4590; **Hopkins Associates,** 18 Elizabeth Street, Conshohocken, PA 19428, (215) 828-7191; **Gentry Associates, Inc.,** 7665 Currency Drive, Orlando, FL 32809, (305) 859-7450; **Mesa Technology Corp.,** 16021 Industrial Drive, Gaithersburg, MD 20877, (301) 948-4350; **Lowry Computer Products, Inc.,** 8163 West Grand River, Brighton, MI 48116, (313) 229-7200; **First Rep Company,** 747 Church Road, Suite C1, Elmhurst, IL 60126, (312) 530-2450; **Micro Resources,** 4640 West 77th Street, Suite 109, Edina, MN 55435, (612) 830-1454; **Dallas Digital,** 731 Lingco, Suite 102, Richardson, TX 75081, (214) 238-8977; **CTI Frontier,** 8030 East Morgan Trail, Scottsdale, AZ 85258, (602) 998-4438; **DEX Corporation,** 1050 E. Duane Avenue, Suite G, Sunnyvale, CA 94086, (408) 733-6900; **Group III Electronics,** 2020-116th N.E., Bellevue, WA 98004, (206) 454-0150; **R² Marketing,** 940 North 400 East, North Salt Lake, UT 84054, (801) 298-2631

	14"		10½"	8"			5¼"		
CAPACITY (M Bytes)	168/336	671	474	24/48	84	168	7/13*	7/13/20/27	31/55/86
AVERAGE POSITIONING TIME (ms)	27	27	18	70	20	20	95	83	35
TRANSFER RATE (K Bytes/s)	1012	1860	1860	1200	1229	1229	625	625	625
INTERFACE	SMD	SMD (MOD)	SMD (MOD)	SA4000	SMD	SMD	ST506/ SA4000	ST506/ SA4000	ST506/ SA4000
POSITIONING METHOD	Rotary Voice Coil	Rotary Voice Coil	Rotary Voice Coil	Buffered Stepper	Rotary Voice Coil	Rotary Voice Coil	Buffered Stepper	Buffered Stepper	Rotary Voice Coil

*Half High

STORAGE PRODUCTS DIVISION

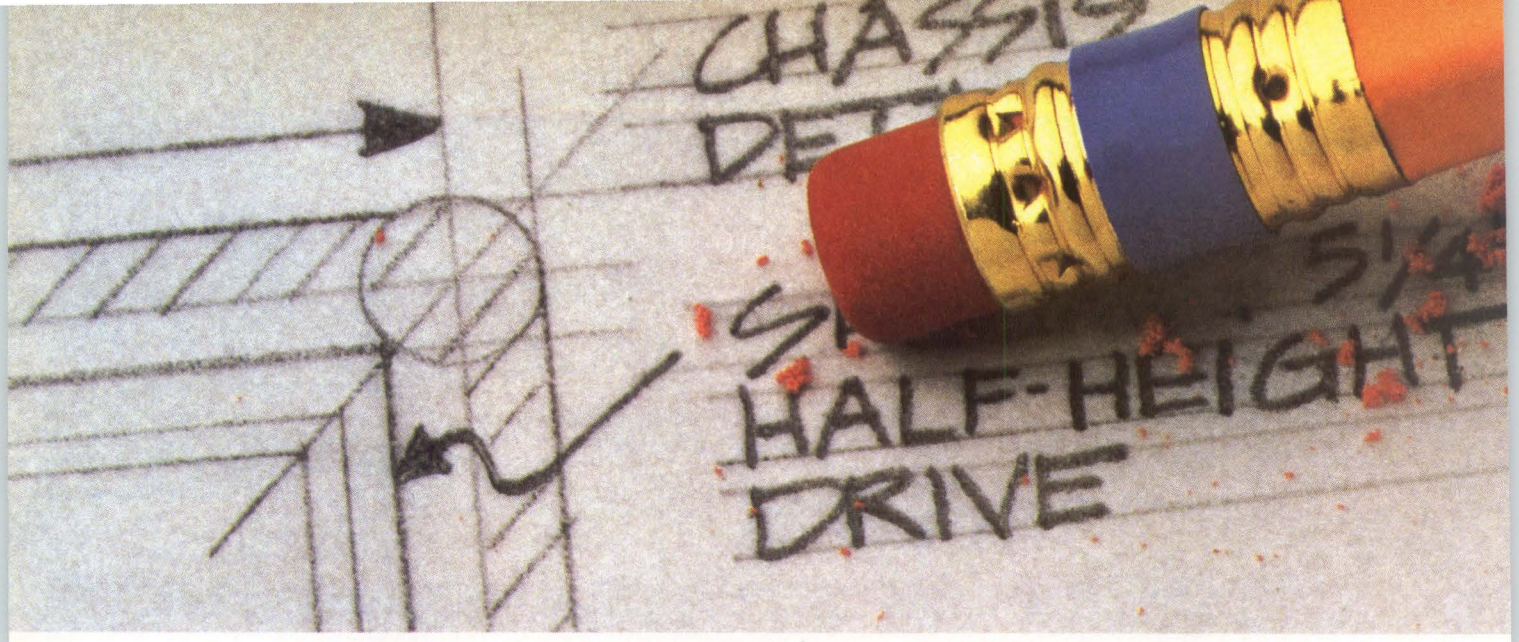
Quality Lives

FUJITSU

CIRCLE NO. 63 ON INQUIRY CARD

SINGLE-USER MICROCOMPUTERS

Company Model	Display size, color/screen format (col. x lines)	CPU type	Minimum (maximum) memory size (bytes)	Operating system	Programming language	Unit price ($)	Configuration, options
SX-3000	12-inch, green (80x24)	Z80B, 8086	128K (896K)	CP/M, CP/M-86, CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	6,295	includes one 5.25-inch, 1.5M-byte diskette drive, 15 programmable function keys; opt. async/bisync communications software
SX-5000	12-inch, green (80x24)	Z80B, 8086	128K (896K)	CP/M, CP/M-86, CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	9,995	includes one 5.25-inch, 1.5M-byte diskette drive, 15 programmable function keys; opt. async/bisync communications software
4/20	12-inch, green (80x24)	Z80B, 8088	128K (256K)	CP/M, CP/M-86, CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	3,995	includes two 5.25-inch, 1.2M-byte diskette drives, detached keyboard with 15 programmable function keys; opt. async/ bisync communications software
4/40	12-inch, green (80x24)	Z80B, 8088	128K (256K)	CP/M, CP/M-86, CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	5,995	includes one 5.25-inch, 630K-byte diskette drive, one 10M-byte hard disk, 15 programmable function keys; opt. async/ bisync communications software
4/60	12-inch, green (80x24)	Z80B, 8088	128K (256K)	CP/M, CP/M-86 CCP/M-86, MS-DOS	BASIC, COBOL, FORTRAN, Pascal	9,995	includes one 5.25-inch, 630K-byte diskette drive, one 30M-byte hard disk; opt. async/ bisync communications software
VISUAL TECHNOLOGY INC.							
1050	12-inch, monochrome (80x25)	Z80A, 6502	128K (256K)	CP/M Plus	CBASIC, MBASIC, Assembly	2,695	includes two 5.25-inch, 800K-byte diskette drives, one 10M-byte hard disk drive, bundled software
WANG LABORATORIES INC.							
Wang Professional Computer	12-inch, green (80x25)	8086	128K (640K)	MS-DOS; opt. CP/M, UCSD P-System	BASIC, interpretive BASIC, FORTRAN, Pascal, COBOL, COBOL Level II, Microfocus	2,595	includes two 5.25-inch, 360K-byte diskette drives, one 10M-byte hard disk, bundled software; upgradable to Wang PIC image processing system
WICAT SYSTEMS INC.							
140	14-inch, monochrome (80x24)	68000	512K	UNIX, WMCS (proprietary)	Assembly, APL 68000, C, FORTRAN 77, Pascal, WBASIC, SMC-BASIC, RM-COBOL	8,000	includes one 5.25-inch, 630K-byte diskette drive, one 10M- or 15M-byte hard disk drive; opt. printer
XEROX CORP.							
16/8	12-inch, b&w	Z80A, 8086	64K (256K)	CP/M-80, CP/M-86, MS-DOS		3,395	includes two 5.25-inch, 256K-byte diskette drives, one 10.67M-byte hard disk drive; opt. 8-inch diskette drive
ZENDEX CORP.							
835		8085	64K (1M)	CP/M-80, ISIS-II	FORTRAN, Pascal, PL/M-80	8,995	includes two 8-inch, 500K-byte diskette drives, boot/monitor; opt. removable hard disk, upgrade to 8088 CPU
95/36A		8086 (8 MHz)	256K (1M)	CP/M-86	C, Pascal-86	8,495	includes two 1M-byte diskette drives and one 10-, 20- or 42M-byte hard disk; opt. modular chassis configuration, supports universal development interface
95/80		8086 and 8087 coprocessor	512K (1M)	RMX-86	FORTRAN-86, Pascal 86, PL/M-86, C	14,495	includes one 8-inch, 1M-byte diskette drive and 40M-byte hard disk drive; opt. multiuser capability
ZENITH DATA SYSTEMS							
Z-150	13-inch, color or amber (80x25)	8088	128K (640K)	Z-DOS	BASIC, FORTRAN, Pascal, COBOL	2,699	includes one 5.25-inch, 360K-byte diskette drive; opt. dual drives
Z-160	9-inch, amber (80x25)	8088	128K (640K)	Z-DOS	BASIC, FORTRAN, Pascal, COBOl	2,799	portable, includes one 5.25-inch, 320K-byte diskette drive; opt. dual drives



Right now some of your competitors are changing their strategy.

If you are an OEM or Systems Integrator, some of your competitors have already erased past memories. They've found a new advantage and are changing their strategy. A way to get more performance and capacity for their money.

The Tulin half-height 5.25" Winchester disk drive.

Raw capacity is one reason. We offer you a choice of 40, 26.7 and 13.34 megabyte designs. For more capacity now. And the option of adding more later.

Another reason is superior technology. Dynamic features like a space-saving motor that fits completely inside the spindle. And a read/write preamp that's built right inside the head/disc assembly—for better S/N ratio and protection from RF interference.

And while our drives deliver a lot of power, they don't use much. Only 16 watts.

This superior technology will do a lot more for you than raise your customers' eyebrows. It'll also boost reliability as well. Our rotary actuator has only one moving part. Which means less to go wrong. And for the read/write heads we designed a dedicated landing zone. Which provides additional data security.

To order your evaluation unit, write or call us now: Tulin Corporation, 2393 Qume Drive, San Jose, CA 95131, (408) 942-9025, Telex 499-4365.

Because a lot of companies are finding room for us in their plans. A good reason we should be a part of yours.

Tulin

Eastern Regional Sales Office
1 Speen Street Suite 240
Framingham, MA 01701
(617) 879-6667

Western Regional Sales Office
2393 Qume Drive
San Jose, CA 95131
(408) 942-9025

See us at NCC, Booth D-3838

CIRCLE NO. 26 ON INQUIRY CARD

Hardware, software trends expand multiuser system performance

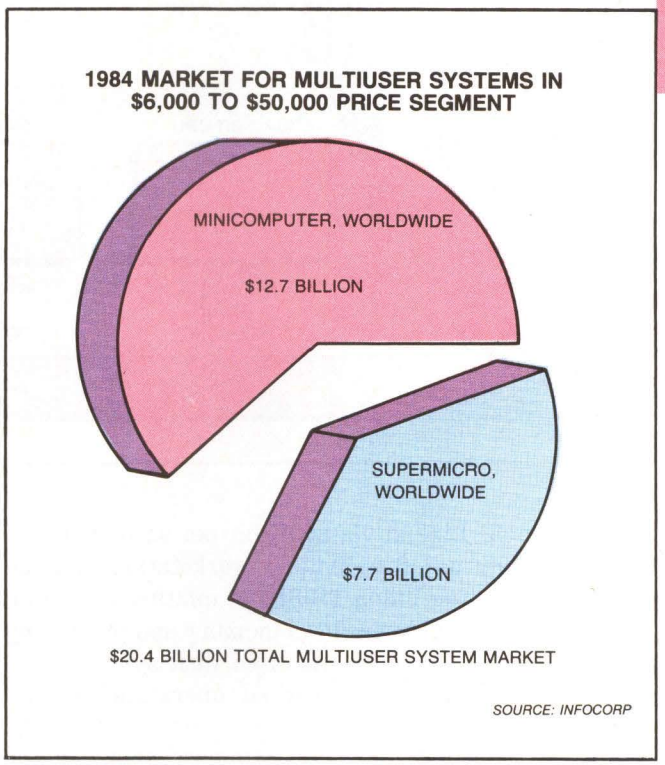
Multiuser systems gain favor via software compatibility, distributed processing and host communications

Chris Bailey, Western Editor

The hoopla surrounding the success of the IBM PC and the PC clones has overshadowed development in the multiuser market, but significant advances are being made. In the drive to produce powerful three- to 128-user systems that can be upgraded, several trends have become evident. One trend centers on the move toward software compatibility with popular operating systems like UNIX, MS-DOS and Pick. Another trend spotlights the increased performance made possible through the use of distributed-processing I/O processors, multiple-application processors or both. A third trend focuses on the growing awareness of the need for comprehensive communications with mainframes, minicomputers and other microcomputers as evidenced by the growing availability of communication facilities.

New systems incorporating these developments are winning significant market share and are expected to increase that share as more corporate users find their processing needs growing beyond the capabilities of single-user systems.

Thanks to very-large-scale-integration (VLSI) technology in the form of 16- and 32-bit microprocessors, a host of small system companies created the first multiuser microcomputers about three years ago. They integrated microprocessors, Winchester disks, streaming-tape drives, "standard" operating systems and application-software packages. Their immediate success encouraged more than 100 vendors to compete in this market segment. The reason? This year's revenues are expected to exceed $7 billion.



With base prices in the $10,000 to $50,000 range and support for three to 64 users, multiuser sytems should outpace the sales growth of minicomputer systems, capturing some 70 percent of the market by 1988. System integrators can distinguish the multitude of product offerings on the hardware side by checking the various processing modules. On the software side, system integrators should examine the system's opera-

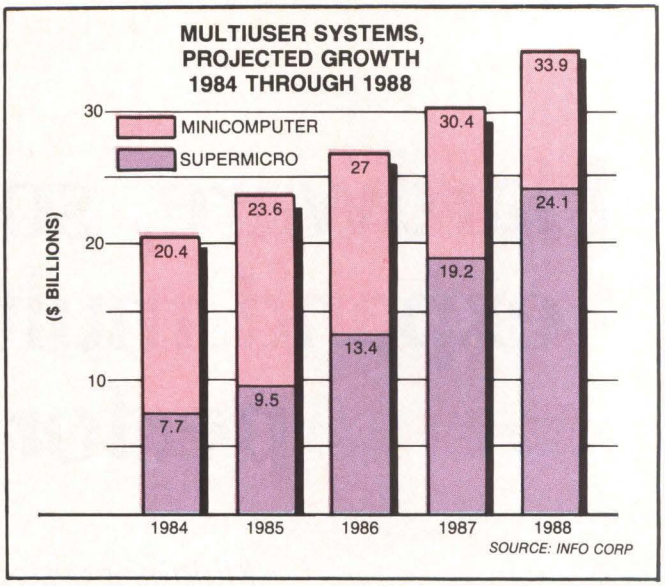
ting system. So far, no single architecture has emerged triumphant, nor does any one "standard" operating system dominate.

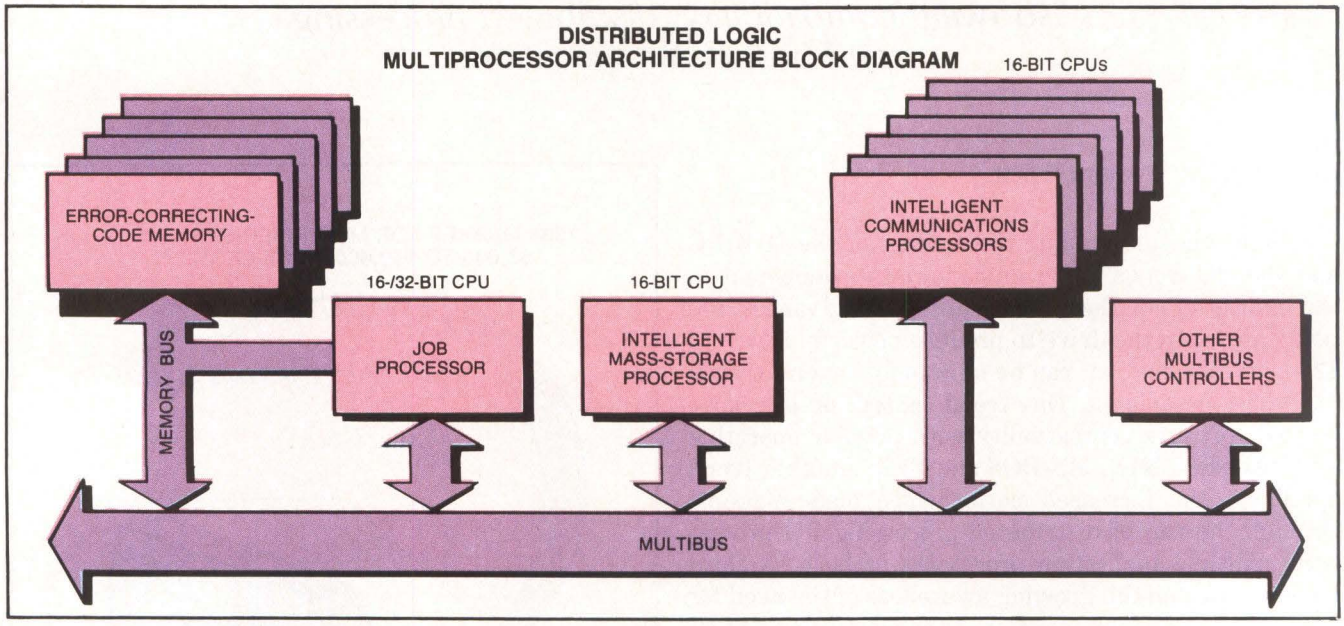
The drive to squeeze more processing power from the central processing engine has taken several directions. Some system builders have developed loosely coupled networks of single-user stations, similar in function to local-area networks (LANs) but configured around a central file server. Other builders have enforced the single main processor with dedicated I/O processors—primarily 8-bit auxiliary processors such as Z80s. However, system builders are increasing their use of 16-bit processors, such as 8086s and 80186s, to increase I/O performance. Other manufacturers have installed a number of distributed and dedicated application processors, as well as supplied dedicated I/O processors.

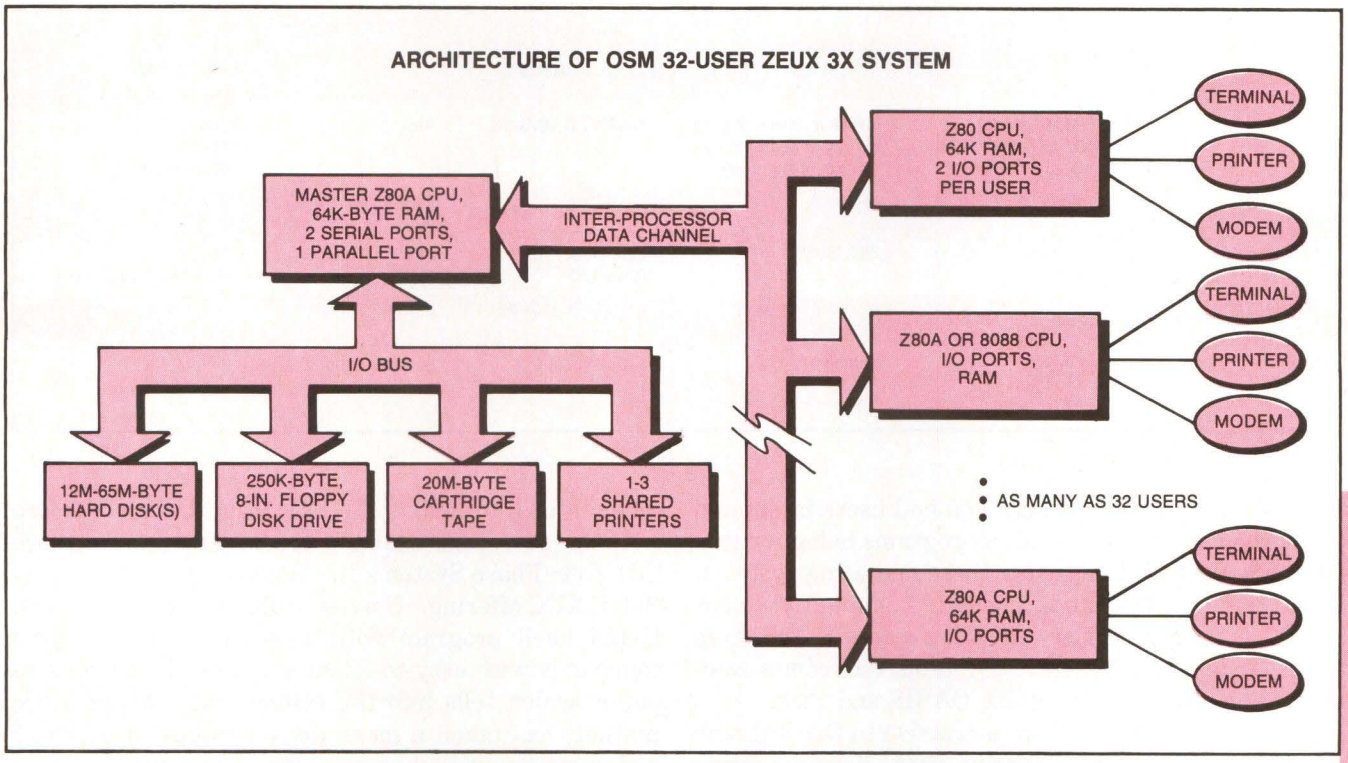
TeleVideo Systems Inc. exemplifies the loosely coupled approach. Linked via 800K-bit-per-second RS422 links, as many as 16 individual workstations can be connected to a TeleVideo TS 816/40 multiuser system. Each workstation contains local memory and processing resources and shares a centralized disk system managed by the Mmmost networked operating system. Workstations can contain local mass storage or use the central disk resources. While Mmmost manages the central file server, each local workstation runs the CP/M operating system and provides the user interface. Supported workstations include 8-bit Z80 systems and 16-bit 8088-/8086-based systems. This approach appeals to users who wish to start with single-user stations and expand into multiuser capabilities.

One of the earliest to use the distributed-I/O-processor approach was Plexus Computers Inc. with the P series of Z8000- and 68000-based systems. Although most system builders claim to use intelligent I/O processors, Plexus enhanced this idea by dividing the kernel of the operating system—in this case, UNIX—between various 16-bit processors. Dedicated 16-bit processors with dedicated memories support file operations, terminal I/O handling and application-program execution. This setup significantly speeds overall operation and provides the performance to support as many as 64 users in a fully loaded configuration.

A second approach, typified by the Zeus series of computers from OSM Computer Corp., involves Z80 or 8086 units in a centralized cabinet. Starting with a two- to four-user system, users can expand the system with additional processor/memory boards. This method bypasses degradation as the system becomes more fully







loaded. Similar products have won market share because this multiuser capability is compatible with the popular single-user CP/M operating system.

Convergent Technologies Inc. has duplicated this approach with 16-bit technology. Convergent's MegaFrame system uses 68010 16-/32-bit processors as applications processors and 16-bit 80186 processors as I/O handlers. For example, a fully equipped UNIX-based system includes eight 68010 application processors and supports as many as 128 users.

For Convergent, a key 68010 advantage centers on virtual-memory management. This memory-/disk-swapping technique allows each application program to address the full physical memory space of the processor —in this case, 16M bytes—even if the full memory space is not filled with physical memory.

Communications enhance data sharing

Because multiuser systems provide a convenient way of sharing data and resources among multiple users, software facilities that enhance those capabilities prove important. For example, electronic-mail packages can transfer messages among users of a departmental computer system and link to other systems. Specifically, the UNIX multiuser operating system supplies message switching and supports electronic mail.

For another example, communications software can link several departmental computers into a corporate-wide information system or can connect to remote host mainframes or LANs. These systems feature simple asynchronous ASCII serial communications.

Other systems offer comprehensive communications packages that permit linking to mainframes and other hosts. For example, Fortune Systems Corp. offers IBM Systems Network Architecture (SNA) protocol packages and Wang Laboratories Inc. interfaces for connecting Fortune's systems to IBM mainframes and to Wang office-automation systems, respectively. Altos Computer includes in its ACS 586 system an integral communications computer systems board that supports IBM 2780/3780 synchronous, 3270, SNA/SDLC, X.25 and Ethernet protocols.

Software focuses on compatibility

Although advances in hardware occur daily, users' interest has shifted to software compatibility. This shift has affected the single-user workstation world as evidenced by the widespread cloning of IBM Corp.'s PC and of MS-DOS. This important marketing strategy also affects multiuser systems. Many multiuser vendors have attracted market share by offering multiuser capability with a CP/M-based or -compatible system.

However, as developments unfold in 16-bit-based systems, no single operating system dominates. This market is being approached from three directions. On one side, CP/M derivatives like CP/M-86 and MS-DOS are appearing in multiuser systems. System builders are appealing to the 8-bit upgrade market and are

OPERATING SYSTEM WARS

	CP/M, CP/M-86 CP/M-68K, MS-DOS	MP/M-II, Muse (OSM), Mmmost (TeleVideo), n-Star (Molecular)	OASIS, OASIS-16	Pick	UNIX, XENIX (Microsoft)
Characteristics	single-user	multiuser	multiuser	integral database-management system	multiuser
CPUs supported	Z80, 8080	Z80, 8086	Z80, 8080, 8086/186	Z8000, 8086/186, 68000	Z8000, 8086/86, 68000, 1600
File system	simple	record/file locking	record/file locking	record/file locking	record/file locking, hierarchical file system
User interface	primitive	primitive	sophisticated	sophisticated	difficult

attempting to attract dealers and end users interested in the thousands of application programs being written for single-user systems using these operating systems. From the scientific and academic community comes UNIX, a true multiuser operating system. And from third parties like Phase One Systems Inc. comes commercial operating systems like OASIS and Pick.

CP/M-86 and MS-DOS are attractive to this upgrade market because of the relative ease of transporting popular 8-bit programs to this environment and the popularity of the single-user, PC-DOS-based (MS-DOS-compatible) IBM PC. System builders like OSM, Molecular Computer and TeleVideo have produced multiuser systems using these operating systems.

From the other direction comes the push for UNIX. This AT&T Co.-developed operating system is a multiprogramming, multiuser 16-bit operating system. UNIX has had many upgrades and revisions in the 12 years since its development. In addition, it was widely distributed in colleges and universities during the 1970s; thus, a large base of professional programmers exists. In addition, UNIX has evolved into a highly developed programming environment incorporating a number of programming languages and tools. It has been widely ported to a number of minicomputers including the Digital Equipment Corp. PDP-11 and VAX-11 series minicomputers.

UNIX has some disadvantages, however, for commercial business applications. Because of the sophistication of its original users, the system interface can be extremely intimidating to novices or casual users. Many commands give no response, thereby mystifying users. Other utilities use cryptic commands such as "awk" or "grep" that give little indication of their function. Lastly, many elegant shortcuts that make the system so powerful for trained programmers require software knowledge that most commercial users don't have.

To combat these objections, nearly all major UNIX supporters in the commercial business arena have taken steps to make UNIX's user interface more friendly. A recent example is the Uniview interface that Four-Phase Systems Inc. has added to its commercial UNIX offering. Uniview replaces the traditional UNIX shell program with a set of menu-selectable commands with easy-to-follow prompts. Fortune Computer, which sells into the commercial Fortune 1,000 market, has taken a menu-driven front-end approach and has encountered no negative end-user response.

A potentially more important problem with UNIX when implemented in microprocessor-based systems is the disk-I/O bottleneck. The popularity of UNIX on DEC minicomputers was partially the result of the fast disk-I/O characteristic of these systems. In these popular products, pages of memory are continually being swapped to and from the 14-inch disk subsystems. In the first microprocessor-based UNIX systems, this posed a serious performance problem: the systems typically used first-generation 5¼-inch Winchester disks.

Fortune encountered this problem in its 16:32 product when attempting to support more than a few users. To overcome this problem, Fortune enhanced the operating system to speed file-handling algorithms and then switched to a second-generation Winchester disk drive, cutting the raw data-access time from 90 to 30 msec. Therefore, Fortune's upgraded systems can support as many as 12 users with one 68000 main processor.

Business applications are limited

Another major problem with UNIX is its lack of suitable business-oriented application programs. While UNIX probably has been ported to more hardware than any other operating system, much of the development work has been in the scientific and technical areas. Thus, the broad base of UNIX applications has little applicability to business. The first crop of UNIX-based supermicrocomputers, which appeared in 1981, was expected to result in a flood of UNIX-based

commercial applications, but the flood has not yet materialized.

Despite problems in the commercial business environment, UNIX is receiving widespread support from such major players as IBM, AT&T, DEC, Data General Corp. and Hewlett-Packard Co., which this year announced systems that support UNIX. With their backing and UNIX's intensely loyal following in the smaller supermicro computer companies, the long-awaited flood of applications may begin in the next 12 months.

Most of the established UNIX-based manufacturers offer at least a handful of basic application programs. Some, like Plexus, have searched out third-party software houses that have developed "bridge" software. These software programs ease the transportation to the UNIX environment of application programs written in a proprietary language or operating system. SIBOL from Software Ireland, for example, permits the recompilation of application programs written in DEC's DIBOL, so that they can execute under UNIX.

Other participants who see CP/M-type operating systems as too primitive and UNIX as too technical prefer the OASIS or Pick operating systems. These systems were designed for the commercial processing environment. OASIS, designed for Z80 8-bit systems, has been upgraded for use with 16-bit processors and has earned a small but satisfied user base. Pick has its roots in the Reality operating system designed for the 16-bit MicroData Corp. commercial minicomputers of the early 1970s. Organized around inherent database management, the system is a well-regarded multiuser business-oriented operating system.

That there is no clear de facto standard in the operating-system sweepstakes is evident from the many system builders that have opted to offer multiple operating systems on their computers. Taking the stance that the dealer, system integrator or end user can best choose the capabilities that best meet his needs, vendors may offer two or more choices. Some, like Altos, offer all of the popular systems, including CP/M-86, MP/M-86, XENIX (a version of UNIX), OASIS-16 and Pick. □

Interest Quotient (Circle One)
High 807 Medium 808 Low 809

Yes! ☑ Mupac has everything you need for Multibus*Compatible Packaging...

....Including this NEW 7 position .75 pitch Multibus rack.

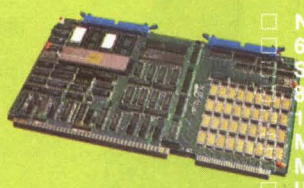
This flexible, compact and reliable packaging system can handle from 2 to 26 panels in easy to use modular increments. Features include panel guides on .60 and .75 inch centers, a backplane designed to eliminate crosstalk and noise, terminated bus lines and provision for parallel priority. Look to Mupac for multiple solutions to Multibus Compatible Packaging. Call or write for complete details today!

*Multibus is a registered trademark of Intel Corporation.

MUPAC®
10 Mupac Drive, Brockton, MA 02401
TEL (617) 588-6110 TWX (710) 345-8458

CIRCLE NO. 27 ON INQUIRY CARD

OEM'S SINGLE BOARD COMPUTERS



- New Reduced Price
- 68000 Multibus™
- S.U.N. technology
- 8, 10, 12 MHz
- 128, 256 Kbytes RAM
- Memory Management (MMU)
- Memory expandable
- UNIX™ available

Reliability and performance now for less

PLUG COMPATIBLE TO:
- ☐ Cyb
- ☐ Sun
- ☐ Forward
- ☐ Callan
- ☐ CoData
- ☐ Microbar

from $965.00

™Multibus is a trademark of Intel Corp.
™UNIX is a trademark of Bell Laboratories.

For information, write or phone:

PACIFIC MICROCOMPUTERS, INC.
119 Aberdeen, Cardiff, CA 92007
619/436-8649

CIRCLE NO. 28 ON INQUIRY CARD

Get the most out of the UNIX* operating system with Zilog's System 8000.

No other microcomputer for commercial and technical applications gives you access to the powerful UNIX operating system like Zilog's System 8000. Instead of designing a computer and then choosing an operating system to run on it, Zilog selected the UNIX operating system first—and then carefully and intentionally structured the architecture of the System 8000 to take full advantage of it.

Zilog's high performance, multi-user, UNIX System 8000 supermicros give you a proven way to quickly migrate your minicomputer software onto affordable micros. For instance, we offer compatible migration tools for Basic Four BBIII, 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.

Find out what it's like to free yourself from expensive minicomputers, and at the same time get a high level of service and support. Ask about our RSVP Referred Software Vendor Program, too, where you can find the applications software and tools you need. The System 8000 family starts at under $15,000.

Get the whole story by calling our TOLL FREE number 800-841-2255. Or write: Zilog Systems Division, Corporate Publications, 1315 Dell Avenue, M/S C2-6, Campbell, CA 95008

CIRCLE NO. 29 ON INQUIRY CARD

Systems

Zilog

an affiliate of EXXON Corporation

*UNIX is a trademark of AT&T Bell Laboratories. Zilog is licensed by AT&T Technologies, Inc. DEC and DIBOL are registered trademarks of Digital Equipment Corporation.
ICOS and Proxi are trademarks of Data General Corporation.

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
ACTION COMPUTER ENTERPRISE INC.							
Discovery 500	8, 16	Z80A, 8086	96K (2M)	dpc/os 3.0, CP/M Plus, CP/M-86	BASIC, Pascal, FORTRAN, COBOL, C	7,640	one 640K-byte diskette drive, 22M-byte hard disk drive
Discovery 1600	8, 16	Z80A, 8086	96K (4M)	dpc/os 3.0, CP/M Plus, CP/M-86	BASIC, Pascal, FORTRAN, COBOL, C	7,855	one 640K-byte diskette drive, 22M-byte hard disk drive
ALCYON CORP.							
APS	16, 32	68000	256K (2M)	REGULUS	COBOL, BASIC, FORTRAN, Pascal	10,850	one 5M-byte Winchester cartridge drive, 4 I/O ports, one printer port
APS.RMS	16, 32	68000	256K (4M)	REGULUS	COBOL, BASIC, FORTRAN, Pascal	11,846	two 5M-byte Winchester cartridge drives, 4 I/O ports, one printer port
APX	16, 32	68000	256K (4M)	REGULUS	COBOL, BASIC, FORTRAN, Pascal	31,225	one 75M-byte hard disk, .5-inch tape drive, 4 I/O ports, one printer port
ALLOY COMPUTER PRODUCTS							
MultiNet	8	Z80B	128K (128K)	network O/S, CP/M Plus	DRI languages	12,995	one 1.2M-byte diskette drive, 2 user processor boards, one 17M-byte cartridge tape drive
ALPHA MICROSYSTEMS							
AM-1000	16, 32	68000	128K (348K)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly	8,750	one 10M-byte hard disk, one 800K-byte diskette drive, one 40 cps printer; communicates with IBM Mainframe
AM-1000E	16, 32	68000	256K (512K)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly	15,000	one 30M-byte hard disk, one 800K-byte diskette drive, one 40 cps printer
AM-1042E	16, 32	68000	512K (3M)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly		one 32M-byte hard disk, one 1.2M-byte diskette, one 40 cps printer
AM-1072	16, 32	68000	512K (4M)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly	30,500	one 70M-byte hard disk drive, 40 cps printer, IBM Mainframe communications capabilities
AM-1082	16, 32	68000	512K (4M)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly	48,000	one 140M-byte hard disk drive, one 40 cps printer, IBM Mainframe communications capabilities
AM-1092	16, 32	68000	512K (4M)	AMOS, UNIX, CP/M	Alpha BASIC, COBOL, FORTRAN 77, C, Pascal, Assembly	56,000	one 400M-byte hard disk drive, one 3.2G-byte hard disk drive, one 40 cps printer
ALSPA COMPUTER INC.							
ALSPA-NET	8	Z80A	64K (128K)	Turbo-DOS		9,785	one 1.2M-byte diskette, one 10M-byte hard disk, 2 terminals
ALTOS COMPUTER SYSTEMS							
580 Series	8	Z80A	192K (192K)	MP/M-II, OASIS	CBASIC, MS BASIC, MS COBOL, RM COBOL, CIS COBOL, MT, Pascal, B1280	6,185	one 1M-byte diskette drive, one 20M-byte hard disk drive, one terminal
586 Series	16	8086	512K (1M)	XENIX, MP/M-86	CBASIC, SOFTBOL, MS BASIC-86, MS COBOL, RM COBOL, CIS COBOL, MT, Pascal, MS FORTRAN	10,990	one 1M-byte diskette drive, one 40M-byte hard disk drive, one terminal
986 Series	16	8086	1M (1M)	XENIX, MP/M-86	CBASIC, SOFTBOL, MS BASIC-86, MS COBOL, RM COBOL, CIS COBOL, MT, Pascal, MS FORTRAN	12,990	one 1M-byte diskette, one 40M-byte hard disk drive, one terminal
APOLLO COMPUTER INC.							
DN320	16	68010	500K (1.5M)	AEGIS, AUX (UNIX)	FORTRAN 77, Pascal, C	12,900	font editor, network interface, language debugger, graphics primitives
APPLIED DIGITAL DATA SYSTEMS INC.							
Mentor 2000	16	Z8001	256K (1024K)	ADDS-enhanced, PICK	D/BASIC, INFO/ACCESS	23,000	one 27M-byte hard disk drive, 200-lpm matrix printer; opt. up to 4 terminals

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
Mentor 4000	16	Z8001	256K (512K)	ADDS-enhanced, PICK	D/BASIC, INFO/ACCESS	49,000	one 60M-byte hard disk drive, 300-lpm matrix printer; opt. up to 8 terminals
Mentor 5000	16	Z8001	512K (1024K)	ADDS-enhanced, PICK	D/BASIC, INFO/ACCESS	79,000	one 150M-byte hard disk drive, 300-lpm matrix printer, opt. up to 20 terminals
AURAGEN SYSTEMS CORP.							
System 4000	32	68010	1M (256M)	UNIX-compatible AUROS	C, COBOL, FORTRAN, Pascal, BASIC	68,000	fault tolerant, includes 4 68010's and 4 2901 processors; one 76M-byte hard disk drive, one .5-inch streaming tape, one terminal
BURROUGHS CORP.							
B21-4	16	8086	256K (512K)	BTOS, MS-DOS, CP/M-86	BASIC, COBOL, FORTRAN, Pascal	6,435	one 630K-byte diskette drive, one 5M-byte hard disk drive, up to 4 terminals
B21-5	16	8086	256K (512K)	BTOS, MS-DOS, CP/M-86	BASIC, COBOL, FORTRAN, Pascal	7,200	one 630K-byte diskette drive, one 10M-byte hard disk drive, up to 4 terminals
B21-6	16	8086	256K (512K)	BTOS, MS-DOS, CP/M-86	BASIC, COBOL, FORTRAN, Pascal	8,745	one 630K-byte diskette drive, one 15M-byte hard disk drive, up to 4 terminals
B22	16	8086	256K (640K)	BTOS, MS-DOS, CP/M-86	BASIC, COBOL, FORTRAN, Pascal	12,090	one 500K-byte diskette drive, 1M- to 10M-byte hard disk drive, up to 16 terminals
CADMUS							
9000	32	68010	512K (4M)	UNIX System V, with Berkeley 4.2 Enhancements	C, FORTRAN 77, Pascal, PROLOG, FRANZ LISP, COBOL, SIBOL		9720 File Server, 9730 multi-user node offer opt. 140M-byte hard disk drive, one 32M-byte cartridge tape drive, 9-track tape drive, 65M-byte hard disk drive, 2M-byte 5.25-inch diskette drive
CALLAN DATA SYSTEMS							
UNISTAR 100	32	68000 8 MHz	512K (2M)	UNIX System V	C, FORTRAN 77, Pascal, Ada, BASIC, COBOL, Assembly	11,450	one 616K-byte diskette, one 21M-byte hard disk, integrated CRT, 8-slot Multibus, one terminal
UNISTAR 200	32	68000 8 MHz	512K (2M)	UNIX System V	C, FORTRAN 77, Pascal, Ada, BASIC, COBOL, Assembly	13,950	one 616K-byte diskette drive, one 21M-byte hard disk drive, integrated CRT, 8-slot Multibus, one terminal
UNISTAR 300	32	68010 10 MHz	512K (2M)	UNIX System V	C, FORTRAN 77, Pascal, Ada, BASIC, COBOL, Assembly	19,950	one 616K-byte diskette, one 43M-byte hard disk, one 45M-byte cartridge tape, 12-slot Multibus
CHARLES RIVER DATA SYSTEMS							
UV 68/05-B	8, 16, 32	68000	512K (16M)	Unos, UNIX System V	C, FORTRAN 77, Pascal, RM COBOL	13,150	one 8-inch 1M-byte diskette drive, one 5.25-inch 35M-byte hard disk drive, up to 4 terminals
UV 68/35-B	8, 16, 32	68000	512K (16M)	Unos, UNIX System V	C, FORTRAN 77, Pascal, RM COBOL	14,900	includes one 8-inch 1M-byte diskette drive, one 5.25-inch 35M-byte hard disk drive, up to 4 terminals
UV 68/67-T-B	8, 16, 32	68000	512K (16M)	Unos, UNIX System V	C, FORTRAN 77, Pascal, RM COBOL	24,900	includes one 8-inch 60M-byte hard disk drive, one 45M-byte streaming tape drive, up to 4 terminals
CHRISLIN INDUSTRIES INC.							
CI-MICRO-11	16	LSI-11/23	64K (4M)	RT-11, RSX11-M, UNIX	FORTRAN, COBOL, Pascal, BASIC	6,850	two 1M-byte diskette drives, one 20M-byte hard disk, 4 serial lines, rackmount hardware
CI-MWS23	16	LSI-11/23	64K (4M)	RT-11, RSX11-M, UNIX	FORTRAN, COBOL, Pascal, BASIC	12,695	two 1M-byte diskette drives, one 70M-byte hard disk, one terminal
CI-MWS73	16	LSI-11/73	64K (4M)	RT-11, RSX11-M, UNIX	FORTRAN, COBOL, Pascal, BASIC	15,395	two 1M-byte diskette drives, one 140M-byte hard disk, one terminal
CIE SYSTEMS INC.							
680/20BSP	16, 32	68000	256K (512K)	REGULUS, RM/COS	C, Pro-IV	9,995	one 500K-byte diskette drive, one 10M-byte 5.25-inch hard disk, one printer
680/30	16, 32	68000	256K (756K)	REGULUS, RM/COS	COBOL, BASIC	9,000–10,400	one 500K-byte diskette drive, one 40M-byte hard disk drive
680/40	16, 32	68000	512K (1M)	REGULUS, RM/COS		25,000–43,000	one 500K-byte diskette drive, one 84M-byte hard disk drive, one 20M-byte streaming tape, matrix or daisywheel printer
680/35	16, 32	68000	512K (756K)	REGULUS, RM/COS	FORTRAN, Pascal	24,000–26,000	one 500K-byte diskette drive, one 84M-byte hard disk, one 20M-byte streaming tape
CIPHER PLC							
Series 9000	16	68000	256K (1M)	UNIX	COBOL, FORTRAN, Pascal, BASIC, C	19,000	one 800K-byte diskette drive, 4 terminals, one printer, multi-user UNIX license

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
CODATA							
3300	16	68000	320K (1.5M)	UNIX	FORTRAN, Pascal, BASIC, APL, COBOL	11,000	one 33M-byte hard disk drive, one 1M-byte diskette drive, 10 ports
CODEX CORP.							
CDX-268/220	8	6809E	192K (384K)	ISOS II, MUMPS	BASIC, COBOL, C	13,500	two 650K-byte diskette drives, 3 terminals, one 200 cps printer
CDX-268/240	8	6809E	192K (384K)	ISOS II, MUMPS	BASIC, COBOL, C	23,100	one 650K-byte diskette drive, one 1.5M-byte hard disk, 6 terminals, one 200 cps printer
COLEX AMERICA							
880/3	8	Z80A	64K (64K)	Turbo-DOS	CP/M-compatible languages	6,995	one 720K-byte diskette drive, one 10M-byte hard disk drive, co-processor
880/4	8	Z80A	64K (64K)	Turbo-DOS	CP/M-compatible languages	7,495	one 720K-byte diskette drive, one 10M-byte hard disk drive, co-processor
880/6	8	Z80A	64K (64K)	Turbo-DOS	CP/M-compatible languages	8,495	one 720K-byte diskette drive, one 10M-byte hard disk drive, co-processor
COLUMBIA DATA PRODUCTS							
1600-4	16	8088	128K (1M)	MS-DOS 1.25, 2.0; CP/M-86, MP/M-86 C, MACRO-86	BASIC, COBOL, FORTRAN, Pascal	4,545	one 320K-byte diskette drive, one 10M-byte hard disk drive
COMPUCORP							
OA3200	16	68000	256K (2M)	XENIX, Zebra	BASIC, SMC, RM COBOL, FORTRAN 77, Pascal, C	18,000	up to three 5.25-inch 15M- to 100M-byte diskette drives; opt. printer, monitor
COMPUPRO							
816/10	8, 16	8088, Z80B	1M (1M)	MP/M-8-16		4,995	two 800K-byte diskette drives, bundled software
816/A	8, 16	8085/88	128K (1M)	CP/M-8-16		5,495	two 1.2M-byte diskette drives, 5 applications software packages
816/B	8, 16	8085/ 8088	256K (1M)	CP/M-8-16, MP/M 8-16		6,995	two 1.2M-byte diskette drives, 5 applications software packages
816/C	8, 16	8085/ 8088	512K (1M)	CP/M-8-16, MP/M-8-16		8,995	two 1.2M-byte diskette drives, 5 applications software packages
816/D	16	8086	512K (1M)	CP/M-86, MP/M-86		13,995	two 1.2M-byte diskette drives, 1.5M-byte RAM disk, bundled software
816/E	16	68000	256K (16M)	CP/M-68K	C, map FORTH	8,995	two 1.2M-byte diskette drives
COMPUTER DESIGNED SYSTEMS INC.							
Adviser Micro Plus	8	Z80A	64K (256K)	CP/M	BASIC, COBOL, FORTRAN	2,995	two 380K-byte diskette drives, one terminal
Advisor Micro Plus II	16	8086	64K (512K)	CP/M, A-DOS, MS-DOS	BASIC, COBOL, FORTRAN, ABOL	5,995	one 10M-byte disk drive, one terminal
Advisor Micro Plus III	8, 16	Z80A and 8086	64K (1M)	CP/M, MS-DOS, PC-DOS, UNIX	BASIC, COBOL, FORTRAN, RPG	6,995	one 10M-byte disk drive, one terminal
COMPUTER SYSTEMS							
CS/8086	16	8086	128K (1M)	MP/M, UNIX	Pascal, BASIC, FORTH, C	3,980	two 320K-byte diskette drives, CRT, keyboard; opt. matrix printer, 68000 CPU, up to 8 terminals
CONVERGENT TECHNOLOGIES							
MegaFrame	32	Multiple 68010s, 80186s	1M (20M)	CTIX (System V UNIX)	C, FORTRAN 77, ISO Pascal, ANSI BASIC, COBOL, ISAM		one 5M-byte removable cartridge drive, 2 50M-byte hard disk drives, 16 terminals, serial or Centronics interface
MiniFrame	32	68010	512K (2M)	CTIX (System V UNIX)	C, FORTRAN, 77, ISO Pascal, ANSI BASIC, COBOL, ISAM		one 640K-byte diskette drive, one 50M-byte hard disk drive, 8 terminals, serial or Centronics interface
CORVUS SYSTEMS							
Concept Plus	16, 32	68000	512K (512K)	Uniplus System III	FORTRAN, Pascal, Assembly, C	11,785	one 622K-byte 5.25-inch diskette drive, one 1.2M-byte 8-inch diskette drive, 11M- or 20M-byte hard disk, one terminal
Uniplex	16, 32	68000	512K (512K)	Uniplus System III	FORTRAN, Pascal, Assembly, C	10,785	one 622K-byte 5.25-inch diskette drive, one 1.2M-byte 8-inch diskette drive, 11M- or 20M-byte hard disk, one terminal

The TeleVideo IBM PC
The best hardware for

TeleVideo versus IBM. Make a few simple comparisons and you'll find there is no comparison.

RUNS IBM SOFTWARE.

With the TeleVideo® IBM Compatible line—PC, XT and portable computers—you'll get the most out of all the most popular software written for the IBM® PC—more than 3,000 programs.

Because every TeleVideo Personal Computer offers the highest level of IBM compatibility on the market and has the standard—not optional—features

RATED 99% COMPATIBLE*

Features	Tele-PC	IBM PC	Tele-XT	IBM XT
Monitor	YES	OPTIONAL	YES	OPTIONAL
Screen Size	14"	12"	14"	12"
Tilt Screen	YES	NO	YES	NO
Quiet Operation	YES (NO FAN)	NO	YES	NO
Memory	128K	128K OPTION	256K	256K OPTION
Graphics Display (640 x 200 resolution)	YES	OPTIONAL	YES	OPTIONAL
Printer Port	YES	OPTIONAL	YES	OPTIONAL
Communication Port	YES	OPTIONAL	YES	YES
MS™-DOS/BASIC®	YES	OPTIONAL	YES	OPTIONAL
System Expansion Slot	YES	YES	YES	YES
RGB and Video Port	YES	OPTIONAL	YES	OPTIONAL
Typical System Price	**$2995**	**$3843**	**$4995**	**$5754**

compatibles. the best software.

your people need to take full advantage of every job their software can do.

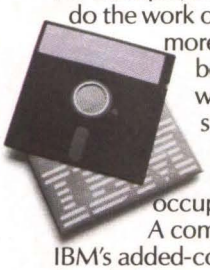
Study the chart at the left. It proves that TeleVideo—not IBM—offers the best hardware for the best price.

Note that TeleVideo's ergonomic superiority extends from fully sculpted keys and a comfortable palm rest to a 14-inch, no glare screen that tilts at a touch.

THE BEST MICROCHIPS.

What is perhaps most impressive about the TeleVideo IBM PC Compatible can be found deep within its circuitry. We use the same 8088 central processing unit that runs an IBM PC. But we also employ new VLSI (Very Large Scale Integration) microchips that are designed and built exclusively for TeleVideo. These interface more efficiently with the powerful 8088 and yield numerous benefits.

For example, our tiny custom chips do the work of many of the larger, more expensive circuit boards in an IBM PC. So we can offer a computer system that comes in one attractive, integrated case, is ready to run and occupies less desk space.



A computer that edges out IBM's added-cost component system for reliability, ease of service and purchase simplicity.

Fewer circuit boards to cool also allowed us to eliminate the noisy, irritating fan IBM and most other PCs force you to put up with. And TeleVideo compatibles accept any IBM hardware options without modification.

THE BEST LINE.

But the Tele-PC is only one element of the TeleVideo IBM PC Compatible line.

The TeleVideo XT is the best hardware for users of popular IBM XT software who would appreciate an extra 10 megabytes of storage capacity along with the advantages listed on the preceding chart.

THE BEST PORTABLE FOR THE BEST PRICE.

Features	TPC II	COMPAQ
High Capacity Storage	YES	NO
2nd Disk Drive	YES	OPTIONAL
Quiet Operation (No Fan)	YES	NO
Ergonomic Display	YES	NO
Communication Port	YES	OPTIONAL
International Power Supply	YES	NO
MS™-DOS 2.11	YES	NO
Graphics Display	YES	YES
Typical System Price	**$2995**	**$3710**

As the chart above demonstrates, our portable IBM compatible computer, the TPC II, is far and away better hardware than COMPAQ.™ Better hardware—standard—at a better price.

THE BEST MANUFACTURER.

The TeleVideo IBM PC Compatible line is made by the world leader in multi-user computer systems and the number one independent manufacturer of terminals.

So not only can you count on the service and support of an established industry leader, you can get it all—desktop, hard disk desktop and portable computers—from one single vendor.

Contact the TeleVideo office nearest you. You'll find that TeleVideo—not IBM or COMPAQ—has the best hardware for the best software. At the best price.

The TeleVideo Regional Sales Offices:
Southeast (404) 447-1231 • Mid-Atlantic (703) 556-7764 • Eastern (516) 496-4777 • Northeast (617) 890-3282 • South Central (214) 258-6776 • Rocky Mountain (408) 745-7760 • Southwest (714) 476-0244 • Midwest (312) 397-5400 • Northwest (408) 745-7760 • Southern Europe (33) 1.687.34.40 • Central Europe (31) 2503-35444 • International (408) 745-7760.

For more information, call 800-538-8725 (in California, 800-345-8008).

IBM is a registered trademark of International Business Machines.
MS is a trademark of MicroSoft Corporation
GW Basic is a registered trademark of MicroSoft Corporation.
COMPAQ is a trademark of COMPAQ Computer Corp.

*PC World, April 1984.

TeleVideo®
Personal Computers
TeleVideo Systems, Inc.

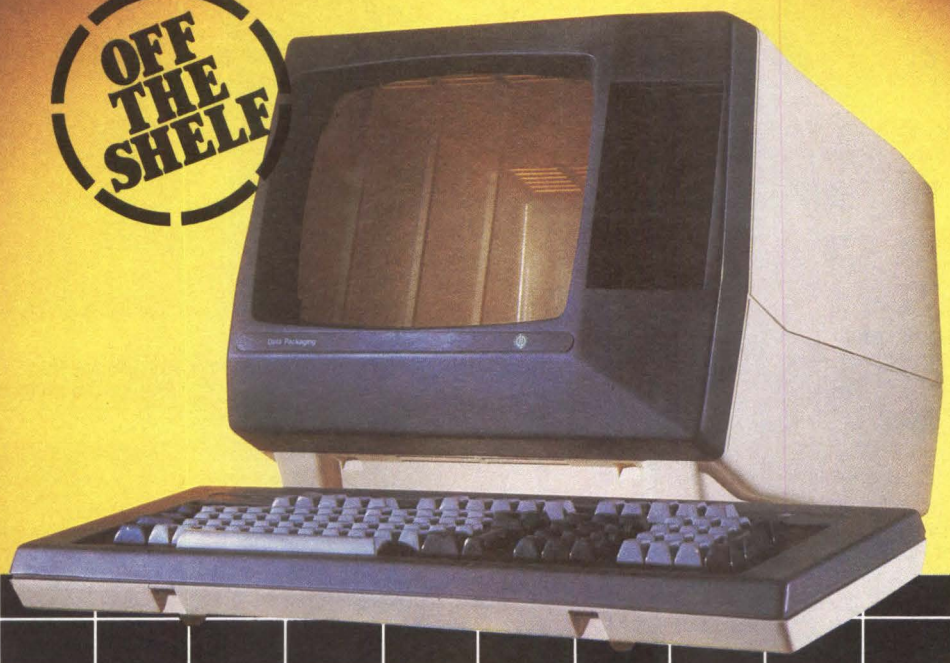
CIRCLE NO. 30 ON INQUIRY CARD

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
CROMEMCO							
CS.1	8, 16	Z80A, 68000	128K/ 512K (2M)	CROMIX	MACRO Assembler, C Compiler, COBOL, RPG-II, structured BASIC		two 390K-byte diskette drives
CS.2	8, 16	Z80A, 68000	128K/ 512K (2M)	CROMIX	BASIC, FORTRAN IV, FORTRAN 77, Pascal, RATFOR		two 390K-byte diskette drives
CS.3	8, 16	Z80A, 68000	128K/ 512K (2M)	CROMIX	LISP		two 1.2M-byte diskette drives
DATA GENERAL CORP.							
10/SP	16	8086, D9 Micro-Elipse	256K			5,430	
20/SP	16	8086, D9 Micro-Elipse	256K	RDOS	Business BASIC	10,640	one 15M-byte hard disk drive, one 5.25-inch diskette drive, 4-line multiplexer
30/SP	16	8086, D9 Micro-Elipse	256K	AOS	FORTRAN	17,030	floating-point accelerator, one 15M-byte hard disk drive, one 5.25-inch diskette drive, 4-line multiplexer
DATAVUE CORP.							
DU3000	8	Z80	64K (512K)	CP/M 2.2, MD/M	CP/M 2.2 languages	5,445	one 1M-byte diskette drive, one 5M-byte hard disk drive, multiplexer
DBS INTERNATIONAL INC.							
DBS-16	16	80186	256K (3.5M)	CP/M-86, MP/M-86, Concurrent CP/M-86	CBASIC 86, CB-86, Pascal, Assembly	5,535	two 360K-byte diskette drives, 2 terminals
DIGITAL MICROSYSTEMS INC.							
DMS-3/102 and 3/103	8	Z80A	64K (64K)	CP/M, CP/M-86, MS-DOS	CBASIC-2, PL/1, CBASIC-86, C, COBOL, FORTRAN, Assembly, Pascal	27,045	one 500K-byte diskette drive, one 23M-byte hard disk drive, 10 intelligent workstations, HiNet cabling, HiNet software
DMS-3/501	8	Z80A	64K (64K)	CP/M-2.2, CP/M-86, MS-DOS	CBASIC-2, PL/1, CBASIC-86, C, COBOL, Assembly, FORTRAN, Pascal	13,830	one 640K-byte diskette drive, one 15M-byte hard disk drive, 4 intelligent workstations, HiNet cabling, HiNet software
DMS-4/102 and 4/103	8	Z80A	64K (64K)	MP/M, OASIS, CP/M	CBASIC-2, PL/1, CBASIC-86, C, COBOL, FORTRAN, Assembly, Pascal	13,850	one 500K-byte diskette drive, one 23M-byte hard disk drive, 4 terminals, HiNet cabling
DIGITEX							
4000	8	Z80B	128K (896K)	OASIS, CP/M, Turbo-DOS	BASIC, C, FORTRAN, RM COBOL, DATABUS	5,995	one 1M-byte diskette drive
6000	8	Z80B	128K (896K)	OASIS, CP/M, Turbo-DOS	BASIC, FORTRAN, RM COBOL, C, DATABUS	11,620	one 20M- or 40M-byte hard disk drive, one terminal, one 180 cps matrix printer; opt. 5M-byte removable hard disk drive
8000	8	Z80B	128K (896K)	OASIS, CP/M, Turbo-DOS	BASIC, C, FORTRAN, RM COBOL, DATABUS	11,620	one 1M-byte diskette drive, one 180 cps dot-matrix printer, one terminal; opt. 10M- and 40M-byte removable hard disk drive
DUAL SYSTEMS CORP.							
System 83/20	16, 32	68000	512K (3.25M)	UNIX V7, UNIX System V	C, Pascal, FORTRAN, BASIC, LISP, COBOL	16,660	one 1.2M-byte diskette drive, one 20M-byte hard disk drive
System 83/80	16, 32	68000	512K (3.25M)	UNIX V7, UNIX System V	C, Pascal, FORTRAN, BASIC, LISP, COBOL	20,990	one 1.2M-byte diskette drive, one 80M-byte hard disk drive
DURANGO SYSTEMS							
800	8	8085	64K (192K)	DX-85-M (proprietary)	Star BASIC	7,645	two 100K-byte diskette drives, one terminal, one Durango printer
900	8	8085	64K (192K)	DX-85-M (proprietary)	Star BASIC	9,665	one 100K-byte diskette drive, one 10M-byte hard disk drive, one terminal, one Durango printer
Poppy 52	16	80186	128K (640K)	CCP/M MU 3.1, XENIX 3.0, MS-DOS 2.0	M-BASIC, Personal BASIC, RM COBOL, C	4,395	two 800K-byte diskette drives, one terminal
Poppy 53	16	80186	128K (640K)	CCP/M MU 3.1, XENIX 3.0, MS-DOS 2.0	M-BASIC, Personal BASIC, RM COBOL, C	5,995	one 800K-byte diskette drive, one 10M-byte hard disk drive, one terminal
Poppy II	16	80186, 80286	384K (1M)	XENIX 3.0, CCP/M MU 3.1, MS-DOS 2.0	C, Star BASIC	11,745	one 20M-byte hard disk drive, one terminal

INTRODUCING

OFF THE SHELF



CONCEPT 1 ENCLOSURES

A NEW CONCEPT IN COMPUTER PERIPHERAL ENCLOSURES.

Concept 1 Enclosures is a versatile system of standardized molded enclosures for cost-effective packaging of systems and electronics. Concept 1 Enclosures have the field-proven performance and off-the-shelf availability to minimize engineering design time and manufacturing lead time. Plus, total versatility gives system integrators and OEM's the product flexibility to stay competitive at lower costs.

Functional Versatility—Concept 1 Enclosures accommodate 12″ and 15″ CRT sizes, have swivel/tilt bases, and are available with either standard or DIN keyboards. The 12″ CRT enclosures can have either a 5¼″ floppy drive or a 5¼″ fixed or removable Winchester drive. Or two slim line ½-high drives.

Appearance Versatility—Concept 1 Enclosures are distinctive, with many color combinations and bezel configurations to "personalize" your system.

Packaging Versatility—Concept 1 Enclosures have a unique internal modular mounting system to hold various-sized control and function boards.

All Concept 1 Enclosures are molded in high-quality, OEM-grade plastic (Noryl® FN215 and Noryl® N190) and meet worldwide equipment and safety standards, including UL, CSE, VDE, BS, and IEC. Shielding for RFI and EMI also can be provided.

For special housing requirements, Data Packaging's 35 years of design, tooling, and high-volume manufacturing experience provides their customers with unique solutions to electronics housing problems.

CIRCLE NO. 31 ON INQUIRY CARD

DATA PACKAGING

DATA PACKAGING CORPORATION

205 Broadway, Cambridge, MA 02139 617/868-6200; TWX 710-320-0885

Come see us at NCC '84, Booth #C4330 in the Convention Center.

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
DYNABYTE							
Monarch 6000		Z80B	256K (1M)	OASIS			
Monarch 6600	8, 16	Z80B	256K (1M)				
Monarch 6900	8, 16	8086 co-processor, Z80B	256K (1M)				
FINANCIAL BUSINESS COMPUTERS							
FBC Computer	8	Z80	64K (128K)	Turbo-DOS	BASIC, Pascal, FORTRAN, COBOL, C	7,995	one 2M-byte 5.25-inch hard disk drive, one 1.6M-byte 8-inch diskette drive, 2 slave boards
FIRST COMPUTER							
Taurus 73	32	PDP-11/73	256K (4M)	RT 11, RSTS/E, RSX11M, RSX11M-Plus, UNIX			160M-byte hard disk drive, TSV05 46M-byte tape drive, 4 serial lines
Gemini 23 Plus	32	PDP-11/23-Plus	256K (4M)	RT 11, RSTS/E, RSX11M, RSX11M-Plus, UNIX	PDP-11, COBOL, BASIC, FORTRAN		one 160M-byte hard disk drive, one 80M-byte cartridge disk drive, 2 serial lines
Gemini 73	32	PDP-11/73	256K (4M)	RT 11, RSTS/E, RSX11M, RSX11M-Plus, UNIX	BASIC, FORTRAN		one 160M-byte hard disk drive, one 80M-byte cartridge disk drive, 4 serial lines
FORTUNE SYSTEMS CORP.							
32:16	32	68000	512K (1.5M)	UNIX	UNIX based languages		four RS232C ports, 2 sync ports, one 1M-byte diskette drive, one terminal, bundled software; opt. 10-, 20- or 30M-byte hard disk drive
GENERAL AUTOMATION INC.							
ZEBRA/PICK 750, 1500, 2500, 3500, and 5500	32	68000	128K (1.5M)	PICK	BASIC	27,000	64M-byte hard disk drive, one 300-lpm printer, bundled software
ZEBRA/XENIX 700, 2000, 3000	32	68010	256K (1.5M)	XENIX	C, COBOL, BASIC	21,000	one 64M-byte hard disk drive, one 300-lpm printer, bundled software
GIMIX INC.							
6809-79	8	6809	256K (1M)	OS9 III, UNIFLEX	BASIC, C, Pascal, COBOL	6,000	two 350K-byte diskette drives; opt. up to 16 terminals
HEWLETT-PACKARD CO.							
216S	16, 32	68000	128K (768K)	HP Pascal, HP BASIC, Multi-FORTH	HP Pascal, BASIC, FORTH, MC68000 ASM	5,550	9-inch monitor, RS232C port
220S	16, 32	68000	128K (3.9M)	HP Pascal, HP BASIC, HP UX (UNIX System III)	HP Pascal, BASIC, FORTH, MC68000 ASM	9,000	
226S	16, 32	68000	128K (2M)	HP Pascal, BASIC, FORTH, MC68000 ASM, FORTRAN, C	HP Pascal, BASIC, FORTH, MC68000 ASM, FORTRAN, C	11,605	7-inch monitor, one 5.25-inch diskette drive
236CS	16, 32	68000	128K (2M)	HP Pascal, HP BASIC, HP UX	HP Pascal, BASIC, FORTH, MC68000 ASM, FORTRAN, C	17,660	two 256K-byte diskette drives, graphics
236S	16, 32	68000	128K (2M)	HP Pascal, HP BASIC, Multi-FORTH	HP Pascal, BASIC, FORTH, MC68000 ASM, FORTRAN, C	14,630	two 256K-byte diskette drives, graphics
520	32	NMOS III (proprietary)	256K (5M)	HP BASIC, HP UX	BASIC, C, HP Pascal, FORTRAN 77	35,000	one 270K-byte diskette drive, one 10M-byte hard disk drive, one 480-lpm printer graphics library
530	32	NMOS III (proprietary)	512K (5M)	HP UX	C, HP PCL, FORTRAN 77	90,000	one 65M-byte hard disk drive, 4 terminals (3 graphics), one 300-lpm printer
540	32	NMOS III (proprietary)	512K (5M)	HP UX	C, HP PCL, FORTRAN 77	90,000	one 65M-byte hard disk drive, 4 terminals (3 graphics), one 300-lpm printer
HONEYWELL INFORMATION SYSTEMS							
MicroSystem 6/20	16	LSI-6	512K (1M)	GCOS 6	COBOL, FORTRAN, BASIC, Pascal, RPG	23,125	one 650K-byte diskette drive, one 40M-byte hard disk drive, 4 terminals, one printer

Key in on Your Hot Prospects

with Mini-Micro Systems 13th Annual Mini-Micro Computer Market Report

This year Mini-Micro Systems readers will spend $50 billion on minicomputers, microcomputers, peripherals, software and supplies. The 13th annual Mini-Micro Computer Market Report outlines 8,511 sites (buying centers) representative of the explosive value-added market. Data is available in the following formats:

MAGNETIC TAPE OF COMPLETE DATABASE

For those marketers who wish to receive all the information and be able to generate their own analysis, the complete database is available on magnetic tape. Data includes:

- *1983 Expenditures* for minicomputers, microcomputers, peripherals, and software.
- *1984 Estimated Expenditures* for minicomputers, microcomputers, peripherals, and software.
- *Geographical Regions*
- *Type of Organization*
- *Minicomputers/Microcomputers purchased in 1983 and those installed in prior years:*
  - Vendor name and model number
  - Units acquired
  - Major applications
- *Minicomputers/Microcomputers planned 1984 purchases:*
  - Vendor name and model number
  - Units planned to be acquired
  - Major applications
  - Sites planning to change major vendor
  - Fail-safe computer operations
  - Electronic office functions

PRESELECTED LISTS AND MAILING LABELS

All selections are available as a listing or as cheshire or pressure sensitive labels. Cross tabulations of categories are also available.

Site Selection	*Site Count*
Total sites surveyed	8,511
Sites by planned 1984 expenditure levels	
$50,000-99,999	4,829
$100,000-249,999	3,582
$250,000-499,999	2,218
$500,000 or more	1,403
Sites planning to install integrated electronic office functions in 1984	1,642
HOT PROSPECTS...Sites planning to change major vendors in 1984	1,085
Value-added OEMs and third parties	3,110
Value-added user sites	4,813

13th ANNUAL MINI-MICRO COMPUTER MARKET REPORT

All data is available in a 200-plus page bound report for $495. In addition to an executive summary, the report's tables include:

- 1983 Unit expenditures
- Type of Organization
- Geographical Regions
- Current Computer Vendors
- 1984 plans for:
  - switching vendors
  - unit expenditures
  - fail-safe computer operations
  - electronic office functions

For more information on prices, list selections, and the MINI-MICRO SYSTEMS Market Report, fill out and send the coupon below.

- Boston (617) 536-7780
- Chicago (312) 635-8800
- Dallas (214) 980-0318
- Denver (303) 388-4511
- Los Angeles (213) 826-5818
- Mid-Atlantic (215) 293-1212
- in New York (212) 724-1790
- Orange County (714) 851-9422
- Northern California & Northwest (408) 243-8838
- Southeast (404) 955-6500

Cahners Publishing: Publishers of 33 specialized magazines in Building & Construction, Electronics & Computers, Foodservice, Manufacturing, Healthcare

Mini-Micro Systems

Your key to sales in the value-added market.

Mini-Micro Systems

Please send ____ copies of the 13th Annual MINI-MICRO COMPUTER MARKET REPORT to the address below. (Please make checks payable to Mini-Micro Systems. $495.00/report.)

Please send more information on....

____ The complete Mini-Micro Computer Market Database ____ Preselected lists and mailing labels

____ The 13th Annual Mini-Micro Computer Market Database

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone (____) _____

MINI-MICRO SYSTEMS COMPUTER MARKET REPORT, 221 Columbus Avenue, Boston, MA 02116

CIRCLE NO. 48 ON INQUIRY CARD

How can you develop one system and offer your customers a choice of three?

Simple. Develop it around HP's new three-in-one microsystem. That way, you don't have to redesign your system to offer your customers a range of performance. Because the entire power range of HP's new A-Series computers fits into the same small, convenient package. At a slimmed-down starting price of $6110*

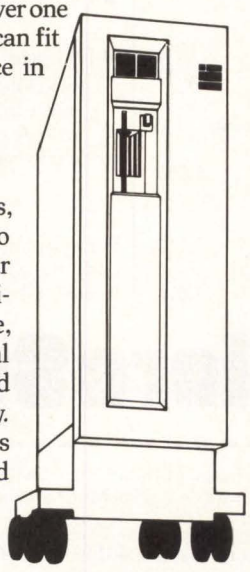
So you can offer 1 MIPS performance. Or floating point hardware and microprogramming in either a 1 MIPS or 3 MIPS computer. Whichever one your customer chooses, you can fit it easily into the same space in your system.

Identical software keeps it simple.

When you change processors, you don't have to go back to the drawing board with your programs. Because, in addition to compatible hardware, these computers run identical software. That's the best kind of compatibility you can buy.

Our A-Series family consists of the Micro 26, Micro 27 and Micro 29. The Micro 26 comes with integrated 14.6 Mb mini-Winchester disc and microfloppy. And it has 8 I/O slots, giving you plenty of room for our wide selection of I/O cards for instruments, measurement and control, and datacomm, to name a few.

The Micro 27 adds floating point hardware and microprogramming. And, for jobs needing up to three times the power, our 3 MIPS Micro 29 has got what it takes.



Our new microsystems also come in this floor-mount or bench-top models.

Our brand new operating system really performs.

That's one secret of our success. The new, full-function RTE-A real-time operating system provides the performance you need for your real-time automation applications. Ranging from dedicated machine control to monitoring instruments to supervising a network of computers.

This power, speed and I/O capacity also make our A-Series systems ideal for multi-user, multi-tasking environments.

Of course, these compact new computers are part of our newly expanded OEM program. This includes higher discounts and credits, extended warranties and free training. So you'll make more when you get to market. And you'll also get there faster with our new operating system and newly packaged microsystems.

If you'd like micro, mini or maxi performance in one micro package, call your local HP sales office listed in the white pages of your phone book. Ask for a technical computer representative. Or write for more information to: Hewlett-Packard, Attn. Greg Gillen, Dept. 08171, 11000 Wolfe Road, Cupertino, CA 95014. In Europe, write to Henk van Lammeren, Hewlett-Packard, Dept. 08171, P.O. Box 529, 1180 AM Amstelveen, The Netherlands.

*A600+ microsystem component, 128Kb memory, box, Winchester disc.

Prices are U.S.A. list in OEM quantities of 100 and include integrated peripherals, one interface card, RTE-A and 512Kb of memory for Micro 26 and Micro 27. Micro 29 includes 768Kb of memory.

HEWLETT PACKARD

TC-02309

CIRCLE NO. 49 ON INQUIRY CARD

Micro:

1 MIPS for
$7445

Maxi:

3 MIPS, plus floating point hardware and microprogramming, for
$16,650

Mini:

1 MIPS, plus floating point hardware and microprogramming, for
$13,140

Whatever the level of performance you pick, it fits in this little 7″ x 19″ x 25.5″ package.

The only controlled circulation product review and evaluation magazine for business users and retailers of IBM PC and PC-compatible computers.

PC Products

100% products 100% business 100% users and buyers

PC *Products* Is An Entirely Different Kind Of "Computer" Magazine

PC *Products* is the only PC publication reaching both the IBM PC business user—and the retailer.

PC *Products* reaches the biggest audience of *qualified business* users of IBM PCs and compatibles. Every one of **PC *Products*** 100,000 subscribers has specifically *requested* the magazine. Every one of **PC *Products*** subscribers is either an IBM PC business user or retailer. And every subscriber is a potential buyer of additional IBM PC or compatible products for business use.

Your Product Headquarters

PC *Products* is 100% products. Our editorial consists of software and hardware product evaluations, product reviews and product announcements. **PC *Products*** does not provide the latest industry news or the hottest company gossip.

You won't find vendor profiles or guru profiles. Instead, **PC *Products*** is directed exclusively to the needs of business users.

Call your PC *Products* Regional Manager for rates and data.

New England—John C. Moon (617) 536-7780/ *North California*—Theodora Franson, Dana Shaw (408) 243-8838/ *Mid-Atlantic/ New York*—Mark Donohue (215) 293-1212/ *Midwest*—Peter E. Hoffman (312) 635-8800/ *Mountain States*—John Huff, Joe Vitiello (303) 388-4511/ *Southeast*—Larry Pullman (404) 955-6500/*Southern California*—Marty L. Navarro (714) 851-9422 /*Southwest*—Don Ward (214) 980-0318

PC Products

FOR BUSINESS USERS OF IBM PCS AND COMPATIBLES

Cahners Publishing ☐ Publishers of 33 specialized business magazines in Building & Construction ☐ Electronics & Computers ☐ Foodservice ☐ Manufacturing ☐ Health Care ☐

CIRCLE NO. 50 ON INQUIRY CARD

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
IMS INTERNATIONAL							
5000 IS	8, 16	Z80A, 8086	64K (4.1M)	CP/M-86, MS-DOS		5,600	one 820K-byte diskette drive, 6M- to 24M-byte hard disk drive, up to 3 terminals
5000 SX	8, 16	Z80A, 8086	64K (4.1M)	CP/M-86, MS-DOS		14,000	two 820K-byte diskette drives, 6M- to 24M-byte hard disk drive, up to 8 terminals
8000 S	8, 16	Z80A, 8086	64K (4.1M)	CP/M-86, MS-DOS		52,000	two 1.2M-byte diskette drives, 6M- to 71M-byte hard disk drive, up to 16 terminals
8000 SX	8, 16	Z80A, 8086	64K (4.1M)	CP/M-86, MS-DOS		18,400	two 1.2M-byte diskette drives, 6M- to 71M-byte hard disk drive, up to 8 terminals
INDEPENDENT BUSINESS SYSTEMS							
Ultraframe	8, 16	Z80A, Z80B, 8186	64K (1.1M)	IBS P-NET; Turbo-DOS	UCSD-Pascal, FORTRAN, COBOL, C, BASIC	8,645	1.2M-byte 8-inch diskette drive, one 10M-byte hard disk drive, 4 application processors
INTEGRATED BUSINESS COMPUTERS (IBC)							
Ensign	16	Z80, 68000	512K (8M)	UNIX from Unisoft	UNIX-compatible	25,000	one 1M-byte diskette drive; opt. 85M-byte hard disk drive; up to 32 terminals
Middi Cadet	8	Z80B	256K (512K)	OASIS, CP/M, MP/M II	any OASIS-, CP/M- or MP/M-based languages	7,995	one 5.25-inch diskette drive, one 20M-byte hard disk drive; opt. up to 9 terminals
High Performance Middi Cadet	8	Z80H	512K	OASIS, MP/M II	any OASIS- or MP/M-based languages	10,995	one 5.25-inch diskette drive, one 40M-byte hard disk drive; opt. up to 10 terminals
Super Cadet	8	Z80H	256K (640K)	OASIS, MP/M II	any OASIS- or MP/M-based languages	15,095	one 5.25-inch diskette drive, one 85M-byte hard disk drive; opt. up to 16 terminals
INTEGRATED SOLUTIONS, INC.							
5/00	32	68000, 68010	256K (4M)	4.2 BSD-System III and V	FORTRAN, Pascal, ASM, BASIC, COBOL, Ada	18,300	one 66M-byte hard disk drive, one 60M-byte .25-inch tape
5/10V	32	68000, 68010	256K (16M)	4.2 BSD-System III and V	FORTRAN, Pascal, ASM, BASIC, COBOL, Ada	18,300	one 66M-byte hard disk drive, one 60M-byte .25-inch tape
INTELLIMAC INC.							
IN/7000K	16, 32	68000	.5M (4M)	ROS, UNIX	Ada, C, Assembly, COBOL, FORTRAN, Pascal	30,000	
IN/7000M	16, 32	68000	.5M (8M)	ROS, UNIX	Ada, Assembly, C, COBOL, FORTRAN, Pascal	55,000	one 1.6M-byte 8-inch diskette drive, one printer
INTERTEC							
Model 128	8, 16	Z80A, 8086	128K (1M)	CP/M 2.2, MS-DOS, LAN-DOS		1,895	
Model 512	8, 16	Z80A, 8086	512K (1M)	CP/M 2.2, MS-DOS, LAN-DOS		3,495	one 500K-byte diskette drive, RAM Disk, network board, 12-inch screen terminal
Model 1000	8, 16	Z80A, 8086	1M	CP/M 2.2, MS-DOS, LAN-DOS		4,495	one 500K-byte diskette drive, RAM Disk, network board, 12-inch screen terminal
VPU 10	8	Z80A	64K (64K)	CP/M 2.2, LAN-DOS	M-BASIC	1,795	
VPU 20	8	Z80A	64K (64K)	CP/M 2.2, LAN-DOS	M-BASIC	2,495	two 170K-byte diskette drives
VPU 30	8	Z80A	64K (64K)	CP/M 2.2, LAN-DOS	M-BASIC	2,995	two 340K-byte diskette drives
IRONICS INC.							
IV-1600/D-UM	16, 32	68000, 68010	768K (15M)	UNIX System III and V	C, FORTRAN, COBOL, Pascal, Ada, BASIC, B-Net, ASM-68	13,920	one 30M-byte hard disk drive, one 1M-byte diskette drive, VMEbus card cage and backplane
ITHACA INTERSYSTEMS INC.							
Encore 580	8	Z80B	128K (1M)	CP/M, MP/M	CP/M, MP/M-based languages	4,995	two 640K-byte diskette drives
Encore 880H	8	Z80B	128K (1M)	CP/M, MP/M	CP/M, MP/M-based languages	8,295	one 1.2M-byte diskette drive, one 10M-byte hard disk drive
Encore 88000	16	Z8002	256K (2.5M)	XENIX	C, Pascal, FORTRAN, COBOL	11,995	one 1.2M-byte diskette drive, one 10M-byte hard disk drive
LANIER BUSINESS PRODUCTS INC., HARRIS CO.							
EZ-1	8	8088	192K (256K)	LEXS	BASIC	4,700	one 650K-byte diskette drive, one terminal, one 1600 cps printer

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
EZ-2	8	8088	256K (256K)	LEXS	BASIC	10,095	one 10M-byte hard disk drive, 2 terminals, one 1600 cps printer
Lanier Business Processor	8, 16	Z80B, 8088	192K (256K)	CP/M-80, MS-DOS, LEXS	BASIC	4,995	one 650K-byte diskette drive, one terminal, one 1300 cps printer
LOMAS DATA PRODUCTS							
LDP2W	16	8086	128K (1M)	CCP/M-86, MS-DOS, CP/M-86	BASIC, Pascal, C, FORTRAN	6,699	one 1.2M-byte diskette drive, one 40M-byte hard disk drive
LDP2W+	16	80286	256K (16M)	CCP/M-86, UNIX	BASIC, Pascal, C, FORTRAN	8,995	one 1.2M-byte diskette drive, one 40M-byte hard disk
S100-PC	16	8086	128K (1M)	CCP/M-86, MS-DOS, CP/M-86	BASIC, Pascal, C, FORTRAN	2,995	two 360K-byte diskette drives
M/A-COM ALANTHUS DATA INC.							
AS1000	16	8086, 8088	384K (1M)	CTOS, CP/M-86, MS-DOS, XENIX	COBOL, FORTRAN, Pascal, BASIC		
One Touch	16	8086	384K (1M)	CTOS, MS-DOS, CP/M-86	COBOL, FORTRAN, BASIC, Pascal, Assembly		
TI PC	16	8088	64K (256K)	MS-DOS, CP/M-86, CCP/M-86, UCSD p-system	COBOL, FORTRAN, Pascal, BASIC		
MDB SYSTEMS INC.							
MICRO/11	16	Q-bus-compat-ible	256K (4M)	RT-11, RSX, RSTS/E, TSX+, UNIX	COBOL, FORTRAN, Pascal, BASIC		two 500K-byte diskette drives
MICRO/32	16	68000	512K (4M)	REGULUS	COBOL, FORTRAN, Pascal, BASIC		two 500K-byte diskette drives
MEASUREMENT SYSTEMS AND CONTROLS							
System 2900	8	Z80A	64K (768K)	CP/M, MP/M, OASIS	BASIC, COBOL, FORTRAN	5,130	two 1.26M-byte diskette drives, one terminal; opt. hard disk drive and tape backup
Voyager I	16, 32	68000	768K (16M)	UNIX	C, COBOL, FORTRAN, BASIC, Ada	16,350	one 1.26M-byte diskette drive, 10 terminals; opt. 40M-byte hard disk drive, tape backup
MICRO FIVE CORP.							
1050	16	8088-2	128K (512K)	SMC BASIC, MP/M-86, CP/M-86, Stardos	BASIC, COBOL, FORTRAN, Pascal	4,495	two 2M-byte diskette drives
1440	16	8088-2	128K (512K)	SMC BASIC, MP/M-86, CP/M-86, Stardos	BASIC, COBOL, FORTRAN, Pascal	7,095	one 1M-byte diskette drive, 12.8M-byte hard disk drive
1540	16	8088-2	128K (512K)	SMC BASIC, MP/M-86, CP/M-86, Stardos	BASIC, COBOL, FORTRAN, Pascal	7,995	one 1M-byte diskette drive, 19M-byte fixed disk operating system
1640	16	8088-2	256K (512K)	SMC BASIC, MP/M-86, CP/M-86, Stardos	BASIC, COBOL, FORTRAN, Pascal	16,495	one 1M-byte diskette drive, 40M-byte fixed disk and 20M-byte streaming tape operating system
1740	16	8088-2	256K (512K)	SMC BASIC, MP/M-86, CP/M-86, Stardos	BASIC, COBOL, FORTRAN, Pascal	19,995	one 1M-byte diskette drive, 40M-byte fixed disk and 20M-byte streaming tape operating system
MICRO-LINK							
Approach 2	8	Z80A	64K (256K)	CP/M, Approach Control (FORTH-based)	polyFORTH, CP/M languages	5,995	two 5.25-inch 400K-byte diskette drives, peripheral drivers
MICRODATA CORP.							
M1000	32	80186	512K (1M)	CTOS, MS-DOS, MICRO-REALITY	DATA BASIC, English	8,075	one 630K-byte diskette drive, one terminal, one 10M-byte hard disk drive
MICROMATION							
Mariner	8, 16	Z80A, 8088	64K (1.5M)	CP/M, CP/M-86, MP/M, M/NET, Turbo-Dos	COBOL, RPG, FORTRAN, APL, BASIC, PL/I, C, Pascal	14,770	two 1M-byte diskette drives, 4 terminals, 21M- or 42M-byte hard disk drive; opt. serial or Centronics port, up to 16 terminals
MiSystem	8	Z80A	64K (320K)	CP/M, MP/M, M/NET	COBOL, RPG, FORTRAN, APL, BASIC, PL/I, C, Pascal	8,970	one 140K-byte diskette drive, one terminal, one 10M-byte hard disk drive; opt. serial or Centronics port
M-System	8, 16	Z80A, 8088	64K (1.5M)	CP/M, CP/M-86, MP/M, M/NET, Turbo-DOS	COBOL, RPG, FORTRAN, APL, BASIC, PL/I, C, Pascal	15,020	four 1M-byte diskette drives, 4 terminals, one 21M-byte hard disk drive; opt. serial or Centronics port, 42M- or 84M-byte hard disk drive, up to 16 terminals

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
MITSUBISHI ELECTRONICS AMERICA INC.							
M816	16	8086	384K (896K)	MP/M-86	BI-286, Level II COBOL	8,900	one 1.6M-byte diskette drive, parallel or Centronics printer, 20M-byte fixed disk; opt. up to 4 terminals
MOHAWK DATA SCIENCES CORP.							
HERO Networked Personal Computer	16-bit	80186 8 MHz	256K (1M)	H/OS, MS-DOS 2.0	COBOL, BASIC, Pascal, FORTRAN, MOBOL	2,950	one or two 630K- or 1.2M-byte diskette drives; opt. up to four 5M-, 10M- or 20M-byte 5.25-inch hard disk drives
Super 21	16-bit	Z80B	256K (512K)	H/OS, MS-DOS 2.0	COBOL, MOBOL	7,000	one diskette drive, configurations support 8 to 16 HERO workstations; opt. 5M- to 60M-byte hard disk drives
MOLECULAR COMPUTER							
SuperMicro 8	8, 16	Z80A	64K (45M)	n/STAR (proprietary), CP/M-80, CP/M-86, MP/M-80, MP/M-86, MS-DOS-compatible		16,135	one 500K-byte diskette drive, one serial printer; opt. up to 6 terminals
SuperMicro 16X	8, 16	Z80B	256K (180M)	n/STAR (proprietary), CP/M-80, CP/M-86, MP/M-80, MP/M-86, MS-DOS-compatible		38,875	one 1M-byte diskette drive, one serial printer; opt. up to 12 terminals
Supermicro 32X	8, 16	Z80B	256K (180M)	n/STAR (proprietary), CP/M-80, CP/M-86, MP/M-80, MP/M-86, MS-DOS-compatible		66,755	one 1M-byte diskette drive, one serial printer; opt. up to 24 terminals
MOMENTUM COMPUTER SYSTEMS INT'L.							
32	32	68000	512K (2M)	UNIX	RM COBOL, SVS Pascal, SMC BASIC, SVS FORTRAN, C	11,950	one 800K-byte diskette drive, one 10M-byte hard disk drive, 2 serial ports, bundled software
32/4	32	68000	512K (1M)	UNIX	R/M COBOL, SVS Pascal, SMC BASIC, SVS FORTRAN, C	12,495	one 5M-byte removable hard disk drive, 4 serial ports, bundled software
32/E	32	68000	512K (2M)	UNIX	RM COBOL, SVS Pascal, SMC BASIC, SVS FORTRAN, C	13,250	one 800K-byte diskette drive, one 10M-byte hard disk drive, 2 serial ports, bundled software
MORROW DESIGNS							
Decision One	8	Z80	64K (256K)	Micronix (combination UNIX, CP/M)	BASIC-80, Pilot, BAZIC	5,495	one 400K-byte diskette drive, one 11M-byte hard disk drive
MUSYS CORP.							
8816-A	8, 16	Z80A, 8088	128K (128K)	Turbo-DOS	CP/M-based languages	8,000	one 1.2M-byte diskette drive, one 18M-byte hard disk drive
8816-B	8, 16	Z80A, 8088	128K (128K)	Turbo-DOS	CP/M-based languages	10,000	one 1.2M-byte diskette drive, one 31M-byte hard disk drive
8816-D	8, 16	Z80A 8088	128K (128K)	Turbo-DOS	CP/M-based languages	15,000	one 1.2M-byte diskette drive, one 121M-byte hard disk drive
NATIONAL SEMICONDUCTOR DATA CHECKER/DTS							
1100	16	LSI-11/ 23+	256K (4M)	RT-11	COBOL 81		one 655K-byte diskette drive, one 10M-byte hard disk drive, one terminal, one dot-matrix printer
1110	16	LSI-11/ 23+	512K (4M)	RSX-11M+	COBOL 81		one 655K-byte diskette drive, one 20M-byte hard disk drive, 3 terminals, one dot-matrix printer
NCR CORP.							
Tower 1632	16	68000	512K (2M)	Tower OS (UNIX-derived)	BASIC, COBOL, FORTRAN, Pascal, C	20,000-25,000	one 1M-byte diskette drive, one 46M-byte hard disk drive, 8 I/O ports, up to 4 terminals, one 125-lpm matrix printer
I-Tower	16	68000	512K (2M)	RM/COS	RM COBOL	30,000-35,000	one 1M-byte diskette drive, one 40M-byte hard disk drive, one 20M-byte streaming tape drive, 8 I/O ports
NOHALT COMPUTERS							
NH-1000	8, 16	Z80A, 8086	64K (1M)	NH-DOS (CP/M-, MP/M-compatible)	C, FORTRAN, PL1, COBOL, BASIC, Pascal, CP/M, MP/M	25,000	one 1M-byte diskette drive, up to 64 terminals, dual hard disk drives; opt. serial or parallel printer

LMC's 32-Bit Virtual Memory MegaMicro Is The-State-Of-The-Art UNIX Microcomputer

LMC's 32-bit MegaMicro provides mainframe or super-minicomputer performance at prices competitive with today's far less powerful 8- and 16-bit microcomputers. This is made possible by use of the next generation of logic chips—the National Semiconductor 16000-series. LMC MegaMicros incorporate: the NS16032 central processing unit which has true 32-bit internal logic and internal data path configured on the IEEE 796 multibus; demand-paged virtual memory implemented in hardware; and hardware 64-bit double-precision floating-point arithmetic.

The LMC MegaMicro is supplied with HCR's UNITY* which is a full implementation of UNIX** and includes the Berkeley 4.1 enhancements to take advantage of demand-paged virtual memory. Also included are C and FORTRAN. Typical multi-user systems with 33 megs. of fast (30 ms. average access time) winchester disk storage, a half meg. of RAM, virtual memory, hardware floating-point arithmetic, UNIX, C, and FORTRAN 77 are available for $20,000 (and even less with quantity or OEM discounts).

* UNITY is a Trademark of Human Computing Resources.
**UNIX is a Trademark of Bell Laboratories.

LMC MegaMicros *The Logical Alternative*™

LMC

The Logical MicroComputer Company
4200 W. Diversey, Chicago, IL 60639 (312) 282.9667

MARMON A member of The Marmon Group of companies

CIRCLE NO. 32 ON INQUIRY CARD

Protection For . . . RS232, Modems, 20ma Loops, etc.

MCG Data Line Protectors stop "transients" from causing downtime and costly equipment failure.

High voltage transients, caused by lightning, by switching surges, relays, solenoids, and heavy machinery, etc. can be coupled into data lines directly. High voltage transients cause immediate and cumulative damage to semiconductor junctions that results in equipment failure. A direct lightning strike even many miles away can do serious damage.

MCG Data Line Protectors keep these transients from reaching your equipment. They interface between the equipment and the data line, and provide a sophisticated blend of high speed (less than 5 nanoseconds) and brute force protection.

MCG Data Line Protectors can be used with coaxial cable, single or twisted pairs, and will protect RS-232, -422, and -423, 20ma loops, and modems.

Best of all, MCG protectors offer cost effective insurance against "downtime" that cannot be obtained in a service agreement.

To request our complete DLP catalog, contact Bill Purcell at (516) 586-5125, or at the address below.

MCG ELECTRONICS, INC.
12 BURT DRIVE
DEER PARK, NEW YORK 11729
(516) 586-5125 • TELEX 645518
Protection you can depend on

CIRCLE NO. 47 ON INQUIRY CARD

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
NORTHSTAR COMPUTERS							
Northstar Horizon/8	8	Z80A	64K (64K)	Turbo-DOS	CP/M languages	6,699	two workstation boards, one 15M-byte hard disk drive, one 360K-byte diskette drive
Northstar Horizon/16	16	8088	128K (512K)	Turbo-DOS	CP/M languages	6,699	two workstation boards, one 15M-byte hard disk drive, one 300K-byte diskette drive
Northstar Dimension	16	80186, 8088-2	128K (512K)	PC-DOS	PC-DOS languages	7,000	two workstation boards, 2 terminals, one 15M-byte hard disk drive, one 320K-byte diskette drive
OMNIBYTE CORP.							
OB68K/SYS	16, 32	68000	128K (16M)	IDRIS, VRTX, MTOS	C, FORTRAN 77, polyFORTH/32	11,895	one 1.2M-byte diskette drive, one 40M-byte hard disk drive
ONYX SYSTEMS INC.							
Onyx 186	16	80186	256K (768K)	Concurrent DOS, OASIS, Thoroughbred/OS	BASIC, COBOL, C	8,245	one 6M-byte disk drive, one terminal, tape backup, 6 user ports
C5001A	8	Z80A	192K	CP/M, MP/M, OASIS	COBOL, BASIC	5,990	one 7M-byte disk drive, tape backup, 3 user ports
C5001/MU	8	Z80A	256K	CP/M, MP/M, OASIS	COBOL, BASIC	7,790	one 14M-byte disk drive, tape backup, 5 user ports
C5012D	16	Z8000	512K (512K)	UNIX System III	C, BASIC, COBOL, Pascal, FORTRAN	12,990	one 14M-byte disk drive, tape backup, 5 user ports, application software
C5012V	16	Z8000	512K (1M)	UNIX System III	C, BASIC, COBOL, Pascal, FORTRAN	16,750	one 14M-byte disk drive, tape backup, 11 user ports, application software
C8002A	16	Z8000	512K (1M)	UNIX System III	C, COBOL, BASIC, Pascal, FORTRAN	17,990	one 20M-byte disk drive, tape backup, 11 user ports, application software
C8002M	16	Z8000	512K (1M)	UNIX System III	C, COBOL, BASIC, Pascal, FORTRAN	20,500	one 20M-byte disk drive, tape backup, 8 user ports, application software
C8001/MU	8	Z80	256K	CP/M, MP/M, OASIS	COBOL, BASIC	10,990	one 20M-byte disk drive, tape backup, 5 user ports
Sundance II	8	Z80A	192K	CP/M, MP/M, OASIS	COBOL, BASIC	7,250	one 7M-byte disk drive, one terminal tape backup, 2 user ports
OSM COMPUTER CORP.							
Zeus 3x	8	Z80A	64K (2.1M)	MUSE, CP/M, MP/M		10,800	one 1M-byte diskette drive, one 20M-byte cartridge tape, one 12M-byte hard disk drive, real-time clock; 4 users
Zeus 3x/16	16	Z80A, 8088	64K (2.1M)	MUSE, CP/M-86, MP/M-86		10,800	one 1M-byte diskette drive, one 20M-byte cartridge tape, one 12M-byte hard disk drive, real-time clock; 2 users
Zeus 4	8	Z80A	64K (320K)	MUSE, CP/M, MP/M		7,595	includes one 1M-byte diskette drive, one 12M-byte hard disk drive, real-time clock; opt. UPS
Zeus 4/16	8, 16	Z80A, 8088	64K, 128K (320K)	MUSE, CP/M, MP/M, CP/M-86, MP/M-86		7,595	includes one 1M-byte diskette drive, one 12M-byte hard disk drive, real-time clock; opt. UPS
PACIFIC MICROCOMPUTERS INC.							
PM200	16	68000, 68010	1M (3M)	UNIX System III	BASIC, C, Pascal, FORTRAN, COBOL	12,900	one 20M-byte hard disk drive, 10 serial I/O ports, 1M-byte diskette drive
PM400	16	68000, 68010	1M (3M)	UNIX System III	BAISC, C, Pascal, FORTRAN, COBOL	29,900	one 84M-byte hard disk drive, 10 serial I/O ports, .5-inch tape
PERTEC COMPUTER CORP.							
3215	32	68000	256K (1M)	OS/3200 with CP/M, UNIX	BASIC, COBOL, FORTRAN, Pascal	10,365	one 1M-byte diskette drive, one 13.33M-byte hard disk drive, 3 RS232C ports
3230	32	68000	512K (2M)	OS/3200 with CP/M, UNIX	BASIC, COBOL, FORTRAN, Pascal	26,890	one 35M-byte hard disk drive, one streaming cartridge tape drive, 3 RS232C I/O ports
3240	32	68000	1M (4M)	OS/3200 with CP/M, UNIX	BASIC, COBOL, FORTRAN, Pascal	33,990	one 70M-byte hard disk drive, one streaming cartridge tape drive, 3 RS232C ports
SABRE/4210	32	68000	256K (1M)	PICK	PICK BASIC	9,400	one 1M-byte diskette drive, 13M- to 53M-byte hard disk drives, 45M-byte external cartridge tape drive
SABRE/4220	32	68000	256K (1M)	PICK	PICK BASIC	13,000	13M- to 100M-byte hard disk drives, 45M-byte cartridge tape drive; opt. 1M-byte diskette drive
SABRE/4240	32	68000	256K (2M)	PICK	PICK BASIC	26,000	35M- to 420M-byte hard disk drives, 45M-byte cartridge tape; opt. 1.6M-byte diskette drive

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
PIXEL COMPUTER INC.							
Pixel Proline 80	32	68000	512K (6.1M)	UNIX	FORTRAN 77, Ada, RM COBOL, Level II COBOL, BASIC Plus, Pascal, C, SIBOL, APL, MUMPS, LISP, Assembler, TOM-BASIC, Thoroughbred BASIC	18,650-35,000	one 600K-byte diskette drive, one 40M-byte hard disk drive, 4 to 16 terminals, 8 RS232C serial ports, 2 Centronics ports, one printer
PLESSEY PERIPHERAL SYSTEMS INC.							
6220	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, COBOL, DBL, Assembly	8,330	one 1M-byte diskette drive, one 5.25-inch 10.4M-byte hard disk drive, 5 RS232C ports
6221	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, COBOL, DBL, Assembly	10,255	one 1M-byte diskette drive, one 5.25-inch 20.8M-byte hard disk drive, 5 RS232C ports
6230	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11, M/M+, MUMPS, UNIX	FORTRAN, BASIC, COBOL, DBL, Assembly	9,360	two 1M-byte diskette drives, one 5.25-inch 10.4M-byte hard disk drive, 5 RS232C ports
6231	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	11,400	two 1M-byte diskette drives, one 5.25-inch 20.8M-byte hard disk drive, 5 RS232C ports
6240	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11, M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	9,685	one 5.25-inch 10.4M-byte hard disk drive, one .25-inch 20M-byte streaming tape drive, 5 RS232C ports
6241	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	11,760	one 5.25-inch 20.8M-byte hard disk drive, one 20M-byte streaming tape drive, 5 RS232C ports
6244	16	LSI-11/23	512K (1M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	10,485	one 5.25-inch 10.4M-byte hard disk drive, one 20M-byte streaming tape drive, 5 RS232C ports
6245	16	LSI-11/23	512K (1M)	RT-11, TSX-Plus, TSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	12,650	one 5.25-inch 20.8M-byte hard disk drive, one 20M-byte streaming tape drive, 5 RS232C ports
6247	16	LSI-11/23	1M (1M)	RT-11, TSX-Plus, TSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	11,885	one 5.25-inch 10.4M-byte hard disk drive, one 20M-byte streaming tape drive, 5 RS232C ports
6248	16	LSI-11/23	1M (2M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	14,050	one 5.25-inch 20.8M-byte hard disk drive, one 20M-byte streaming tape drive, 5 RS232C ports
6602	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11, M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	17,250	one 8-inch 70M-byte hard disk drive, RK06/07 emulation, 6 RS232C ports
6603	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	17,750	one 8-inch 70M-byte hard disk drive, RM02 emulation, 6 RS232C ports
6622	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	18,100	one 1M-byte diskette drive, one 8-inch 70M-byte hard disk drive, 6 RS232C ports
6632	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	18,800	two 1M-byte diskette drives, one 8-inch 70M-byte hard disk drive, 6 RS232C ports
6642	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	18,975	one 8-inch 70M-byte hard disk drive, one 20M-byte streaming tape drive, 6 RS232C ports
6650	16	LSI-11/23	256K (256K)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	16,250	one 8-inch 41.6M-byte fixed/removable disk drive, 6 RS232C ports

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
6702	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	19,250	one 8-inch 70M-byte hard disk drive, RK06/07 emulation, 6 RS232C ports
6703	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	19,750	one 8-inch 70M-byte hard disk drive, RM02 emulation, 6 RS232C ports
6722	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	20,100	one 1M-byte diskette drive, one 8-inch 70M-byte hard disk drive, 6 RS232C ports
6732	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11, M/M+, MUMPS, UNIX	FORTRAN, BASIC, MACRO, COBOL, DBL	20,800	two 1M-byte diskette drives, one 8-inch 70M-byte hard disk drive, 6 RS232C ports
6742	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	20,975	one 8-inch 70M-byte hard disk drive, one 20M-byte streaming tape drive, 6 RS232C ports
6750	16	LSI-11/23	512K (4M)	RT-11, TSX-Plus, RSX-11 M/M+, MUMPS, UNIX, RSTS/E	FORTRAN, BASIC, MACRO, COBOL, DBL	18,250	one 8-inch 41.6M-byte fixed/removable disk drive, 6 RS232C ports
PLEXUS COMPUTERS							
P/35	16, 32	68000, Z8000	512K (2M)	UNIX, NOS	C, Pascal, FORTRAN, COBOL, BASIC	27,000	
P/60	16, 32	68000, Z8000	512K (4M)	UNIX, NOS	C, Pascal, FORTRAN, COBOL, BASIC	45,700	
P/65	16, 32	68000, Z8000	512K (4M)	UNIX, NOS	C, Pascal, FORTRAN, COBOL, BASIC	47,950	
POLYMORPHIC SYSTEMS							
System 8810	8, 16	Z80, 80186	256K (1M)	CP/M-80, Concurrent CP/M-86, MS-DOS, UNIX	BASIC, Assembler, C, Pascal, FORTH	4,495	one 800K-byte diskette drive, one terminal, 5-slot S-100 bus backplane, 4 RS232C ports, 2 parallel ports
System 8813	8, 16	Z80, 80186	256K (1M)	CP/M-80, Concurrent CP/M-86, MS-DOS, UNIX	BASIC, Assembler, C, Pascal, FORTH	5,995	two 800K-byte diskette drives, one terminal, 18-slot S-100 bus backplane, 4 RS232C serial ports, 2 parallel ports
Q1 CORP.							
Q1/LITE, Q1/COMPANION	8	Z80A	64K (64K)	Q1 OS	Q1 PL/1		one diskette drive, one hard disk drive up to 400M bytes, up to 16 workstations
Q1/68000	16, 32	68000	256K (16M)	IDRIS	C		one diskette drive, one hard disk drive up to 600M bytes, streaming tape, up to 255 terminals
QDP COMPUTER SYSTEMS							
QDP-300H	8-bit	Z80B	128K (512K)	MP/M II	CBASIC	8,495	one 1.2M-byte diskette drive, one 32M-byte hard disk drive, 4 serial ports, one parallel port
QDP-400	8-bit	Z80B	128K (768K)	Turbo-DOS	CBASIC	8,295	one 1.2M-byte diskette drive, one 15M-byte hard disk drive, 6 serial ports and 2 parallel ports
QUAY CORP.							
550M	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC,, COBOL, APL, Pascal	5,595	one 1.6M-byte diskette drive, one 5M-byte hard disk drive
560M	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC, COBOL, APL, Pascal	5,995	one 1.6M-byte diskette drive, one 10M-byte hard disk drive
570M	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC, COBOL, APL, Pascal	7,295	one 1.6M-byte diskette drive, one 20M-byte hard disk drive
900M	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC, COBOL, APL, Pascal	6,845	two 1.25M-byte diskette drives
910	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC, COBOL, APL, Pascal	8,495	one 1.25M-byte diskette drive, one 10M-byte hard disk drive
935	8	Z80A	208K (208K)	MP/M	FORTRAN, BASIC, COBOL, APL, Pascal	9,995	one 1.25M-byte diskette drive, one 36M-byte hard disk drive

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
QUBIX GRAPHIC SYSTEMS							
Model I	32	68010	1M (2M)	UNIX 4.2	C, FORTRAN 77, LISP	59,400	one 80M-byte hard disk drive, one terminal, one laser printer; opt. 9-track tape drive
Model II	32	68010	2M (4M)	UNIX 4.2	C, FORTRAN 77, LISP	100,600	one 80M-byte hard disk drive, 2 terminals, one laser printer; opt. 9-track tape drive
Model IV	32	68010	3M (6M)	UNIX 4.2	C, FORTRAN 77, LISP	151,000	one 160M-byte hard disk drive, 3 terminals, one laser printer; opt. 9-track tape drive
RADIO SHACK							
TRS-XENIS	16	68000	256K (768K)	TRS-XENIX	BASIC, FORTRAN, COBOL, Pascal	7,897	includes one 15M-byte hard disk drive, 2 terminals
RAIR MICROCOMPUTER							
Rair Black Box	8, 16	8088, 8085	256K (1M)	MP/M-86, CP/M-80, MP/M-80	CP/M, MP/M languages	9,500	includes one 1M-byte diskette drive, one 19M-byte hard disk drive, 8 RS232C ports
Business Computer	8, 16	8088, 8085	512K (1M)	CP/M-86, CP/M-80, MP/M-80, MP/M-86, MS-DOS	CP/M, MP/M, MS-DOS languages	7,875	includes one 1M-byte diskette drive, one 19M-byte hard disk drive, 4 workstation ports, 2 RS232C ports
REXON BUSINESS MACHINES CORP.							
RX100	16	8086	128K (960K)	RECAP (Bus. Basic), MP-M-86		13,940	one 10M-byte hard disk drive, 2 terminals, streaming cartridge tape drive
RX200	16	8086	128K (960K)	RECAP, MP/M-86		21,080	one 28M-byte hard disk drive, 4 terminals, streaming cartridge tape drive
RX400	16	8086	128K (960K)	RECAP, MP/M-86		43,360	one 140M-byte hard disk drive, 8 terminals, streaming cartridge tape drive
SAGE COMPUTER TECHNOLOGY							
Sage 2	16, 32	68000	256K (512K)	P-System	Pascal, BASIC, C, FORTRAN	3,900	two 640K-byte diskette drives, bundled software
Sage 4	16, 32	68000	256K (1M)	P-System	Pascal, BASIC, C, FORTRAN	7,900	one 640K-byte diskette drive, one 18M-byte hard disk drive, bundled software
SBE INC. (ADAPTIVE SCIENCE DIV.)							
SBE 200	16	68000	128K (9M)	REGULUS, polyFORTH/32	Assembly, C, FORTRAN, Pascal, COBOL, BASIC	6,000	one 320K-byte diskette drive, one 10M-byte hard disk drive
SBE 250	16	68000	128K (5M)	REGULUS, polyFORTH/32	Assembly, C, FORTRAN, Pascal, COBOL, BASIC	6,000	one 320K-byte diskette drive, one 10M-byte hard disk drive
SCI SYSTEMS INC.							
SCI 1000	16	80186	500K (1M)	UNIX	COBOL, BASIC, FORTRAN, Pascal, C	9,500	one 500K-byte diskette drive, one 26M-byte hard disk drive, 4 RS232C serial ports
SMOKE SIGNAL BROADCASTING							
CHIEFTAIN	16	6809	128K (1M)	OS-9	BASIC, COBOL, C, ASM, Pascal	19,345	one 1M-byte diskette drive, one 140M-byte hard disk drive, one 60M-byte tape drive
VAR/68	16	6809	128K (1M)	OS-9	BASIC, COBOL, C, ASM, Pascal	13,375	one 750K-byte diskette drive, 3 terminals, one 20M-byte hard disk drive, one 40M-byte tape drive
VAR/68K	32	68008	512K (1M)	REGULUS (UNIX III)	BASIC, COBOL, C, ASM, Pascal	14,000	one 750K-byte diskette drive, 3 terminals, one 40M-byte hard disk drive, one 40M-byte tape drive
SOUTHWEST TECHNICAL PRODUCTS CORP.							
S/09	8	68B09	128K (1M)	UniFlex, MSM-09	Business BASIC, FORTRAN, Pascal, COBOL, C	12,070	two 1.25M-byte diskette drives, dot-matrix printer; opt. hard disk, streaming tape drive, up to 12 terminals
St	8	68B09	256K (1M)	UniFlex, CCSM	Business BASIC, FORTRAN, COBOL, Pascal, C	41,150	one 1.25M-byte diskette drive, dot-matrix printer, 20M-byte hard disk, 40M-byte streaming tape; opt. up to 18 terminals
X-12+	8	68B09	256K (1M)	UniFlex	Business BASIC, FORTRAN, COBOL, Pascal, C	7,495	one 1.25M-byte diskette drive, 20 M-byte hard-disk drive, dot-matrix printer; opt. up to 3 stations
SPERRY CORP.							
Distributed System 5	16, 32	68000	256K (1M)	System V/68, UNIX	C, BASIC, COBOL, FORTRAN	25,000	one 737K-byte diskette drive, one 70M-byte hard disk drive, 3 terminals, one graphics-matrix printer

HERE TODAY HERE TOMORROW

Reliability.

The essential ingredient that OEMs and systems integrators need for today and tomorrow. Without it, you can't generate business.

Which is why CompuPro's System 816™ answers your needs.

Survival of the Fittest.

This micro is The Essential Computer. It not only outperforms the competition, but also operates in extreme environments for virtually an unlimited number of applications.

Just one look at our specs and you know the System 816 will be around for a long, long time. And because the System 816 is structured on the IEEE 696/S-100 bus you can select the appropriate components, independently, in any combination. Even use boards for graphics and other unique applications.

One of the Strongest Warranties.

And since only the strong survive, we housed the System 816 in a rugged metal enclosure . . . and backed it with one of the industry's longest warranty coverages: From 12 to 24 months.

To find out more about how the System 816 outlasts and outperforms anybody else, call **(415) 786-0909** and ask for an OEM/systems integrator application package and our 1984 catalog.

You'll find CompuPro will be just as essential tomorrow as we are today.

CompuPro®

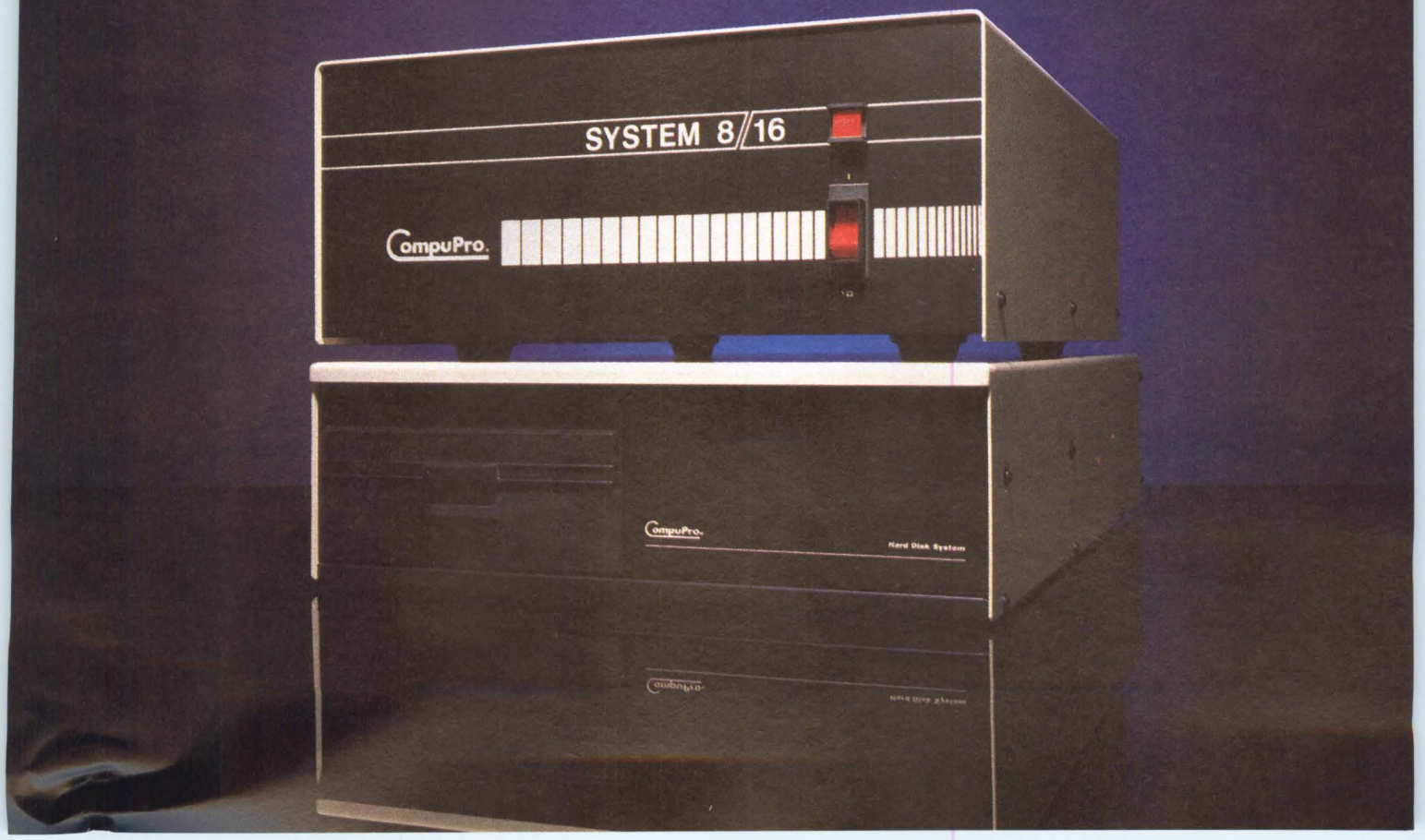
A *GODBOUT* COMPANY

3506 Breakwater Court, Hayward, CA 94545

System 816 and The Essential Computer are trademarks of CompuPro. System 816 front panel design shown is available from Full Service CompuPro System Centers only. ©1984 CompuPro

The Essential Computer™

CIRCLE NO. 33 ON INQUIRY CARD

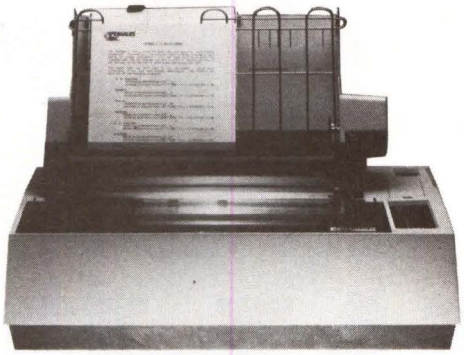


MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
UTS 4020	16	AM 2900, multiple Z80s	128K (1M)	Uniscope Mode SCS, DDP-4000 Mode SCS, CP/M Plus	CP/M Plus-based languages	36,126	four 1M-byte diskette drives, two 160-cps serial matrix printers; opt. up to 6 terminals
UTS 4040	16	AM 2900, multiple Z80s	256K (2M)	Uniscope Mode SCS, DDP-4000 Mode SCS, CP/M Plus	CP/M Plus-based languages	79,266	two 14M-byte hard disk drives, up to 12 terminals, one 180-lpm line printer
STRATUS COMPUTER INC.							
Stratus/32	32	68000	2M/ module (8M, 16M/ module)	Virtual Operation System	Pascal, COBOL, FORTRAN, BASIC, PL/1	133,000	two 30M-byte disk drives, one terminal, one tape drive
SYKES DATATRONICS							
	8	6502	4K (80K)	proprietary	BASIC	6,800	two 250K-byte diskette drives
	16	8086	512K (1M)	XENIX, MS-DOS	C, BASIC, COBOL, FORTRAN		one 1M-byte diskette drive, 4 terminals
Telemiser	8	6809	256K (1M)	OS-9	C, Assembly	3,500	one diskette drive
Minimiser	8	6502	8K (64K)		BASIC, Assembly	1,000–2,000	one terminal
CS/SMDR	8	6502	80K (500K)		BASIC, Assembly	3,000–10,000	two diskette drives, one terminal
TECMAR INC.							
TEC-86	16	8086	64K (1M)	CP/M-86, MP/M-86, MS/DOS	COBOL, FORTRAN, BASIC, Pascal, FORTH	4,390	two 600K-byte diskette drives; RS232C, parallel and IEEE-696 interface; 10-slot S-100 bus
TEXAS INSTRUMENTS							
300	16	TMS 99000	256K (512K)	DX10	COBOL, FORTRAN, Pascal, BASIC	9,995	one 17M-byte hard disk drive, one terminal
USDATA							
RT2010	8	8080	64K (64K)	File Control System	BASIC, CP/M, Assembly, FORTRAN	16,000	three 250K-byte diskette drives, 10M- to 20M-byte hard disk drives, 14-port multiplexor, 3K- to 72K-byte UV EPROM boards
VECTOR GRAPHIC INC.							
5E Series	8	Z80B	128K (256K)	CP/M	BASIC, COBOL, FORTRAN, Pascal, C	6,750	one 10M-byte hard disk, one 630K-byte diskette drive, one terminal
WAVE MATE INC.							
Bullet IV	8	Z80A 4 MHz	128K (128K)	CP/M 3.0, MP/M II	CP/M-based languages	1,995	two 1M-byte diskette drives; opt. up to 2 terminals, one printer
Super Bullet 510	8	Z80H 8 MHz	256K (256K)	CP/M 3.0, MP/M II, OASIS	CP/M-based languages	4,150	one 1M-byte diskette drive, one 10M-byte hard disk drive; opt. up to 4 terminals, one printer
Super Bullet IV	8	Z80H 8 MHz	256K (256K)	CP/M 3.0, MP/M II	CP/M-based languages	2,450	two 1M-byte diskette drives; opt. up to 4 terminals, one printer
WICAT SYSTEMS INC.							
150	16	68000 8 MHz	256K (1.5M)	UNIX, WMCS (proprietary)	RM COBOL, C, FORTRAN 77, Pascal, W-BASIC, SMC-BASIC, Level II COBOL, Assembly, APL 68000	10,000	one 960K-byte 5.25-inch diskette drive, parallel port, 15M-byte hard disk drive; opt. 5 RS232C ports, up to 6 users
155	16	68000 8 MHz	512K (4.5M)	UNIX, WMCS (proprietary)	RM COBOL, C, FORTRAN 77, Pascal, W-BASIC, SMC-BASIC, Level II COBOL, Assembly, APL 68000	15,000	two parallel printer ports, 10M-byte hard disk drive, .25-inch cartridge tape drive; opt. up to 16 users
160	16	68000 8 MHz	512K (4.5M)	UNIX, WMCS (proprietary)	RM COBOL, C, FORTRAN 77, Pascal, W-BASIC, SMC-BASIC, Level II COBOL, Assembly, APL 68000	25,000	two parallel printer ports, 10M-byte hard disk drive, 630K-byte 5.25-inch diskette drive, .25-inch cartridge tape drive; opt. SMD hard disk drive, 9-track tape drive, up to 16 RS232C ports
200	16	68000	512K (4M)	UNIX, WMCX (proprietary)	Assembly, C, FORTRAN 77, Pascal, W-BASIC, SMC-BASIC, RM COBOL, Level II COBOL	27,000	eight intelligent RS232C and 4 sync ports, 2 parallel ports, SMD hard disk drive, .25-inch cartridge tape drive; opt. 9-track tape drive, up to 32 users
220	16	68000	512K (12M)	UNIX, WMCS (proprietary)	Assembler, C, FORTRAN 77, Pascal, W-BASIC, SMC-BASIC, RM COBOL, Level II COBOL	32,000	eight intelligent RS232C and sync ports, SMD hard disk drive, .25-inch cartridge tape drive; opt. 9-track tape drive

"PRIMAGES...DARES TO DEFY THE COMMON WISDOM BY OFFERING A PRINTER BOTH FASTER AND LESS EXPENSIVE THAN ITS COUNTERPARTS, WITHOUT SACRIFICING QUALITY."

DIGITAL REVIEW, May 1984*



In today's market, if you're going to defy the common wisdom, you'd better have an uncommon product.

Like the Primage I daisy wheel printer. Uncommon in that it prints letter quality manuscripts at a brisk 45 cps in multiple languages. Interfaces easily with all leading micros and PCs and utilizes patented new technology to improve reliability. Yet it costs less than printers with less capability.

And it helps to have an uncommon sheet feeder to make full use of the printer's speed. Like our PAGEMATE I, a jam-free, trouble-free sheet feeder. Designed as an integral part of the Primage I system, it too is revolutionary in design when compared to other sheet feeders. Yet it costs about half as much as they do.

Stop in at your local dealer for a demonstration of our remarkable system.

You'll be uncommonly surprised.

PRIMAGES INC.

620 Johnson Ave., Bohemia, NY 11716
516 567-8200

*For your copy of the complete DIGITAL REVIEW report, attach your business card to this ad, and mail to Primages.

See Primages at PCExpo Booth No. 726

CIRCLE NO. 34 ON INQUIRY CARD

MULTIUSER MICROCOMPUTERS

Company Model	CPU word size (bits)	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
ZENDEX CORP.							
95/86 A-RMX	16	8086	512K (1M)	RMX-86	Pascal 86, FORTRAN 86, CP/M-86, C	19,495	one 1M-byte diskette drive, one 80M-byte hard disk drive; opt. up to 5 terminals
ZENTEC							
Series 2000	16	8086	256K (1M)	ZENIX	C, COBOL, BASIC	15,770	includes one 5.25-inch 27M-byte hard disk drive, one terminal, one printer, one modem; opt. 8087 O/S
ZILOG INC.							
11	16	Z8000	512K (1M)	UNIX, CP/M emulation	C, FORTRAN, SMC BASIC, SOFBOL, ACE COBOL, RM COBOL, Pascal, Ada, Assembly	14,950	one 19M-byte hard disk drive
11 Plus	16	Z8000	512K (1M)	UNIX, CP/M emulation	C, FORTRAN, SMC BASIC, SOFBOL, ACE COBOL, RM COBOL, Pascal, Ada, Assembly	18,950	one 33M-byte hard disk drive
21	16	Z8000	512K (4M)	UNIX, CP/M emulation	C, FORTRAN, SMC BASIC, SOFBOL, ACE COBOL, RM COBOL, Pascal, Ada, Assembly	22,950	one 32M-byte hard disk drive
31	16	Z8000	512K (4M)	UNIX, CP/M emulation	C, FORTRAN, SMC BASIC, SOFBOL, ACE COBOL, RM COBOL, Pascal, Ada, Assembly	31,950	one 80M-byte SMD disk drive

HALF SIZE.

Delta makes your deliveries DASH.

Delta DASH℠ delivers the same day to over 90 cities across the U.S and abroad, covering 10,000 communities. Why get that small package delivered tomorrow when you can DASH it today? DASH (Delta Air Lines Special Handling) delivers packages up to 70 lbs . . . to over 10,000 communities. So give us a ring at the Delta Marketing Office in the city nearest you. Or call DASH at (800) 638-7333 for pick up or delivery.

For top priority shipments over 70 lbs., use Delta Air Express. It guarantees your shipment gets on the flight specified. For full details, call your nearest Delta Marketing Office.

DELTA AIR CARGO. READY ALL·AROUND.

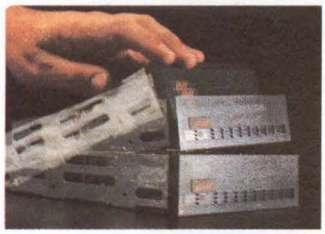
MORE DRIVE.

IMI's new 2300H Series Winchester disk drives.

The 2300H Series is the most rugged disk drive made today, with a shock-proof design tough enough for desk top and portable applications. And IMI includes a full two-year warranty on parts and labor.

The 2306H and 2312H pack 6 and 12 megabytes of storage into half height 5¼" Winchester packages with all the capabilities of your full height drive, and more.

More reliability. Large scale integration allows for a single PC board with fewer components and connectors. Conservative 300 track per inch technology provides reliable operation over the full 4°C-50°C operating range.



More durability. IMI's exclusive shock isolation system utilizes improved damping materials and low mass head/flexure design. It's so tough you can literally drop it. Just try that with any other disk drive, full or half.

More performance. The patented "dynamic seek complete" and closed loop stepper control circuitry virtually eliminate seek errors. Plus, the 2300H operates on a wider voltage range than a full height.

More features. Extensive self test micro diagnostics monitor power supply voltages, spindle speed, and verify the integrity of the positioning system during the power-up cycle. Auto power sequencing reduces starting currents.

Half size. The 2300H may be mounted in a variety of configurations in addition to the usual half height mini floppy standards. An optional full height bezel allows mounting in a full height chassis location. Or, two 2300H drives can be stacked in a full height space, without compromising the shock isolation system. The 2300H is fully compatible with the ST506/412 interface.

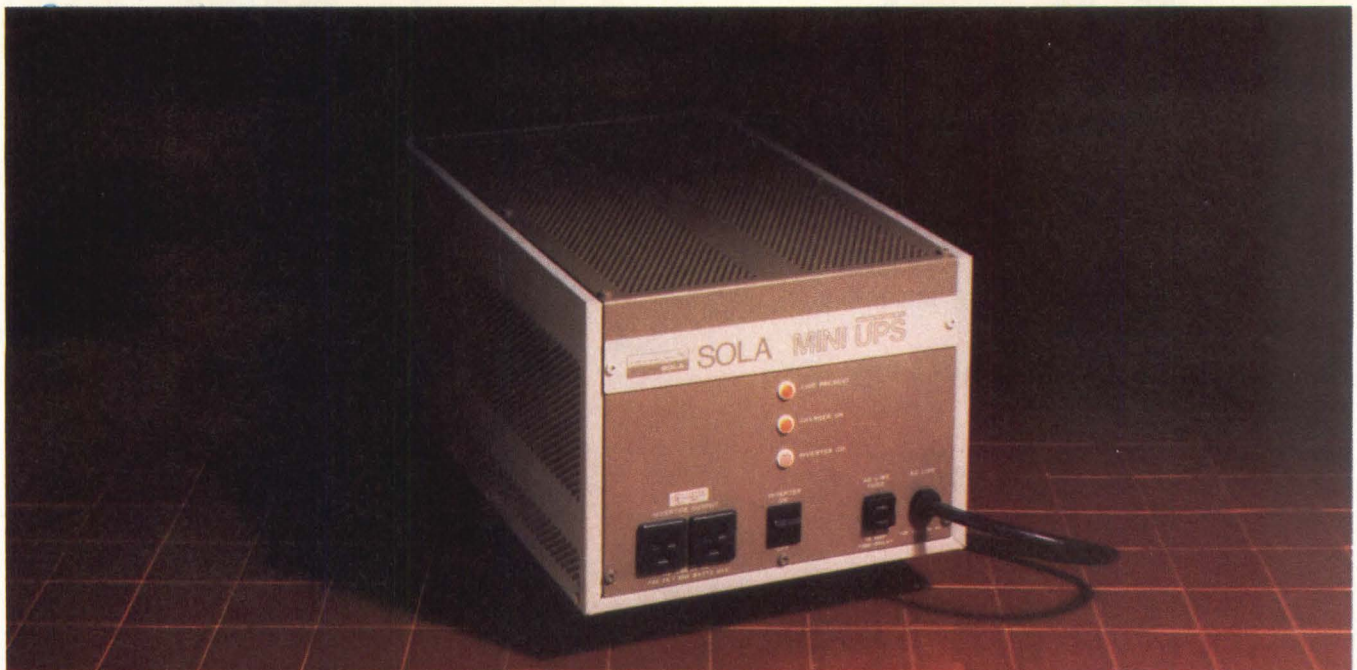
For spec sheet and further information, contact:

International Memories Inc.,
10381 Bandley Drive,
Cupertino, California 95014,
(408)446-9779 TWX:910-338-7347.

IMI®

We're at it again.

CIRCLE NO. 35 ON INQUIRY CARD



If you think a UPS is just for "lights out"...

think again.

A UPS, if it's a *true* UPS, offers more than just blackout protection. Because it's always "on-line," a *true* UPS protects your system and data against all kinds of irregular voltage conditions, including brownouts and blackouts.

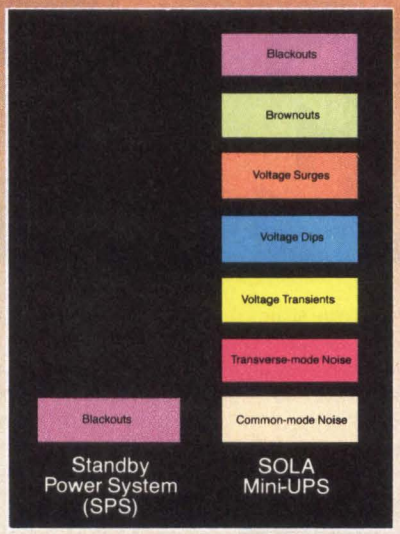
The difference between a *true* UPS and a standby UPS is like night and day.

A standby (off-line) unit is designed solely for blackouts. While some models do offer a limited amount of noise filtering, they do not provide continuous, conditioned power. And that leaves you vulnerable to the costly effects of brownouts, overvoltages, sudden power surges, transverse-mode and common-mode noise.

If your power protection needs are critical, you can't afford to "stand by."

For some applications a standby unit is sufficient. If that's the case, we offer our new standby power system (SPS).

But for more critical applications such as computer systems linked to security, medical life support, communications and industrial process control, you can't afford to be without clean, conditioned, "no-break" power for even a few milliseconds. That's when you need the complete protection you get with our portable, plug-in, UL-listed Mini-UPS.



Sure, a standby costs less. But it only operates when voltage drops below a preset transfer point (typically −10% nominal). A Mini-UPS, on the other hand, pays for itself every day by providing conditioned power and instantaneous blackout protection around-the-clock.

We introduced the concept of power protection more than fifty years ago.

In that time we've introduced some things you'd expect from the leader in power protection... like 100% quality testing and mandatory 72 hr. "burn-in" periods for all UPS units. We've also developed the nation's largest network of *stocking* distributors.

Think about it. Can you get by with anything less than *true* UPS protection? For more information on our complete line of UPS units, power conditioners, CV transformers, computer power centers and line monitors, contact:
Sola Electric, 1717 Busse Rd., Elk Grove Village, IL 60007. 312/439-2800.

See us at NCC '84, Booth #A-1702.

A UNIT OF GENERAL SIGNAL GS

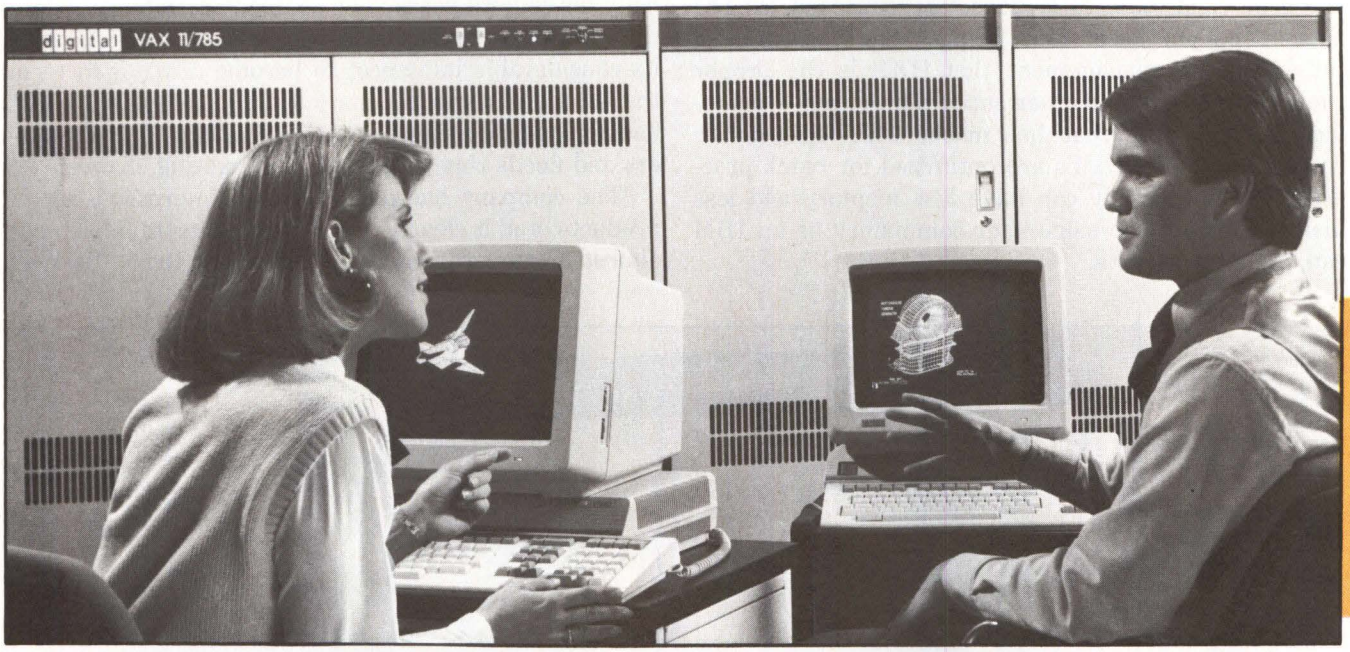
SOLA

The *Original* Power Protectors

CIRCLE NO. 36 ON INQUIRY CARD

Superminis defy micro and mainframe intrusion

Recent superminicomputers challenge multiuser microcomputers in price and mainframes in performance



The new VAX-11/785 *is housed in the same cabinet as that used by the VAX-11/780 but delivers 50 percent to 70 percent more throughput, DEC says. Basic price is $195,000.*

David Bright, Assistant Editor

Typifying the trends among minicomputer manufacturers to drop price while increasing performance in a more compact package, Digital Equipment Corp. has expanded its VAX line of superminicomputers. The line now extends from the low-priced MicroVAX I at $13,880 to the new top-end VAX 11/785 rated at 1.6 single-precision whetstones at a base price of $195,000.

Also joining DEC in a round of new superminicomputer introductions are IBM Corp., Gould Inc., Harris Corp. and, making its debut in the computer market, AT&T Co.

But all the activity in superminicomputer products underlines the absence of new minicomputers. DEC and the other minicomputer vendors are now concentrating on low-priced superminicomputers to meet the 16-bit multiuser microcomputer challenge. This trend does not mean that the traditional minicomputer is disappearing—all manufacturers expect substantial revenues from minicomputer sales to continue. But minicomputer vendors' flagship products clearly center on superminicomputers.

Supermini vendors run scared

The addition of IBM's 4361 and 4381 mainframes to its 4300 line last fall brought IBM into head-to-head competition with the leading superminicomputer powers such as DEC, Data General Corp. and Prime Computer Inc. "IBM is scaring the big guys," notes

Aaron Goldberg, senior analyst at International Data Corp. (IDC), Framingham, Mass. There is no longer any real price/performance gap between the leading superminicomputers and the comparative IBM mainframes, he says.

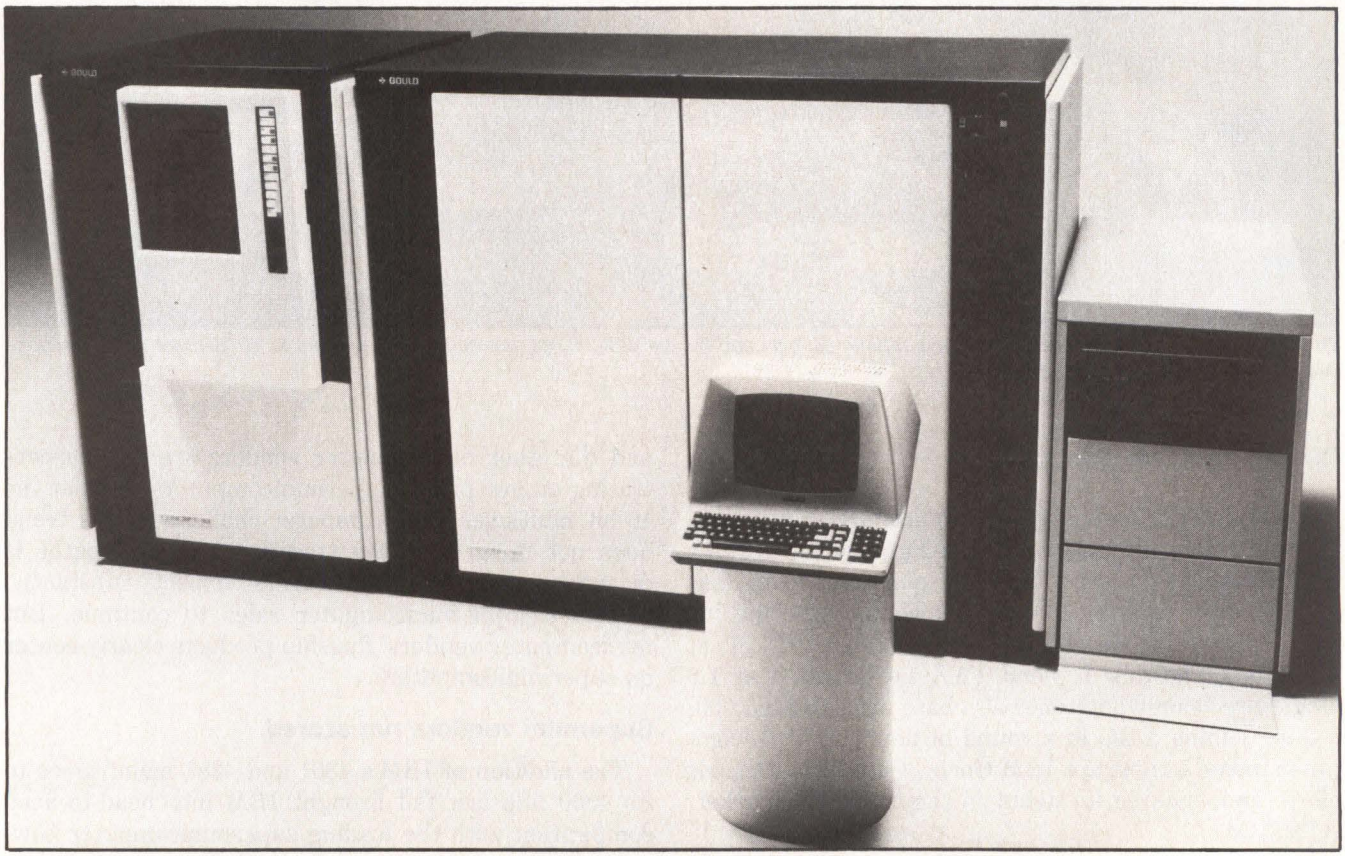
There is some argument about that. IBM rates its $200,000 4361 Group 5 processor at 1.45 million instructions per second (MIPS) on a mixed Whetstone scale, putting it in the same range as the DEC VAX-11/785. DG, however, rates its MV10000 at 2.5 MIPs, with a basic price of only $150,000.

Along with its claimed price/performance advantage, DG stresses the company's long-term viability, says Del Hunter, manager of OEM and computational system marketing. "You never have more image and more end-user clout than IBM does," he concedes, so DG hopes "the purchaser isn't going to have a problem convincing his management that [DG] is the proper choice." DG, DEC and other superminicomputer manufacturers also claim that their machines are designed to run interactively; IBM's are optimized for batch processing. "We typically can have less memory and less disk to support the same user community as an IBM can," Hunter asserts.

Many observers expect IBM to compete mostly in the commercial side of the superminicomputer market, because DEC, Gould and others have a strong hold on the scientific and engineering sectors. Those sectors account for only about 15 percent of the total, according to market research company First Boston Corp., so attacking the business side might be more lucrative. The general business sector of the superminicomputer market is the fastest-growing, with an average growth rate of 54.8 percent per year, according to research company Venture Development Corp.

AT&T, another giant that has recently entered the superminicomputer race, this March introduced its 3B20 and 3B5 series of superminicomputers running UNIX System V. AT&T has used these systems internally for several years. The company is initially selling the computers to OEMs. Analysts expect AT&T, with its considerable influence, to become a major force in the superminicomputer market. But most say it won't happen quickly because AT&T is new at selling computers and needs time to establish marketing channels.

"The company has announced an impressive set of products, and it clearly has the resources to implement almost any plan it chooses," observes Grant Bushee,



Future superminicomputers might use multiple processors *to boost performance. Gould's new Concept 32/970, for scientific applications, incorporates two CPUs to run 8.4 whetstones. Gould plans to add more CPUs to future machines.*

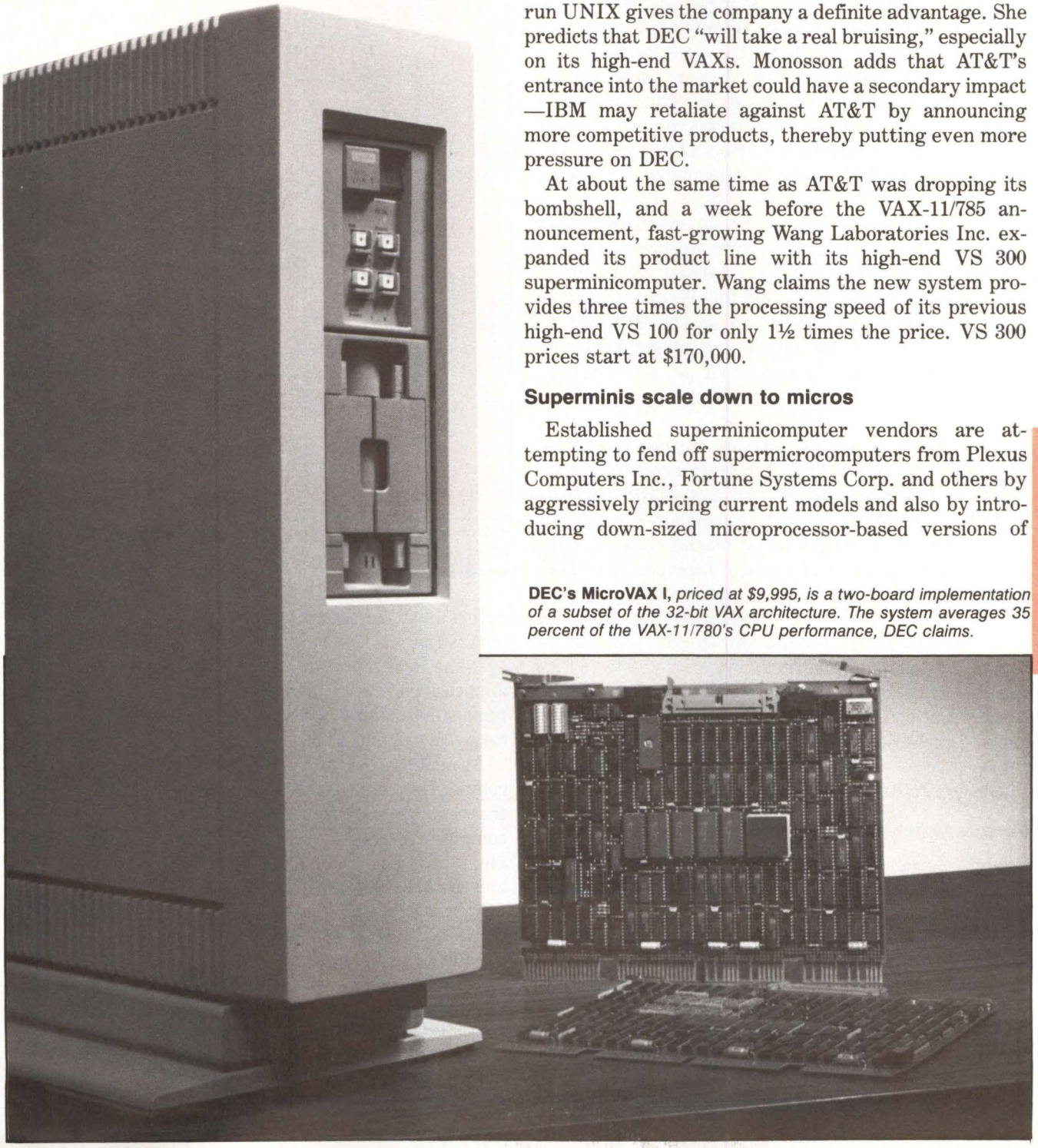
executive vice president of research company InfoCorp. "However, AT&T has never been in the computer business except as a supplier of technology, and for this reason it is likely to be years before the company will be able to optimize its strategy and organization to assume a significant position in the market."

Adolph "Sonny" Monosson, publisher of the *Monosson on DEC* newsletter, disagrees. He expects AT&T's name to lure OEMs away from IBM, DEC and the rest of the field immediately. "They [AT&T] are going to have to fight the OEMs off," he insists. UNIX maven Jean Yates, president of market research company Yates Ventures, believes the AT&T machines' ability to run UNIX gives the company a definite advantage. She predicts that DEC "will take a real bruising," especially on its high-end VAXs. Monosson adds that AT&T's entrance into the market could have a secondary impact —IBM may retaliate against AT&T by announcing more competitive products, thereby putting even more pressure on DEC.

At about the same time as AT&T was dropping its bombshell, and a week before the VAX-11/785 announcement, fast-growing Wang Laboratories Inc. expanded its product line with its high-end VS 300 superminicomputer. Wang claims the new system provides three times the processing speed of its previous high-end VS 100 for only 1½ times the price. VS 300 prices start at $170,000.

Superminis scale down to micros

Established superminicomputer vendors are attempting to fend off supermicrocomputers from Plexus Computers Inc., Fortune Systems Corp. and others by aggressively pricing current models and also by introducing down-sized microprocessor-based versions of



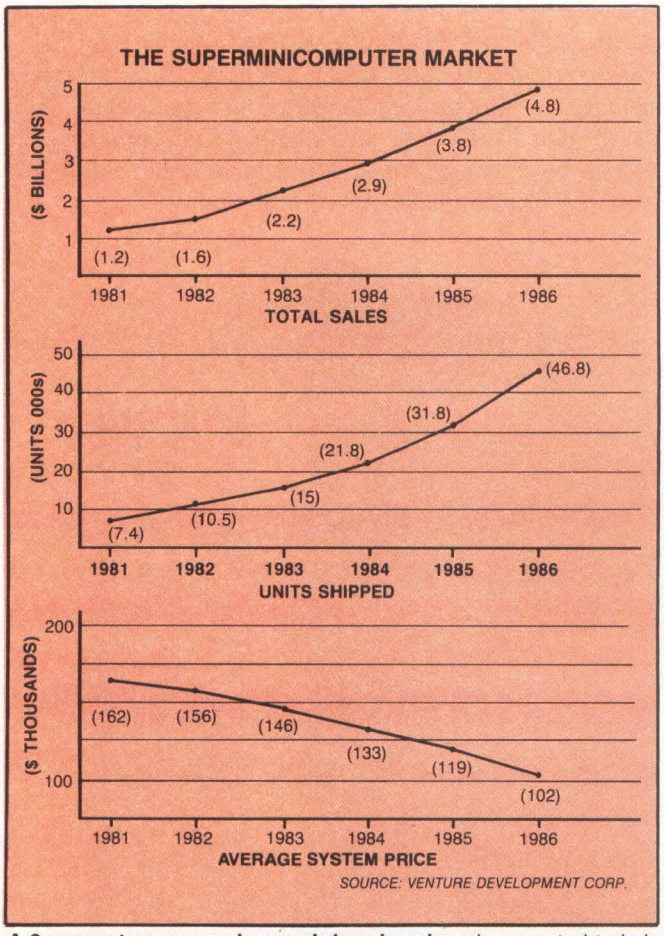
DEC's MicroVAX I, *priced at $9,995, is a two-board implementation of a subset of the 32-bit VAX architecture. The system averages 35 percent of the VAX-11/780's CPU performance, DEC claims.*

their minicomputer and superminicomputer technologies. A case in point is the Q-bus-based MicroVAX I, which DEC should ship in late spring. Prices for the MicroVAX I without storage begin at $9,995. A system with 512K bytes of memory, two floppy disk drives and a 10M-byte Winchester disk drive costs $13,880. In contrast, prices for Plexus' P/35 multiuser microcomputer start at $27,000. The P/35 incorporates both the 68000 and Z8000 chips. A basic 68000-based, multiuser Wicat 150 from Wicat Systems Inc. lists for $10,000.

Another superminicomputer vendor using similar tactics is Perkin-Elmer Corp. Its $9,950 3205 superminicomputer, introduced last year, is selling well. The unit is packaged in an eight-slot, 7-inch-high, rack-mountable chassis for OEMs and is also available in end-user configurations.

Prime is not worried about the supermicrocomputer invasion, claims Gale Aguilar, vice president of corporate business development and strategy. "We're down in the $38,000 range with our full Primos operating system and [32-bit] architecture on the 2250, so we have not been encountering severe competition with the supermicros," he maintains. "We get a tremendous advantage with the full-function Primos operating system down at that low end."

The Harris 60, announced this spring, is another contender. The 48-bit, 30-inch-high Harris 60 supports as many as 32 users and delivers 0.85-MIPS performance. The Harris 60 marks the company's expansion from the scientific and technical market into business. The company stresses the machine's compactness. Harris's new CPU has two boards, whereas the company's larger machines have five. The Harris 60's CPU uses complementary-metal-oxide-semiconductor (CMOS) custom gate arrays, and memory, expandable to 12M bytes, is in the form of 256K-bit RAM chips. To save more space, the company incorporates a high-performance 8-inch Winchester disk drive that provides a 20-msec. access time—the same as that of a 14-inch Winchester. Prices start at $69,500.



A 9 percent compound annual drop in prices *is expected to help boost superminicomputer market sales by a 45 percent compound annual growth rate.*

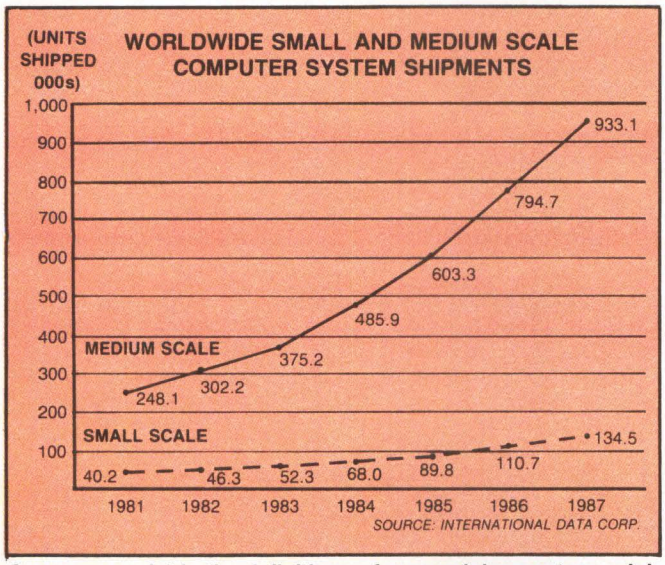
Vendors watch fault tolerance

Fault-tolerant computers are another area the traditional superminicomputer vendors are keeping a wary eye on. That market, which Tandem Computers Inc. single-handedly began in 1976, should grow from $500 million in sales in 1982 to $4.2 billion in 1987, predicts International Resource Development Inc. Until recently, Tandem, with 1983 revenues of $418 million, virtually owned the market. But now several other companies, mostly start-ups, have jumped into the race with the intention of attracting converts from the minicomputer and superminicomputer markets. Most of those companies, such as Synapse Computer Corp., Stratus Computers Inc., Auragen Systems Corp. and Parallel Computers Inc., use multiple 68000 microprocessors in their systems, which are targeted for transaction-processing applications. Prices of the Tandem and Synapse systems start at $200,000 and $300,000, respectively, and target VAX- and 4300-level systems.

Although most of the other systems appear to be competing primarily against minicomputers, many of the vendors hope to steal a portion of the superminicomputer market as well. Parallel Computer, for example, plans to compete against PDP-11s, the VAX 11/750 and the MV 4000, says Parallel president Charles Ryle, former marketing vice president of Tandem. Tandem markets its systems directly to end users, whereas Parallel concentrates on OEMs and system integrators. Ryle claims the low price of Parallel's bare-bones fault-tolerant system—about $75,000—gives OEMs their first chance to offer such systems to their customers.

Some superminicomputer vendors are beginning to fight back by adding redundancy to their systems. DEC's VMS 3.3 enables VAXcluster customers to program fault tolerance into clusters with as many as 16

VAX CPUs. Honeywell Information Systems Inc. last year introduced the Resilient TPS system that incorporates two loosely coupled processors along with transaction processing software. P-E is one of the latest to add fault-tolerant capabilities to its systems. Its Resilient system uses a dual-processor configuration with switched peripherals and can be installed as a field upgrade to a P-E Series 3200 system. New software detects and corrects system failures, say company officials.



Gray areas exist in the definitions of superminicomputers, minicomputers, supermicrocomputers and even mainframes. *It's sometimes more valid to classify a computer according to its market position and general capability. IDC classifies medium-scale computers as those that compete against the DEC VAX line, IBM 4300 series, DG MV products and Hewlett-Packard Co. HP3000s. Small-scale computers include the DEC PDP-11/34, IBM System/34, Altos Computer Systems Inc. ACS-68000 and Plexus P-60. Representing a superminicomputer trend toward compactness, the 30-inch-high Harris 60 supports 32 users and performs at 0.85 whetstones.*

Vendors wait and see

Many superminicomputer vendors are cautious about plunging full-force into the market for fault-tolerant systems. At newcomer Pyramid Technology Corp., fault tolerance is "definitely not an objective," states marketing vice president Frank Madren, even though the market is expected to boom. Instead, Pyramid will concentrate on making "good, reliable equipment" without the software overhead and premium price of fault-tolerant systems. The company attracted considerable attention last summer when it introduced its 90X superminicomputer. The 90X was specifically designed to run UNIX V and was the first commercially marketed system to use the experimental reduced-instruction-set-computer (RISC) architecture. RISC uses overlapping registers and is said to run higher-level languages faster than programs that compile to a large number of instructions because the CPU can operate more efficiently, with fewer wait states, especially while data is being transferred to and from memory. Pyramid seems to be the guinea pig for RISC; other vendors say they might latch onto it if it proves successful.

Another way for superminicomputers to increase performance is through the use of emitter-coupled-logic (ECL) circuits rather than the transistor-to-transistor-logic (TTL) circuits commonly used. ECL is faster but more expensive than TTL. Gould, Harris and Prime are the only superminicomputer vendors using ECL, according to IDC's Goldberg. DEC says its planned Venus super VAX will use ECL; Wang will not reveal whether its new VS 300 uses ECL.

At Gould's Computer Systems Division, Concept/32 product planning manager Hank Taylor says Gould's plan concerning ECL is to "push it to the limit." To further improve performance, Gould will build multiprocessor systems. "It seems like the only way to go," he says, but acknowledges that the problem with running more than four processors is keeping them all active at once. Gould's recently introduced Concept 32/9780 system uses dual processors to achieve a performance rating of 8.4 MIPS.

Performance improves in parallel

Parallel processing to improve performance and to lead to artificial-intelligence applications is a continuing area of interest in both industry and academia. P-E and DEC have tested the waters with multiple-processor machines. P-E's modular 3200MPS supports a CPU and as many as nine tightly coupled auxiliary processing units. P-E says a 3200MPS with nine auxiliary units performs at 21 MIPS in single-precision whetstones. DEC's VAX-11/782 features two tightly coupled VAX-11/780 CPUs, and the VAXcluster, which loosely links as many as 16 VAXs via a 70M-byte-per-second coaxial cable, might be the forerunner of a high-performance, tightly coupled multiprocessor scheme that also provides fault tolerance.

Encore Computer Corp., formed last summer by former Prime president Ken Fisher, is developing at least three "large applied multiprocessor systems," sources say. One of the systems will reportedly use 10 to 100 processor modules connected by a common bus, run UNIX and compete in the high-end VAX market. Encore subsidiary Hydra Computer Systems, Natick, Mass., plans to introduce that system in early 1985. □

Interest Quotient (Circle One)
High 810 Medium 811 Low 812

MINICOMPUTERS

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
ANDROMEDA SYSTEMS INC.							
11/B1-32DS	16	LSI-11/23	32K (4M)	RT-11, RSX-11M, TSX-PLUS	COBOL, BASIC, Pascal, FORTRAN, Assembly	7,350	two 625K-byte diskette drives, one terminal, 4 serial ports, floating point processor
11/B23-W15	16	KDF11-AA (11/23), KDJ11-AA (11/73)	256K (4M)	RT-11, RSX-11M, TSX Plus	Pascal, BASIC, APL, FORTRAN, Assembly	8,995	one 512K-byte diskette drive, one 15M-byte hard disk drive, 4 serial ports
11/M12-W10	16	KDF11-AA (11/23), KDJ11-AA (11/73)	256K (512K)	RT-11	Pascal, BASIC, APL, FORTRAN, Assembly	6,995	one 512K-byte diskette drive, one 10M-byte hard disk drive, 4 serial ports
11/M23-W15	16	KDF11-AA, KDJ11-AA	256K (512K)	RT-11	Pascal, BASIC, APL, FORTRAN, Assembly	7,450	one 512K-byte diskette drive, one 15M-byte hard disk drive, 4 serial ports
APOLLO COMPUTER INC.							
DN460	32	proprietary	1M (4M)	AEGIS, AUX (UNIX)	FORTRAN, Pascal, C	39,500	operating system, font editor, network interface, language debugger, graphics primitives
DN660	32	proprietary	1M (4M)	AEGIS, AUX (UNIX)	FORTRAN, Pascal, C	59,000	operating system, font editor, network interface, language debugger, graphics primitives
ARDENT COMPUTER PRODUCTS							
15	16		64K (128K)	MICOS, R-DOS, BLIS/COBOL, BITS, IRIS, IOS	BASIC, COBOL, FORTRAN	4,990	
20/40	16		64K (1M)	MICOS, R-DOS, BLIS/COBOL, BITS, IRIS, IOS	BASIC, COBOL, FORTRAN	7,000	
Mini/Max	16		64K (128K)	MICOS, R-DOS, BLIS/COBOL, BITS, IRIS, IOS	BASIC, COBOL, FORTRAN	4,000	
ARETE SYSTEMS							
Arete 1000	32	68000	2M (16M)	UNIX System V, RM/COS	C, BASIC, Pascal, COBOL, DIBOL, APL; FORTRAN 4, 77	78,000	includes one 60M-byte hard disk drive, one 45M-byte tape drive, I/O processors
AT&T							
3B5/100	32-bit	WE 32000 7.2 MHz	1M (8M)	UNIX System V	C, FORTRAN 77, RATFOR, COBOL, BASIC	57,000	8K-bytes cache memory, one 48M-byte fixed/removable disk drive, 8 RS232C ports
3B5/200	32-bit	WE 32000 10 MHz	1M (8M)	UNIX System V	C, FORTRAN 77, RATFOR, COBOL, BASIC	73,000	8K-bytes cache memory, 48M-byte fixed/removable disk drive, 8 RS232C ports
3B2/300	32-bit	WE 32000	512K (2M)	UNIX	C, FORTRAN	9,950	one 720K-byte diskette drive, one 10M-byte hard disk drive, one parallel port, up to 6 serial ports
3B20A	32-bit	WE 32000	4M (12M)	UNIX	UNIX System V-compatible languages	330,000	
3B20D	32-bit	WE 32000	4M (16M)	UNIX, Real-Time-Reliable OS	UNIX System V-compatible languages	340,000	
3B20S	32-bit	WE 32000	4M (12M)	UNIX	C, FORTRAN 77, RATFOR	230,000	
ATV SYSTEMS INC.							
Evolution	16		64K (1M)	PICK	BASIC, Assembly	32,950	one 33M-byte disk drive, one terminal, one Data Products printer
BYTRONIX CORP.							
MIKRON 600	16	NOVA-emulator	64K (128K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	5,000	disk controller for ST506 or SMD-type drives
MIKRON 600 20/20 SYSTEM	16	NOVA-emulator	64K (128K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	11,200	one 20M-byte hard disk drive, disk controller, one 20M-byte .25-inch streaming tape drive

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
MIKRON 600 40/40 SYSTEM	16	NOVA-emulator	64K (128K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	13,000	one 40M-byte hard disk drive, disk controller, one 40M-byte .25 inch streaming tape drive
SERIES 1000A SYSTEM	16	NOVA-emulator	64K (64K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	6,670	disk controller, power supply, 6-slot chassis
SERIES 4000 SYSTEM	16	NOVA-emulator	64K (128K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	7,900	disk controller, power supply, 6-slot chassis
SERIES 5000 SYSTEM	16	NOVA-emulator	64K (512K)	BITS, BLIS/COBOL, IRIS, MICOS	Business BASIC, COBOL	10,800	disk controller, power supply, 6-slot chassis
COMPUTER AUTOMATION INC.							
SyFA 200	16	proprietary	64K (128K)	SyCLOPS	SyBOL		
SyFA 300	16	proprietary	64K (304K)	SyCLOPS	SyBOL		
SyFA 1000	16	proprietary	128K (384K)	SyCLOPS	SyBOL		
SyFA 1700	16	proprietary		SyCLOPS	SyBOL		
SyFA 2000	16	proprietary	128K (384K)	SyCLOPS	SyBOL		
CONTROL DATA CORP.							
CYBER 120-40	16	MicroEclipse	512K (2M)	AOS	FORTRAN 77, FORTRAN V, COBOL, BASIC	31,250	one 1.2M-byte diskette drive, one 12.5M-byte hard disk, one terminal
DATA GENERAL CORP.							
ECLIPSE S/120	16-bit	proprietary	512K	AOS	PL/1, FORTRAN 77	40,000	
ECLIPSE S/140	16-bit	proprietary	128K (2M)	AOS	FORTRAN, BASIC, PL/1, DG/L, ALGOL	19,000-43,000	
ECLIPSE S/280	16-bit	proprietary	512K (2M)	MP/AOS, AOS, RDOS		30,000-46,000	
MV 4000	32-bit	proprietary	1M (8M)	AOS/RT-32, INFOS II	APL, COBOL, BASIC, RPG, FORTRAN 77, Pascal, PL/1, C	27,000-79,000	
MV 8000 II	32-bit	proprietary	1M (12M)	UNIX, AOS/VS, AOS/RT-32	COBOL, BASIC, PL/1, Pascal, APL, RPG, C, FORTRAN 77, DG/L, SWAT	83,000-240,000	
MV 10000	32-bit	proprietary	1M (16M)	AOS/VS, AOS/RT-32	C, COBOL, BASIC, Pascal, APL, PL/1, RPG, FORTRAN 77, DG/L	154,000-686,000	
DATAPOINT CORP.							
6600	8	proprietary	64K (248K)	Datapoint DOS, Datapoint RMS	COBOL Plus, BASIC Plus, Datashare	53,300	one 134M-byte hard disk drive; opt. terminal
8600	16	proprietary	256K (512K)	Datapoint DOS, Datapoint RMS	Databus (Datapoint COBOL), COBOL, FORTRAN, BASIC	14,950	one 10M-byte hard disk drive; supports up to 12 terminals
8800	16	proprietary	256K (1M)	Datapoint RMS	COBOL, Databus, RPG Plus	66,950	one 202M-byte hard disk drive, one terminal
DATARAM CORP.							
A22	16-bit	LSI 11/23	256K (4M)	RT-11, RSTS, RSX-11M Plus, UNIX, TSX-Plus			one 8-inch diskette drive, one 40M-byte hard disk drive, 10M-byte removable hard disk drive, rack mount; opt. .25-inch tape drive
DIGITAL EQUIPMENT CORP.							
PDP-11/24	16-bit	proprietary	128K (4M)	RT-11, RSX-11M and 11/M Plus, RSTS/E, DSM-11, CTS-300	C, COBOL 81, DIBOL, FORTRAN 77 and IV, CORAL 66; BASIC-11, -Plus, -Plus 2	27,000	
PDP-11/44	16-bit	proprietary	256K (4M)	RT-11, DSM-11, RSTS-E; RSX-11M, -11S, -11M Plus	C, Pascal, APL, CORAL 66, COBOL 81, MACRO-11, FORTRAN IV and 77, BASIC -11 and Plus 2; RSX-11M, -11S, -11M Plus	29,000	

MINICOMPUTERS

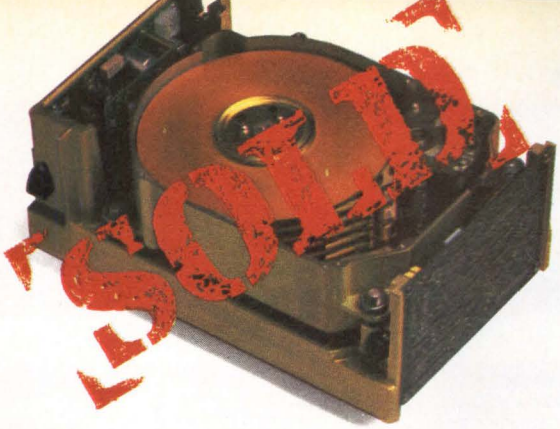
Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
Micro VAX I	32-bit	proprietary	1M (1.5M)	VAX/VMX, ULTRIX	BASIC, COBOL, FORTRAN, Pascal, C, CORAL 66, DIBOL, APL, MACRO, RPG II	13,880	two 800K-byte 5.25-inch diskette drives; opt. 10M- or 30M-byte hard disk drive
VAX-11/725	32-bit	proprietary	1M (3M)	VAX/VMS, ULTRIX	C, BASIC, FORTRAN, COBOL	25,000-37,000	
VAX-11/730	32-bit	proprietary	1M (5M)	VAX/VMS, ULTRIX	C, Pascal, APL, PL/1, BLISS, CORAL 66, DIBOL, FORTRAN 77, COBOL 81, BASIC Plus 2	28,000-59,000	
VAX-11/750	32-bit	proprietary	2M (8M)	VAX/VMS, ULTRIX	C, Pascal, APL, PL/1, BLISS, CORAL 66, DIBOL, FORTRAN 77, COBOL 81, BASIC Plus 2		
VAX-11/780	32-bit	proprietary	2M (32M)	VAX/VMS, ULTRIX	C, Pascal, APL, PL/1, CORAL 66, BLISS, DIBOL, BASIC Plus 2, COBOL 81, FORTRAN 77	190,000-340,000	
VAX-11/782	32-bit	proprietary	2M (32M)	VAX/VMS, ULTRIX	C, Pascal, APL, PL/1, BLISS, DIBOL, BASIC Plus 2, COBOL 81, FORTRAN 77	180,000-445,000	
VAX-11/785	32-bit	proprietary	2M (32M)	VAX/VMS, ULTRIX	C, Pascal, APL, PL/1, CORAL 66, BLISS, DIBOL, BASIC Plus 2, COBOL 81, FORTRAN 77	195,000 and up	
DIGITAL SYSTEMS CORP.							
Galaxy 5	8, 32	2900	128K (1M)	proprietary	COBOL, RPG, Assembler, FORTRAN	150,000	two 15-port multiplexers, 600-lpm printer, 300M-byte hard disk storage, 20 terminals
FIRST COMPUTER							
Orion 730	32	VAX 730	1M (4M)	VAX/VMS	BASIC, COBOL, FORTRAN, Pascal, BLISS, CORAL, PL/1, C, DCL		134.8M-byte fixed storage, streaming tape drive, printer
FORMATION INC.							
F4000-101	32	2901	1M (8M)	DOS/VS, DOS/VSE, VM/370, VM/SP, OS/VSI, OS/MVS	COBOL, PL/1, FORTRAN, RPG, BASIC, Assembly, APL	88,300	one 100M-byte hard disk, one tape drive, 5 terminals, one 300-lpm printer
F4000-201	32	2901	1M (8M)	DOS/VS, DOS/VSE, VM/370, VM/SP, OS/VSI, OS/MVS	COBOL, PL/1, FORTRAN, RPG, BASIC, Assembly, APL	141,450	two 100M-byte hard disks, one tape drive, 10 terminals, one 600-lpm printer
F4000-301	32	2901	2M (8M)	DOS/VS, DOS/VSE, VM/370, VM/SP, OS/VSI, OS/MVS	COBOL, PL/1, FORTRAN, RPG, BASIC, Assembly, APL	199,850	two 635M-byte hard disks, one tape drive, 10 terminals, one 600-lpm printer
GOULD INC. COMPUTER SYSTEMS DIVISION							
32/27	32		256K (4M)	MPX-32, UTX	BASIC, MACRO Assembly, FORTRAN 77+, FORTRAN 66+, COBOL, Pascal	45,000	one 80M-byte hard disk, one .25-inch cartridge tape drive
32/6780	32		2M (16M)	MPX-32, UTX	BASIC, MACRO Assembly, FORTRAN 77+, FORTRAN 66+, COBOL, Pascal	150,000	
32/8780	32		2M (16M)	MPX-32, UTX	BASIC, MACRO Assembly, FORTRAN 77+, FORTRAN 66+, COBOL, Pascal	370,000	
HARRIS CORP., COMPUTER SYS. DIV.							
600	48		768K (4.5M)	Harris VOS	FORTRAN, BASIC, COBOL, Pascal, APL, RPG, Assembly, SNOBOL, FORGO	39,000	12M bytes of virtual memory, 16 priority interrupts, communications processor with 2 ports
700	48		384K (12M)	Harris VOS	FORTRAN, BASIC, COBOL, Pascal, APL, RPG, Assembly, SNOBOL, FORGO	49,000	48M bytes of virtual memory, 16 priority interrupts, communications processor with 2 ports, one terminal
800	48		768K (12M)	Harris VOS	FORTRAN, BASIC, COBOL, Pascal, APL, RPG, Assembly, SNOBOL, FORGO	140,000	6K bytes of cache memory, 48M bytes of virtual memory, 16 priority interrupts, communications processor with 2 ports, one terminal

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
1000	48		2M (12M)	Harris VOS	FORTRAN, BASIC, COBOL, Pascal, APL, RPG, Assembly, SNOBOL, FORGO	250,000	6K bytes of cache memory, 48M bytes of virtual memory, 16 external interrupts, communications processor with 2 ports, one terminal
HEWLETT-PACKARD CO.							
1000-A600	16	AMD 2901C	128K (4M)	Real Time Executive (RTE-A)	FORTRAN 77, Pascal, BASIC, MACRO, C, COBOL	19,800	two 15M-byte hard disk drives, one terminal, one 300-lpm printer, bundled software
1000-A700	16	AMD 2903, custom ALU	128K (4M)	Real Time Executive (RTE-A)	FORTRAN 77, Pascal, BASIC, MACRO, C, COBOL	40,700	one 65M-byte hard disk drive, one terminal, one 300-lpm printer, bundled software
1000-A900	16	custom	768K (24M)	Real Time Executive (RTE-A)	FORTRAN 77, Pascal, BASIC, MACRO, C, COBOL	57,600	one 32M-byte hard disk drive, one terminal, one 300-lpm printer, bundled software
HP 3000 Series 68	16	proprietary	3M (8M)	HP MPE	COBOL, FORTRAN, Pascal, BASIC, SPL	258,565	one hard disk drive, one tape drive, one terminal, one 300-lpm printer
HP 3000 Series 39	16	proprietary	512K (3M)	HP MPE	COBOL, FORTRAN, Pascal, BASIC, SPL	50,174	one 65M-byte hard disk drive, cartridge tape backup, one terminal, one 200-cps printer, one controller
HP 3000 Series 42	16	proprietary	1M (3M)	HP MPE	COBOL, FORTRAN, Pascal, BASIC, SPL	74,924	one 132M-byte hard disk drive, one .5-inch magnetic tape backup, one terminal, one 200-cps printer, one controller
HP 3000 Series 48	16	proprietary	2M (4M)	HP MPE	COBOL, FORTRAN, Pascal, BASIC, SPL	115,645	one 132M-byte hard disk drive, one .5-inch magnetic tape backup, one terminal, one 300-lpm printer, one controller
HONEYWELL INFORMATION SYSTEMS INC.							
DPS 6/40	16	LSI-6	512K (2M)	GCOS 6	COBOL, FORTRAN, BASIC, Pascal, RPG	45,600	one 40M-byte hard disk drive, one 512K-byte diskette drive, one 400-cps printer, 6 terminals
DPS 6/45	16	LSI-6	512K (2M)	GCOS 6	COBOL, FORTRAN, BASIC, Pascal, RPG	42,090	one 40M-byte hard disk drive, one 650K-byte diskette drive, one 400-cps printer, 4 terminals
DPS 6/75	16	DPS 6	1M (2M)	GCOS 6	COBOL, FORTRAN, BASIC, Pascal, RPG	72,160	one 80M-byte hard disk drive, one 650K-byte diskette drive, 8 terminals, one 400-cps matrix printer
DPS 6/95	32	DPS 6	2M (16M)	GCOS 6	COBOL, FORTRAN, BASIC, Pascal, RPG	213,170	two 256M-byte hard disk drives, one 650K-byte diskette drive, 15 terminals, two 35-cps printers, one 600-lps printer
IBM							
Series/1	16-bit	proprietary	64K (1M)	RPS, EDX, CPS	COBOL, BASIC, PL/1, FORTRAN IV	6,000-22,000	
System 38 series	32-bit	proprietary	512K (8M)	CPF	COBOL, RPG III, BASIC	58,000-252,000	
4300 series	32-bit	proprietary	256K (16M)	MVS/370, DOS/VSE, SSX/VSE, OS/VSI, VM/SP	COBOL, FORTRAN, BASIC, Pascal, APL, PL/1	150,000-620,000	
INTERLINK COMPUTER SERVICES							
System 3711	16	DEC micro 11	128K (256K)	RSX11M	Assembly		two 512K-byte diskette drives, one 10M-byte Winchester drive, one DEC VT100 terminal, includes AUSCOM interface between IBM mainframe and the system 3711
MDS QANTEL							
10	8	2901	128K (256K)	BEST	QUIC BASIC, COBOL	13,950	one 20M-byte hard disk drive, one 1.3M-byte diskette drive, one terminal, one 150-cps printer
20	8	2901	256K (512K)	BEST	QUIC BASIC	32,000	one 40M-byte hard disk drive, .25-inch cartridge tape, one terminal, one 300-lpm printer
40	8	2901	256K (1M)	BEST	QUIC BASIC	65,000	one 150M-byte hard disk drive, one 1600 bpi 45-ips, one streaming tape drive, one terminal, one 600-lpm printer
64	8	2901	512K (4M)	BEST	QUIC BASIC	170,000	one 400M-byte hard disk drive, 1600 or 3200-bpi 120-ips, one streaming tape drive, one terminal, one 1000-lpm printer
MODULAR COMPUTER SYSTEMS, INC. (MODCOMP)							
CLASSIC 32/85	32	2M (64M)	MAX 32	FORTRAN, PASCAL, COBOL, CORAL 66	148,500		

Better come and see us at NCC – Booth A1022. New 378 MByte Mercury SCSI and ESMD interfaces

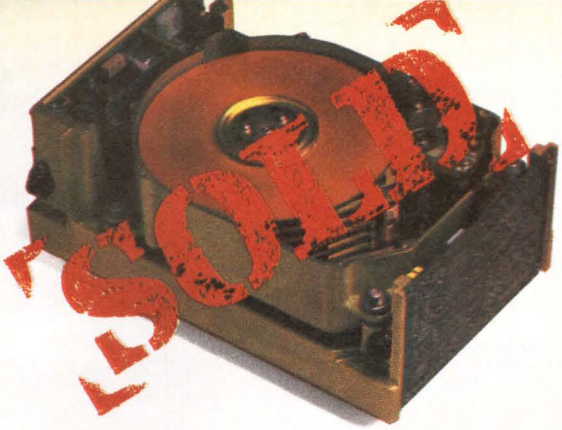
Northern Telecom's 8″ Winchester.

Better memory.
Better reliability.
Better service.
Better diagnostics.
Better availability.
Better read on.



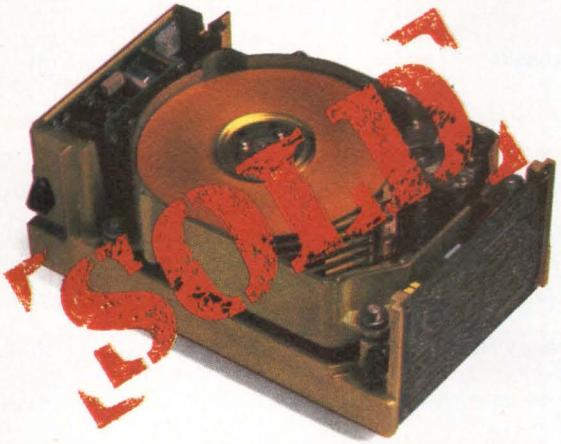
Better memory.

Northern Telecom's MERCURY* disk drive has 225 megabytes of memory, the largest 8" capacity in volume production today. The same components used in this drive are also in 90 and 180 megabyte versions. Even higher capacity versions available in the same basic design in future.



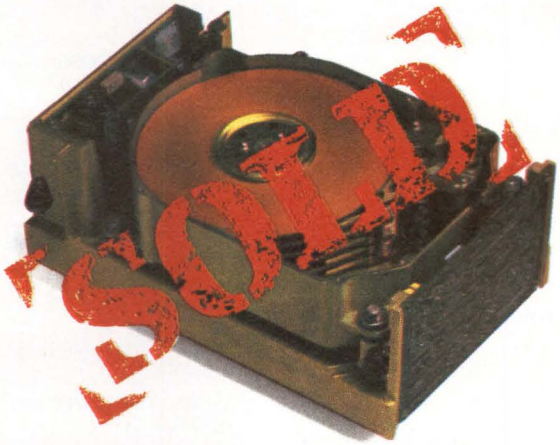
Better reliability.

Mercury disk drive can be mounted in any plane. Contains significant component reduction for simplicity of operation. Has oxide media, and mini-composite heads: simple and reliable. Embedded servo control. Plus, Northern Telecom's heritage.



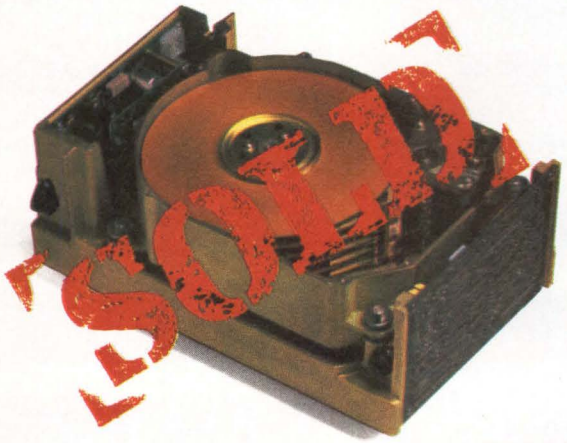
Better service.

No routine maintenance or field adjustments. Modular design for total interchangeability of all sub-assemblies. Plus, you have Northern Telecom's network of service centers—135 in the U.S. and 19 in Europe.



Better diagnostics.

Has both power-up and background diagnostics. Thirteen automatic pre-write checks. Automatic power monitoring capability. Speed regulation monitoring. And more can be brought to your computer panel by our intelligent interface.



Better availability.

Not announcing! But shipping 225 megabytes today! Have 75,000 square feet of manufacturing space. Plus another 75,000 square feet when you need it.

Better hurry.

Call today for your evaluation unit! Toll-free 1/800-521-FAST or your nearest district sales office: **(714)** 955-0450, **(408)** 297-6800, **(313)** 973-4534, **(214)** 239-0803, **(617)** 357-5159. Northern Telecom Inc., Memory Systems Division, 100 Phoenix Drive, P.O. Box D, Ann Arbor, MI 48106.

*Trademark of Northern Telecom Limited.

nt northern telecom

CIRCLE NO. 37 ON INQUIRY CARD

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
M/A-COM ALANTHUS DATA INC.							
Megaframe	16, 32	80186, 68010 and proprietary CPUs	4M (1M)	CTIX (UNIX V), C-TOS	COBOL, BASIC, FORTRAN, Pascal, C		
MAI/BASIC FOUR INFORMATION SYSTEMS							
MAI 1600	8	MAI proprietary	128K (512K)	BOSS proprietary	Business BASIC	16,700	one 16M-byte hard disk drive, one cartridge tape drive, 2 terminals, one 120-cps printer, controller
MAI 8010	32	MAI proprietary	1M (1.5M)	BOSS/VS proprietary	Business BASIC	52,550	one 144M-byte hard disk drive, one streaming tape drive, 2 terminals, one 150-lpm printer
MAI 8020	32	MAI proprietary	1M (2M)	BOSS/VS proprietary	Business BASIC	61,050	one 144M-byte hard disk drive, one streaming tape drive, one terminal, one 150-lpm printer
MAI 8030	32	MAI proprietary	1M (4M)	BOSS/VS proprietary	Business BASIC	87,050	one 144M-byte hard disk drive, one streaming tape drive, one terminal, one 150-lpm printer
MICRODATA CORP.							
Series 4000	32	VMS 3200	512K (4M)	DMS	DATA/BASIC, ENGLISH R	31,000	one 32M-byte hard disk drive, one dual density streaming tape drive, one terminal, one 180-cps serial printer
Series 9000	8	MICRODATA 1600	64K (512K)	DMS	DATA/BASIC, ENGLISH R	107,500	one 128M-byte hard disk drive, one dual density streaming tape drive, 2 terminals, one 150-lpm parallel printer
MOTOROLA/FOUR-PHASE SYSTEMS							
IV/40	24	IV/40	24K (96K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	35,713	one 2.5M-byte hard disk drive, 8 terminals, synch communications controller
IV/50	24	IV/50	24K (96K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	46,934	one 2.5M-byte hard disk drive, 9 terminals, one 55-cps printer
IV/60	24	IV/60	240K (720K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	69,203	one 40M-byte hard disk drive, 16 terminals, one 120-lpm printer
IV/65	24	IV/65	288K (768K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	79,816	13 terminals, one 300-lpm printer, SDLC communications controller
IV/70	24	IV/70	48K (96K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	75,261	one 67.5M-byte hard disk drive, one 9-track tape drive, one bisynch communications controller, 17 terminals
IV/80	24	IV/80	288K (864K)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	95,124	one 80M-byte hard disk drive, 15 terminals, one 450-lpm printer, SDLC communications controller
IV/90M	24	IV/90M	96K (48M)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	75,597	one 2.5M-byte and one 67.5M-byte hard disk drive, 10 terminals, one 300-lpm printer, bisynch communications controller
IV/90S	24	IV/90S	96K (48M)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	75,597	one 2.5M-byte and one 67.5M-byte hard disk drive, 10 terminals, one 300-lpm printer, bisynch communications controller
IV/95	24	IV/95	480K (1.5M)	MFE proprietary	COBOL, Assembly, VISION, DATA IV	112,099	one 138M-byte hard disk drive, 19 terminals, 2 printers, SDLC communications controller
PARADYNE							
System 8400	16	Z8000	512K (2M)	UNIX	C, COBOL, Pascal	12,000	one 26M-byte Winchester disk drive, one 640K-byte diskette drive, 4 communications ports
PERKIN-ELMER							
3200MPS	32	3200MPS	2M (16M)	OS/32, Edition VII	COBOL, Assembly, FORTRAN, CORAL 66, BASIC, C, Pascal, RPG II	235,955	one 300M-byte hard disk drive, 10 terminals, 16 communication ports
3205	32	AMD 26116	512K (4M)	OS/32, Edition VII	COBOL, Assembly, FORTRAN, CORAL 66, BASIC, C, Pascal, RPG II	31,535	one 25M-byte fixed disk drive, one 25M-byte removable disk drive, 4 terminals, 8 communication ports
3210	32	3210	512K (4M)	OS/32, Edition VII	COBOL, Assembly, FORTRAN, CORAL 66, BASIC, C, Pascal, RPG II	46,085	one 32M-byte CDD disk drive, 4 terminals, 2 communication ports
3230	32	3230	1M (16M)	OS/32, Edition VII	COBOL, Assembly, FORTRAN, CORAL 66, C, BASIC, Pascal, RPG II	112,780	one 80M-byte hard disk drive, 5 terminals, 10 communication ports

MINICOMPUTERS

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
3250XP	32	3250XP	2M (16M)	OS/32, Edition VII	COBOL, Assembly, FORTRAN, CORAL 66, BASIC, C, Pascal, RPG II	225,655	one 300M-byte hard disk drive, 10 terminals, 16 communication ports
POINT 4 DATA CORP.							
Mark 2	16	proprietary	64K (128K)	IRIS	Business BASIC, BLIS/COBOL	9,995	one 19M-byte Winchester disk drive, one 20M-byte streaming tape drive, disk controller, 4-port DMA MUX
Mark 5	16	proprietary	128K (128K)	IRIS	Business BASIC, BLIS/COBOL	26,700	one 35M-byte Winchester disk drive, one 20M-byte streaming tape drive, 8-port DMA MUX, disk controller, battery backup
Mark 9	16	proprietary	256K (512K)	IRIS	Business BASIC, BLIS/COBOL	32,700	one 35M-byte Winchester disk drive, one 20M-byte streaming tape drive, 8-port DMA MUX, mapped memory, disk controller, battery backup
POLYCOMPUTERS INC.							
301A	16	2901	256K (1.26M)	VMOS	C, COBOL, BASIC, IRIS BASIC, Pascal, FORTRAN, BLIS/COBOL	13,000	one 20M-byte hard disk drive, up to 8 terminals, 20M-byte cartridge tape drive, 1200-baud modem
401A	16	2901	750K (4.22M)	VMOS	C, COBOL, BASIC, IRIS BASIC, Pascal, FORTRAN, BLIS/COBOL	18,500	one 40M-byte hard disk drive, up to 16 terminals, 20M-byte cartridge tape drive, 1200-baud modem
PolyEtte minimum system	16	2901	256K (4M)	VMOS	COBOL, FORTRAN, BASIC, Pascal, IRIS	13,450	one 20M-byte hard disk drive, up to 3 terminals, .25-inch streaming tape
PolyEtte nominal system	16	2901	1.25M (4M)	VMOS		27,450	two 40M-byte diskette drives, up to 16 terminals, .25-inch streaming tape
PRIME COMPUTER INC.							
250II (Super Mini)	32	Prime 50 Series	512K (4M)	Primos		89,000	two 80M-byte SMD hard disk drives with one controller
450II (Super Mini)	32	Prime 50 Series	1M (4M)	Primos		120,500	one 160M-byte hard disk drive, one tape drive, one PST 100 console
550II (Super Mini)	32	Prime 50 Series	1M (4M)	Primos		120,500	one 160M-byte hard disk drive, one tape drive, one PST 100 console
750 (Super Mini)	32	Prime 50 Series	1M (8M)	Primos		202,000	one 160M-byte hard disk drive, one tape drive, one PST 100 console
850	32	Prime 50 Series	2M (8M)	Primos		308,500	one 675M-byte hard disk drive, one tape drive, one PST 100 console
2250	32	Prime 50 Series	512K (4M)	Primos		59,400	one 68M-byte hard disk drive, one streaming tape drive
9950 (Super Mini)	32	Prime 50 Series	4M (16M)	Primos		439,000	one 300M-byte hard disk drive, one tape drive, 2 controllers, one PST 100 console
PYRAMID TECHNOLOGY CORP.							
Pyramid 90x (mid-size configuration)	32		1M (16M)	OSx (UNIX)	C, FORTRAN, Pascal	115,000	one 450M-byte hard disk drive, 9-track tape drive, one terminal, 16 user ports
RIDGE COMPUTERS							
Ridge 32	32	proprietary	1M (8M)	UNIX System V, Berkeley, 4.2 UNIX	C, Pascal, FORTRAN	72,400	includes 1M-byte 8-inch diskette drive, one 60M-byte hard disk drive, 3 graphics terminals, one printer
STC SYSTEMS INC.							
5000	16	Data General	128K (1M)	THE CHAMP proprietary	BASIC, Assembly, Skillwriter	50,950	one 25M-byte hard disk drive, one 25M-byte removable disk drive, one terminal, one 64-lpm matrix printer
6000	16	Data General	512K (1M)	THE CHAMP proprietary	BASIC, Assembly, Skillwriter	105,850	one 80M-byte removable disk drive, one 160M-byte hard disk drive, one terminal, one 300-lpm band printer
MC30-2	16	Data General	128K (128K)	THE CHAMP proprietary	BASIC, Assembly, Skillwriter	33,050	one 25M-byte hard disk drive, one 25M-byte removable disk drive, one 64-lpm matrix printer, modem, one terminal; 2 partitions for CRT

Company Model	CPU word size	CPU type	Main memory (minimum/maximum bytes)	Operating systems available	Programming languages supported	Unit price ($)	Configuration
MC30-4	16	Data General	128K (128K)	THE CHAMP proprietary	BASIC, Assembly, Skillwriter	35,050	one 25M-byte hard disk drive, one 25M-byte removable disk drive, one 64-lpm matrix printer, modem, one terminal; 4 partitions for CRT
MC30-6	16	Data General	128K (128K)	THE CHAMP proprietary	BASIC, Assembly, Skillwriter	37,050	one 25M-byte hard disk drive, one 25M-byte removable disk drive, one 64-lpm matrix printer, modem, one terminal; 6 partitions for CRT
SYMBOLICS INC.							
3600	36	proprietary	2M (30M)		ZetaLISP, FORTRAN, Pascal	85,000	one 167M-byte hard disk drive, one laser printer; opt. high-resolution graphics printer
TEXAS INSTRUMENTS INC.							
600	16	990/10A	512K (1M)	DX10, DNOS	COBOL, FORTRAN, Pascal, BASIC	2,400	one 18M-byte hard disk drive, one terminal
800	16	990/12	512K (2M)	DX10, DNOS	COBOL, FORTRAN, Pascal, BASIC	38,300	one 43M-byte hard disk drive, 2 terminals
TOLERANT SYSTEMS							
Eternity Series	32	National 32032 semi	1M (16M)	UNIX	COBOL, C, FORTRAN, Pascal, PL/1, BASIC	70,000	includes one 84M-byte hard disk drive, one tape drive, 6 communication lines, one 300-lpm printer
THE ULTIMATE CORP.							
750	16	proprietary	128K (256K)	PICK	BASIC, Recall	20,000	one 19M-byte hard disk drive, 4 to 8 ports
1000	16	proprietary	128K (256K)	PICK	BASIC, Recall	32,000	one 35M-byte hard disk drive, 8 to 16 ports
2000/2000S	16	proprietary	256K (512K)	PICK	BASIC, Recall	34,000; 36,000	one 23M-byte hard disk drive, 8 to 32 terminals
C2	16	proprietary co-processor, Honeywell DPS 6	256K (2M)	PICK	BASIC, Recall	80,000	one 80M-byte hard disk drive, 8 to 126 ports
D2	16	proprietary co-processor, Honeywell DPS 6	512K (2M)	PICK	BASIC, Recall	107,000	one 288M-byte hard disk drive, 8 to 126 ports
E2	16	proprietary co-processor, Honeywell DPS 6	1M (2M)	PICK	BASIC, Recall	180,000	one 288M-byte hard disk drive, 32 to 126 ports
WANG LABORATORIES INC.							
2200LVP	8	proprietary	32K (256K)	Basic 2 Multiuser	BASIC 2		
2200LVPC	8	proprietary	64K (512K)	Basic 2 Multiuser	BASIC 2		
2200MVP	8	proprietary	32K (256K)	Basic 2	BASIC 2		
2200MVPC	8	proprietary	64K (512K)	Basic 2	BASIC 2		
2200SVP	8	proprietary	32K (128K)	Basic 2	BASIC 2		
VS25	16	proprietary	512K (1M)	VS/OS, UNIX	COBOL, RPG II, FORTRAN, BASIC, PL/1, Assembly, Procedure		
VS45	16	proprietary	512K (1M)	VS/OS, UNIX	COBOL, FORTRAN, BASIC, PL/1, RPG II, Assembly, Procedure		
VS85	32	proprietary	1M (4M)	VS/OS, UNIX	COBOL, RPG II, FORTRAN, BASIC, PL/1, Assembly, Procedure		
VS90	32	proprietary	1M (4M)	VS/OS, UNIX	COBOL, RPG II, FORTRAN, BASIC, PL/1, Assembly, Procedure		
VS100	32	proprietary	1M (4M)	VS/OS, UNIX	COBOL, RPG II, FORTRAN, BASIC, PL/1, Assembly, Procedure		

Software portability issues confront computer OEMs

UNIX appears to be the unifying theme—but how and when?

Rick Dalrymple, Senior Editor

Many OEM customers find themselves married to their computer vendor. The knot was not tied by exchange of contractual vows; it was tied with software application programs developed under the computer vendors' proprietary operating system. This setup does not always work to the benefit of OEM customers, and, increasingly, they have been searching for operating systems that can run on a variety of computers.

In the commercial systems arena, operating system candidates include CP/M, MS-DOS, Pick, Oasis and UNIX. In industrial, scientific or engineering applications, the list includes RMX86, VRTX, the p-System and UNIX. But will UNIX emerge as the de facto standard? Perhaps, but the evidence so far suggests that a "standard" UNIX is not likely soon and, in many applications, it might never be the best choice to solve many current problems. (MMS, June, Page 125).

UNIX versions abound

Consider the versions of UNIX currently on the market. There are AT&T Co.'s UNIX III, V and VII; the enhanced UNIX from the University of California at Berkeley, Microsoft Corp.'s derivative XENIX and the various "shells" around UNIX such as Cromemco Inc.'s CROMIX. Unfortunately, software developed under one of these versions of UNIX is not, strictly speaking, compatible with software developed with any of the others.

Consider also the UNIX compatibility problem at Digital Equipment Corp. For many years, DEC enjoyed a virtual monopoly on commercial hardware supporting UNIX because AT&T's original UNIX port was a DEC PDP-11. Later, the University of California at Berkeley designed its popular BSD UNIX enhancements to run on the DEC VAX. So, today, DEC offers one version of UNIX—V7M-11, a derivative of AT&T's outdated UNIX Version VII—on its PDP-11 family, and another—ULTRIX-32, based on Berkeley release 4.2—on the VAX line. The two versions have different tools and are not fully compatible at the application-source-code level. ULTRIX achieves performance levels comparable to DEC's proprietary VMS operating system because it employs virtual memory techniques and runs in a native-code environment. But these

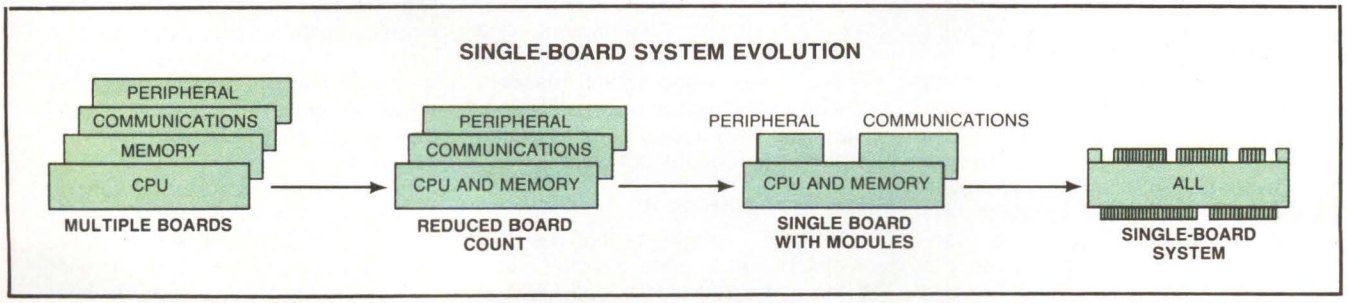


Fig. 1. Thanks to LSI and VLSI circuitry, *the number of computer system functions that can be placed on a single board has been growing. Single-board computer manufacturers will soon be offering single-board computer systems. This new level of system integration will lead single-board computer buyers to emphasize their software and added value.*

performance-oriented features prevent DEC from porting ULTRIX to the PDP-11 family, which does not support virtual memory.

UNIX V bandwagon accelerates

Meanwhile, DEC is facing vigorous competition from several computer vendors running AT&T's UNIX Sytem V. Some of these machines have been designed from the ground up for UNIX. Many of the new competitors employ designs using the Motorola 68000 family of microprocessors. Because UNIX is the only "standard" operating system available for the 68000, UNIX has become the portable operating system for the current generation of supermicrocomputers. Several other major microprocessor manufacturers have purchased UNIX V licenses; they include Intel Corp. for the 80286, National Semiconductor Corp. for the 16032 and Zilog Corp. for both the Z8000 and Z80000.

Hewlett-Packard Co. and Honeywell Information Systems Inc. have also jumped on the UNIX V bandwagon, as have several superminicomputer vendors. Unlike DEC's VAX users (who must choose between ULTRIX-32 and DEC's proprietary VMS), users of Data General Corp., Prime Computer Inc. and Wang Laboratories Inc. equipment will find UNIX V running as a software layer on top of their proprietary operating system. Even Perkin-Elmer (P-E) Corp. and Gould Inc. are finding ways to capitalize on UNIX's strengths. Although UNIX is poorly suited to real-time industrial applications, it is well suited as a tool for developing

Computer vendors seek closer ties to OEMs

Ron Shinn, Senior Editor

Original equipment manufacturers (OEMs) today range from concerns buying complete, integrated systems with operating systems and software development tools to concerns that start at the board level and build systems from the ground up. All OEMs add value, but that value varies from vendor to vendor, depending on the levels of integration and types of systems they provide.

Basically, OEMs sell into vertical-application markets with off-the-shelf solutions. But they add their particular expertise, which is primarily software development for commercial markets and hardware bits and pieces for the industrial markets.

Most computer vendors agree that OEM opportunities are an important part of their business strategies, and the vendors are actively working to improve relationships with the smaller, widely diffuse OEMs that will provide much of the market growth over the next several years.

Distribution strategies vary

Generally, OEM business is done directly with the vendor, not through independent distributors and retail dealers. This varies with the level of hardware/software integration provided; board-level-only vendors rely more on outside distribution than vendors offering fully-caged systems. For example, Advanced Micro Devices Inc., Sunnyvale, Calif., does a large percentage of its business through distributors, but IBM Corp. has set up a large, multi-lateral direct sales organization.

Late in 1983, IBM formed its National Distribution Division (NDD) that, according to a company spokesman, has the "mission to establish a single-line marketing organization focused on delivering high product volumes at the lowest possible cost through alternate internal and external channels." There are three units within NDD: Systems Supplies, Retail Marketing and Distribution Channels. The latter is the OEM arm.

"We believe there are great opportunities in the OEM business," says an IBM spokesman, "and we expect to be more active in that channel than in the past. We intend to be competitive, and, in the terms and conditions presently available, we appear to be consistent with the way the industry does business."

The IBM spokesman said the Distribution Channels unit is now offering to OEMs products like the IBM PC series; Series 1; Systems 34, 36 and 38; the 4300 family; Datamasters; and CS9000s. These OEMs typically are IBM-qualified value-added resellers (VARs) providing turnkey installation. The IBM VAR typically adds value through applications software.

How TI and HP do it

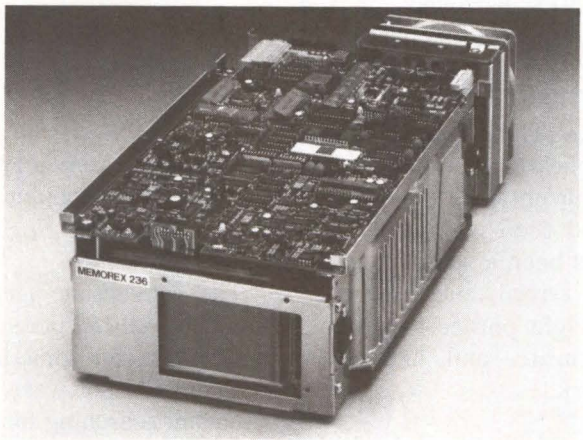
At Texas Instruments Inc., the bulk of distribution is done directly, either to the software value-added OEM or to the large-system manufacturer. Almost 90 percent of all TI sales are direct, and the company does not encourage dealer business.

Hewlett-Packard Co., Cupertino, Calif., takes much the same approach, maintaining a direct sales force focused on the Fortune 1000 suppliers. HP personal computer products, however, are sold through dealers. Because HP provides most of its sales and service directly, the software value-added OEM is an important part of its distribution strategy. Small software houses are given commissions on sales, and larger OEMs are given marketing and sales assistance. Generally, HP will supply the hardware, and the OEM adds software to complete the application solution. This approach to distribution is standard for large manufacturers.

Training for OEMs by most vendors is extensive. It's provided either on-site or, in many instances, at regional locations world-wide. The board-level-only vendors rely heavily on documentation provided as a training tool with the product. Larger companies use the seminar approach for their more complex products. Furthermore, larger companies provide a wide range of training, including marketing, sales and general business tutorials, along with hardware and software segments.

For service, most large vendors provide on-site, regional depot and factory contracts. Smaller vendors generally leave on-site and continuing service to OEMs and their customers. But most also offer telephone assistance to both OEMs and end users.

If you don't call us, you're paying too much.



Memorex® high-performance 8" disc drives are available right now. At the best prices you'll probably find anywhere.

Hundreds of dollars less than you'd expect.

On all three of our high-capacity models: 83, 116, and 166 megabytes.

So if you're evaluating 8" disc drives now, call us. If you don't, you'll never know how much you would have saved.

Call M. Webb, at 408-987-3308, for all the details. Or write:

Memorex Corporation
OEM Equipment Sales, MS 10-01
San Tomas at Central Expressway
Santa Clara, CA 95052

In Europe call: (32)-2-7368930.

Value.
When it matters, make it Memorex.™

MEMOREX

Memorex is a registered trademark of Memorex Corporation.

A Burroughs Company

See our complete line of OEM Storage Products at NCC. Booth #3218.

CIRCLE NO. 38 ON INQUIRY CARD

real-time applications. So, both P-E and Gould are augmenting UNIX with hardware and software tools that allow users to create and test applications with UNIX and then execute the applications using a proprietary real-time operating system.

AT&T Information Systems has entered the computer market and, to no one's surprise, supports UNIX V. However, a surprise that could bring the UNIX V bandwagon to a halt is a move by IBM to market its own UNIX-like operating system. No such announcement has yet been made, but industry analysts caution that offering a proprietary UNIX-like operating system across the IBM line from micros to mainframes is a possibility. They further suggest that IBM's current support of UNIX on its PC family and CS9000 laboratory computer should not be interpreted as a UNIX endorsement (MMS, April, Page 137).

With a wide variety of UNIX hardware on the market, the next set of missing links are the horizontal application software packages such as database management and word processing. These software building blocks are now falling into place. Therefore, computer OEMs developing vertical applications and not using UNIX should now evaluate their options.

Writing a program once and then porting it from machine to machine has always been a sound concept. In practice, it has not been a trivial task. However, "porting software" is not the right phrase—"patching software" is perhaps more accurate—and, like quilts, there is beauty in the patchwork.

The beauty of patchwork

One of the key factors holding back wide market acceptance of UNIX-based systems is a lack of applications software. This situation has been improving rapidly. UNIX software packages listed in the /usr/group catalog have grown from 300 in the 1982 edition to 450 in the 1983 version and should exceed 700 in 1984. These swelling numbers are not necessarily coming from software developed under UNIX; many were initially written in proprietary languages and operating systems. Thanks to "bridge" software, though, and some clever software patching, these programs have been converted to run under UNIX on a target system (MMS, October 1983, Page 305).

"Bridge" software is created by first designing compilers that accept the operations and data structures of a source system's programming language (in some cases, the existing front end can be used). The next step is the development of a new code generator for the target system or an intermediate-level "pseudo machine." Several vendors now offer bridge software products that convert programs developed on a variety of minicomputers and microcomputers in languages such as Business BASIC, COBOL, CP/M, DIBOL and RPG II.

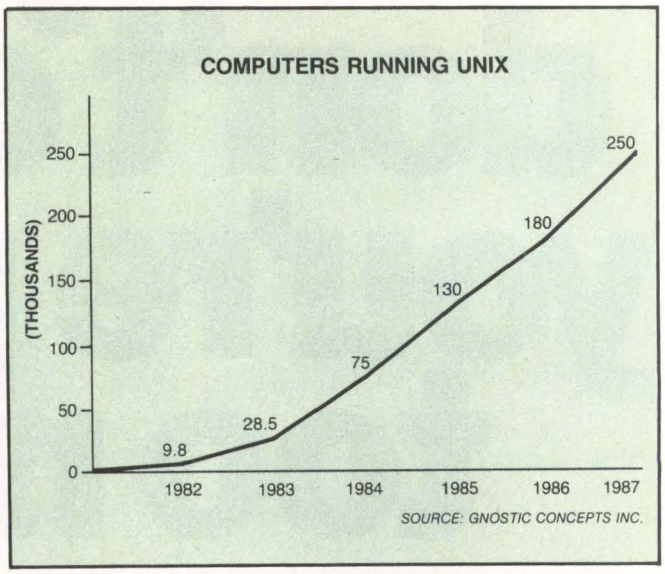


Fig. 2. The UNIX market started to take off in 1983, *when 12 vendors shipped more than 1,000 units each, according to Gnostic Concepts estimates.*

The conversion performed by the bridge software might be only 99 percent complete, though. Hence, the need exists for some additional patchwork. After conversion, the software developer must go through the program searching for calls that do not exist in UNIX. Sometimes, the solution lies in rerouting a call and sometimes in manually rewriting program statements. Each process is clearly superior to translating programs without a bridge compiler or completely rewriting them in UNIX.

Developing new software in UNIX

As P-E and Gould have noted, UNIX and its C language are very useful program development tools even if the final code will run under a different operating system. Over the last 18 months, several C compilers have emerged that convert UNIX programs into native-code for various target processors. As their numbers increase, software developers will find an ever-widening array of computer hardware on which to run their UNIX-based applications programs. □

Interest Quotient (Circle One)
High 813 Medium 814 Low 815

More than A Memory
A Commitment To Quality

Every department, every person in our organization is dedicated to one goal—to deliver the finest in disk memories.

At Century Data Systems, we see quality as a pervasive, company-wide attitude. And our customers share this perspective.

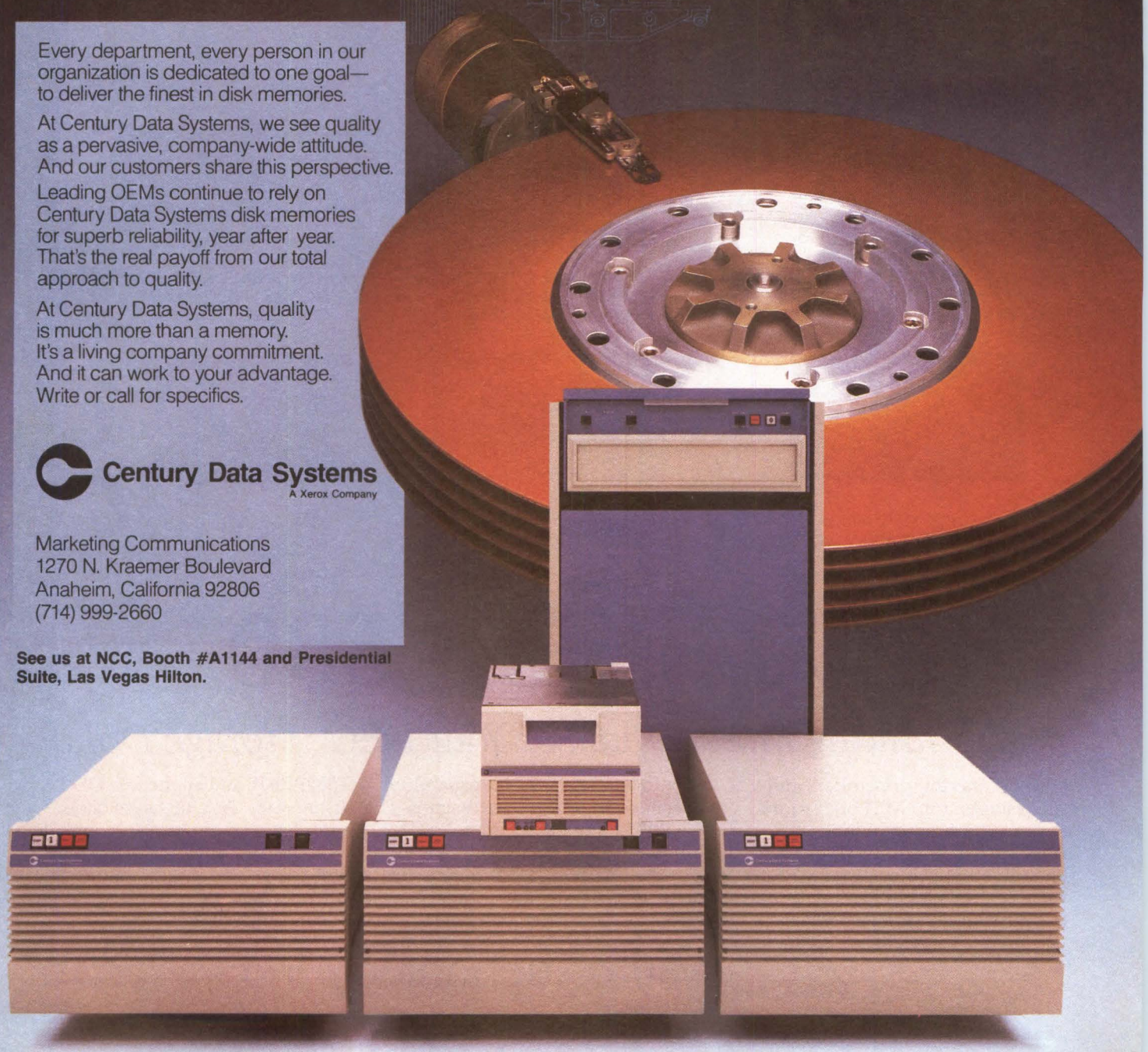
Leading OEMs continue to rely on Century Data Systems disk memories for superb reliability, year after year. That's the real payoff from our total approach to quality.

At Century Data Systems, quality is much more than a memory. It's a living company commitment. And it can work to your advantage. Write or call for specifics.

Century Data Systems
A Xerox Company

Marketing Communications
1270 N. Kraemer Boulevard
Anaheim, California 92806
(714) 999-2660

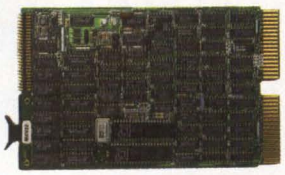
See us at NCC, Booth #A1144 and Presidential Suite, Las Vegas Hilton.



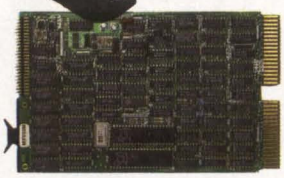
CIRCLE NO. 39 ON INQUIRY CARD

Call Us For A Quote

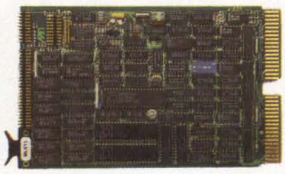
"



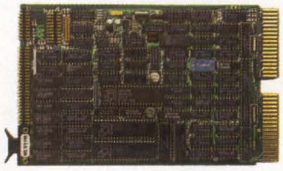
1. Q-BUS RX02 COMPATIBLE 8" FLOPPY DISK CONTROLLER-MXV22.



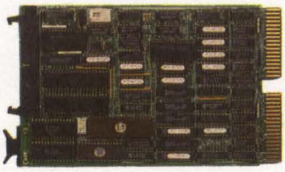
2. Q-BUS RX02 COMPATIBLE 5¼" FLOPPY DISK CONTROLLER-MXV22M.



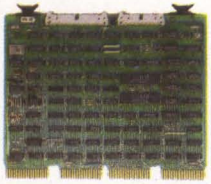
3. Q-BUS RL01/RL02 COMPATIBLE 8" WINCHESTER DISK CONTROLLER MLV11.



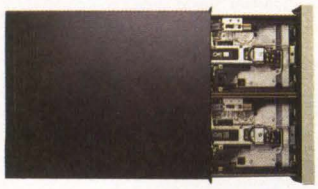
4. Q-BUS RL01/RL02 COMPATIBLE 5¼" WINCHESTER DISK CONTROLLER MLV11M.



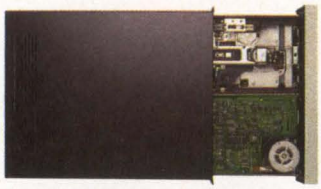
5. NEW Q-BUS TSV05 COMPATIBLE ¼" STREAMING CARTRIDGE TAPE CONTROLLER-MSV05.



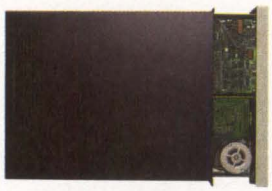
6. NEW UNIBUS RX02 COMPATIBLE 5¼" or 8" FLOPPY DISK CONTROLLER-MX22.



7. Q-BUS RX02 COMPATIBLE 8" FLOPPY DISK SUBSYTEM-MD3100.



8. Q-BUS RX02 and RL02 8" FLOPPY/ WINCHESTER SUBSYSTEM-MD3500.



9. NEW Q-BUS RL02 AND TSV05 8" WINCHESTER / ¼" STREAMING CARTRIDGE TAPE SUBSYSTEM MD3800.

!"

(714) 632-7580

We're Talking More Value For Your DEC® Storage Dollar

DEC-compatible controllers and subsystems from MTI offer more features per product which translates into uncommonly high value for your storage investment. High-value features include more formatted Winchester storage per drive, built-in bootstrap, 22-bit capability with built-in or software diagnostics. MTI products emulate RX02 for Floppy disks, RL01/RL02 for Winchesters and TSV05 for streaming tape. They are also compatible with DEC-supported software, TSX-Plus™ and applicable DEC diagnostics. As a measure of our confidence in our proven controller products, we offer a full year warranty. For a competitive quote that delivers more value for your storage dollar, call us today.

Micro Technology, Inc.

Micro Technology, Inc. • 1620 Miraloma Ave. • Placentia, CA 92670 • Telephone: (714) 632-7580

Q-bus, Unibus, DEC, RX02, RL01, RL02, TSV05 are registered trademarks of Digital Equipment Corporation.
TSX-Plus is a registered trademark of S&H Computer Systems, Inc.

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
			EXPANSION BOARDS								PERIPHERALS							
ACKERMAN DIGITAL SYSTEMS																		
8-bit	yes	yes (S-100, VME)	•				•			no								
16-bit	yes	yes (VME, Multibus)					•		•	no								
ACTION COMPUTER ENTERPRISE INC.																		
8-bit	yes	yes (S-100)	•	•	•	•	•	•	•	yes				•	•	•		
16-bit	yes	yes (S-100)	•				•	•	•	yes				•	•	•		
ADVANCED DIGITAL CORP.																		
8-bit	yes	yes (S-100)	•	•			•	•		yes				•	•			
16-bit	yes	yes (S-100)	•	•			•	•		yes				•	•			
ADVANCED MICRO DEVICES																		
16-bit	yes	yes (Multibus)	•	•	•		•			yes								
ALCYON CORP.																		
16-bit	yes	yes (LSI-11 bus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•
32-bit	yes	yes (LSI-11 bus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•
ALLOY COMPUTER PRODUCTS																		
8-bit	yes	yes (S-100)	•	•	•		•	•	•	yes				•	•	•		
ALSPA COMPUTER INC.																		
8-bit	yes	no					•	•		yes			•	•	•	•		
ALTOS COMPUTER SYSTEMS																		
8-bit	no	no	•	•			•	•		yes	•	•	•	•	•			
16-bit	no	no	•	•			•	•		yes	•	•	•	•	•			
ANDROMEDA SYSTEMS INC.																		
22-bit	yes	yes (LSI-11 bus, Q-bus)	•	•	•		•	•	•	yes		•	•	•	•	•	•	
APPLE COMPUTER INC.																		
8-bit	no	no (proprietary)	•	•			•			yes	•	•		•			•	
16-bit	no	no (proprietary)	•	•			•			yes	•	•		•			•	
32-bit	no	no (proprietary)	•	•	•	•	•	•		yes	•	•		•			•	
APOLLO COMPUTER INC.																		
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes	•	•		•	•	•	•	
APPLIED BUSINESS COMPUTER CO.																		
8-bit	yes	yes (EXORciser bus)	•	•	•		•		•	yes	•	•	•	•		•	•	

OEM COMPUTERS

Company / CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
APPLIED MICRO TECHNOLOGY INC., A BURR BROWN CO.																		
8-bit	yes	yes (STD)	•	•	•		•	•		yes	•	•		•	•			
CENTURY COMPUTER CORP.																		
8-bit	yes	yes (Multibus)	•	•	•	•	•	•		yes	•	•	•	•	•		•	
16-bit	yes	yes (Multibus)	•	•	•	•	•	•		yes	•	•	•	•	•		•	
CHARLES RIVER DATA SYSTEMS																		
32-bit	yes	yes (Versabus, VME)	•	•	•	•	•	•	•	yes			•	•	•	•		
CHRISLIN INDUSTRIES INC.																		
16-bit	no	yes (Q-bus)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
CIFER plc																		
8-bit										yes	•	•	•	•	•			
32-bit										yes	•	•	•	•	•	•		
CODATA SYSTEMS CORP.																		
16-bit	yes	yes (Multibus)	•	•	•	•	•	•	•	yes				•	•	•		
CODEX CORP.																		
8-bit	no	no								yes	•	•	•	•	•		•	
COLEX AMERICA INC.																		
8-bit	yes	yes (STD)	•	•	•		•	•	•	yes				•	•			
16-bit	yes	yes (STD, VME)	•	•	•		•	•	•	yes				•	•			
COMARK CORP.																		
8-bit	yes	yes (Multibus)	•	•	•		•	•	•	yes	•	•	•	•	•	•		
16-bit	yes	yes (Multibus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•		
COMPANION COMPUTER CORP.																		
16-bit	yes	no	•	•	•	•	•	•		yes	•	•		•	•		•	
COMPUPRO																		
8-bit	yes	yes (S-100, STD)	•	•			•	•		yes				•	•			
16-bit	yes	yes (S-100, STD)	•	•			•	•		yes				•	•			
32-bit	yes	yes (S-100)	•	•			•	•		yes				•	•			
COMPUTER AUTOMATION INC.																		
8-bit	yes	yes (SCOUT-bus)		•	•	•	•	•	•	yes				•	•			
16-bit	yes	yes (Maxibus)	•	•						yes				•	•	•		
CONTEMPORARY CONTROL SYSTEMS INC.																		
8-bit	yes	yes (STD)	•	•	•					no								
CONVERGENT TECHNOLOGIES																		
32-bit	no	no	•	•			•	•		yes	•	•	•	•	•			
CORONA DATA SYSTEMS																		
16-bit	no	no								yes	•	•		•	•			

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
			EXPANSION BOARDS								PERIPHERALS							
CORVUS SYSTEMS INC.																		
16-bit	yes	yes (Apple bus)	•	•	•		•	•	•	yes	•	•	•	•	•	•		
CREATIVE MICRO SYSTEMS																		
8-bit	yes	yes (EXORbus)	•	•	•		•	•		yes	•	•	•	•	•		•	
16-bit	yes	yes (EXORbus)	•	•	•		•	•		yes	•	•	•	•	•		•	
CROMEMCO INC.																		
8-bit	yes	yes (S-100)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
16-bit	yes	yes (S-100)	•							yes	•	•	•	•	•	•	•	
CUBIT DIV. — PROTEUS INDUSTRIES																		
8-bit	yes	yes (KIM bus)	•	•	•					no		•					•	
CYBERSYSTEMS INC.																		
8-bit	yes	yes (proprietary)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•
DATA GENERAL CORP.																		
16-bit	no	yes (proprietary)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
DATAVUE CORP.																		
8-bit	yes	yes (proprietary)								yes	•	•	•	•	•	•	•	•
16-bit	yes	yes (proprietary)								yes	•	•	•	•	•	•	•	•
DBS INTERNATIONAL INC.																		
16-bit	no	no	•	•	•		•	•	•	yes			•	•	•	•	•	
DIGITAL EQUIPMENT CORP.																		
16-bit	yes	yes (Q-bus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	
32-bit	no	no	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	
DIGITAL MICROSYSTEMS INC.																		
8-bit	no	no								yes	•	•		•	•	•		
16-bit	no	no								yes	•	•						
DISTRIBUTED COMPUTER SYSTEMS																		
16-bit	yes	yes (Multibus)		•	•		•	•	•	yes				•	•	•		
DIVERSIFIED TECHNOLOGY INC.																		
8-bit	yes	yes (Multibus)	•	•						no								
16-bit	yes	yes (Multibus)	•							no								
DUAL SYSTEMS CORP.																		
16-bit	yes	yes (S-100)	•	•	•		•	•	•	yes			•	•	•	•		
DURANGO SYSTEMS INC.																		
16-bit	no	yes (extended Multibus)	•	•	•	•	•	•		yes	•	•	•	•	•	•	•	•

In technology,
production, nobody

experience and stacks up to Archive.

At Archive, we ship nearly three times as many ¼" streaming tape drives as the rest of the industry combined.

Of course, that shouldn't be too surprising. Because we've also had more technological breakthroughs than all those other guys combined.

For example, we were the first streamer manufacturer to successfully use LSI technology. This enabled us to reduce the number of parts in our newest drives by 40%. Which means there's even less of a chance that anything will go wrong.

Going back to our early days, one of the reasons we left the competition at square one is because we did our homework.

Archive offers 8", 5¼" full-height and 5¼" half-height streaming tape drives.

We made sure we had a thorough understanding of the physics and dynamics of the ¼" cartridge, as used in a high-density, high-performance streaming mode. This led to the development of our unique phase-locked-loop that follows the instantaneous speed variations that are inherent in the cartridge.

Equally impressive is the fact that Archive designs were the basis for the industry's standard QIC-02 interface and QIC-24 recording format.

As you can see, even the competition depends on Archive for experience. You should, too. For more information, write Archive Corporation, 3540 Cadillac Avenue, Costa Mesa, CA 92626. Or call (714) 641-0279.

ARCHIVE
CORPORATION

CIRCLE NO. 41 ON INQUIRY CARD

TIME is MONEY

OEM 200 doesn't waste either.

You can't afford to waste time waiting for your printer to finish before your computer can move on to something else. The OEM 200 is designed for **THRUPUT.** The large print buffers, high speed space skip and fast paper advance combine to generate 'usable' speed, not simply impressive spec sheet figures!

With the OEM 200's unusually large buffers, you can print and process simultaneously.

NO WAITING.

Most printers have very small buffers - 2K or 4K at most. Our 150 CPS wide carriage OEM 200 comes standard with a 4K buffer which is expandable to 20K, 36K, or 68K. MPI offers the biggest buffers in the business!

The OEM 200 has other outstanding features like an optional SoftSwitch™ front panel keypad and a fast and impressive near letter quality mode. Our exclusive applications packages (AP-PAKS), providing enhanced graphics printing along with a vast selection of decorative type styles, are available for selected microcomputers.

At a suggested list price of $1045, the OEM 200 won't take your life's savings either. **STOP WASTING TIME AND MONEY. BUY AN OEM 200 FROM MPI** — The American Printer Company!

Call Us For More Information At: **(800) 821-8848**

Model shown with optional SoftSwitch™ keypad

The Printer People
mpi

Micro Peripherals, Inc.
4426 South Century Drive
Salt Lake City, Utah 84123
(801) 263-3081

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
DY-4 SYSTEMS INC.																		
8-bit	yes	yes (STD)	•	•	•		•			yes	•	•	•	•	•	•		
16-bit	yes	yes (STD)								yes	•	•	•	•	•	•		
32-bit	yes	yes (VME)	•	•			•			yes				•	•			
EAGLE COMPUTER INC.																		
8-bit	no	no					•	•			•	•	•	•	•			
16-bit	no	no	•		•			•	•	no	•	•	•	•	•			
ENTERPRISE SYSTEMS CORP.																		
8-bit	yes	yes (STD)	•	•	•		•	•		yes	•	•	•	•	•		•	
FIRST COMPUTER CORP.																		
16-bit	yes	yes (Unibus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	
22-bit	yes	yes (Q-bus)	•	•	•	•		•	•	yes	•	•	•		•	•	•	
32-bit	yes	yes (Massbus)	•	•	•	•		•	•	yes	•	•	•		•	•	•	
FORCE COMPUTERS INC.																		
8-bit	yes	yes (VME, VMX, VMS)	•	•	•		•	•	•	yes	•	•	•	•	•			
16-bit	yes	yes (VME, VMX, VMS)	•	•	•		•	•	•	yes	•	•	•	•	•			
32-bit	yes	yes (VME, VMX, VMS)	•	•	•		•	•	•	yes	•	•	•	•	•			
FORMATION INC.																		
32-bit	no	yes (proprietary)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	
FORTUNE SYSTEMS CORP.																		
32-bit	no	no	•	•	•		•	•		yes	•	•	•	•	•		•	
FORWARD TECHNOLOGY INC.																		
16-bit	yes	yes (Multibus)	•	•	•	•		•	•	yes	•	•	•		•	•	•	
GENERAL AUTOMATION INC.																		
32-bit	no	yes	•	•			•	•		yes			•	•	•			
GIMIX INC.																		
8-bit	no	yes (SS-50 bus)	•	•			•	•		yes				•	•			
GOULD INC.																		
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
HARRIS CORP.																		
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
HEWLETT-PACKARD CO.																		
8-bit	yes	yes (HP-IB)	•	•	•	•	•	•		yes	•	•	•	•	•	•	•	•
16-bit	yes	yes (IEEE-408, HP-IB)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	EXPANSION BOARDS: Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	PERIPHERALS: Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
32-bit	no	no	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•
HONEYWELL INFORMATION SYSTEMS INC.																		
16-bit	no	no								yes	•	•	•	•	•	•	•	
32-bit	no	no								yes	•	•	•	•	•	•	•	
IBM CORP.																		
16-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
INDEPENDENT BUSINESS SYSTEMS INC. (IBS)																		
8-bit	yes	yes (S-100)	•	•	•	•	•	•	•	yes			•	•	•	•	•	
16-bit	yes	yes (S-100)	•							yes								
INFOSPHERE INC.																		
8-bit	yes	yes (STD, Multibus)	•	•			•		•									
16-bit	yes	yes (Q-bus, VME, Multibus)	•	•			•	•	•									
INTECOLOR CORP.																		
8-bit	yes	yes (proprietary)	•	•	•		•			yes	•	•	•	•	•		•	•
INTEGRATED SOLUTIONS INC.																		
32-bit	yes	yes (LSI-11 bus, VME)	•	•	•		•	•	•	yes					•	•		
INTELLIMAC INC.																		
16-bit	yes	yes (Multibus)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	•
INTERCONTINENTAL MICRO SYSTEMS																		
8-bit	yes	yes (S-100)	•	•	•	•	•	•	•	no								
16-bit	yes	yes (S-100)	•	•	•	•	•	•	•	no								
IRONICS INC.																		
8-bit	yes	yes (STD)	•	•	•		•	•		yes				•	•			
16-bit	yes	yes (VME)	•	•	•		•	•		yes				•	•			
32-bit	yes	yes (VME)	•	•	•		•	•		yes				•	•			
ITHACA INTERSYSTEMS INC.																		
8-bit	yes	yes (S-100)	•	•	•		•	•	•	yes				•	•	•		
16-bit	yes	yes (S-100)	•	•	•		•	•	•	yes				•	•	•		
LEE DATA CORP.																		
16-bit	yes	yes (IBM)	•	•	•		•	•		yes	•	•	•				•	
LOBO SYSTEMS INC.																		
8-bit	yes	no	•				•	•			•	•		•	•		•	
MATROX ELECTRONIC SYSTEMS LTD.																		
8-bit	yes	yes (Multibus)	•	•	•		•			yes				•				

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
	EXPANSION BOARDS										PERIPHERALS							
16-bit	yes	yes (Multibus)	•	•	•					yes				•	•			
MDB SYSTEMS INC.																		
16-bit	yes	yes (Q-bus)	•	•	•			•	•	yes				•	•	•		
MICRO CRAFT CORP.																		
32-bit	yes	yes (proprietary)	•	•	•		•	•		yes		•		•	•			
MICRO-LINK																		
8-bit	yes	yes (STD)	•	•	•	•	•			yes	•	•		•			•	
16-bit	yes	yes (STD)	•	•	•	•	•			yes	•	•		•			•	
MIKROS SYSTEMS CORP.																		
16-bit	yes	yes (Multibus)	•	•			•	•		yes	•	•	•	•	•		•	
MITSUBISHI ELECTRONICS AMERICA INC.																		
16-bit	no	no	•	•	•	•	•	•	•	yes	•	•	•	•	•	•		
MIZAR INC.																		
16-bit	yes	yes (VME)	•	•	•		•	•		yes				•	•			
32-bit	yes	yes (VME)	•															
MONOLITHIC SYSTEMS CORP.																		
8-bit	yes	yes (Multibus)	•	•		•	•	•		yes	•	•	•	•	•		•	
16-bit	yes	yes (Multibus)	•	•		•	•	•		yes	•	•	•	•	•		•	
MOTOROLA INC. MICROSYSTEMS																		
8-bit	yes	yes (EXORbus)	•	•	•		•			yes	•	•	•	•				
16-bit	yes	yes (VME, Versabus)	•	•	•		•	•		yes	•	•	•	•	•			
MRC SYSTEMS INC.																		
8-bit	yes	yes (EXORbus, STD)	•	•	•					no								
MULTITECH ELECTRONICS INC.																		
8-bit	yes	no	•		•		•			yes			•					
MUSYS CORP.																		
8-bit	yes	yes (S-100)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•		
NATIONAL SEMICONDUCTOR CORP.																		
8-bit	yes	yes (Multibus, CIM)	•	•	•		•	•										
16-bit	yes	yes (Multibus)	•	•	•		•	•										
OMNIBYTE CORP.																		
16-bit	yes	yes (Multibus, VME)	•	•			•	•	•	yes				•	•			
32-bit	yes	yes (Multibus, VME)	•	•			•	•	•	yes				•	•			
OSM COMPUTER CORP.																		
8-bit	yes	yes (parallel bus)	•		•		•	•		yes	•	•	•	•	•	•		

When was the last time

If it hasn't been recently, you've probably missed a lot of news. Like the multi-million dollar contracts we recently signed with major OEMs. Or our new small personal computer printers.

Our GLP Series printers are small enough to put just about anywhere.

If you haven't looked at us since last year, you also don't know how fast our product line's expanding. Both dot matrix printers and line printers. Thanks to our increased spending in research and development.

If you've waited over a year to look at us, you've missed even more. Like our affiliation with Control Data Corporation. And you should probably look again. Here's why.

We've expanded our product line.

Whatever your application needs, you'll find that Centronics can help better than ever before. With new personal computer printers that cost less than $300 and fit in a briefcase, to line printers that run at burst speeds up to 2400 lpm without even breathing hard.

In between we have something for just about every application imaginable. Whether it's word processing, business processing or data processing. New printers that give you high quality graphics. Proven printers that give you high quantity output and reliable performance.

Just about the only paper handling technique we don't offer.

We've added features and flexibility.

Not just in our newest printers, but in our existing printer families as well. Take the new additions to our Printstation 350 Series of dot matrix printers. They excel in cut sheet feeding, multi-part forms, fanfold or envelopes. They even collate letters. While performing at a wide range of speeds. From beautiful correspondence and color graphics at 100 cps, to draft form at 400 cps.

Consider our Linewriters 400 and 800. Their new linear free flight hammer technology puts an end to clipped characters and constant hammer adjustments. And their modular design, no scheduled main-

At 55 decibels, our Linewriters are as quiet as a sleeping baby.

*As ranked by "The Datamation 100," June 1983 issue. Report on the leading U.S. DP companies.

you looked at Centronics?

tenance, and reduced failure rates result in the lowest line printer cost of ownership in the industry.

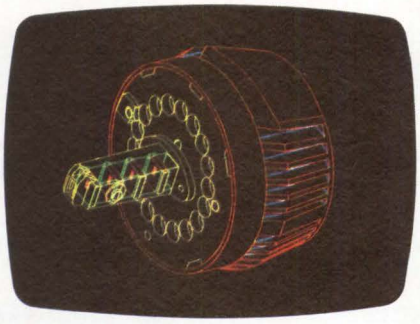
The rest of our products are worth checking out too. They're quieter, more reliable, easier to operate, even smarter.

We're big in small printers too.

This year, we've incorporated the latest technologies into three new series of small

Our color graphics will make all your pie charts beautiful.

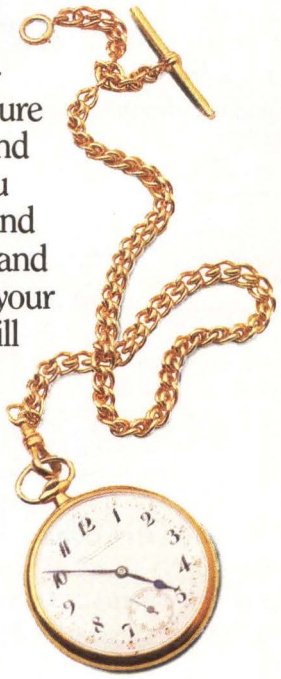
printers. The Printstation 250. The Horizon. And the GLP (Great Little Printer). Now your small business computer and personal computer users can put high performance right on their desks. With features that include versatile paper handling, dual print modes, color graphics, and typefaces to meet any need.



We're using the latest technology to design the latest technology.

Our OEM commitment continues.

Today, four of the five largest computer manufacturers* offer Centronics printers with their systems. Not just because we deliver a full line of products or help them customize interfaces. Not even because we've reduced ownership costs by designing multiple products based on common parts. Rather it's because we insist on working as a partner with our OEMs. Listening to their feedback. Incorporating their ideas into products you can count on. Dramatically increasing our commitment to research and development. To assure the quality and reliability you need today and the features and innovations your customers will demand tomorrow.



Like a Swiss watch, our printers are built with quality and reliability.

Looking ahead.

At Centronics, we're constantly seeking new ways to look out for your business. And that may be the most compelling reason for you to look at us.

CENTRONICS®

An affiliate of Control Data Corporation

When was the last time you looked at us.

Centronics Data Computer Corp., Dept. A, One Wall Street, Hudson, NH 03051 Tel. (603) 883-0111.

CIRCLE NO. 43 ON INQUIRY CARD

OEM COMPUTERS

Company CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	EXPANSION BOARDS: Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	PERIPHERALS: Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
16-bit	yes	yes	•		•					yes	•	•	•	•	•	•		
PACIFIC MICROCOMPUTERS INC.																		
16-bit	yes	yes (Multibus)	•	•						yes				•	•	•		
PARADYNE CORP.																		
16-bit	yes	yes (Multibus, IBM PC)	•	•	•	•	•	•	•	yes	•	•	•	•	•	•	•	
PEOPLEWARE SYSTEMS INC.																		
8-bit	yes	yes (STD)		•						yes								
PERKIN ELMER CORP.																		
32-bit	no	no (proprietary)	•	•	•		•	•	•	yes			•	•	•	•	•	
PERSONAL MICRO COMPUTERS INC.																		
8-bit	yes	no								yes			•	•	•		•	
PERTEC COMPUTER CORP.																		
32-bit	no	no	•	•	•		•	•	•	yes	•	•	•	•	•	•		
PLESSEY PERIPHERAL SYSTEMS INC.																		
16-bit	no	no	•				•	•		yes				•	•	•		
22-bit	no	no	•				•	•		yes				•	•	•		
PLEXUS COMPUTERS																		
16-bit	no	no	•	•	•		•	•	•	yes			•	•	•	•	•	
32-bit	no	no	•	•	•		•	•	•	yes			•	•	•	•	•	
POINT 4 DATA CORP.																		
16-bit	yes	yes (DG Nova bus)	•	•	•			•	•	yes			•		•	•	•	
POLYCOMPUTERS INC.																		
16-bit	yes	yes (DG Nova)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
POLYMORPHIC SYSTEMS																		
8-bit	yes	yes (S-100)	•	•	•		•	•	•	yes	•	•	•	•	•	•		•
16-bit	yes	yes (S-100)	•	•	•		•	•	•	yes	•	•	•	•	•	•		•
PRIME COMPUTER																		
32-bit	no									yes	•	•	•	•	•	•	•	•
PRO-LOG CORP.																		
8-bit	yes	yes (STD)	•	•	•		•			yes	•			•				
16-bit	yes	yes (STD)								yes								
PRONTO COMPUTERS INC.																		
16-bit										yes	•	•		•	•			
PYRAMID TECHNOLOGY CORP.																		
32-bit	no	no								yes	•	•	•	•	•	•	•	
QDP COMPUTER SYSTEMS																		
8-bit	yes	yes (S-100, Multibus)	•	•	•		•	•		yes	•	•	•	•	•	•	•	
16-bit	no	no	•							yes (S-100)			•	•	•	•	•	
QUAY CORP.																		
8-bit	yes	no	•	•	•	•	•	•		yes	•	•	•	•	•	•	•	

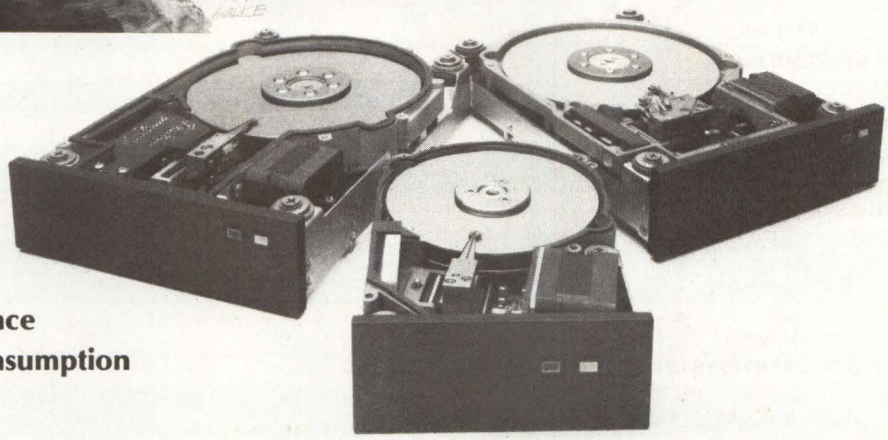
OEM computers

MICROSCIENCE BRINGS SOMETHING NEW, EXCITING TO NCC....

STRAIGHTALK

NCC and Las Vegas. What a backdrop for an exciting, refreshing change of pace. The change is Microscience's introduction of two new half-height Winchester disk drives.

Amid all the hustle ... all the bustle ... all the songs ... all the dancing ... and all the noise, Microscience will unveil two new half-height Winchesters with a dramatic set of differences.



- **High Reliability**
- **Economy**
- **High Performance**
- **Low Power Consumption**
- **Quality**
- **Quantity**

Solid features you've been looking for. Delivery you can depend on.

It really will be a refreshing change.

Microscience International Corporation

575 E. Middlefield Road
Mountain View, CA 94043
(415) 961-2212 Telex: 275907

CIRCLE NO. 44 ON INQUIRY CARD

Area Sales Offices: Orlando, FL (305) 339-8283 • Boston, MA (617) 229-5823 **International Sales Office:** Munich, West Germany, Tel. 0894315669, TTX 5213442 **Distributors: U.S.**–Gulf Stream, Weatherford, North East Peripherals, Orion • **International**–Multilek, Canada • Pericomp, Australia • Dataguild, U.K. • Metrologie, France and West Germany

Don't miss the real excitement at Booth #C4366

OEM COMPUTERS

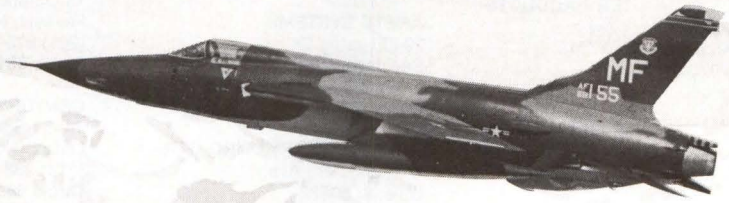
Company	CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
				EXPANSION BOARDS								PERIPHERALS							
R. J. BRACHMAN ASSOCIATES INC.																			
	8-bit	yes	no	•	•	•					no								
RASTER GRAPHICS INC.																			
	8-bit	yes	yes (Multibus)								yes			•	•				
SANYO BUSINESS SYSTEMS CORP.																			
	8-bit	yes		•		•		•	•			•	•	•	•	•		•	•
	16-bit	yes		•		•		•	•			•	•			•		•	
SBE INC.																			
	8-bit	yes	yes	•	•	•		•	•		no				•				
	16-bit	yes	yes (Multibus)	•	•	•		•	•		yes				•	•			
SMOKE SIGNAL BROADCASTING																			
	8-bit	yes	yes (proprietary)	•	•	•		•	•	•	yes			•	•	•	•		
	16-bit	yes	yes (proprietary)	•	•	•		•	•	•	yes			•	•	•	•		
	32-bit	yes	yes (proprietary)	•	•	•		•	•	•	yes			•	•	•	•		
STD MICROSYSTEMS																			
	8-bit	yes	no	•	•	•	•	•		•	no								
SUMICOM INC.																			
	8-bit	yes	yes (Oki bus)	•	•		•				yes	•	•		•	•		•	•
	16-bit	yes	yes (IBM bus)	•	•						yes	•	•	•	•	•		•	•
TELEVIDEO SYSTEMS INC.																			
	16-bit	no	no	•	•			•	•		yes	•	•	•	•	•			
TEXAS INSTRUMENTS INC.																			
	16-bit	yes	no (proprietary)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
TL INDUSTRIES INC.																			
	8-bit	yes	yes (STD, EXORciser bus)	•	•	•	•				yes	•							
	16-bus	yes	yes (TM990, VME)	•	•	•													
TRIANGLE DIGITAL SERVICES LTD.																			
	8-bit	yes	yes (Single Eurocard)	•	•	•				•	yes		•	•			•	•	
VECTOR GRAPHIC INC.																			
	8-bit	no	no								yes	•	•	•	•	•	•	•	•
	16-bit	no	no								yes	•	•	•	•	•	•	•	•
WAVE MATE INC.																			
	8-bit	yes	no	•	•	•		•	•	•	yes				•	•			
WICAT SYSTEMS INC.																			
	16-bit	yes	yes (Multibus, proprietary)	•	•	•		•	•	•	yes	•	•	•	•	•	•	•	
WINTECH SYSTEMS INC.																			
	8-bit	yes	yes (STD)	•	•	•		•	•		yes								

OEM computers

OEM COMPUTERS

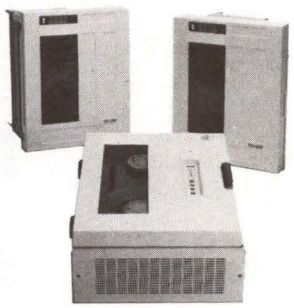
Company	CPU word size	Board-level computers?	Board-level computers integrated with card cage? (bus)	EXPANSION BOARDS: Memory cards	I/O cards	Communication interfaces	Modem board	Diskette drive interface	Hard disk interface	Tape drive interface	Board-level computers integrated with card cage, power supplies, fans, output ports and an enclosure?	PERIPHERALS: Monitors	Keyboard	Terminals	Diskette drive subsystems	Hard disk drive subsystems	Tape drive subsystems	Printers	Plotters
WINTEK CORP.																			
	8-bit	yes	yes (44-pin bus)	•	•	•		•			no				•				
XYCOM INC.																			
	8-bit	yes	yes (VME, Flexibus)	•	•	•					yes	•	•	•	•			•	
	16-bit	yes	yes (VME)	•	•	•					yes	•	•	•	•			•	
ZENDEX CORP.																			
	8-bit	yes	yes (Multibus)	•	•			•	•		yes	•	•	•	•	•			
	16-bit	yes	yes (Multibus)	•	•			•	•		yes	•	•	•	•	•			
ZILOG INC.																			
	16-bit	no	no								yes	•	•	•		•	•	•	•

More power than a Thunderchief.



When it comes to choices in tape transports, Innovative Data Technology puts unprecedented power and technology in your hands. Its Series TD-1012, TD-1050 and TD-1750 tape transports offer full 7- and 9-track IBM/ANSI/ECMA/ISO 1/2-inch magnetic tape compatibility and can be configured for a variety of data transportation, data logging and data back-up. Integrated with these tape transports are a complete line of controllers for: RS-232C, IEEE-488 (GPIB), Unibus/Q Bus, Intel Multibus, Parallel I/O and the new Small Computer Systems Interface (SCSI).

The TD-1012 operates at 12.5 ips Start/Stop and 100 ips Streaming, 1600 bpi (PE). Dual mode, 800 (NRZI) and 1600 bpi (PE), operation is offered at 45 ips Start/Stop for the Series TD-1050 and 75 ips Start/Stop for the Series TD-1750. The Series TD-1750 represents even more advanced engineering—an active tension arm technique that eliminates noisy vacuum columns—a first in 75 ips tape transports to take advantage of this technology. IDT's family of tape transports. They'll give you more power than a Thunderchief.



INNOVATIVE DATA TECHNOLOGY *ON THE RIGHT TRACK*

General Offices:
P.O. Box 178160 • 4060 Morena Blvd. • San Diego, CA 92117
(619) 270-3990 • TWX: (910) 335-1610

Eastern Regional Office:
P.O. Box 1093 • 6845 Elm St., Suite 608 • McLean, VA 22101-1093
(703) 821-1101 • TWX: (710) 833-9888

Solutions for '84 AND BEYOND

Aircraft photo courtesy of Squadron Signal Publications from "Air War over Southeast Asia"

IBM is a trademark of International Business Machines Corp.

DIRECTORY OF MANUFACTURERS

ACKERMAN DIGITAL SYSTEMS INC.
216 W. Stone Ct.
Villa Park, IL 60181
(312) 530-8992
Circle 629

ACTION COMPUTER ENTERPRISES INC.
430 N. Halstead St.
Los Angeles, CA 91007
(818) 351-5451
Circle 630

ADVANCED DIGITAL CORP.
5432 Production Dr.
Huntington Beach, CA 92649
(714) 891-4004
Circle 631

A.D.P.S.
1454 Fields Dr.
San Jose, CA 95129
(408) 446-9332
Circle 632

ADVANCED MICRO DEVICES
P.O. Box 3453-Mailstop 140
Sunnyvale, CA 94088
(408) 732-2400
Circle 633

ALCYON CORP.
8716 Production Ave.
San Diego, CA 92121
(619) 578-0860
Circle 634

ALLOY COMPUTER PRODUCTS
100 Pennsylvania Ave.
Framingham, MA 01707
(617) 875-6100
Circle 635

ALPHA MICROSYSTEMS
17332 Von Karman
Irvine, CA 91714
(714) 958-8500
Circle 636

ALSPA COMPUTER INC.
477 Division St.
Campbell, CA 95008
(408) 370-3000
Circle 637

ALTOS COMPUTER SYSTEMS
2641 Orchard Parkway
San Jose, CA 91534
(408) 946-6700
Circle 638

AMPRO
P.O. Box 390427
Mountain View, CA 94039
(415) 962-0230
Circle 639

ANALOG DEVICES
3 Technology Way
Norwood, MA 02062
(617) 329-4700
Circle 640

ANDROMEDA SYSTEMS INC.
9000 Eton Ave.
Canoga Park, CA 91304
(818) 709-7600
Circle 641

APOLLO COMPUTER INC.
330 Billerica Rd.
Chelmsford, MA 01824
(617) 256-6600
Circle 642

APPLE COMPUTER
20525 Mariani-23-L
Cupertino, CA 95014
(408) 973-2571
Circle 643

APPLIED BUSINESS COMPUTER CO.
330 E. Orangethorpe Ave., Suite C.
Placentia, CA 92670
(714) 993-1101
Circle 644

APPLIED DIGITAL DATA SYSTEMS INC.
100 Marcus Blvd.
Hauppauge, NY 11788
(516) 231-5400
Circle 645

APPLIED MICRO TECHNOLOGY INC. (a Burr Brown Co.)
P.O. Box 3042
Tucson, AZ 85702
(602) 622-8605
Circle 646

ARDENT COMPUTER PRODUCTS
145 Palisades St.
Dobbs Ferry, NY 10522
(914) 693-6900
Circle 647

ARETE SYSTEMS
2040 Hartog Dr.
San Jose, CA 95131
(408) 263-9711
Circle 648

AT&T TELEMARKETING CTR.
4513 Western Ave.
Lisle, IL 60532
(800) 833-9333
Circle 649

ATV SYSTEMS INC.
2921 S. Daimler
Santa Ana, CA 92705
(714) 546-3551
Circle 650

AURAGEN SYSTEMS CORP.
2 Executive Dr.
Fort Lee, NJ 07024
(201) 461-3400
Circle 651

AVATAR TECHNOLOGIES INC.
99 South St.
Hopkinton, MA 01748
(617) 435-6872
Circle 652

BEEHIVE INT'L.
4910 Amelia Earhart Dr.
Salt Lake City, UT 84084
(801) 355-6000
Circle 653

BUBBL-TEC
6800 Sierra Ct.
Dublin, CA 94568
(415) 829-8700
Circle 654

BURROUGHS CORP.
Burroughs Pl.
Detroit, MI 48232
(313) 972-7000
Circle 655

BYTRONIX CORP.
2701 E. Chapman Ave., Suite 102
Fullerton, CA 92631
(714) 871-8763
Circle 656

CADMUS COMPUTER SYSTEMS
6000 Suffolk St.
Lowell, MA 01852
(617) 453-2899
Circle 657

CALIFORNIA COMPUTER SYSTEMS
250 Caribbean Dr.
Sunnyvale, CA 94089
(408) 734-5811
Circle 658

CALLAN DATA SYSTEMS
2645 Townsgate Rd.
Westlake Village, CA 91361
(805) 497-6837
Circle 659

CANON USA INC.
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700
Circle 660

CASIO INC.
15 Gardner Rd.
Fairfield, NJ 07006
(201) 575-7400
Circle 661

CENTURY COMPUTER CORP.
14453 Gillis Rd.
Dallas, TX 75234
(214) 233-3238
Circle 662

CHARLES RIVER DATA SYSTEMS
983 Concord St.
Framingham, MA 01761
(617) 626-1000
Circle 663

CHRISLIN INDUSTRIES INC.
31352 Via Colinas
Westlake Village, CA 91362
(818) 991-2254
Circle 664

CIE SYSTEMS INC.
2515 McCabe Way
Irvine, CA 92713
(714) 660-1800
Circle 665

CIFER PLC.
Avro Way
Bowerhill, Melksham
Wilts, SN12 6TP, England
0225-706361
Circle 666

CODATA SYSTEMS CORP.
285 N. Wolfe Rd.
Sunnyvale, CA 94086
(800) 521-6543
Circle 667

CODEX CORP.
20 Cabot Blvd.
Mansfield, MA 02048
(617) 364-2000
Circle 668

COLEX AMERICA INC.
15028 Beltway Dr.
Dallas, TX 75234
(214) 458-2779
Circle 669

COLUMBIA DATA PRODUCTS
9150-D Rumsey Rd.
Columbia, MD 21045
(301) 992-3400
Circle 670

COMARK CORP.
93 West St., P.O. Box 474
Medfield, MA 02052
(617) 359-8161
Circle 671

COMMODORE BUSINESS MACHINES
1200 Wilson Dr.
Brandywine Industrial Park
Westchester, PA 19380
(215) 431-9100
Circle 672

COMPANION COMPUTER CORP.
74021 Washington Ave. S.
Eden Prairie, MN 55344
(612) 944-5022
Circle 673

COMPAQ COMPUTER CORP.
2033 FM 149
Houston, TX 77070
(713) 370-7040
Circle 674

COMPUCORP
2211 Michigan Ave.
Santa Monica, CA 90404
(213) 829-7453
Circle 675

COMPUPRO
3506 Breakwater Ct.
Hayward, CA 94545
(415) 786-0909
Circle 676

COMPUTER AUTOMATION INC.
1800 Jay Ell Dr.
Richardson, TX 75081
(214) 783-0993
Circle 677

COMPUTER DESIGNED SYSTEMS INC.
10911 Olson Memorial Highway
Minneapolis, MN 55441
(612) 545-2855
Circle 678

COMPUTER SYSTEMS
26401 Harper Ave.
St. Clair Shores, MI 48081
(313) 779-8700
Circle 679

CONTEMPORARY CONTROL SYSTEMS INC.
4949 Forest Ave.
Downers Grove, IL 60515
(312) 963-7070
Circle 680

CONTROL DATA CORP.
P.O. Box 0
Minneapolis, MN 55440
(612) 853-4636
Circle 681

CONVERGENT TECHNOLOGIES
3055 Patrick Henry Dr.
Santa Clara, CA 95050
(408) 980-0850
Circle 682

CORONA DATA SYSTEMS INC.
275 Hillcrest Dr.
Thousand Oaks, CA 91360
(213) 829-1840
Circle 683

CORVUS SYSTEMS INC.
2029 O'Toole Ave.
San Jose, CA 95131
(408) 946-7700
Circle 684

CREATIVE MICRO SYSTEMS
3822 Cerritos Ave.
Los Alamitos, CA 90720
(213) 493-2484
Circle 685

CROMEMCO INC.
280 Bernardo Ave., P.O. Box 7400
Mountain View, CA 94039
(415) 964-7400
Circle 686

CUBIT-DIV. OF PROTEUS INDUSTRIES
190 S. Whisman Rd.
Mountain View, CA 94041
(415) 962-8237
Circle 687

CYBERSYSTEMS INC.
7540 South Memorial Parkway
Huntsville, AL 35802
(205) 883-4410
Circle 688

DATA GENERAL CORP.
4400 Computer Dr.
Westboro, MA 01580
(617) 366-8911
Circle 689

DATAPOINT CORP.
9725 Datapoint Dr.
San Antonio, TX 78284
(512) 699-7000
Circle 690

DATARAM CORP.
Princeton Rd.
Cranbury, NJ 08512
(609) 799-0071
Circle 691

DATAVUE CORP.
225 Technology Park
Norcross, GA 30092
(404) 449-5961
Circle 692

DATRICON CORP.
155 B Ave.
Lake Oswego, OR 97034
(503) 636-7671
Circle 693

DAVIDGE CORP.
1951 Colony St., Suite X
Mountain View, CA 94043
(415) 964-9497
Circle 694

DBS INTERNATIONAL INC.
Welsh Rd. & Park Dr., P.O. Box 425
Montgomeryville, PA 18936
(215) 628-4810
Circle 695

DELTA DATA SYSTEMS CORP.
2595 Metropolitan Dr.
Trevose, PA 19047
(215) 322-5400
Circle 696

DIGITAL EQUIPMENT CORP.
(minis, single-user)
146 Main St.
Maynard, MA. 01654
(617) 897-5111
Circle 697

DIGITAL EQUIPMENT CORP.
77 Reed Rd.
Hudson, MA. 01749
(617) 568-6720
Circle 698

DIGITAL MICROSYSTEMS INC.
1755 Embarcadero Rd.
Oakland, CA 94606
(415) 532-3686
Circle 699

DIGITAL SYSTEMS CORP.
3 Main St.
Walkersville, MD 21793
(301) 845-4141
Circle 700

DIGITEX
2044 Armacost Ave.
Los Angeles, CA 90025
(213) 826-4500
Circle 701

DISTRIBUTED COMPUTER SYSTEMS
330 Bear Hill Rd.
Waltham, MA 02154
(617) 890-8200
Circle 702

DIVERSIFIED TECHNOLOGY INC.
P.O. Box 748
Ridgeland, MS 39157
(601) 856-4121
Circle 703

DUAL SYSTEMS CORP.
2530 San Pablo Ave.
Berkeley, CA 94702
(415) 549-3854
Circle 704

DURANGO SYSTEMS INC.
3003 North First St.
San Jose, CA 95134
(408) 946-5000
Circle 705

DY-4 SYSTEMS INC.
888 Lady Ellen Place
Ottawa, Ontario
Canada, K1Z 5MI
(613) 728-3711
Circle 706

DYNABYTE
521 Cottonwood Dr.
Milpitas, CA 95035
(408) 763-1221
Circle 707

EAGLE COMPUTER INC.
983 University Ave.
Los Gatos, CA 95030
(408) 395-5005
Circle 708

EDUCATIONAL MICROCOMPUTER SYSTEMS
P.O. Box 16115
Irvine, CA 92715
Circle 709

ENTERPRISE SYSTEMS CORP.
Box 698
Dover, NH 03820
(603) 742-7363
Circle 710

EPSON AMERICA INC.
2780 Lomita Blvd.
Torrance, CA 90505
(213) 539-9140
Circle 711

FACIT INC.
235 Main Dunstable Rd.
Nashua, NH 03061
(603) 883-4157
Circle 712

FINANCIAL BUSINESS COMPUTERS
2550 South State
Salt Lake City, UT 84115
(801) 485-7301
Circle 713

FIRST COMPUTER CORP.
645 Blackhawk Dr.
Westmont, IL 60559
(312) 920-1050
Circle 714

FORCE COMPUTERS INC.
2041 Mission College Blvd.
Santa Clara, CA 95054
(408) 988-8686
Circle 715

FORMATION INC.
823 East Gate Dr.
Mt. Laurel, NJ 08054
(609) 234-5020
Circle 716

FORTUNE SYSTEMS CORP.
101 Twin Dolphin Dr.
Redwood City, CA 94065
(415) 595-8444
Circle 717

FORWARD TECHNOLOGY INC.
2175 Martin Ave.
Santa Clara, CA 95050
(408) 988-2378
Circle 718

FRANKLIN COMPUTER CORP.
1070 Busch Memorial Highway
Pennsauken, NJ 08110
(609) 488-0600
Circle 719

FUJITSU MICROELECTRONICS INC.
3320 Scott Blvd.
Santa Clara, CA 95051
(408) 980-0755
Circle 720

GAVILAN COMPUTER CORP.
240 Hacienda Ave.
Campbell, CA 95008
(408) 379-8005
Circle 721

GENERAL AUTOMATION INC.
1045 South St.
Anaheim, CA 92803
(714) 778-4800
Circle 722

GENERAL MICRO SYSTEMS INC.
1320 Chaffey Ct.
Ontario, CA 91762
(714) 621-5475
Circle 723

GIMIX INC.
1337 West 37th Pl.
Chicago, IL 60609
(312) 927-5510
Circle 724

GOULD INC., COMPUTER SYSTEMS DIV.
6901 West Sunrise Blvd.
Ft. Lauderdale, FL 33340-9148
(305) 587-2900
Circle 725

GRID SYSTEMS CORP.
2535 Garcia Ave.
Mountain View, CA 94043
(415) 961-4800
Circle 726

HARRIS CORP., COMPUTER SYSTEMS DIV.
2101 W. Cypress Creek Rd.
Ft. Lauderdale, FL 33309
(305) 974-1700
Circle 727

HEWLETT-PACKARD CO.
19447 Pruneridge Ave.
Cupertino, CA 95014
(408) 725-8111
Circle 728

HEWLETT-PACKARD CO.
11000 Wolfe Rd.
Cupertino, CA 95014
(415) 257-7000
Circle 729

HONEYWELL INFORMATION SYSTEMS
200 Smith St., MS461
Waltham, MA 02154
(617) 895-6000
Circle 730

INDEPENDENT BUSINESS SYSTEMS INC. (IBS)
5915 Graham Ct.
Livermore, CA 94598
(415) 443-3131
Circle 731

IBM CORP.
900 King St.
Rye, NY 10573
(914) 934-4836
Circle 732

IBM CORP.
P.O. Box 1328
Boca Raton, FL 33432
(305) 241-2717
Circle 733

IBC (INTEGRATED BUSINESS COMPUTERS)
21621 Nordhoff St.
Chatsworth, CA. 91311
(213) 882-9007
Circle 734

IMS INTERNATIONAL
2800 Lockheed Way
Carson City, NV 89701
(702) 883-7611
Circle 735

INDUSTRIAL MICRO
189 Hitchcock Rd.
Southington, CT 06489
(203) 628-4844
Circle 736

INFOSPHERE INC.
4730 SW. Macadam Ave.
Portland, OR 97201
(503) 226-3515
Circle 737

INNER ACCESS CORP.
517-K Marine View
Belmont, CA 94002
(415) 591-8295
Circle 738

INNOVATIVE RESEARCH INC.
17071 Kampen Lane
Huntington Beach, CA 92647
(714) 842-0492
Circle 739

INTECOLOR CORP.
225 Technology Park
Norcross, GA 30092
(404) 449-5961
Circle 740

INTEGRATED SOLUTIONS INC.
2240 Lundy Ave.
San Jose, CA 95131
(408) 943-1902
Circle 741

INTEL CORP.
5200 NE. Elam Young Pkwy.
Hillsboro, OR 97123
(503) 681-8080
Circle 742

INTELLIMAC INC.
6001 Montrose Rd, 6th Floor
Rockville, MD 20852
(301) 984-8000
Circle 743

INTERCONTINENTAL MICRO SYSTEMS
4015 Leaverton Ct.
Anaheim, CA 92807
(714) 630-0964
Circle 744

INTERLINK COMPUTER SERVICES
39055 Hastings St., Suite 203
Fremont, CA 94538
(415) 792-6212
Circle 745

INTERTEC DATA SYSTEMS
2300 Broad River Rd.
Columbia, SC 29210
(803) 798-9100
Circle 746

IRONICS INC.
742 Cascadilla St.
Ithaca, NY 14850
(607) 277-4060
Circle 747

ISI INTERNATIONAL
1275 Hammerwood Ave.
Sunnyvale, CA 94087
(408) 743-4300
Circle 748

ITHACA INTERSYSTEMS INC.
1650 Hanshaw Rd.
Ithaca, NH 14850
(607) 273-2500
Circle 749

LANIER BUSINESS PRODUCTS INC.
(a Harris Co.)
1700 Chantilly Dr., NE.
Atlanta, GA 30324
(404) 329-8000
Circle 750

LEE DATA CORP.
7075 Flying Cloud Dr.
Minneapolis, MN 55344
(612) 828-0300
Circle 751

LOBO SYSTEMS INC.
358 S. Fairview Ave.
Goleta, CA 93117
(805) 683-1596
Circle 752

LOGICAL BUSINESS MACHINES
1294 Hammerwood Ave.
Sunnyvale, CA 94089
(408) 744-1290
Circle 753

LOMAS DATA PRODUCTS
66 Hopkinton Rd.
Westboro, MA 01581
(617) 366-6434
Circle 754

M/A-COM ALANTHUS DATA INC.
6011 Executive Blvd., Suite 300
Rockville, MD 20852
(301) 770-1150
(800) 638-6712
Circle 755

MAD COMPUTER INC.
3350 Scott Blvd., Bldg. 13
Santa Clara, CA. 95051
(408) 980-0840
Circle 756

MAI/BASIC FOUR INFORMATION SYSTEMS
14101 Myford Rd.
Tustin, CA 92680
(714) 731-5100
Circle 757

MATROX ELECTRONIC SYSTEMS LTD.
5800 Andover Ave.
Montreal, Quebec
Canada H4T 1H4
(514) 735-1182
Circle 758

MDB SYSTEMS INC.
1995 N. Batavia St., Box 5508
Orange, CA 92667-0508
(714) 998-6900
Circle 759

MDS QANTEL
4142 Point Eden Way
Haywood, CA 94545
(415) 887-7777
Circle 760

MEASUREMENT SYSTEMS AND CONTROLS
1601 W. Orangewood Ave.
Orange, CA 92668
(714) 633-4460
Circle 761

MICRO CRAFT. CORP.
4747 Irving Blvd., Suite 241
Dallas, TX 75247
(214) 630-2562
Circle 762

MICRO FIVE CORP.
3560 Hyland Ave, P.O. Box 5011
Costa Mesa, CA 92626
(714) 957-1517
Circle 763

MICRO LINK
14602 N. Highway 31
Carmel, IN 46032
(317) 846-1721
Circle 764

MICROBAR SYSTEMS INC.
1120 San Antonio Rd.
Palo Alto, CA 94303
(415) 964-2862
Circle 765

MICROCOMPUTER SYSTEMS INC.
1814 Ryder Dr.
Baton Rouge, LA 70808
(504) 769-2154
Circle 766

MICRODATA CORP.
P.O. Box 19501
Irvine, CA 92713
(714) 250-1000
Circle 767

MICROLOG INC.
222 Route 59
Suffern, NY 10901
(914) 368-0353
Circle 768

MICROMATION
1620 Montgomery St.
San Francisco, CA 94111
(415) 398-0289
Circle 769

MIKROS SYSTEMS CORP.
3828 Quakerbridge Rd.
Mercerville, NJ 08619
(609) 890-0440
Circle 770

MILLER TECHNOLOGY INC.
647 N. Santa Cruz Ave.
Los Gatos, CA 95030
(408) 395-2032
Circle 771

MITSUBISHI ELECTRONICS AMERICA INC.
991 Knox Ave.
Torrance, CA 90502
(213) 515-3993
Circle 772

MIZAR INC.
302 Chester St.
St Paul, MN 55107
(612) 224-8941
Circle 773

MODULAR COMPUTER SYSTEMS INC. (MODCOMP)
1650 West McNab Rd.,
P.O. Box 6099
Ft. Lauderdale, FL 33310
(305) 974-1380
Circle 774

MOHAWK DATA SCIENCES CORP.
7 Century Dr.
Parsippany, NJ 07054
(201) 540-9080
Circle 775

MOLECULAR COMPUTER
251 River Oaks Parkway
San Jose, CA 95134
(408) 262-2122
Circle 776

MOMENTUM COMPUTER SYSTEMS INT'L.
2730 Junction Ave.
San Jose, CA 95134
(408) 942-0638
Circle 777

MONOLITHIC SYSTEMS CORP.
84 Inverness Circle East
Englewood, CO 80112
(303) 790-7400
Circle 778

MONROE SYSTEMS FOR BUSINESS
The American Rd.
Morris Plains, NJ 07950
(201) 993-2000
Circle 779

MORROW DESIGNS
600 McCormack St.
San Leandro, CA 94577
(415) 430-1970
Circle 780

MOSTEK CORP.
1215 W. Crosby Rd., P.O. Box 169
Carrollton, TX 75006
(214) 466-6000
Circle 781

MOTOROLA/FOUR-PHASE SYSTEMS
10700 N. De Anza Blvd.
Cupertino, CA 95014
(408) 255-0900
Circle 782

MOTOROLA INC. MICROSYSTEMS
2900 S. Diablo Way
Tempe, AZ 85282
(602) 438-3501
Circle 783

MRC SYSTEMS INC.
7320 Ashcroft
Houston, TX 77081
(713) 771-7511
Circle 784

MULTITECH ELECTRONICS INC.
195 W. El Camino Real
Sunnyvale, CA 94087
(408) 773-8400
Circle 785

MUSYS CORP.
1752-B Langley Ave.
Irvine, CA 92714
(714) 662-7387
Circle 786

NATIONAL SEMICONDUCTOR CORP.
2900 Semiconductor Dr.
Santa Clara, CA 95051
(408) 733-2600
Circle 787

NCR CORP.
1700 S. Patterson Blvd.
Dayton, OH 45479
(800) 543-4833
Circle 788

NEC HOME ELECTRONICS
700 Nicholas Blvd.
Elk Grove Village, IL 60007
(312) 228-5900
Circle 789

NOHALT COMPUTERS
1750 New Highway
Farmingdale, NY 11735
(516) 420-9740
Circle 790

NORTH STAR COMPUTERS INC.
14440 Catalina St.
San Leandro, CA 94577
(415) 357-8500
Circle 791

OMNIBYTE
245 W. Roosevelt Rd., Bldg. 1-5
West Chicago, IL 60185
(312) 231-6880
Circle 792

ONSET COMPUTER CORP
199 Main St., P.O. Box 1016
N. Falmouth, MA 02556
(617) 563-2267
Circle 793

ONYX SYSTEMS INC.
25 E. Trimble Rd.
San Jose, CA 95131
(408) 946-6330
Circle 794

OSBORNE COMPUTER CORP.
26538 Dante Ct.
Hayward, CA 94545
(415) 784-2291 or
(415) 887-8080
Circle 795

OSM COMPUTER CORP.
665 Clyde Ave.
Mountain View, CA 94043
(415) 961-8680
Circle 796

OTRONA ADVANCED SYSTEMS CORP.
4725 Walnut St.
Boulder, CO 80301
(303) 979-3808
Circle 797

PACIFIC MICROCOMPUTERS INC.
119 Aberdeen Dr.
Cardiff, CA 92007
(619) 436-8649
Circle 798

PARADYNE CORP.
8550 Ulmerton Rd.
Largo, FL 33541
(813) 530-2000
Circle 799

PEOPLEWARE SYSTEMS INC.
5190 West 76th St.
Minneapolis, MN 55435
(612) 831-0827
Circle 800

PERKIN-ELMER CORP.
2 Crescent Pl.
Oceanport, NJ 07757
(201) 870-4500
Circle 801

PERSONAL MICRO COMPUTERS INC.
475 Ellis St.
Mountain View, CA 94043
(415) 962-0224
Circle 802

PERTEC COMPUTER CORP.
17112 Armstrong Ave.
Irvine, CA 92714
(714) 660-0488
Circle 803

PHOENIX DIGITAL CORP.
2315 N. 35th Ave.
Phoenix, AZ 85009
(602) 278-3591
Circle 804

PIXEL COMPUTER INC.
260 Fordham Rd.
Wilmington, MA 01887
(617) 657-8720
Circle 805

PLESSEY PERIPHERAL SYSTEMS INC.
17466 Daimler Ave.
Irvine, CA 92714
(714) 540-9945
Circle 806

PLEXUS COMPUTERS
2230 Martin Ave.
Santa Clara, CA 95050
(408) 988-1755
Circle 807

POINT 4 DATA CORP.
2569 McCabe Way
Irvine, CA 92714
(714) 863-1111
Circle 808

POLYCOMPUTERS INC.
3822 E. La Palma Ave.
Anaheim, CA 92807
(714) 632-0144
Circle 809

POLYMORPHIC SYSTEMS
5330 Debbie Lane
Santa Barbara, CA 93111
(805) 967-0468
Circle 810

PRIME COMPUTER INC.
Prime Park
Natick, MA 01760
(617) 655-8000
Circle 811

PRO-LOG CORP.
2411 Garden Rd.
Monterey, CA 93940
(404) 372-4593
Circle 812

PRONTO COMPUTERS INC.
3730 Skypark Dr.
Torrance, CA 90505
(213) 539-6400
Circle 813

PYRAMID TECHNOLOGY CORP.
1295 Charleston Rd.
Mountain View, CA 94043
(415) 965-7200
Circle 814

Q1 CORP.
480 Mill Rd.
Coram, NY 11727
(516) 732-3800
Circle 815

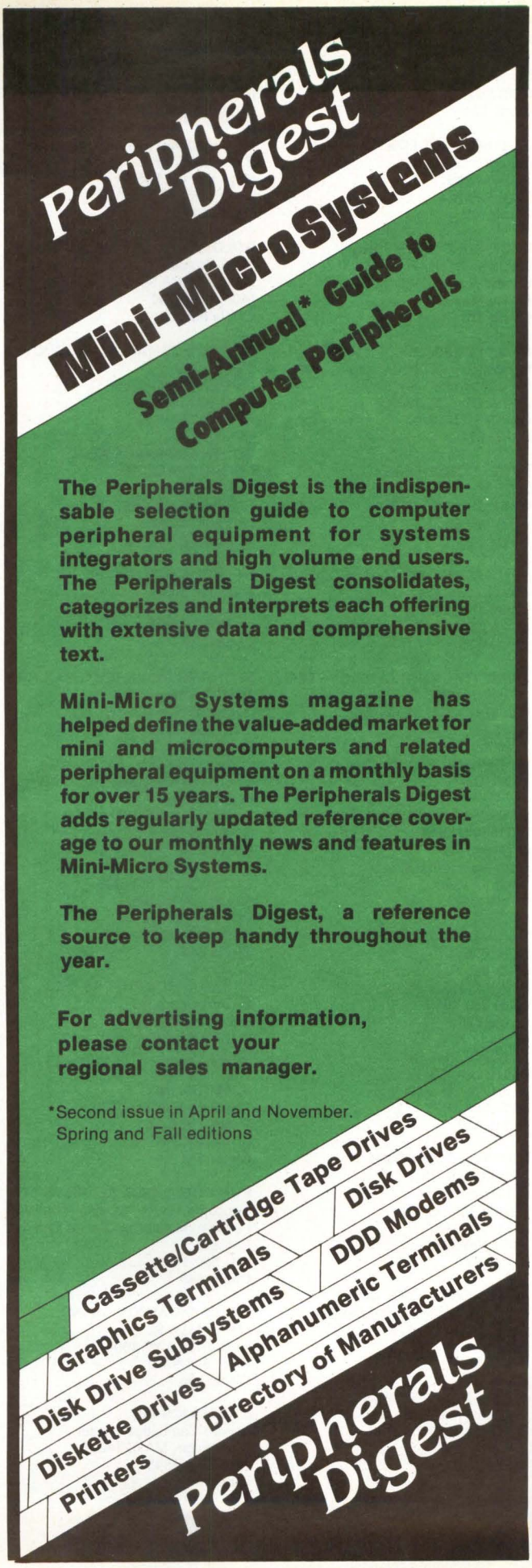
QDP COMPUTER SYSTEMS
10330 Brecksville Rd.
Cleveland, OH 44141
(216) 526-0838
Circle 816

QUAY CORP.
22 Meridian Rd.
Eatontown, NJ 07724
(201) 542-7340
Circle 817

QUBIX GRAPHIC SYSTEMS
18835 Cox Ave.
Saratoga, CA 95070
(408) 370-9229
Circle 818

R. J. BRACHMAN ASSOCIATES INC.
P.O. Box 1077
Havertown, PA 19083
(215) 622-5495
Circle 819

RADIO SHACK/TANDY
1500 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011
Circle 820



CIRCLE NO. 46 ON INQUIRY CARD

RAIR MICROCOMPUTER CORP.
4101 Burton Dr.
Santa Clara, CA 95050
(408) 988-1790
Circle 821

RASTER GRAPHICS INC.
P.O. Box 23334
Tigard, OR 97223
(503) 620-2241
Circle 822

REGENCY SYSTEMS INC.
3200 Farber Dr., P.O. Box 3578
Champaign, IL 61821
(217) 398-8067
Circle 823

REXON BUSINESS MACHINES CORP.
5800 Uplander Way
Culver City, CA 90230
(213) 641-7110
Circle 824

RIDGE COMPUTERS
2451 Mission College Blvd.
Santa Clara, CA 95054
(408) 986-8500
Circle 825

SAGE COMPUTER TECHNOLOGY
4905 Energy Way
Reno, NV 89502
(702) 322-6868
Circle 826

SAND TECHNOLOGY SYSTEMS (CANADA) INC.
P.O. Box 1144, 10 Edison,
Place Bonaventure
Montreal, Canada H5A 1G5
(514) 875-4502
Circle 827

SANYO BUSINESS SYSTEMS CORP.
51 Joseph St.
Moonachie, NJ 07074
(201) 440-9300
Circle 828

SBE INC. (DIV. ADAPTIVE SCIENCE)
4700 San Pablo Ave.
Emeryville, CA 94608
(415) 652-1805
Circle 829

SCI SYSTEMS INC.
P.O. Box 1000
Huntsville, AL 35807
(205) 882-4800
Circle 830

SEATTLE COMPUTER PRODUCTS INC.
1114 Industry Dr.
Seattle, WA 98188
(206) 575-1830
(800) 426-8936
Circle 831

SERVO COMPUTER CORP.
360B N. Ellensburg St., Box 566
Gold Beach, OR 97444
(503) 247-2021
Circle 832

SHARP ELECTRONICS CORP.
10 Sharp Plaza
Paramus, NJ 07652
(201) 265-5600
Circle 833

SMOKE SIGNAL BROADCASTING
31336 Via Colinas
Westlake Village, CA 91362
(818) 889-9340
Circle 834

SOLARCOM TECHNOLOGY INC.
P.O. Box 4715
Hayward, CA 94544
(415) 489-3141
Circle 835

SOLO SYSTEMS
3025 Orchard Pkwy.
San Jose, CA 95134
(408) 945-1700
Circle 836

SONY INFORMATION PRODUCTS
1 Sony Dr.
Park Ridge, NJ 07656
(201) 930-6499
Circle 837

SOUTHWEST TECHNICAL PRODUCTS CORP.
219 W. Rhapsody
San Antonio, TX 78216
(512) 344-0241
Circle 838

SPERRY CORP.
P.O. Box 500
Blue Bell, PA 19424
(215) 542-4011
Circle 839

SPURRIER PERIPHERALS CORP.
10513 LeMarie
Cincinnati, OH 45241
(513) 563-2625
Circle 840

STC SYSTEMS INC.
Four North St.
Waldwick, NJ 07463
(201) 445-5050
Circle 841

STD MICROSYSTEMS
399 Sherman Ave.
Palo Alto, CA 94306
(415) 327-6800
Circle 842

STRATUS COMPUTERS INC.
17 Strathmore Rd.
Natick, MA 01760
(617) 653-1466
Circle 843

SUMICOM INC.
17862 E. 17th St.
Tustin, CA 92680
(714) 730-6061
Circle 844

SUN COMPUTING SERVICES LTD.
Concorde House, St. Anthonys Way
Feltham, Middlesex, TW 14 ONH
England
(01) 890-1440
Circle 845

SYKES DATATRONICS INC.
159 E. Main St.
Rochester, NY 14604
(716) 325-9000
Circle 846

SYMBOLICS INC.
Eleven Cambridge Center
Cambridge, MA 02142
(617) 576-1043
Circle 847

SYNALTA SYSTEMS
31-4 Broadway
Astoria, NY 11106
(212) 728-6700
Circle 848

TECMAR INC.
6225 Cochran Rd.
Solon, OH 44139
(216) 349-0600
Circle 849

TELERAM COMMUNICATIONS CORP.
2 Corporate Park Dr.
White Plains, NY 10604
(914) 694-9270
Circle 850

TELETEK ENTERPRISES INC.
4600 Pell Dr.
Sacramento, CA 95838
(916) 920-4600
Circle 851

TELEVIDEO SYSTEMS
1170 Morse Ave.
Sunnyvale, CA 94086
(408) 745-7760
Circle 852

TEXAS INSTRUMENTS INC.
P.O. Drawer 1255
Johnson City, TN 37605-1255
(615) 461-2500
Circle 853

TEXAS INSTRUMENTS INC.
P.O. Box 225474
Dallas, TX 75266
Circle 854

T L INDUSTRIES INC.
2541 Tracy Rd.
Toledo, OH 43619
(419) 666-8144
Circle 855

TOLERANT SYSTEMS
81 East Daggett Dr.
San Jose, CA 95134
(408) 946-5667
Circle 856

TOSHIBA AMERICA INC.
2441 Michelle Dr.
Tustin, CA 92680
(714) 730-5000
Circle 857

TRIANGLE DIGITAL SERVICES LTD.
100A Wood St.
London, E17 3HX England
(01) 520-0442
Circle 858

ULTIMATE CORP.
77 Brant Ave.
Clark, NJ 07066
(201) 388-8800
Circle 859

U.S. DATA
1551 Glenville
Richardson, TX 75081
(214) 680-9700
Circle 860

VECTOR GRAPHIC INC.
500 N. Ventu Park Rd.
Thousand Oaks, CA 91320
(805) 499-5831
(800) 235-3547
(800) 322-3577 (CA)
Circle 861

VISUAL TECHNOLOGY INC.
540 Main St.
Tewksbury, MA 01876
(617) 851-5000
Circle 862

WANG LABORATORIES INC.
One Industrial Ave.
Lowell, MA 01851
(617) 459-5000
Circle 863

WAVE MATE INC.
14009 S. Crenshaw Blvd.
Hawthorne, CA 90250
(213) 978-8600
Circle 864

WICAT SYSTEMS INC.
1875 South State St., P.O. Box 539
Orem, UT 84058
(801) 224-6400
Circle 619

WINTECH SYSTEMS INC.
Box 121361
Arlington, TX 76012
(817) 274-7553
Circle 620

WINTEK CORP.
1801 South St.
Lafayette, IN 47904-2993
(317) 742-8428
Circle 621

XEROX CORP.
Xerox Square 006
Rochester, NY 14644
(716) 423-5078
Circle 622

XYCOM INC.
750 W Maple Rd
Saline, MI 48176
(313) 429-4971
Circle 623

ZENDEX CORP.
6700 Sierra Lake
Dublin, CA 94508
(415) 828-3000
Circle 624

ZENITH DATA SYSTEMS
1000 Milwaukee Ave.
Glenview, IL 60025
(312) 391-8192
Circle 625

ZENTEC CORP.
2400 Walsh Ave.
Santa Clara, CA 95050
(408) 727-7662
Circle 626

ZIATECH CORP.
3433 Roberto Ct.
San Luis Obispo, CA 93401
(805) 541-0488
Circle 627

ZILOG INC.
1315 Dell Ave.
Campbell, CA 95008
(408) 370-8000
Circle 628

Advertisers Index

Able Computer 1
Advanced Digital Corp. 34
Archive Corp. 122-123
Cambridge Digital Systems (Div. of Compumart) 29
CDI Information Systems Inc. . . . 10-11
Centronics Data Computer Corp. 128-129
Century Data Systems (A Xerox Co.) 117
CIE Terminals 12
CompuPro 93
Convergent Technologies 6-7
Data Electronics Inc. 8
Data Management Labs C3
Data Packaging 83
Dataram C2
Delta Airlines 97
Electronic Conventions 46
Esprit Systems, Hazeltine Terminals Div. 20-21
Faraday Electronics 25
Fujitsu America Inc. 65-68
Gould Inc., S.E.L. Computer Systems Div. 15
Hewlett-Packard 84B-84C
IMI (International Memories, Inc.) 96-97
Innovative Data Technology (IDT) . 133
Iomega Corp. 55
LaPine Technology 31
Logical Microcomputer 88
MCG Electronics 88
Memorex—OEM (A Burrough Co.) 115
Meridan Systems 140
Micom Systems Inc. C4
MicroCraft 50
Microscience International 131
Micro Technology 118
Mini Micro Systems 84A, 137
MPI (Utah) 124
Mupac Corp. 75
Network Products 14
Northern Telecom 108-109
Okidata Corp. 26
Pacific Microcomputers 75
PC Products 84D
Philips Peripherals 22, 41
Plexus Computers 2
Primages 95
Sola, a unit of General Signal 98
SyQuest Technology 39
TeleVideo Systems Inc. 80-81
Tulin 70
Universal Data Systems Inc. 4
Wave Mate 16
Western Digital 32-33
Zilog Inc. 76

See P. 140 for Mini-Micro Marketplace

REGIONAL SALES OFFICES

BOSTON
Robert K. Singer
National Sales Manager

Norma E. Lindahl
Assistant To The National Sales Manager

John J. Fahey
Regional Manager
Katie Kress
Sales Coordinator
221 Columbus Ave.
Boston, MA 02116
(617) 536-7780

PHILADELPHIA
Stephen B. Donohue
Regional Manager
999 Old Eagle School Rd.
Wayne, PA 19087
(215) 293-1212

ATLANTA
Larry Pullman
Regional Manager
6445 Powers Ferry Rd.,
Ste. 140
Atlanta, GA 30339
(404) 955-6500

CHICAGO
Robert D. Wentz
Regional Manager
Marianne Majerus
Sales Coordinator
Cahners Plaza
1350 E. Touhy Ave.
P.O. Box 5080
Des Plaines, IL 60018
(312) 635-8800

DALLAS
Don Ward, Regional Manager
13740 Midway Suite 515
Dallas, TX 75234
(214) 980-0318

DENVER
John Huff
Regional Manager
270 St. Paul St.
Denver, CO 80206
(303) 388-4511

LOS ANGELES
Len Ganz
Regional Manager
12233 West Olympic Blvd.
Los Angeles, CA 90064
(213) 826-5818

ORANGE COUNTY
Debra Huisken
Regional Manager
2041 Business Center Dr.
Suite 109
Irvine, CA 92715
(714) 851-9422

SAN FRANCISCO
Frank Barbagallo
Regional Manager
Rick Jamison
Regional Manager
Janet Ryan
Regional Manager
Laura Obradovic
Sales Coordinator
Sherman Building, Suite 1000
3031 Tisch Way
San Jose, CA 95128
(408) 243-8838

AUSTRIA
Elan Marketing Group
Neutor g. 2
P.O. Box 84
1010 Vienna, Austria
Tel: 43-222-663012 or -638461

BENELUX
Elan Marketing Group
Boschdijk 199B
5612 HB Eindhoven
The Netherlands
Tel: 32-40-455724

ISRAEL
Elan Marketing Group
13 Haifa St., P.O. Box 33439
Tel Aviv, Israel
Tel: 972-3-252967 or -268020
Telex: 341667

JAPAN
Tomoyuki Inatsuki
General Manager
Trade Media Japan Inc.
R. 212 Azabu Heights
1-5-10 Roppongi Minato-ku,
106, Japan
Tel: (03) 587-0581

TAIWAN
Mr. Donald H. Shapiro
Trade Winds, 2nd Floor
132 Hsin Yi Road, Sec. 2
Taipei, Taiwan

UNITED KINGDOM
Elan Marketing Group
5th Floor, Suite 10
Chesham House
136 Regent St.
London W1R 5FA
Tel: 437-6900
Telex: 26153

SWEDEN
Elan Marketing Group
Humlegardsgatan Nr. 5
11446 Stockholm, Sweden
Tel: 46-8-677243 or -676243

WEST GERMANY
Elan Marketing Group
Sudring 53
7240 Norb/Neckar, West Germany
Tel: 49-7451-7828

Mini-Micro Marketplace
Lorraine Marden-Komar
221 Columbus Ave.
boston, MA 02116
(617) 536-7780

Direct-Response Postcards
Carol Anderson
221 Columbus Ave.
Boston, MA 02116
(617) 536-7780

Career Opportunities
Peggy Gordon
Recruitment Advertising Manager
P.O. Box 10277
8 Stamford Forum
Stamford, CT 06904
(203) 328-2550

Cahners Magazine Division
J.A. Sheehan, President
William Platt
Executive Vice President
Tom Dellamaria
VP/Production
Ira Siegel, VP/Research

Promotion Staff
Susan Rapaport
Marketing Communications Director
Wendy Whittemore
Promotion Coordinator
Mary Gregory
Promotion Coordinator
Liz Phillips
Promotion Assistant

Circulation
Denver, CO:
(303) 388-4511
Sherri Gronli
Group Manager

Mini-Micro MARKETPLACE

Products and services for the value-added market.

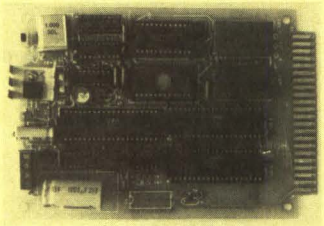
READERS: Please circle reader service numbers for additional information.

CMOS AND IN-CIRCUIT EMULATION

Now! The Microsport® Microcomputer (MMC) is the only CMOS 65SC02 and companion in-circuit emulator (pat. pending) system to offer low power and low cost software development. Maximum I/O flexibility with 2-65SC22's & a 65SC51 or 2-65SC51's plus full duplex 20ma. current loop. Expandable using the Microsport® Bus (vertical) at no I/O over head. Kits-$119.00 & A&T $159.00. MC & VISA.

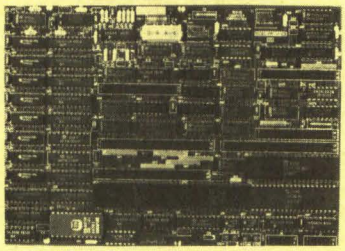
R.J. Brachman Associates, Inc.
PO. BOX 1077
Havertown, PA., 19083
(215) 622-5495

Microsport® is a reg. TM of R.J. Brachman Associates, Inc.



CIRCLE NO. 200 ON INQUIRY CARD

MINI Z80B



SERVO 8 Single Board Computer

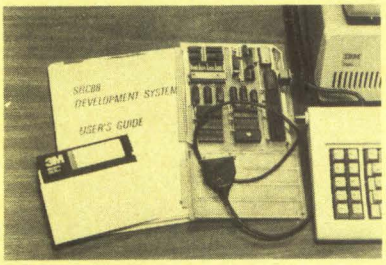
- 5.75" by 8", same as a minifloppy
- Fast, 6 megahertz with no wait states
- Controls both 5.25" and 8" floppy drives
- SASI bus controls 10 megabyte Winchester
- 64K RAM and 2K EPROM, both expandable
- 2 RS232 serial ports and Centronics port
- Runs CP/M and OASIS operating systems
- Special introductory price, only $495.
- In stock, 5 day delivery — VISA M/C COD

SERVO

SERVO COMPUTER CORPORATION
360B N. ELLENSBURG ST. BOX 566
GOLD BEACH, OREGON 97444
(503) 247-2021

CIRCLE NO. 201 ON INQUIRY CARD

IBM PC - 8088 PROTOTYPE DEVELOPMENT SYSTEM

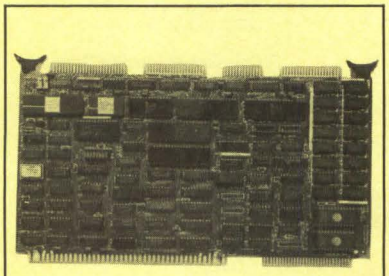


$500 Package Includes:

- SBC88 Board with 8088, iRAM, monitor ROM, Parallel and Serial I/O, Interrupt Controller, Timers and WW area.
- Software: Assembler, utility program; develop program on PC, down load and on-line debug.
- Cable: SBC88 to IBM PC Serial Port
- User's Guide

Meridian Systems
321 Aviador Street, Suite 111
Camarillo, CA 93010
805/484-8696 TWX 910-332-1292

CIRCLE NO. 202 ON INQUIRY CARD

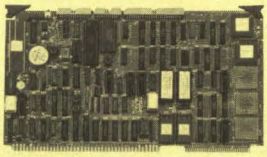


THE SBC90A designed for multiprocessor/ slave or I/O processor, has on card Z80A (4MHZ); DMA; 128K dual ported RAM, no wait state, byte/word accessible; MEMORY MAP RAM; EPROM sockets up to 32K; 2 RS232; 2 parallel ports; 3 counter/timers; floppy disk controller; hard disk interface; math chip AM9511; 20-bit address; 21 vectored interrupts. Multibus compatible.

INNOVATIVE RESEARCH INC. 17071 Kampen, Ln., Huntington Beach, CA 92647 (714)842-0492. Multibus trademark of Intel.

CIRCLE NO. 203 ON INQUIRY CARD

OMNIBYTE™



OB68K/MMU™ SINGLE BOARD COMPUTER WITH OPTIONAL MEMORY MANAGEMENT ON THE IEEE 796 BUS

• 10MHz 68010 Virtual Memory Processor • Up to (4) 68451 Memory Management Units are optional • High speed iLBX* memory port • 8 channel DMA port • (2) RS-232C serial ports • 4/16K RAM • (2) 28-pin ROM sockets • Two year limited warranty.
*iLBX is a trademark of Intel Corp.

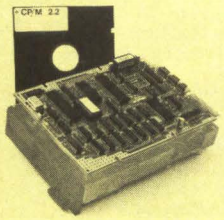
OMNIBYTE CORPORATION
245 W. Roosevelt Road
West Chicago, IL 60185
(312) 231-6880

CIRCLE NO. 204 ON INQUIRY CARD

The Little Board®

Quantity One... $349*

The world's simplest and least expensive single board computer



*Substantial Quantity discounts available

- **4mHz Z80A† CPU, 64K RAM**
- **Two RS232 serial ports**
- **Mini floppy controller**
- **Parallel printer port**
- **On-board -12V converter**
- **Only 5.75 × 7.75 inches**
- **Power Requirement: +5VDC @ .75A; +12VDC @ .05A**
- **Screws directly onto a mini floppy drive**

All this... and CP/M†† 2.2 also!

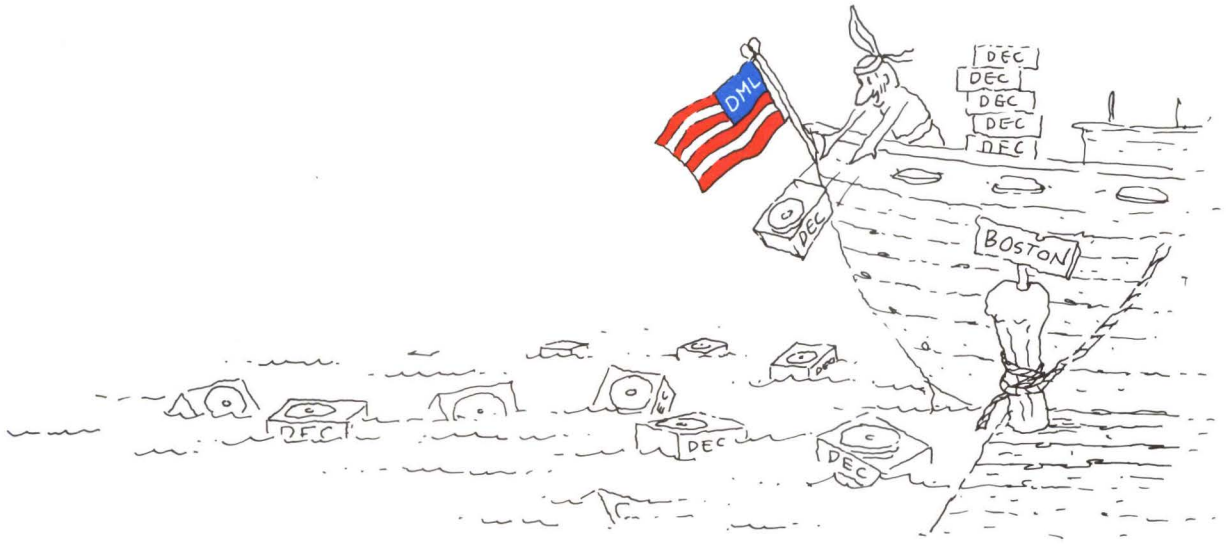
† Z80A is a registered trademark of Zilog, Inc.
†† CP/M is a registered trademark of Digital Research.

AMPRO COMPUTERS, INCORPORATED
67 East Evelyn Ave. • Mountain View, CA 94041 • (415) 962-0230

CIRCLE NO. 205 ON INQUIRY CARD

New! DEC UDA50 Performance and function for Q-Bus Systems
See Us at NCC '84 - Booth 3556

DML's DEClaration Of Independence



DEC's-ation without representation is . . . well, you know the story. Particularly if you've been searching for 100% compatible DEC UDA50 alternative disk subsystems.

Search no more.

DML offers a family of high performance, DEC compatible subsystems and Winchester disk drives for the PDP-11 and VAX UNIBUS product lines that support DEC's Digital Storage Architecture (DSA); and now brings the same high performance to Q-Bus systems.

Along with performance features like command stacking, seek overlap and 51-sector speed matching buffer, the DML alternatives are faster and offer more capacity. Plus, they cost a lot less — 25% less.

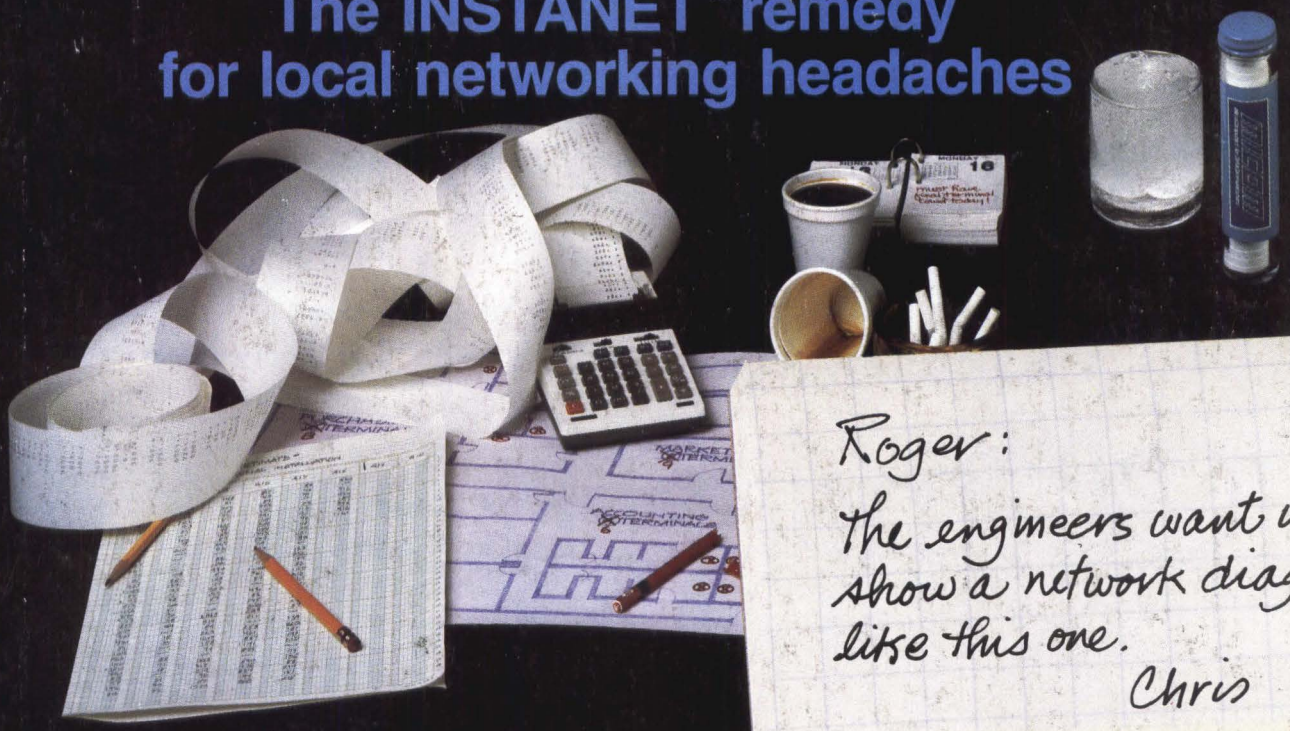
And, they are backed by a company that has manufactured and shipped thousands of Winchester disk subsystems, with OEM service and support internationally.

So, if you want to put an end to tyranny, try a little Boston Tea Party of your own. See what it feels like to be free. Call or write Gordon Orsborn, VP Marketing, Data Management Labs, 2180 Bering Dr., San Jose, CA 95131; (408) 946-9424.

DML
Data Management Labs

CIRCLE NO. 2 ON INQUIRY CARD

The INSTANET™ remedy for local networking headaches



Headache

It's too early to make a long-term commitment to baseband or broadband.

We don't want to get involved with more layers of protocol and more incompatibilities.

Fiber optic cable and coax are expensive and messy to install.

We're not ready to put in a whole network now.

We already own a good deal of datacomm gear.

Division/Group DP Managers want control of their own local datacomm.

We need Gateways:

- To the switched phone network
- To Packet Data Networks
- To other local networks.

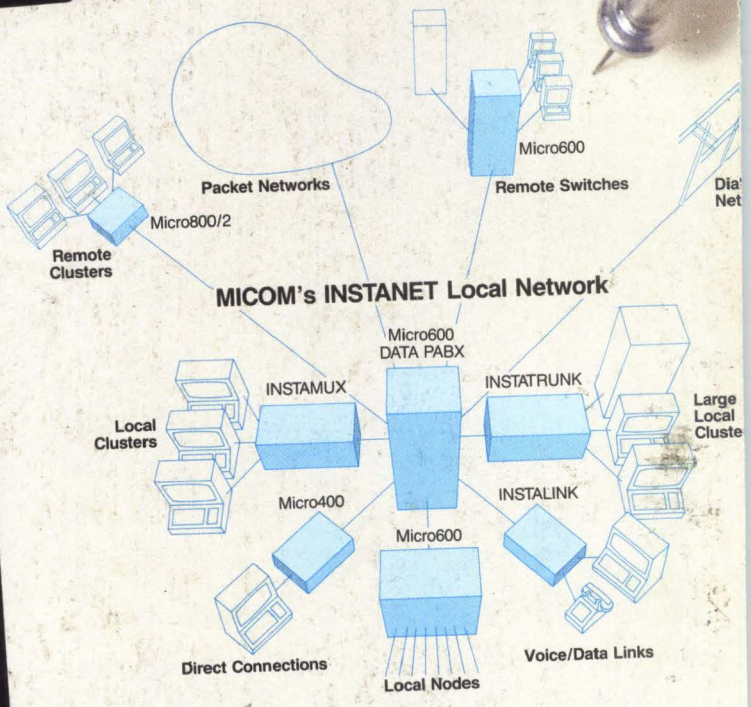
WE NEED IT FAST!

We don't want to spend an arm and a leg.

Roger:

The engineers want us to show a network diagram like this one.

Chris



Not in my ad!

Roger

MICOM®

MICOM SYSTEMS, Inc. • 20151 Nordhoff Street • Chatsworth, CA 91311 • Telephone (805) 583-8600 • TWX 910/494-4910
Regional Sales/Service • Atlanta, GA • (404) 435-2999 • Boston, MA • (617) 527-4010 • Chicago, IL • (312) 789-2430
Dallas, TX • (214) 258-0774 • San Francisco • (415) 327-0890 • St. Louis, MO • (314) 576-7626 • Teaneck, NJ • (201) 836-4000
MICOM-BORER Ltd. • Bel Court • 15 Cradock Road • Reading, Berkshire RG20JT, England • (0734) 866801 • Telex 847135

For literature please call: (800) "MICOM U.S."

CIRCLE NO. 3 ON INQUIRY CARD