Computers for professionals from professionals.
At last, help for companies wrestling with the problems created by personal computers.

"Overrun."
"Invaded."
"Swamped."

DP managers use a variety of terms to describe the arrival of so many different personal computers on the business scene. But the feeling is always the same.

After all, most managers have spent years developing well-controlled information systems. Now, almost overnight, they are losing control.

And while there's no arguing that PCs are valuable tools for individual productivity, everyone would prefer a more integrated approach for the company.

What's needed is a system that combines corporate data base capability with the personal computer capabilities employees now insist upon. A system with the capacity to extend the functionality of the corporate network to the individual local level. This is exactly what Honeywell has built.

The microSystem 6/10.

The cost-efficient microSystem 6/10 is a multi-personality workstation that provides an impressive range of functions — including networking.

Besides personal computing, the system handles data processing and word processing. It can function as a network end-point and a terminal emulator. What's more, power and flexibility make the microSystem 6/10 perfect for adaptation to industry-specific applications.

The microSystem 6/10 helps ensure organizational unity through excellent communications — it talks to IBM mainframes as readily as to our own.

It also offers expandable hardware and our time-proven GCOS operating system, which is compatible across the entire range of Honeywell minicomputer products, including even the most powerful 32-bit systems. This compatibility assures easy progress along your growth path by eliminating the need to re-create applications and retrain personnel.

Fight fire with fire.

Best of all, perhaps, the microSystem 6/10 will be an immediate hit with employees wed to their PCs. Because it accepts popular software packages based on CP/M-86® and MS-DOS®, chances are your people won't have to give up their favorite programs.

The microSystem 6/10.

Here's the way to win the battle against "PC Pandemonium."

And the war for control.

For more information, call 800-343-6665 (within the 617 area, call 392-5246) or write to the Honeywell Inquiry Center, 200 Smith Street (MS 440), Waltham, Massachusetts 02154.

Together, we can find the answers.

Honeywell

CP/M-86 is a registered trademark of Digital Research, Inc. MS-DOS is a registered trademark of Microsoft, Inc.
About the Guide

The Computerworld Buyer’s Guide to Computer Systems is a reference manual containing concise descriptions of computer system products and short profiles of the vendors selling these products.

The guide is divided into four major product sections — mainframes (Section A), superminicomputers (Section B), minicomputers/small business systems (Section C), and microcomputers (Section D). Each of these sections is preceded by a divider, with a fold-out tab identifying the product section.

Vendors are listed alphabetically within each section. Each vendor’s products are also listed alphabetically.

**DEFINITIONS**

For purposes of this guide the following definitions apply:

**Mainframe**: A mainframe is a general purpose computer system that is usually priced from a low price of about $100,000 to upwards of several million dollars. These systems usually have a word-length greater than 32-bits and an enormous amount of online storage. It requires special environmental conditions and is housed in a separate room.

**Superminicomputer**: Although smaller than a mainframe, the superminicomputer, also a general purpose system, often has a power range and price structure that overlaps that of a low-end mainframe. Generally superminis have a word-length of 32-bits. Although they are high-performance systems, they do not have the throughput of mainframes.

**Microcomputers**: This category of products is diverse, generally encompassing systems built around 8-bit or 16-bit architecture with varying power capability. Included within the microcomputer tab are standard microcomputers, high-end superminis, personal computers, desktop computers, hand-held computers, and portable computers.

**Minicomputers**: These systems are generally distinguished by 16-bit architecture, although other word-lengths are also used. They are general purpose in nature, but can also be sold as tools or as a packaged solution. They can operate effectively as small business systems or distributed processors.

**Small Business Systems**: These units, built around either minicomputer or microcomputer architecture, are generally marketed to smaller businesses and are often sold with packaged application software.

**Superminicomputers**: The category of products is diverse, generally encompassing systems built around 8-bit or 16-bit architecture with varying power capability. Included within the microcomputer tab are standard microcomputers, high-end superminis, personal computers, desktop computers, hand-held computers, and portable computers.

**PRODUCT LISTINGS**

Specific product listings in the Computerworld Buyer’s Guide to Computer Systems contain details about the product’s operating system, word length, languages supported, minimum and maximum memory capacity, maximum on-line storage, communications protocols supported, sales and maintenance information and, where possible, the number of units installed to date.

Each vendor’s product listing also contains a cross reference directing the reader to the appropriate page for the vendor’s company profile.

The prices of computer systems listed in this guide generally span a range. This range is comprised of the price of a small configuration of the vendor’s product and the price of a large configuration of the product. A configuration consists of the processor, an on-line storage device, a hard-copy device, a terminal and a tape or other backup storage device where appropriate.

If vendors did not provide a price range for their systems the price shown in the product listing is the price for an average or medium or small or large configuration.

The maintenance fees shown in the products listing are monthly fees.

**COMPUTER CONSOLES, INC.**

**POWER 5/20**

**Mini** Specific Application: Transaction Processing

**Word Length**: 16-bit

**Operating System**: PERPOS

**Languages Supported**: Cobol; Fortran; Basic; C

**Minimum Memory**: 1M bytes

**Maximum Memory**: 4M bytes

**Multiple Users**: Yes; 32

**Maximum On-Line Storage**: 210M bytes

**Maximum I/O Ports**: 32

**Communications Protocols**: Asynchronous; Synchronous

**Distribution**: End user

**Vendor Sales Terms**: Purchase; Rental; Lease

**Purchase Price**: $28,000

**Maintenance**: On-site

**Date First Installed**: July 1982

(See Vendor Profile Page V-5)
About the Guide

COMPANY PROFILES The company profile section of the Computerworld Buyer's Guide to Computer Systems contains each vendor's address and telephone number as well as a listing of key management, marketing and/or technical personnel within the firm. In addition, the profile includes the company's target markets, revenue, and geographic market coverage, among other details.

Note: Vendors were offered the option of placing their company name in a larger type-face than the standard listing size. Vendors were also offered the opportunity to add a boxed insert at the end of their listing. These options were paid for by the vendors and should in no way be construed as an endorsement of these companies or products by the publishers of the Computerworld Buyer's Guide to Computer Systems.

VENDOR/PRODUCT INDEX The vendor/product index provides a quick glimpse of specific vendors and products featured in the guide. The index is arranged alphabetically by vendor, followed by the name of each product listed in the product section of the guide. A section and page number follows each product name to allow the reader to easily find the products he or she is interested in learning about.

An excerpt from this index is shown below.

PRICE INDEX A price index is featured in the Computerworld Buyer's Guide to Computer Systems to give readers a simplified view of the cost of specific products. The price index is divided into 10 ranges, with vendors listed alphabetically within each range, followed by the specific system and its price and a page notation. If a reader has determined the approximate amount he or she is prepared to spend for a particular system, the price index provides a means of narrowing down the necessary prospects and thus eliminating unnecessary browsing in the product section of the guide.

Systems Under $5,000

<table>
<thead>
<tr>
<th>Vendor</th>
<th>System Description</th>
<th>Price</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Matrix Corp.</td>
<td>ACCESS COMPUTER</td>
<td>$2,495</td>
<td>D-1</td>
</tr>
<tr>
<td>Action Instruments Co., Inc.</td>
<td>BC 2</td>
<td>$2,000</td>
<td>D-1</td>
</tr>
<tr>
<td>Advanced Digital Products, Inc.</td>
<td>PDQ-3</td>
<td>$2,995</td>
<td>D-1</td>
</tr>
<tr>
<td>Advanced Informatics, Ltd.</td>
<td>INFORMER II</td>
<td>$1,500</td>
<td>D-1</td>
</tr>
<tr>
<td>Advanced Micro Digital Corp.</td>
<td>SUPERQUAD</td>
<td>$2,200</td>
<td>D-2</td>
</tr>
<tr>
<td>Alcyon, Inc.</td>
<td>A68KPM</td>
<td>$3,000</td>
<td>C-1</td>
</tr>
</tbody>
</table>
The Computerworld Buyer’s Guide to Computer Systems is the premiere issue of a series of market specific reference guides that will be published on a regular basis throughout the year.

During 1983, in addition to the computer systems guide, Computerworld will also publish a Buyer’s Guide to Terminals & Peripherals in early October and a Buyer’s Guide to Software that will appear in late November. Other volumes covering additional specific markets will appear in 1984.

These volumes will also be updated on a regular basis, some annually and others more frequently.

The idea behind the guides is to help Computerworld readers make informed purchasing decisions about the mind-boggling array of computer and computer-related products in the marketplace today. One way of doing this is to compile a comprehensive reference manual to vendors and their products that enables readers to obtain a quick, encapsulated view of the products and vendors to be found in the dynamic computer industry. Because each volume of the Buyer’s Guide series is limited to a specific product category, readers can conveniently look up information without having to plow through unwieldy directories. In addition, the guides will contain a variety of indices which make the process of finding information even easier.

And, unlike other guides, the Computerworld Buyer’s Guide series also has a special magazine section at the beginning of the volume, which features articles by experts on a variety of technological and industry issues related to the specific topic of the guide. The magazine is designed to give readers a perspective on the current and future state of the market for specific products and the vendors of those products, profile state-of-the-art technologies to give a view of what directions products are heading in the future and to provide a new way of thinking about information processing.

The Buyer’s Guide series is another service Computerworld offers to its readers as part of their subscription. Currently, the guides will be sent to our more than 110,000 domestic subscribers.

Compiling these Buyer’s Guides is a complicated process. To achieve this, we have enlisted the services of International Data Corp., a well-known computer industry market research firm. To capture the data needed for the Buyer’s Guides, IDC established the Enterprise File, a data base containing information on the companies that produce or provide computer-related products and services.

The project was started in April 1982 and is a complement to IDC’s Data File, a comprehensive data base of end-user facilities.

Information for the Enterprise File is gathered and updated regularly by IDC through printed questionnaires and telephone surveys. To date, the file has records on nearly 12,000 companies and is expects to have 35,000 to 40,000 product entries for inclusion in the file in the near future.
Digital's Field Service.
We don't just guess when we'll get there.
We guarantee it.

When a computer goes down, you want a service rep at the site. Fast. You're not interested in vague arrival times, dispatcher's lunch breaks, or the rep's workload. You want action.

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At Digital, we take field service as seriously as you do. That's why we'll tailor our service agreements to meet the specific requirements of your business, whether you need 7-day/24-hour service, planned maintenance, Remote Diagnosis, or any of our other innovative service options.

With over 16,000 service people worldwide and with the latest and most advanced service technology to draw on, we are totally committed to backing up our computers, wherever they are. So you can be sure that we'll do everything possible to keep your Digital computers running smoothly. And to be there in a hurry when they're not.

Giving Old Strength New Weight
By Frederic G. Withington
Are mainframes obsolete? Never! Specialized modules are breathing new life into the market for high-end systems.

Finding Balance in The Mini Market
By Robert W. Hauserman
The 32-bit superminicomputer will be the traditional mini by the end of the decade. But the 16-bit mini still has a lot of life.

The Explosion Continues
By Everett T. Meserve
No longer a stand-alone system, the personal computer is quickly becoming an integrated workstation.

An Interview with Gene Amdahl
By Marcia Blumenthal
Gene Amdahl has a new concept for fault-tolerant systems and is putting that idea to work at his second start-up firm, Trilogy Systems Corp.

Who’s Taking Care of The System?
By John Harnett
Maintenance is changing now that micros and mixed configurations are filtering through organizations.

Disaster Recovery Planning — Insuring Against The Unthinkable
By Gary Tarkington/Walter Ulrich
New technology is making the need for disaster recovery plans even more critical.

The Micro Parade
By Esther Dyson
Personal computers are gaining new capabilities. A close-up of three major systems.

Technology Architecture — Keeping the Future In Perspective
By G. Michael Ashmore
A planning methodology for integrating new technology into the corporate information processing environment.
The computer industry is vibrant and flourishing and shows no signs of slowing down. Evolving technology constantly provides new applications for computer systems. The stories on the following pages discuss the latest technological developments and industry trends in the three major hardware sectors — mainframes, minicomputers and microcomputers.
Make sure the pieces in your system fit.

Piecing together the right elements to build and complete a system for your organization is a complicated and time-consuming process. The constant flow of new products and rapidly changing technology presents a real challenge to those involved in planning and purchasing. The Computerworld Buyer's Guide to Terminals & Peripherals provides all the information you need to make the right choices for your system requirements.

The Computerworld Buyer's Guide to Terminals & Peripherals is the second in our buyer's guide series and provides detailed, all-inclusive listings and in-depth purchase decision information that DP professionals need as this market continues to grow. Listings are divided into two sections: complete product listings and vendor profiles. Product listings include name and model number, operating system environment, number of installations, delivery and price data, etc. Vendor profiles include company name, address, contact information, primary markets served and more. Tab dividers separate each category and cross references add to ease-of-use.

Buyers will refer to Computerworld Buyer's Guide to Terminals & Peripherals again and again for vital purchasing information. And advertisers will find this guide a powerful vehicle for telling their story to Computerworld subscribers at that crucial moment when they are actively seeking vendors.

The issue date for the Computerworld Buyer's Guide to Terminals & Peripherals is October 5.

The Computerworld Buyer's Guides are sent exclusively to the more than 111,000 Computerworld subscribers in the U.S. One more good reason to subscribe to Computerworld.

For more information on the Computerworld Buyer's Guides, call Kevin McPherson at (617) 879-0700 or your local Computerworld sales representative.

The Computerworld Buyer's Guide to Terminals & Peripherals puts it all together for you.
The latest personal computers and superminis have exhibited amazing price/performance characteristics and promise to get better. Because most mainframes offer less computing performance per dollar than these units, some people conclude mainframes are becoming obsolete. This is a myth. There are at least three major information processing functions mainframes will continue to dominate indefinitely.

**Batch Production.** High-volume, periodic batch applications were the first uses for business computers, and they will continue to exist. Payrolls must be prepared periodically for thousands of employees; invoices must be prepared for thousands (even millions) of customers; welfare checks must be prepared for millions of recipients.

The systems needed for these tasks are more mechanical than electronic: multiple high-speed printers, farms of disks and tapes and clusters of data entry terminals must be kept humming.

The control computers required must emphasize device control, interrupt structures and complex control software. These add to system cost and overhead without contributing to computing speed, so batch production mainframes can be expected to have relatively low computing speed per dollar — but will always be needed.

**Number Crunching.** There continue to be problems that require more computing power than any supermini can deliver (the National Weather Service, for instance, wants supercomputers with 1,000 times the power currently available). Supercomputers will remain expensive so they must be shared. They also have I/O and file processing needs. They are therefore specialized versions of main-
frames. However, they are becoming modular. Increasingly common are specialized vector or array processor modules (whose computing performance per dollar is far beyond that of superminis, though only for limited application) which are connected to modest mainframes.

Data Base Management. Some data bases need to be managed centrally, because updates may come from many points in the network. Methods exist to synchronize distributed copies of data bases, but so far users have generally judged them impractical.

Systems oriented to data base management have some of the characteristics of batch systems (complex device-control function), but also require a tremendous amount of power to interpret queries, process indices, unblock data and so on.

The recent proliferation of personal computers and superminis has fostered the growth of database-oriented applications, and therefore of central mainframes with ever-increasing power to manage them. Growth will continue, particularly as text, image and digitized voice information begins to be added to data bases.

The mainframe will live, then, but it cannot be expected to have market growth as dynamic as that of personal computers or superminis. While the value of personal computer shipments is forecast to grow at a compound annual rate of 35% from 1981 to 1986 and the value of minicomputer shipments will grow at 20%, the compound annual dollar value growth of mainframes will be only 7%.

Recognizing this sluggish dollar value growth in mainframe shipments, mainframers are becoming increasingly active in the low-end system market.

One reason for this slow growth is the declining cost of electronic components, as a result of this, mainframe power will be met at relatively little increase in mainframe price.

A second and more important market limitation is "site saturation": a mainframe is already in place at almost every site that will have one in 1986. Therefore, growth can only be through upgrading.

This site saturation has also tended to freeze the competitive pattern. Most potential users of new mainframes have already had earlier models for some time and have invested in programs for them. These programs are manufacturer-specific, so the user must undergo a conversion to switch manufacturers. History shows that this happens only rarely. The incumbent manufacturer has a strong advantage when the user wants to change mainframes IBM, Sperry Corp., Honeywell, Inc. and Burroughs Corp. know this well and have moved to exploit their advantages so any erosion of their customer bases will be slow.

Evolving technology may begin to melt the frozen competitive picture. Mainframes are becoming modular. Front-end communications processors have long been sold by specialized manufacturers to users of other manufacturers' mainframes.

But if history is a guide, the mainframe manufacturers will retain a substantial share of the market, but some innovative new companies are likely to capture a substantial share of the new market for specialized modules.

Other classes of modules are evolving that could be the province of specialists. They include:

Data Base Processors. These processors will be of many types, ranging from data base management systems offering extremely fast response for limited purposes (such as for airline reservation systems) to specialized text and graphic file servers designed for information retrieval and support of office information processing. Improvements expected in magnetic and optical disks will enhance the attractiveness of these office file servers. Britton-Lee, Inc. and International Computers, Ltd. are already active in the market.

Expert Systems. Also called knowledge-based systems, these are designed to help users in specific professional categories (such as financial analysis and medical diagnosis) to define problems, learn methods of finding solutions and then apply the solutions.

Processing software and data bases for expert systems contain the experience and knowledge of specialists in the field. Machine designs for expert systems may diverge from those for conventional computers, because they must often manipulate concepts and symbols rather than numbers, process relationships rather than sequential computational steps and have very large memories available. They may therefore take the form of specialized, time-shared modules accessed through general-purpose mainframes. Xerox Corp. and Symbolics, Inc. offer list language processors for research in expert systems.

Large-Scale Simulators. Today's supercomputers are often used to simulate the behavior of nuclear reactors and other large-scale complex systems. It is possible that very large arrays of microcomputers might be of use to form models of such systems, improving the precision of the simulations.

Clearly there is room for manufacturers of specialized modules in each of these market areas. These modules can be attached to future general-purpose mainframes of whatever design, either through a channel, bus or local-area network hookup. Equally clearly, the mainframe manufacturers are aware of these potentials and are doing their own homework.

The technology of specialized modules may then lead to a rejuvenation of the mainframe market. Even without it, however, the mainframe is far from obsolete.

Withington is a vice-president at Arthur D. Little, Inc. in Cambridge, Mass. Withington also directs the firm's annual series of information processing industry studies.
Superminis Step Ahead

Finding Balance In The Mini Market

By Robert W. Hauserman

Although some analysts have been accused of prematurely predicting the demise of the conventional 16-bit minicomputer for several years, recent trends suggest the 32-bit supermini will virtually become the "traditional" minicomputer by the late 1980s.

By the middle of 1982 there were more than 55 superminis available on the market from 19 vendors. With a predicted growth rate of approximately 56% each year through 1985, the 32-bit supermini now represents the fastest growing segment of a thriving minicomputer market.

According to International Data Corp. projections, superminis will comprise about 41.4% of total unit minicomputer shipments by 1986, up from 38.6% of the units shipments last year.

Originally directed at scientific number-crunching and real-time control applications, superminis continue to gain acceptance in conventional data processing applications as well, with many analysts predicting the commercial
sector will grow by as much as 40% each year.

The supermini features a longer word length, which leads to increased throughput, more precise computations and easier program development.

The advantages of superminis over the traditional 16-bit machine are a direct result of their extended word lengths. The maximum number of storage locations that can be directly addressed by the 16-bit word is only $2^{16}$ or 65,536. A 32-bit address, however, can specify up to $2^{32}$, or 4.29 billion distinct storage locations; therefore, the longer word length significantly expands a system's direct addressing capabilities, permitting effective use of the large physical main storage capacities that characterize most of the superminis.

A single 32-bit word provides enough precision to satisfy the demands of scientific and commercial computations, and most superminis are capable of processing double-precision (64-bit) operands. The common 16-bit minicomputer word length, however, is too short to provide the required precision in many applications, necessitating the use of time-consuming multiple-word operations.

Finally, a 32-bit supermini normally transfers twice as much information to or from main storage during each cycle as a 16-bit mini. This inherent performance advantage is further enhanced in many cases through the use of storage interleaving, cache memories and other power-boosting features.

Because it is based on minicomputer architecture, the supermini is more conducive to a multiuser, interactive processing environment than many mainframes are. They are in most cases easier to use, usually do not require special environmental conditions and generally require less power.

Superminis are being marketed for — and finding widespread user acceptance in — a broad spectrum of applications. Applications for superminis now fall into three broad categories: scientific/technical, commercial and combinations.

---

### Selected 32-Bit Minicomputer Systems

<table>
<thead>
<tr>
<th>Manufacturer and Model</th>
<th>Apollo Computer, Inc. DN420, DN600</th>
<th>Data General Corp. MV/Family</th>
<th>Digital Equipment Corp. VAX-11</th>
<th>Formation, Inc. 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workstations Supported</td>
<td>200</td>
<td>64 to 192</td>
<td>24 to 112</td>
<td>96</td>
</tr>
<tr>
<td>Memory Capacity (Bytes)</td>
<td>512K to 3.5M</td>
<td>1M to 16M</td>
<td>1M to 12M</td>
<td>256K to 8M</td>
</tr>
<tr>
<td>Virtual Memory</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Maximum Program Size (Bytes)</td>
<td>16M</td>
<td>512M</td>
<td>2G</td>
<td>16M</td>
</tr>
<tr>
<td>Parity Checking</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
<td>Standard</td>
</tr>
<tr>
<td>No. of Instructions</td>
<td>65</td>
<td>467</td>
<td>244</td>
<td>IBM/370 Inst. Set</td>
</tr>
<tr>
<td>Cache Memory (Bytes)</td>
<td>Optional</td>
<td>16K</td>
<td>8K (11/780)</td>
<td>No</td>
</tr>
<tr>
<td>Maximum Communications Lines</td>
<td>3 K</td>
<td>192</td>
<td>112</td>
<td>100</td>
</tr>
<tr>
<td>Price of CPU, Power Supply, Cabinet &amp; Minimum Memory</td>
<td>$28,900</td>
<td>$56,300 to $211,000</td>
<td>$48,900 to $495,000</td>
<td>$50,300</td>
</tr>
<tr>
<td>Date of First Delivery</td>
<td>3/81</td>
<td>10/80</td>
<td>2/78</td>
<td>8/80</td>
</tr>
<tr>
<td>No. Installed to Date</td>
<td>500</td>
<td>300</td>
<td>Over 2000</td>
<td>50</td>
</tr>
<tr>
<td>Applications Software Availability</td>
<td>Present, Trendview, Manap and CEO Electronic Office</td>
<td>Primarily IBM/370 Software- Compatible</td>
<td>3rd-Party Software</td>
<td></td>
</tr>
</tbody>
</table>
Commercial applications include distributed processing networks, off-loading of applications from large batch-oriented data centers and installations where large numbers of users must be supported simultaneously. In mixed technical and commercial environments the superminis are used for a wide range of interactive applications as well as for operations research functions that can help an organization improve its operations, allocate its resources and sharpen its decisions.

While initially aimed at the scientific and technical markets, current trends indicate the biggest push by supermini vendors during this decade will be in the area of business data processing, threatening the supremacy of the Digital Equipment Corp. 16-bit PDP-11 and Data General Corp. Eclipse families. A manifestation of this trend is that DEC's high-end 16-bit workhorse, the PDP-11/70, is no longer actively marketed.

Vendors are becoming increasingly aware that the business community is interested in machines that are cheaper than mainframes, yet at the same time offer large increases in processing power. The shift away from the scientific and technical markets toward the commercial sector is apparent: superminis are price/performance competitive with small mainframes. They allow users previously limited to time-sharing environments (because of a big mainframe price-tag) to afford an in-house system and they are more agreeable to multiuser and interactive environments.

Another indication of this trend is that in the last 15 months or so, the major supermini vendors have generally extended their product lines downward, clearly moving into the domain of the high-end 16-bit minis. After the introduction of the Eclipse MV/8000 in 1980, DG followed up with the MV/6000 at the end of 1981, and the MV/4000 at the end of 1982. DEC followed a similar path after the introduction of the VAX-11/780.
mark for this product, it was two times as fast as the IBM 4341 Model Group 12 at one-third the price. DEC officials hope to carve a permanent position with the MV/10000, especially in the technical markets, which suggests that, despite their courting of the commercial sectors, supermini vendors are not prepared to abandon the technical market to the conventional mainframe.

The major supermini vendors, such as Formation, Inc., with their established IBM-compatible F4000 supermini line, are bracing for an assault on the low-end mainframe market in the same way as the MV/4000 and VAX-11/730 have chipped away at the high-end 16-bit systems. Perhaps the two most recognizable trends within the supermini area lie in their cost effectiveness and software availability. Because the commercial segment is currently growing faster and offers a greater growth potential for the future than any other area of the 32-bit market, supermini vendors are hastening to provide the appropriate software tools to turn their systems into efficient business data processors. Prime already boasts a relatively strong complement of business-oriented software. The availability of 32-bit software, however, will expand slowly because of the enormous investment needed by vendors to produce such programs and the time it takes to develop 32-bit software packages. Much of the software available today is based on the 16-bit architecture and therefore cannot take full advantage of the 32-bit computer's processing power. The slow rate of software development is the reason the predicted demise of the 16-bit minicomputer is far from certain. If the fate of the PDP-11 family represents that of all 16-bit minis, then the minicomputer is, at least for the present, alive and well. It will take three to five years before there is a substantial amount of 32-bit software on the market.

Although DEC has recently dropped the high-end systems like the PDP-11/70 and 11/34, they seem to have concentrated on the lower end of the series with introductions like the Micro/PDP-11. With more software available for the PDP-11 line than any other system and more than 400 companies selling peripherals and add-on equipment for the series, it is certain the PDP-11 will be with us for several more years.

Finally, the end of the traditional 16-bit mini cannot happen until the price of 32-bit systems descend from their original and lofty $150,000-plus heights. However, during the past several months, this event has dramatically occurred.

Today, several systems, including the Eclipse MV/4000 with 1M byte of main memory and the VAX-11/730, offer working configurations in the $50,000 price range. As the perceived value of the 32-bit word length has sparked demand for products incorporating this architecture, the cost of providing these capabilities continues to decline. The cost of integrated circuits decreases every year. Moreover, as denser chips with more capabilities become available, fewer chips are needed. The eventual reductions in costs and size filter through the system design, reducing circuit-board areas and the cost of cooling, cabinets, power supplies and so on.

With the 32-bit superminis descending in price so dramatically, how low can price/performance ratios decrease before they level out? Supermini prices average on the whole around $90,000. According to some analysts, the cost will drop annually by about 15% for the next two to three years, leveling off somewhere between $40,000 to $50,000. The supermini then will truly have become the "traditional" minicomputer of the '80s.

Robert W. Hauserman is an associate editor for Datapro Research Corp.'s "Datapro Reports on Minicomputers," in Delran, N.J.
While the mainframe computer is moving towards maturity and the minicomputer is approaching middle-aged status, the microcomputer is still a mere flowering youth. Despite its youthful and glamorous position in the marketplace, it is becoming evident that the microcomputer industry will soon face a competitive shakedown. This shakedown will not be cataclysmic; it will instead occur as several major competitors corner a significant market-share position, leaving a smaller piece of the pie available to a growing number of less powerful competitors. In addition, at some point in the not-too-distant future, the growth rate of the microcomputer market will begin to level off. A taste of this type of competitive situation occurred last year in the small business system market as demand for these systems slowed, partially as a result of a poor economy, resulting in disastrous results for at least six firms in this market.

As industry participants — hardware and software suppliers, software developers, investors, resellers and service providers — look toward that eventuality, it is critical to consider and understand one of the key industry trends that is redefining the competitive environment — the metamorphosis from stand-alone to integrated personal computing.

In the summer of 1977, Radio Shack, Commodore Business Machines, Inc. and Apple Computer, Inc. almost simultaneously announced products that distinguished themselves from many of their predecessors by low prices.
and the integration of subsystems into one convenient unit. The microcomputer market took off and in the five years that followed another 100 to 150 microcomputer suppliers joined in to provide personal computing to business professionals, technical professionals, educators, small business manag-

ers and consumers.

The major focus of these suppliers has been to broaden the penetration and availability of microcomputers by introducing products with lower cost and expanded capabilities and by making available the all-important applications software that allows noncomputer professionals to justify and use personal computers. Since the summer of 1977 the keys to success have shifted from availability and hardware performance to market segmentation, application solutions and distribution.

The spread of micros to an estimated 800,000 business users has combined with other separate trends in office automation and integrated data communications to determine the foundation for the industry's growth for the next five to ten years.

During this upcoming period the competitive battle will continue to focus on the broad and diverse population of professional business users as they are drawn, encouraged, pushed and shoved toward the use of information technology to improve their professional productivity and to enhance their decision-making ability.

Tangible evidence of this competitive battle centers on the transition of microcomputers from individual, dedicated, stand-alone professional tools to system-integrated personal workstations.

The major market for today's desktop micros consists of the business and technical professionals working in large corporate organizations (who bought some 200,000 units in 1982). Many of these corporate professionals want to communicate via electronic mail and text communications networks, obtain data from corporate data bases for local manipulation, and secure information from public information sources.

While personal computers can provide this capability, they were designed primarily to operate as stand-alone, dedicated products. The integrated personal workstation, however, is designed with significant communications capability (but can also function as a stand-alone). Integrated personal workstations can be linked to one another with local-area communication networks, as well as to other systems using telecommunications facilities.

They are equipped with software that combines office automation, communication, decision and management aids with information processing functions. Eventually they will handle graphics and voice media as well as data and text.

The metamorphosis of today's stand-alone personal computer into tomorrow's integrated personal workstation is being aided by recent software announcements and joint venture arrangements which facilitate the linking of this limited stand-alone device to the rich resources and information wealth of the corporate mainframe.

Some examples of this integration trend are Peachtree Software, Inc.'s Executive Peachpak mainframe micro-link products announced last year; Tandy Corp.'s support of Datapoint Corp.'s Arcnet local-area network scheme; Vi-sicorp's and Informatics General Corp.'s announcement to link Vi-siAnswer with Informatics' Answer/DB software; and Cullinet Software, Inc.'s introduction of its Information Database which will link its data base system with the IBM Personal Computer and eventually with Apple Computer, Inc.'s Lisa system.

The significance of these early products linking mainframes to micros is to break the logjam created by an inability of personal computers to communicate with a centralized processor in a compatible format.

These moves are the first implementation of opening the door between local stand-alone computing capabilities and centralized information resources. This strategy will continue to be enhanced regularly during the next five years.

While it is convenient to view the integrated personal workstation as a technological offshoot of stand-alone microcomputers, extended application software and communications capability will eventually differentiate them.

Inadequate integrated applications software, limited communications infrastructures and evolving system architecture will constrain the early growth of integrated personal workstations for a few years. However, by 1990 workstations will be broadly used.

One of the major changes also necessary for integrating the personal computer into the corporate information processing structure is the transformation of the mainframe architecture into compartmentalized, specialized processors. Such processors include a data base processor, communications processor and file server processor, all controlled by the supervisory processor. These changes will provide the required throughput demanded by personal workstation users because it parcels out the jobs traditionally done by one processor into several discrete processors.

The changing complexion of the microcomputer market also creates important new keys to business success for vendors as they offer products that provide...
stand-alone performance vs. network operation, individual vs. integrated software and product vs. system marketing.

In an attempt to position themselves for success in the frothy integrated personal workstation environment, many vendors are increasingly entering into a variety of joint ventures. Joint ventures help spread the risk for vendors. These arrangements buy time and allow vendors to keep their technology current in a marketplace that is running at five times the speed of the historic computer market.

What does this scenario of industry evolution forecast for market growth? Today's original-purchase microcomputer — hardware and software market in the U.S. is approximately $2.9 billion. By 1987 it is expected to be near $10 billion.

As integrated personal workstations enter their growth phase (1985-1987) they will strongly compete with stand-alone desktop microcomputers. The result will be a maturing of the stand-alone microcomputer market, a market which will be only slightly larger in the early 1990s than it will be in the late 1980s.

The integrated personal workstation marketplace today is an embryonic business that will require another four to five years to reach its growth stage, but thereafter will grow dramatically, reaching $3 billion by 1987 and approximately $10 billion by 1992. At that point the size of the stand-alone microcomputer and integrated workstation markets will be equal.

This growth will require that files of data, text and graphics material be available to untrained users in a convenient manner, that communications facilities with appropriate bandwidth exist not only in the office but also between the office and other corporate networks, public information and central processing points, and that a wide variety of easy-to-use integrated software packages for manipulating data, text, graphics and voice be available. Also, prices must decline, the present embryonic products at $10,000 should cost no more than $5,000, and less capable versions may very well cost in the $1,000 to $3,000 range.

The marketplace for future professional micros and integrated personal workstations is critical to the futures of several groups of competitors. Companies seeking new business growth see the large potential user population — more than seven million managers and administrators in U.S. organizations — as an opportunity to provide new technology solutions for increasing professional productivity and responsiveness.

Desktop microcomputer vendors, who already have many business customers, see the integrated personal workstations as an extension of their own current offerings in the marketplace.

Terminal, computer and office product suppliers experiencing diminished growth due to industry maturity see the potential for renewed or expanded sales.

Each of these groups has important strategic reasons (such as survival or large potential rewards) to participate in the integrated personal workstation business. The rewards are enticing and the competition will be intense.

As has been true from the beginning in the evolving microcomputer industry, the keys to success will continue to change. Opportunities will be provided for new competitors to secure positions or for existing competitors to become stronger. Competitors which can provide (or be part of) an integrated capability or offering based on information and communications capability will have a significant edge.

Suppliers who can convey or demonstrate reliability, on-going support and investment protection will have an advantage. Advantages will also accrue to those who can reach and support widely dispersed users.

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Suppliers who can convey or demonstrate reliability, on-going support and investment protection will have an advantage. Advantages will also accrue to those who can reach and support widely dispersed users. Participants who have a current understanding of user applications, work requirements and environment, as well as how procurement decisions are made, will have a strong competitive advantage.

Some competitors will have adequate technology, products and systems orientation to provide integrated personal workstations, but these may not be enough.

For many the critical attribute may be endurance — the ability to remain viable while the system architecture, communications infrastructure and standards develop — that will move the marketplace toward long-term growth.

Meserve is a senior management consultant at Arthur D. Little, Inc., located in Cambridge, Mass.
When Gene Amdahl left Amdahl Corp. in 1979, starting another computer company was the last thing on his mind. Or so he said. A year later, however, he resigned as chairman emeritus from Amdahl, the company he founded in 1970, to form Trilogy Systems Corp.

Soft-spoken and dignified, Amdahl projects the image of an elder statesman of the computer industry, a role he confesses that sometimes disturbs him. Nonetheless, in his thirty-odd years of being a leader in the computer industry he has witnessed the unfolding of the history of commercial computing, an experience relatively few people share.

A budding physicist in a graduate program at the University of Wisconsin in 1950, Amdahl thought there was a better way to compute numbers than with a calculator and slide rule. That "better mouse-trap" emerged as the Wisconsin Integrally Synchronized Computer, now fondly known as the Wisc. Amdahl describes it as a one-ton version of today's hand-held calculators. The system had a main memory of 1,000 words, an overlap/pipeline which allowed the machine to perform four operations concurrently and an input/output mechanism which was the first channel that occurred in computers, Amdahl recalls. Amdahl designed Wisc with university support as an educational tool for training engineers in a new field called computers.

The Wisc remained operational at the university until 1959, when the last man able to maintain it retired and took it home with him, where it was used as a backdrop for a pistol range. After the man died, his family offered it to Amdahl. Smattered with bullet holes, today the Wisc, which looks like the stereotype of an infernal machine imagined by H.G. Wells, resides at Trilogy. Amdahl takes obvious pleasure in showing visitors his original design and telling about its history.

By the time the Wisc was built in 1954, Amdahl had already been working at IBM for two years. During his career at IBM Amdahl was the project engineer and chief designer of the IBM 704 and later was...
In charge of developing the architecture for the IBM 360, a principal in Magnuson Computer Systems, Inc.

Recently Amdahl met with Marcia Blumenthal, editor of Computerworld Buyer's Guides, to share some of his experiences in the computer industry and to discuss the upcoming Trilogy system.

What is the idea behind the new Trilogy system?

Basically our mission is to develop new semiconductor technology, which will be useful for many things besides computers. About 75% of the cost of our program is allocated to chip development and automated design techniques. The other 25% will go towards the computer system.

Who designed the chip that will be used in the system?

Carl and I worked it out ourselves. It's a new way of approaching redundancy. Chips used in other computer systems can't have any defects. Ours will permit many defects. That means chips that would have otherwise been rejected are considered good. The chip has active redundancy which will tolerate new faults even after the computer system is shipped. The greater percentage of the faults will never be noticed by anyone. This improves reliability and the mean time between failures will be measured in years rather than weeks. The reliability improvement allows a high yield on chip production and therefore brings the cost of a system down.

Are you using very large-scale integration (VLSI) with these chips?

The physical size of the chip itself is very large, about 2.5 inches square. Using this technology, 40 wafers can be used instead of 4,000 chips. It has an extremely high level of integration — higher than VLSI — and it is bigger than a 256K-bit chip. IBM takes a ceramic motherboard and puts a lot of little chips on top of the chip connection. Our one big chip holds about two-thirds of the circuitry of one of IBM's thermoconduction modules.

So you are aiming to produce a very high-performance, IBM plug-compatible mainframe?

An IBM-compatible system is able to run programming written for IBM computers. Our system can do that and is able to connect to peripherals that can connect to IBM computers.

But the Trilogy system, when introduced in 1985, will be a continuously operating, large, fault-tolerant computer. Most fault-tolerant systems consist of two computers — one asks the other one if it feels sick. Our system is a single system that doesn't get sick; it performs in spite of being sick and performs without fault. This is because special circuits on the chip detect failure and relay signals to another set of circuits on the chip.

The system is a very fast on-line general-purpose computer system so anyone with large on-line applications is a potential user.

Why haven't there been other very large fault-tolerant systems built to date?

Because current fault-tolerant systems are really two processors. They depend on a job being neatly partitioned. In very large applications it is difficult to partition so they can be put on two separate computers.

For example, the AT&T computer center in New Jersey may have 14 high-end systems; a couple of Trilogy systems will be able to replace all of those.

Do you fear IBM coming up with such a system before you introduce the Trilogy system?

It's difficult to decide how to approach the solution. We found an easy way to do it, but it wasn't easy finding the solution. IBM would like to do it, but I don't think they will. There wasn't really anything new we had to do with the system. The technology and ideas have been around along a long time, but have never been thought of in those combinations before.

What is the market potential for these large fault-tolerant systems?

Well, a study done for us in 1980 by International Data Corporation projected that in 1985 IBM would ship 2,000 high-end units worldwide. At the end of 1982, IBM shipments were running 50% ahead of IDC projections.

Basically a large portion of IBM 3081 users want a larger machine; that is why the firm introduced a system with two processors. John Opel, IBM's chairman, estimates computing power in mips [millions of instructions per second] at user sites is growing 50% annually. This is because almost everything being done in the corporation today is in someway involved with computing. The proliferation of micros will increase the need for large computers. If a company doesn't keep up, it will not be able to be competitive.

And today, companies are running their businesses as tight as possible because of the economy, so managers need up-to-date information about what is going on in
the company.

Right now our competition is running at about 14 [mips]; we expect to come out with a 32-mips machine. There will be very many 3081s that we replace.

When will your system debut?
We will ship our first one for testing in very early 1985. Right now we are negotiating with a large insurance firm to be the test site.

What will your pricing be?
Our price for a 32-mips machine will probably be in the $5 million range, but we haven't decided that finally yet... However, we think we can manufacture our system at one-third less per mips than IBM does.

[Trilogy projections show IBM's price per mips in 1985 will be $245,000 for a 25-mips machine. The firm estimates IBM's cost per mips at 15% of the list price of the system divided by the number of mips.]

Historically other IBM-compatible prices their systems at 40% price/performance over IBM systems. Trilogy doesn't have to do any better than that. We may be able to ask a premium, but with a relatively small sales force, we may have to temper our ambitions on price.

This is your second time around starting a computer firm. What lessons have you learned?
Not enough! Keeping control over the ownership of the company is important because it determines whether you can implement the programs you think are best for the company. I wanted Amdahl to have the right to manufacture its products. It didn't; it gave it away. So now they can't determine the cost of the product. If you can't determine the cost of the product, you can't set up long range plans for the company. You have lost one of the basic elements of your strategy, which is getting the cost structure that will be appropriate for some time in the future.

[In raising the initial $160 million for the company, the firm's founders retained 71% of the ownership of the firm. After the R&D limited partnership is dissolved, the owners will retain a 50% interest in the firm.]

The IBM plug-compatible market doesn't seem to be as exciting as it promised. What do you think has happened in this market?
I think IBM has done everything it can to make it difficult for the PCMs [plug-compatible manufacturers]. More than anything else, the firm withholds information about its new products in a way which is both unreasonable and anticompetitive.

What technologies do you find exciting today?
There are a lot of new things going on, but the curious thing is how these new ideas consist of reworking of old concepts. I find the 256K memory chip very exciting. Also, Cmos semiconductor technology is very interesting. Cmos has low power requirements, but very complex structures that will make powerful personal computers available. Also plasma display terminals are interesting, but I don't know whether this technology will be feasible unless power requirements and cost come down.

It is possible for a product to have technical promise without having commercial promise. You see new things that should replace old ways of doing things, but there is so much investment in the current technology that it never happens. Magnetic bubble memory is an example of an exciting technology that didn't make it commercially.

You have generally worked in the high end product market, but what do you think about the personal computer explosion?
I have to admit I never thought the personal computer would find a market. I didn't believe there were enough people interested in using computers for practical purposes.

What do you foresee happening in the information systems environment?
I think the expert systems approach will become part of the corporate world, particularly for planning. Right now these systems are still not intelligent because they don't learn by themselves, but it won't take too much to get these systems to operate that way.

How significant a threat do you think Japan is to the U.S. computer industry?
I think Japan presents very real competition to the U.S. Japanese companies have technology that exceeds what is good at IBM.

There is a myth that Japanese companies don't know how to create software. They know how to create pretty good software. Japanese firms are skilled in every area they have to be. The Japanese are also very active in robots and memory technology.

Unless something is done by the U.S. and Japan to ensure equal competition, I don't think the U.S. governement should interfere to help the industry, but I think it should interfere to get the Japanese to take some of the protective measures off its marketplace or to pay some kind of penalty to make the competitive basis equal.

Contributing to this article was Computerworld Staff Writer, Patricia Keefe.
To say that personal computers have stirred a revolution in information processing is now a well-accepted notion. The ability of these personal work-machines to enhance corporate productivity, especially at the managerial level, is unparalleled. And they have intensified competition in the computer industry as well as stimulated the U.S. economy.

But the role personal computers will play in the evolving corporate management information systems (MIS) strategy has yet to be thoroughly defined. It is a role requiring the attention of information systems planners because of both the rapid growth in personal computer use and the proliferation in the ways they are used.

The market research firm Input, Inc. estimates that by 1986, 16 million personal computers will be installed in businesses nationwide, with eight million of those installed in Fortune 1000 companies. But today, personal computers are still novelties in the corporate setting. Sixty percent of all corporate departments using personal computers have installed them within the past year, 25% of those within the past six months. Clearly, if the above prediction — which is probably conservative — is to come true, a huge influx of personal computers is likely within the next few years.

Users’ attitudes and plans for personal computers seem to support this expectation. In the Input study titled “Personal Computers in the Information Systems Strategy,” the 185 personal computer users (based in large corporations) who were interviewed expressed overwhelming support for this form of computer. Sixty percent of the users interviewed planned additional hardware purchases within the year. Fifty-five percent planned additional software purchases. Many were patient with shortcomings they would never have tolerated in MIS department or commercial time-sharing computing solutions.

Departmental plans for personal computer purchases were even more aggressive than those of users. Department heads of 50 Fortune 500 companies planned for average increases of 129% in expenditures for personal computer hardware and software during 1983.

In another study of 306 large companies, overall spending for mainframe and related hardware and software was expected to increase only 8% in 1983 from 1982 spending. Spending for personal computers, however, was expected to increase by 60%. It is clear...
that personal computers are slated for major growth in the corporate environment.

From the user's point of view, the personal computer is the ideal information processing resource. Its solutions are fast. Many of the tasks it replaces were formerly done by hand, either because applications programs or programs written by personal computer users. The tasks for which the MIS department must plan exceed the capabilities of micros, but the immediate users do not care about the big picture, they just want the convenience of a personal computer.

Input's research identifies four broad objectives for MIS management in the near-to-midterm future and several tasks for realizing each of those objectives. The objectives are: improving MIS planning, increasing MIS cost-effectiveness, extending computing power throughout the organization and increasing MIS contribution to corporate goals.

Capacity planning, life-cycle planning, and resource optimization exemplify the tasks necessary for improving overall MIS planning. Increasing cost-effectiveness, the second objective, demands such requirements as effective charge-back systems and improved hardware efficiency and programmer productivity.

But personal computers pose two major dilemmas for MIS managers and strategies. First, conflicts can arise within any of the four objectives. In improved planning, for example, personal computers could either displace existing information systems or lead to an increased demand for them depending on how well they are integrated into the overall corporate information system.

Personal computer applications could skim off in-house time-sharing work, leaving high overhead in the MIS department. Resulting MIS cutbacks might leave personal computer users unsupported. Future exchanges between MIS and micro users would then be even less satisfactory from the user, MIS or corporate standpoint.

Another survey of 586 MIS departments confirmed this notion of uncertainty: future planning and control were the most frequently mentioned problem areas for information system management. Significantly, the importance of this problem increased with company size.

The second major dilemma is that personal computer usage may lead to conflicts between MIS objectives. For example, personal computers certainly contribute to the goal of extending computing power throughout the organization. Users have access to low-cost, on-line processing for transactional and analytical requirements.

By 1990, analytical or decision support processing will have grown from 35% of all computing up to 60%, while transaction processing will decline from 65% to 40%. The size of the pie will have grown by a factor of 10 during the period. Just as important is the enormous growth of dispersed processing, from 20% to 55% of all processing.

This problem, personal computing systems will not be the sole source of these two major changes in computing focus, but they will surely stand as a major factor, the more so as hardware (especially local-area networks) and software (down-loading and integration) advances continue to compound their capabilities.

But, at the same time as they are extending computing capabilities, personal computers could be increasing overall computing costs and leading to other inefficiencies. The hardware and software purchase plans mentioned earlier indicate corporate, departmental and personal user enthusiasm for adding to the value of their systems. Yet uncontrolled growth from these various sources could result in incompatibility among data, hardware and software.

Even worse is investment in virtually obsolete devices or machines that are unsupported because of vendor failure. Fascination with gadgetry commonly leads users to spend more time programming applications that might be available on a "canned" basis. Poor matches of
tools with tasks are common, with gross mismatches possible. Some managers were found performing word processing on VisiCorp’s VisiCalc, for example.

These are just a few examples of conflicts certain to arise as personal computer growth continues. MIS managers foresee that isolated or even widespread success with personal computers will be attributed to users or to the machines themselves, yet widespread failure of personal computers is likely to be seen as an MIS failure — something that should have been prevented.

The adoption and early implementation of a personal computer strategy are now necessities for large corporations and large users of computing resources. At present, only 22% of all corporate users receive any kind of assistance from their information systems departments. Self-teaching help from vendors and computer stores all rated higher than information systems departments as sources of assistance with personal computer problems. But the MIS department is the logical organization to direct personal computer use, especially when corporate-wide goals of coherent information systems planning and cost-effectiveness are considered.

The question arises, then, as to what role MIS organizations can and should play in the personal computer revolution. Many MIS organizations are currently at cross purposes with personal computer use, which in some cases are viewed as functional competitors. This is especially true for those organizations that have replaced commercial time-sharing with extensive in-house networks.

But from the user’s perspective, control is the most highly valued feature of his personal computer, frequently the only way to escape dependence on internal MIS departments.

There are a range of possible roles foreseen for the MIS organization or manager which range from the extreme position of controller to the position of informal advisor. In between are roles of specifier, coordinator and information officer.

The controller role is almost doomed from the start. In this situation the MIS department seeks to plan and control personal computer use throughout the organization, as if personal computers were extensions of the central information systems department. Not only will users resist and attempt to undermine such a role, but few MIS departments have the resources or expertise to carry it off.

By acting as a specifier, MIS would define what departments may or may not do with personal computers, including what hardware and software products to buy and the types of work to be performed. This role is already being attempted in some companies and industries, but will prove difficult to maintain in the face of the extreme dynamism in personal computer technology, price, and applications.

Input believes that the role of coordinator is appropriate for most MIS organizations. It is also the one most likely to result in a successful melding of user desires and organizational needs, while accommodating rapidly changing technology.

This role covers a wide range of activities. It encompasses vendor selection, establishment of hardware, software and communications standards and organizing user groups and information exchanges. The coordinator should work with purchasing and accounting departments to maintain budgets and gain volume discounts and with vendors to secure maintenance. He should be responsible for documentation and for monitoring the success of personal computer use and its integration into the organization’s overall information strategy.

The role of information provider is more passive than that of coordinator but he must take an active part in promoting personal computer awareness, while making no effort to control or direct their use. At the far extreme (short of doing nothing) is the informal advisor, available if consulted but essentially passive.

Given users’ current resistance to depend upon MIS, this position virtually assures that MIS will be ignored or passed by in personal computer development.

MIS managers foresee that isolated or even widespread success with personal computers will be attributed to users or to the machines themselves, yet widespread failure of personal computers is likely to be seen as an MIS failure — something that should have been prevented.

The initial, sometimes euphoric, enthusiasm for personal computer use disguises the fact that many personal computers are now essentially fair-weather systems. They are adequate for certain tasks and will surely continue to increase in capability and usefulness. But they have neither been critically tested for many applications nor have they stood the test of time. Standardization, for example, remains a major problem, as does documentation and overall value in proportion to expenses.

Above all, the personal computer role in supporting information systems objectives needs careful scrutiny and planning. This is even more critical now as usage of these systems is already well under way. Well conceived, planned and implemented personal computer strategies will go a long way toward insuring a productive, valuable future for this exciting computing resource.
Of course they’re not! Yet MIS professionals persist in treating these systems like smaller versions of mainframes. It’s time to take a fresh look at what these small wonders can and should do.

The long-sought-after multi-function workstation has arrived, but many office automation (OA) experts are having trouble recognizing it because it came disguised as the personal computer.

The role of personal computers in OA is poorly understood primarily because they have created new, revolutionary opportunities and a new computing culture beyond the original vision of many DP and OA managements. As a result, an undeclared war has been waging for the past four years in corporate environments between DP/MIS management information systems (MIS) “establishment” forces and the personal computer “revolutionaries.”

Personal computers are potentially the best development tools that DP has ever had. However, realizing that potential requires that DP/MIS management take an active role in encouraging and supporting wide deployment of personal computers. This DP role needs to be oriented to support rather than to control.

DP and OA managements must begin to view the personal computer not as a toy or threat but as a tool, and must also recognize that the end of the terminal and shared-logic word processor era is at hand.

It is also essential that DP and OA management begin to provide communications and on-line services to personal computer users. The time-sharing bureaus have, on the whole, found it easier to recognize this need and have geared up to seize this opportunity on a larg-
er scale than have corporate and departmental DP organizations.

The difficulty experienced by many DP managements in making this transition is especially tragic, because the explosively growing number of personal computers is generating an immense demand for the host-network services, of which internal DP/MIS organizations are ideally placed to meet.

The first step toward meaningfully defining an office systems role for personal computers is to understand that personal computers are different from shared DP computers in ways much more fundamental than size. A personal computer is not a little computer. It is best not to think of it as a computer at all.

This notion that a personal computer is not a computer is best explained by using an analogy to transportation. Imagine that a crazed bunch of academics founded a university department of motor vehicle science. The department's introductory course might include a large chart showing the continuum of motor vehicles. The chart would list the major types of motor vehicles, itemizing for each the components of a motor vehicle system: engine, chassis/body, wheels, cargo area and so on. Such a chart would position large trucks as "real" motor vehicles, those having powerful engines and enormous carrying capacity. And the chart would position cars as low-performance, "toy" motor vehicles, with underpowered engines and almost no cargo carrying capacity.

Similarly, to conceive of personal computers as computers because they have system components (CPU, primary storage, disk drives and so on) and to think of them as "little" or "toy" versions of mainframes and minis are misguided notions and avoid a meaningful understanding of their role in the office.

Personal computers have dramatically altered the economics of
computing, making feasible all sorts of applications which are not economically or conveniently carried out on a shared-host basis. Spreadsheet analysis and word processing are two convenient examples of this.

The core of the personal computer's attractiveness is that it delivers computing power on users' terms without requiring them to give up autonomy or to depend on the overburdened DP department to get the work done. Also, all of the personal computer's resources are available to one person. That means there is no overhead for the software that administers the sharing of one processor; in addition, better response times are found for most office applications.

Just as the choice of a car and its options allows users to personally address their needs and preference, so does a personal computer. The user-tailorability of a personal computer is formidable, wholly beyond what would be possible with a shared computer, whose functionality represents a compromise facilitated through the trading-off of the needs of several users. The lead time required to implement a personal computer application is also much shorter than for data processing systems, on the order of days or weeks.

To press the analogy to transportation a bit further, a truck is so expensive to own and operate that idleness becomes an enemy to be avoided by scheduling in advance to keep the vehicle running. With a car, though, idleness is a fine and valuable thing called "availability" — allowing immediate access at the user's whim for whatever purpose desired. This analogy is the same for computers.

The fact that the personal computer is idle most of the time means that the marginal cost of computing approaches zero. This in turn means that new applications can evolve far more easily than in a traditional data processing environment where the marginal costs of computing are so large that they routinely require elaborate cost/benefit studies and long lead times for planning and development.

In defining a role for personal computers in advanced office systems, it is important to consider both the personal computer's strengths and weaknesses, as well as to provide host/network services as a means to augment personal computer capability and overcome its limitations. The table below summarizes personal computer advantages and disadvantages compared to traditional data processing systems.

If the multifunction personal computer has one major purpose, it is to serve as an applications development machine for nonprogrammers. The most successful software packages for personal computers are not really applications at all, but rather "tools" through which the user can develop his own applications with — in lieu of programming. No more convenient example exists than the spreadsheet. The user who, after creating a few spreadsheets on his personal computer, replaces a stack of paper spreadsheets and a manual process with a computerized process and a set of machine readable files has developed an application. This application, however, does not fit the standard notion

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**The Personal Computer: Pro and Con**

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Full control by user of applications facilities</td>
<td>- End user must assume the system management roles (such as media back-up and software installation) from which he was previously insulated</td>
</tr>
<tr>
<td>- Lower costs for hardware and maintenance</td>
<td>- Limits on the size of application programs that may be executed</td>
</tr>
<tr>
<td>- Software inexpensive enough to be used as &quot;throw-away&quot; prototype</td>
<td>- Processor-bound applications may exceed hardware capabilities</td>
</tr>
<tr>
<td>- Negligible marginal cost of computing</td>
<td>- Decentralized data storage may result in multiple, inconsistent data files with attendant data management problems</td>
</tr>
<tr>
<td>- Constant processing power, independent of other users' activity</td>
<td>- Limited software support, though in general software needs less support due to lower complexity</td>
</tr>
<tr>
<td>- Ready availability of color and graphics displays</td>
<td>- Small, unstable vendors with lower probability of continuity than established minicomputer or mainframe vendors</td>
</tr>
<tr>
<td>- Lighter requirements for environment characteristics and hardware maintenance</td>
<td>- Software protection mechanisms employed, and other factors may severely limit ability to modify and tailor software or to share data files among multiple applications</td>
</tr>
<tr>
<td>- Portability</td>
<td>- Computer power available to user at any time convenient for him</td>
</tr>
<tr>
<td>- Computer power available to user at any time convenient for him</td>
<td>- Greater uptime than larger systems</td>
</tr>
</tbody>
</table>

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of applications development, and compared with procedural language programming environments there are many restrictions. Nonetheless, a user-developed application it is, and it is much quicker and cheaper than more traditional applications development.

The three most widely implemented types of personal computer office software are word processing packages, spreadsheet/modeling packages and data management systems. In addition, there are five other popular types of packages, including systems for communications and terminal emulation, graphics utilities, vertical applications, report and application generators and user "shells" for integrated application environments.

These five software types are not as widely implemented as the first three, but are rapidly gaining in popularity. The last type listed, user shells for integrated application environments, exists in two major forms. The first consists of bundled packages (such as Lotus Development Corp.'s 1-2-3 and Visicorp's VisiOn), which incorporate spreadsheet, word processing, graphics and sometimes other functions.

The second are packages that allow users to assemble their own integrated system using software packages of his choice. Examples of the latter include Epic Computer Products, Inc.'s Supervyz and The Information People's Organiz.

Data management and personal word processing packages, are widely used as applications development tools for nonprogrammers. The data management packages, some of which are really data base management systems (DBMS), allow users to define forms, to collect data and to report formats.

Some personal computer DBMS packages now have available application generators which allow users to define nonprocedurally an application and have the machine generate high-level source codes.

The list management modules of WP systems are routinely used to implement crude transaction processing systems; inelegant by DP standards but attractive to personal computer users who value speed of implementation and self-reliance.

The wide implementation of data management packages on personal computers has prepared many end-users for appreciating DBMS packages and tools (such as query languages) available on minicomputers and mainframes. Technologically oriented personnel tend to think of personal computer functionality in hardware terms. In contrast to this, end-users tend to think of personal computer functionality in terms of the applications software base available for a given machine.

While the merits of personal computers as stand-alone machines are becoming relatively well-known, users quickly come to expect to be able to connect their systems to other personal computers or to time-sharing hosts as an intelligent terminal. Communication capabilities on personal computers are important because they allow users to exchange documents, data and software with co-workers.

Communications capabilities also allow personal computer users access to data existing on corporate and departmental DP hosts. By allowing such access, many of the DP applications now geared to periodic large report generation can be reoriented to on-demand query processing, reducing the cost and workload of data processing centers.

Communications capabilities are essential to personal computer users as office workstations. Office workers are "team players," devoting 60% of their typical work day to communications activities. Usually, office workers prepare documents or calculations to be sent to at least one other person. Most of the documents processed by office workers are in turn at least partially prepared by their colleagues. Therefore, it is a key requirement that the personal computer allows users to exchange as well as to prepare documents.

Most popular personal computers can serve as terminals to host and networks. However, most personal computers in use today function as stand-alone machines. This is due in part to the historical antitagonism between DPers and personal computer users. A conspicuous exception to this rule are personal computers that are used to access the rapidly growing number of on-line data banks and information utilities such as Dow-Jones, Computserve, Inc. and Source Telecomputing Corp. External host/network services allow office workers to obtain and send information outside of their organizations nearly as easily as they can within them. This is a key benefit of advanced office systems.

Most electronic mail implementations at present are tackled at the departmental or corporate level. This leaves unsatisfied the need to communicate with individuals not on the mail system. Users can send mail electronically to correspondents not on their internal systems by using public electronic mail systems such as Tymnet, Inc.'s Tymnet; GTE Telenet Communications Corp.'s Telenet; Computerve's E-Mail; and the U.S. Postal Service's Electronic Computer-Originated Mail (Ecom).

Personal computer access to hosts and networks typically make use of communications software such as Polygon Associates, Inc.'s Poly-TRM; Southwestern Data Systems' AE Pro and Z-Term; and Decmate CX/DX. Such software runs
on the personal computer, manipulat-
ing the communications port and modems to provide such functions as:

- "Dumb" terminal emulation.
- Uploading of local personal computer files to the host.
- Downloading host data to local personal computer files.
- Automatically dialing host telephone number, with repeated redialing if the line is busy or there is no answer.

- Definition of personal computer function keys as "macros," allowing repetitive multiple key sequences to be sent with one keystroke.
- Automatically executing host logon sequences.
- Unattended host access and file upload/download operations.

Although about three-quarters of the functions required by office workers can be delivered by the personal computer in stand-alone mode, the other 25% requiring host/network access is of critical importance, far more than its proportion suggests.

A personal computer user may spend one hour manipulating spreadsheet data and using a personal word processor to fold the data into a memo and might then consume only 30 seconds of host connect time uploading the memo to the host that he uses for electronic mail. But the short host connect time might save other workers four days of waiting, ultimately shortening the time needed to complete the total task.

Another key issue in defining an office role for personal computers is acquisition and operating costs. Office systems are aimed at having at least one workstation per office worker. Consequently, the total cost per workstation is even more important than in traditional data processing and word processing systems.

Personal computers are often perceived as too expensive for widespread use when compared with terminals. But a personal computer is often cheaper. The usual comparisons show that terminals cost between $500 and $2000 while a personal computer costs between $2000 and $10,000. This is an unsound basis for comparison because a personal computer by itself delivers a multitude of functions, whereas a terminal by itself does nothing.

Rather than considering only the isolated price of a workstation, what should be measured is the cost of total system resources needed to make each workstation (whether personal computer or terminal) provide the function required by office workers. This involves allocating a share of the total cost of operating the host system that supports the terminal or personal computer. Such costs include:

- Host system processor, memory and disks.
- Host system peripherals.
- Host system software acquisition.
- Software development labor.
- Hardware/software maintenance labor and contracts.
- DP center labor.

Upon factoring in these costs, we see that terminal cost is merely the tip of an iceberg. The overwhelming cost is in the "undersea," or invisible portion. The first three cost categories listed above are limited costs, typically amortized over a seven-year period. But the last three categories continue for the life of the system, in fact they actually become more expensive every year, due to labor cost trends.

The personal computer has a hidden portion, too, but typically a much smaller one than the terminal. The reason for this is simple, the terminal must be connected to the relatively expensive, shared host services for all of its functions to be performed, while the personal computer need only be connected for a small portion of its activity. Moreover, that connect would not need to occur during prime time. Personal computer communication software could be used for unattended host access and file upload/download during off-peak hours.

The net result is that the number of personal computers that can be connected to an office host is usually between two and 10 times larger than the number of terminals that could be connected. Consequently, the personal computer annual share of the host operating costs is much smaller than that for a terminal.

The wide implementation of data management packages on personal computers has prepared many end-users for appreciating DBMS packages and tools (such as query languages) available on minicomputers and mainframes.
Interest in fault-tolerant (FT) systems, which for nearly eight years was limited to Tandem Computer, Inc. and its products, has greatly intensified over the past year or so. Significant amounts of venture capital have been invested in a number of FT start-ups, including Stratus Computer, Inc., Synapse Computer Corp., Auragen Systems Corp. and Tolerant Transaction Systems. At least two well-established companies (Hewlett-Packard Co. and Computer Consoles, Inc.) have also entered the field. Others, including IBM, NCR Corp. and AT&T, are expected to unveil FT products before year-end 1983.

The main reason for this enhanced interest in FT systems is the rapid development of on-line systems. Unlike "back-office" batch systems, on-line systems are at the heart of many modern businesses. Examples abound in many industries: reservations systems for airlines, hotels/motels and car rental agencies, to mention a few. Even such classical back-office applications as accounts payable and inventory control are now going on-line.

While on-line systems lead to higher employee and process productivity and more timely reporting, hence tighter business controls and new or improved customer services, they also make the business much more fragile: the tangible and intangible costs of a computer failure are sharply higher in the on-line environment.

Fault-tolerant systems are attracting attention because they promise to reduce the probability that a failure in any one of their internal subsystems will have an adverse impact on the end-user, the process being controlled, or the validity of the data in the common data base.

Fault-tolerant features were incorporated in some of the earliest relay and vacuum-tube digital computers. In the 1960s, however, interest in FT features declined as the introduction of transistors and integrated circuits greatly improved component reliability. The
development of error-correcting codes brought solid-state memories to the reliability level of the older magnetic cores. FT techniques continued to command interest in a few specialized applications, including computer-controlled telephone switching, military and commercial real-time monitoring and control systems. Fault tolerance also aroused interest, though to a lesser degree, in the commercial timesharing area.

The typical solution to the high availability requirement during the '60s centered around the back-up concept, in which a second, complete system stood by ready to take over the load should the primary system fail. Some switching arrangement, typically manual, was provided to switch the peripherals from one system to the other. Software for such systems was generally custom fit to the application, often by the end user.

The development of airline reservations systems in the late '60s and early '70s was significant for two reasons. First, while these systems still used variants of the redundant back-up scheme, they also served as test beds for many of the practical aspects of today's fault-tolerant systems, including the concepts of disk mirroring, record and file locking, checkpointing and audit trails. Second, they were the harbingers of the online transaction processing applications, which today constitute the largest potential market for fault-tolerant systems.

Tandem Arrives on the Scene

In 1975, Tandem's founders astutely recognized that the on-line transaction processing field would eventually grow to encompass numerous applications and that most such applications could be better served by an architecture that relied on a multiplicity of minicomputer-class processors, rather than the giant mainframes used in the airline reservations systems.

Using existing minicomputer technology, Tandem developed a unique new architecture that for the first time delivered true fault-tolerance at an affordable cost. Tandem's solution, now called Non Stop, differed from the redundant back-up scheme in several important respects. First, the many single points of failure inherent in the older schemes had to be eliminated. Second, the Tandem system offered, for the first time, the ability to remove defective subsystems and return repaired ones to service without disrupting ongoing operations.

The extent of the on-line repair capability is a touchstone test for any system claiming to offer fault-tolerance. Achieving this capability requires such hardware features as a redundant power distribution system and provisions for controlling electrical transients created by printed-circuit board removal and insertion. More importantly, the software system must be designed to accommodate the on-line removal and reinsertion of subsystems in a way that isolates the user's programs from such changes in the system's configuration. The subsequent wide-market acceptance enjoyed by Tandem is due in no small measure to its success in meeting these design goals.

A Tandem Non Stop system consists of anywhere from two to 16 processors. Each processor is in effect an independent 16-bit minicomputer with its own memory and I/O channel. The more recent Non Stop II added a limited 32-bit addressing capability. A high-speed (6.7 MHz), 16-bit-wide bus system connects all processors and is used for interprocessor communications. Dubbed Dynabus, this system actually includes two identical 16-bit buses, each with its own access controller, which arbitrates bus usage among the processors.

The peripheral controllers are dual-ported, so that each may be accessed by I/O channels from two different processors. Dual-access disk drives are each attached to two controllers, thereby assuring that the data they hold is accessible even when both a controller and a processor fail. To guard against the loss of data due to a failure in the drive itself, disk mirroring can be invoked by the user.

When active, disk mirroring causes the system to maintain automatically identical copies of the designated files on two independent drives. This action is transparent to the user. In normal operation, the system will execute all write requests to both disks, while satisfying read requests from the head nearest the desired data. Following the recovery of a failed drive, the user can invoke a utility which gradually restores the repaired drive to mirror condition.

A copy of the Guardian operating system, along with a table of available resources and their location, is kept in each processor's memory. At regular intervals, each processor is required to broadcast an 'I'M ALIVE' message on the Dynabus and to verify the receipt of such messages from all other processors. This is a generalization of the watchdog timer scheme, used in redundant back-up systems to detect "stalls," meaning a failed processor or one caught an infinite loop.

Checkpointing

Recovery from failure in the Tandem system relies on the checkpointing concept. Each running process has a backup, an inactive counterpart residing in anoth-
er processor, ready to take over should the primary process or the processor in which it runs fail. The primary keeps its backup up to date by sending it checkpoint messages, each of which defines the state of the process at a given critical point in the computation. Should the primary process (or its processor) become disabled, the system will awaken the backup process, which will then resume the task from the last checkpoint.

Backup processes and checkpointing are still the key recovery mechanisms used by the Tandem system's software. For a variety of reasons, this method proved to be undesirable at the applications program level. A few years ago, Tandem introduced new system software elements called Pathway and TMF, which allow the applications programmer to disregard the complexities of checkpointing.

Pathway provides centralized terminal handling capabilities, while TMF assures the consistency of the data base by undoing the effects of incomplete transactions and by keeping audit trails which permit the reconstruction of a data base should it become necessary. The user provides "server" routines which interface between Pathway and TMF and which are expendable in that their loss will at most require a restart of a transaction.

A key feature of the Tandem software is the isolation of user processes from configuration details. This is achieved by the message system. For example, when an applications process wishes to obtain data from a disk driver process, it must formulate a message addressed to the logical disk in question. The message is handed over to the operating system, which determines the actual destination by consulting the local copy of the resource directory. The user process need not know which two processors have access to the disk in question, nor which one is currently the primary. This isolation is of course essential in order to permit on-line repair.

This isolation has, somewhat unexpectedly, yielded two additional and significant benefits. Since the system can dynamically accept repaired modules, it can also in the same fashion accommodate new ones. Thus it becomes feasible, for example, to increase the transaction handling capacity of the system by simply plugging in additional processors. This "graceful growth" capability is so attractive, compared to the alternatives of initially buying extra capacity or going through an upgrade that many prospects have selected Tandem based primarily on this aspect of the system.

Furthermore, since processes are largely unconcerned with the actual location of resources (such as other processes or peripherals), it becomes relatively easy to expand the system to include a variety of nodes connected via long-haul communications facilities, possibly including satellite links. Only the resource tables used by the operating system copies need to be updated, for example, to remove nodes. Expand is the Tandem software component that handles network routing. Tandem is now building on its networking capability by developing comprehensive corporate information networks, which it dubbed Transfer.

Some 4,000 Tandem processors have been shipped to approximately 600 customers since 1976. Until quite recently, Tandem enjoyed freedom from comparable competition. Now, however, the technological environment is again reminiscent of the one which prevailed when Tandem got its start. Tandem capitalized on the maturing minicomputer technology to achieve a price/performance edge vis-à-vis mainframes. Today's powerful 16/32-bit microprocessors are likewise making possible new FT designs that were economically out of the question only a few years ago.

Stratus' Pair and Spare
One such design is the "pair and spare" concept, employed by Stratus Computer of Natick, Mass. The company was established in mid-1980 and has attracted nearly $15 million in venture capital. It began shipping in February 1982; by the year-end, it had 22 customers and 35 processing modules installed.

A Stratus Processing Module (PM) is a self-contained computer with its own memory, controllers, and peripherals. Each subsystem within the PM is typically contained on a large printed-circuit board. The functions of the subsystems and peripherals, each based on the Motorola, Inc. 68000 microprocessor (actually, two 68000s are used). The pair of CPU functions (four 68000s in all) receive identical inputs; their outputs are compared (self-checked) on each clock pulse. Should a discrepancy be detected, the board "pulls out," letting the duplexed CPU board carry on with the task at hand. Once the bad board has been repaired and reinserted, an interrupt alerts the running processor, which then undertakes to re-educate the "new" board and bring it back into tight synchronism. Memory boards and Zilog, Inc. Z80A-based controller boards are similarly self-checking.

A fully-duplexed PM can contain as many as 18 microprocessors. Each function is in effect replicated on two boards. (Continued on Page 40)
### Fault-Tolerant Systems:

<table>
<thead>
<tr>
<th>COMPANY/SYSTEM</th>
<th>ADDRESS &amp; PHONE</th>
<th>TARGET MARKETS</th>
<th>CPU TECHNOLOGY</th>
<th>OPERATING SYSTEM NAME &amp; TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>August Systems, Inc.</td>
<td>18277 S.W. Boones Ferry Road, Tigard, OR 97223</td>
<td>Industrial automation &amp; process monitoring/ control</td>
<td>Three Intel Corp. 8086-based processors run identical code when in FT mode</td>
<td>RTTS (Real Time Task Scheduler), one copy per CPU</td>
</tr>
<tr>
<td>Auragen Systems Corp.</td>
<td>210 Sylvan Ave., Englewood Cliffs, NJ 07632</td>
<td>On-line transaction processing (OLTP); medium to large companies</td>
<td>Up to 32 clusters, Three Motorola, Inc. 68000's on a high-speed, duplex, parallel bus</td>
<td>Bell Laboratories Unix with internal modifications, one copy per cluster</td>
</tr>
<tr>
<td>Autech Corp.</td>
<td>Data System Division, 1301 W. Copans Road, Pompano Beach, FL 33064</td>
<td>Industrial automation &amp; process monitoring/ control</td>
<td>Dual 68000-based Displaymaster and Dacmaster, Zilog, Inc. Z80A-based Process I/O Modules</td>
<td>Aide process control development system plus read only memory routines in Dacmasters controller and Process I/O Modules</td>
</tr>
<tr>
<td>Computer Consoles, Inc.</td>
<td>97 Humboldt St., Rochester, NY 14609</td>
<td>OLTP, medium to large companies</td>
<td>Up to eight 68000-based CPUs with 68000-based disk and terminal controllers</td>
<td>Perpos (Perpetual Processing OS), Unix-like, one copy per CPU, plus special control in Inter-Computer Controllers (ICC)</td>
</tr>
<tr>
<td>Hewlett-Packard Co., CPU Systems</td>
<td>Data Systems Division, 1100 Wolfe Road, Cupertino, CA 95014</td>
<td>Industrial automation &amp; process monitoring/ control</td>
<td>Two HP1000 Models 60 or 65 working in 'hot backup' mode. (16-bit, micro-programmed)</td>
<td>RTE-6/VM, real-time, multitasking, virtual memory; one copy per CPU</td>
</tr>
<tr>
<td>Parallel Computers, Inc.</td>
<td>501 Cedar St., Santa Cruz, CA 95061</td>
<td>OLTP, very small to small companies</td>
<td>Three to five 68000s on a bus</td>
<td>Xenix, one copy per CPU</td>
</tr>
<tr>
<td>Segovia Systems</td>
<td>1 Metropolitan Corp. Center, Marlboro, MA 01752</td>
<td>Going after Digital Equipment Corp. VAX users</td>
<td>Up to 64 68000-based CPUs, probably self-checking, with shared memory</td>
<td>Unix compatible, one copy per CPU (despite shared memory)</td>
</tr>
<tr>
<td>Stratus Computer, Inc.</td>
<td>17 Strathmore Road, Natick, MA 01760</td>
<td>OLTP, small to medium companies</td>
<td>Each self-checking CPU has two 68000s, each Processing Module can have duplicated CPU and memory and controllers. Maximum 32 Processing Modules on a ring-type local-area network</td>
<td>VOS (Virtual OS), one copy per CPU</td>
</tr>
<tr>
<td>Synapse Computer Corp.</td>
<td>801 Buckeye Court, Milpitas, CA 95035</td>
<td>OLTP, medium to large companies</td>
<td>Up to 28 68000-based CPUs and Tops (I/O processors) working against a shared memory via a duplexed, high-speed 32-bit parallel bus</td>
<td>Synthesis, one copy in shared memory</td>
</tr>
<tr>
<td>Tandem Computers, Inc.</td>
<td>19333 Vailco Parkway, Cupertino, CA 95014</td>
<td>OLTP, medium to large companies</td>
<td>Up to 16 CPUs on a duplexed, high-speed, 18-bit parallel bus</td>
<td>Guardian, one copy per CPU</td>
</tr>
<tr>
<td>Tolerant Transaction Systems Plus 32</td>
<td>681 River Oaks Parkway, San Jose, CA 95131</td>
<td>OLTP, small to medium companies; Also real time, end user and OEM</td>
<td>Two National Semiconductor Corp. 1800's in each System Building Block</td>
<td>Transaction Executive, Transaction/Operator Interface elements may be replicated in same or multiple System Building Blocks.</td>
</tr>
</tbody>
</table>
The Major Competitors

<table>
<thead>
<tr>
<th>MEMORY SYSTEM</th>
<th>PERFORMANCE/CPU (MIPS &amp; TPS)</th>
<th>CPU FAULT-DETECTION</th>
<th>RECOVERY SCHEME</th>
<th>ESTIMATED REVENUES &amp; EARNINGS FY '82</th>
</tr>
</thead>
<tbody>
<tr>
<td>32K-bytes per</td>
<td>Approximately 0.4 Mips/Intel 8086 &amp; system; 256 points typical maximum and up. TPS: not relevant</td>
<td>At start of each iteration, three CPUs check state data and vote out bad data. Transient faults thus automatically fixed.</td>
<td>Replaced processor reads programs from read-only link or from disks, synchronized at next voting point.</td>
<td>Revenue $1.5M Earnings ($2M)</td>
</tr>
<tr>
<td>CPU on-board;</td>
<td>Up to 8M bytes per cluster (1M byte/board) 0.85 Mips/cluster (company figure), so nominally 27 Mips/system at full expansion. 1.5 TPS/CPU (estimate)</td>
<td>Self-detect via idle diagnostics</td>
<td>Backup cluster picks up load</td>
<td>Revenues Nil Earnings ($2.6M)</td>
</tr>
<tr>
<td>up to 1M-byte per CPU on Multibus 64k bytes to 256k bytes per CPU; parity battery back-up on board Cmos static</td>
<td>Dacmaster supports up to 256 process points. TPS: not relevant</td>
<td>Timeouts, cross diagnostics</td>
<td>Auto switchover to backup Dacmaster on stall (timeout)</td>
<td>None from Data Systems Division</td>
</tr>
<tr>
<td>512k bytes to 4M bytes per CPU, error checking &amp; correction, battery backup. Each of two Intel computer controllers has 512K bytes.</td>
<td>Normally 5.6 Mips (0.7 per 68000) 2 TPS/CPU (ITOM estimate) due to multiplicity data base</td>
<td>ICCs time out transactions; bad ICCs detected by CPU voting scheme</td>
<td>Next available CPU completes installed transaction or bad ICC functions.</td>
<td>Revenue $63M Earnings $7.4M (Estimated 80% FT)</td>
</tr>
<tr>
<td>256K bytes to 2M bytes per CPU; 1 parity bit/16 bits of data</td>
<td>1 Mips (200K Floating point operation/sec; mod 65); Hence 1 Mips/system. TPS: not relevant</td>
<td>Watchdog timer times out.</td>
<td>Peripheral switch flips over, 'hot backup' CPU informed via interrupt</td>
<td>Revenue $4B Minimal FT contribution</td>
</tr>
<tr>
<td>Maximum 2M bytes/ system</td>
<td>Hard to say until architecture settles down.</td>
<td>Conventional</td>
<td>Manual replace &amp; restart</td>
<td>Revenue Nil Earnings small loss</td>
</tr>
<tr>
<td>N/A</td>
<td>Sequoia claims up to 40 Mips at full expansion.</td>
<td>Probably some time-outs on entries in shared memory</td>
<td>Next available CPU picks up stalled transaction.</td>
<td>Revenue Nil Earnings ($3M)</td>
</tr>
<tr>
<td>8M bytes effective (16M bytes actual) per per processing module (2M bytes/board),</td>
<td>0.85 Mips/CPU (ITOM estimate); nominally 27 Mips/system at full expansion</td>
<td>Self-checking subsystem pulls out &amp; generates 'red light' interrupt to operating system</td>
<td>'Reeducation' procedures synchronizes repaired module with one that's running.</td>
<td>Revenue $5.4M</td>
</tr>
<tr>
<td>16M bytes/system (1M byte boards), Error Checking and Correction</td>
<td>0.7 Mips/CPU system Mips depend on how many CPU configured. 2 TPS/CPU (ITOM estimate, due to shared memory) if supported by enough I/O Processors</td>
<td>Some time-out mechanism in shared memory</td>
<td>Next available processor picks installed transaction that's been checkpointed into shared memory.</td>
<td>Revenue Nil Earnings ($4M)</td>
</tr>
<tr>
<td>8M bytes/CPU (2M bytes/board), Error Checking and Correction</td>
<td>Non Stop I: 0.7 Mips (Tandem estimates) Non Stop II: 0.8 Mips (Tandem estimate)</td>
<td>Absence of I'M ALIVE message; each CPU must broadcast over Dynabus each second.</td>
<td>Backup process in another CPU picks up transaction from last good checkpoint sent by primary</td>
<td>Revenue $335M Earnings $29M (estimated)</td>
</tr>
<tr>
<td>1M byte to 4M bytes per System Building Block (Tolerant estimate)</td>
<td>1.5 Mips/System Building Block</td>
<td>Timeouts and I'M ALIVE messages</td>
<td>Backup System Building Block takes over</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Charts ©1983 ITOM International Co.
Synapse calls their architecture $N+1$: by having one more than the $N$ applications processors required to service a given load, the system achieves essentially the same degree of resiliency as one in which each processor is backed by another processor (the 2N approach).

and without the need for checkpointing. To avoid the possibility that such a failure will go undetected for a long while, Stratus has equipped its systems with automatic dialers that call in to a support center to report failures. Only when a defective module is turned to service need the system be interrupted momentarily for the resynchronization process.

Up to 32 Processing Modules can be connected together over a ring-type, 11.2M-baud local-area network which can be duplexed. The system supports a global naming convention that allows users to access resources by logical names, without regard to their physical location. Geographically dispersed PMs can be accommodated as well.

Bell Laboratories is also using self-checking approach in its 3B20D system, the latest in a series of Bell Labs/Western Electric processors. The memory systems of the two (duplexed) processors are kept in mirror-image condition by special hardware. One of the processors is the primary, while the second acts as a "warm" standby. The system stops short of implementing the Stratus tight lockstep scheme. A single processor (simplex) version, the 3B20S, is already being offered to the Bell operating companies. The 3B20S and 3B20D may eventually be available commercially, although the underlying minicomputer technology may not compare well with today's breed of microprocessor based systems.

The Synapse $N+1$ Concept

A multiplicity of 68000 microprocessors is also used in an FT system from Synapse Computer. The Multus, Calif.-based company was founded in late 1980, and is capitalized with nearly $26 million in venture capital. The first two shipments took place in December 1982 and February 1983.

The Synapse architecture consists of up to 28 processors, each based on the 68000 microprocessing unit. Some are applications processors while others are I/O processors. All are "tightly coupled" via a duplexed, 8 MHz parallel bus system to a shared memory system. This shared memory holds the only copy of the operating system, along with work queues, flags and semaphores.

The applications processors form a resource pool which is available to service the transactions being prepared through the I/O processors. These processors, which contain substantial private memories, support dual-ported controllers which service the terminals and the disks. The applications processors are self-dispatching: whenever they are idle, they look up the work queues and assign themselves to service the next ready transaction. A large, fast cache in each applications processor allows them to execute the common operating system without stressing the bus system.

Synapse calls this architecture $N+1$: by having one more than the $N$ applications processors required to service a given load, the system achieves essentially the same degree of resiliency as one in which each processor is backed by another processor (the 2N approach).

The main strength of the Synapse scheme is the extent to which it supports both graceful degradation and graceful growth. Although the shared memory system seems to be a single point of failure, the Synapse software and hardware is prepared to deal with a faulty memory. The system can quickly reboot itself, bypassing the failed memory. Data base consistency and recoverability are assured through a combination of system programming and applications programming conventions.

Auragen's Unix Connection

Auragen Systems is another start-up which plans to offer an FT design based on multiple 68000-based processors by using still another architecture. The New Jersey company, founded in 1980, recently unveiled its 4000 system, which consists of up to 32 clusters, interconnected by a duplexed, high-speed bus system. Each cluster is a multiprocessor system in its own right, consisting of a 68000-based Executive Processor, in charge of system functions and bus interface; a Work Processor, utilizing two Motorola 68010s, which executes the user's programs; up to four 68000-based communications processors; and up to four bit-slice disk/tape controllers. A high-speed internal bus system connects these processors and up to 8M bytes of common memory. Peripheral controllers are dual-ported; each may be each attached to two clusters.

A unique feature of the Auragen system is that its Auros operating system is derived from and is compatible with Bell Labs' Unix. The software has been internally enhanced to support the system's architecture, and has been augmented with Oracle, a relational data base management system from Oracle Systems, Inc.

Auragen has also entered into a
technology exchange agreement with Nixdorf Computer AG, of West Germany, which should help Auragen’s growth in the FT arena.

Microprocessors are often combined with local-area networks in new general-purpose systems as well as FT systems. Stratus, as noted above, employs a local-area network to interconnect its PMs. Tandem has announced a fiber-optic-based local network to interconnect a number of local nodes, so that more than 16 processors could be brought to bear on larger transaction systems.

The significance of a local area network as a low-cost, high-speed inter-processor communications facility has not been lost on Tolerant Transaction Systems (TTS), a 1982 start-up based in San Jose, Calif. TTS is developing an innovative solution to the fault-tolerant/on-line transaction processing requirements, involving a loosely coupled arrangement of System Building Blocks (SBB) called the Interprocessor Communications Coordinator (ICC), which utilizes Carrier Sense Multiple Access/Collision Detect Arbitration. The full connectivity between the processors and all other elements of the system allows each processor to back up any other processor. The CCI system makes use of this important advantage by supporting a powerful generalization of disk mirroring: the data base can have several mirror images, and the system automatically maintains a “write to many, read from any” policy.

Process Control and Industrial Automation

Not all of the new FT activity is in the on-line transaction processing field, although it is the largest and most promising. Some companies are addressing FT designs to the process control and industrial automation marketplace.

One such company is Autech Corp., whose Data Systems Division in Pompano Beach, Fla., is a 1980 start-up. Autech is using microprocessor and local-area network technologies to develop a fault-proof system for harsh plant environments.

August Systems of Tigard, Ore., founded in 1978, is pursuing a similar market with its Can’t Fail system which utilizes three Intel Corp. 8086-based processors in a triply redundant configuration. Hewlett-Packard’s HP 1000 series minicomputers have long been popular in industrial environments. Systemsafe/1000, announced in October 1982, is based on the somewhat aging HP 1000 models 60/65 from that series.

Some Open Issues

If one discounts the relatively minor IBM Series/1 and HP 1000 efforts in the fault-tolerance marketplace, the absence of the “big guns” from the FT scene is notable. This absence is puzzling, in view of the multibillion dollar market projections for various FT applications.

The problem faced by the leading mainframe and minicomputer vendors is that, in order to offer fault tolerance on the Tandem scheme, much of the existing software, at both the operating system and standard application levels, will have to be reworked or discarded. Stratus’ “pair and spare” scheme could be employed to limit the impact on the software; but such an implementation will have to rely on ad-hoc logic and so will not be able to take advantage of the cost economies offered by

A unique feature of the Auragen system is that its Auros operating system is derived from and is compatible with Bell Labs’ Unix. The software has been internally enhanced ... and has been augmented with Oracle, a relational DBMS from Oracle Systems, Inc.
standard, off-the-shelf microprocessors.

Nevertheless, it is probable that certain mainframe and minicomputer suppliers will attempt to offer systems with some FT flavor within the next year or so.

Plug-compatible manufacturers IPL Systems, Inc. and Formation, Inc. have already unveiled dual-processor IBM-compatible sys-
tems. IBM executives have hinted at some work along those lines in the large-mainframe area in addi-
tion to the Series/1 efforts de-
scribed above. Digital Equipment Corp. recently introduced a shared disk, shared memory scheme for its VAX 11/780 and Decsystem 20 lines. Gene Amdahl's Trilogy Sys-
tems Corp. is developing an IBM-
compatible supercomputer that will feature some measure of fault-
tolerance at the component level. NCR Corp. is known to be consid-
ering a FT system based on its 32-
bit chip set (which powers the re-
cently introduced 9300 and 9800 systems), as well as its 68000-
based Tower. Hewlett-Packard is believed to be considering how to endow its HP 3000 series with FT features, in addition to the System-
safe/1000 mentioned above. Using its Ringnet, Prime Computer, Inc. could provide an FT system similar to the IBM Series/1 ring.

These systems are likely to be far less elegant and convincing than the architectures offered by the new FT suppliers already de-
scribed, who are not constrained by the need to maintain compati-
bility with an existing software base.

One development which could change the picture dramatically is the availability of FT features at the chip level. Intel has made a start in this direction with its 432 family. Chips in that family incorporate Functional Redundancy Checking (FRC), which greatly simplifies the design of various "pair and spare" architectures. Unfortunately, the 432 has not been a commer-
cial success so far. Wide availabil-
ity of FRC-equipped semicustom chips could allow the leading com-
puter vendors to build economical FT architectures that support exist-
ing instruction sets, thereby mini-
mizing the impact on the software.

A legitimate question is wheth-
er the trend to base FT systems on a multiplicity of low-level proces-
sors, begun by Tandem, is not lim-
iting their application. Neither Tandem nor its newer competitors have been able, for example, to penetrate such large-scale applica-
tions as the airline reservations sys-
tems. Other factors may be at work here, including the reluctance to tinker with massive IBM-based software developed over the years at great cost.

However, as users begin to de-
mand systems to handle 1,000 transactions per second, much more powerful processors will be required. An arrangement invol-
ing a pair of very powerful proces-
sors would be better suited to this task. In this connection it is inter-
esting to note that the computers used in central-office telephone switching applications in both the U.S. and Japan have always relied on the dual-processor approach.

Fault-tolerance at the hardware level is well within present tech-
nology. One can never have abso-
lute protection against faults; but by investing more resources in the system, it is possible to increase its depth and coverage. Depth is a measure of the survivability of the system in the face of multiple fail-
ures, while coverage implies the range of possible failure types with which the system is equipped to deal. The probability that a fault will have an impact on the end user can be reduced to an accept-
ably low level.

However, experience has shown that the primary cause of problems in FT systems is not un-
expected hardware faults, but rather bugs in the operating system, typically discovered through some sequence of events triggered by an error on the part of the user. Soft-
ware fault tolerance is a much more intractable problem, because the design of software is still main-
ly a creative process. Some theo-
retical solutions have been pro-
posed; for example, "correctness proofs" which use mathematical notation and procedures to ex-
press the goals of the program and to prove that it accomplishes only these goals.

Unfortunately, except for very simple subroutines written in a very structured fashion (with a very limited set of control con-
structs), the task of proving the correctness of typical programs is so onerous as to make it totally impractical. Other solutions have been proposed, but they are even more limited. Progress in this area awaits a breakthrough in the gen-
eral discipline of software engi-
neering.

Omri Serlin is president of ITOM International Co., a research and consulting firm in Los Altos, Calif. He has authored market research studies on fault-tolerant systems as well as on supermicros and is the editor of ITOM newsletters dealing with these subjects.
Who's Taking Care of The System?

The invasion of peripherals and smaller computers into user departments is changing the staid complexion of maintenance.

By John Harnett

This year, owners of computer equipment will spend an estimated $8 billion to $10 billion on maintenance.

The traditional large computer manufacturers perform the majority of this service through their captive service organizations — maintaining and repairing the equipment they have built and marketed.

However, during the 1980s the complexion of computer maintenance will change as micros and accompanying peripherals flood offices. In order to keep labor costs down, necessary due to stiff price competition among sellers of microcomputer equipment, many vendors in this arena are shifting a good portion of the onus of support to the user, while at the same time touting their products as “easy to maintain.” Hence such innovations as mail-in, drop-off, walk-in service and self-service have resulted in a smorgasbord of maintenance alternatives varied enough to confuse even the most sophisticated end-user.
concerned about cutting the cost of computer maintenance. Generally, maintenance costs 5% or less of the annual DP budget and is a minor headache compared to the more momentous problems faced by the DP executive.

Despite frequent occurrences of breakdowns in equipment, particularly micros and fussy peripherals, most business operations are willing to pay for high-quality on-site service for the entire spectrum of equipment installed in the company.

This difference in attitude towards maintenance between some vendors and users, which was created in part by the microcomputer explosion, will spur demand for service from third-party maintenance firms and dealers willing to take on full service responsibility for selected equipment.

Independent or third-party maintenance organizations began operating in the late '60s and early '70s as a result of two changing developments in the marketplace. The first had to do with manufacturers' product strategies. As new products were introduced, vendors raised maintenance prices on older models to encourage migration to new products. Such aggressive pricing opened an opportunity for third-party maintenance firms to offer a price incentive to users.

The second significant development was in plug-compatible peripherals. Users built systems by combining products of various manufacturers, but these vendors generally serviced only their own equipment. Third-party maintenance firms began to offer single source services to users of large, mixed systems, and this particular development has spilled over from the traditional large-scale data processing computer environment to the micro revolution of the past few years.

Many of today's manufacturers will not, or simply cannot afford to, invest in both the manpower and capital required to establish effective support service for their products.

Some established manufacturers are divesting their service operations in order to invest resources in marketing or research and development. Rexon Business Machines Corp. and General Automation, Inc. are two companies that have opted to do this.

Major manufacturers offer service agreements for their own smaller computers and their peripheral equipment as well as their high-end products. However, some companies, such as Xerox Corp., are expanding their maintenance operations to service products from other vendors, recognizing maintenance as a potential revenue producer.

The first step in making a maintenance decision is to realize that service plays an important role in the relationship between the company and its computer. Before even considering maintenance alternatives, the company must first assess its present computer needs and realistic future requirements so that it can select equipment adequate for the job.

Although some individuals and even businesses have purchased equipment without clearly evaluating the amount of time it will be used, it generally develops that, once in place, the machines are deluged with applications. Many service problems arise from overuse of equipment not intended to handle the workload.

Thus, even for computer age technology, the old adage, "Penny wise, pound foolish," holds true. Buying an economically priced printer, for example, at first may save money, but could eventually result in huge operating costs due to frequent maintenance problems caused by overloading.

Consideration of maintenance costs should be part of the purchase decision process. Shop around and compare maintenance costs—they can vary from vendor to vendor. In some cases maintenance cost can be used as a measure of equipment reliability. For example, if two printers that are very similar in speed and printing technology have a 25% differential in maintenance fees, this may indicate a problem with reliability.

Since a maintenance operation will tend to offer service contracts on those products that are relatively reliable, it is a good endorsement when a product can be serviced by one of the name-brand third-party organizations.

Also, service contract prices can be a seal of a product's failure characteristics. The expected mean time between failures and the expected mean time to repair are significant components of maintenance pricing.

Since service costs will be in direct proportion to these factors, these prices will provide a good idea of what experts in the industry think about the quality of the product under consideration.

In general, CPUs are relatively stable items and the annual service charge for this equipment can be as low as 5% of the selling price. Yearly service charges for peripherals and communications equipment tend to run around 15% to 20% a year. Likewise, letter-quality printers and plotters generally sport relatively high maintenance price tags largely because the electromechanical features of these products are more readily prone to failure.

As microcomputers are configured with hard disks, expect maintenance for these systems to run 12% to 15% of the selling price.

Equipment that has an interface involving firmware is a potential
maintenance problem.

In addition to the cost of service, there are other maintenance factors to consider when purchasing equipment. Convenience and reliability of the organization providing service should also be evaluated. The vendor should be local enough to provide timely service when needed.

The user should also feel fairly confident that the service organization — whether it is the manufacturer, a third-party servicer or a local dealer — will be in business at least as long as this system is in operation.

Moreover, if systems are configured with products from multiple vendors and serviced by several organizations, a method must be developed for avoiding a finger-pointing situation that can arise when different organizations service different components of the system.

Most of the larger manufacturers will service their own equipment but will not support “foreign” peripherals — any components added to the system not manufactured by them. Some third-party operations repair a limited menu of products and farm out those components they do not handle.

Many larger third-party organizations, however, service a broad product selection of processor units and peripherals so that an end-user can assemble a personalized system and be assured that all the parts are serviced by one company. In this situation single-source servicing becomes the most efficient and economical option.

Product reliability is increasing, but no matter how highly engineered a product is, chances are it will eventually need servicing. In addition to overloading, maintenance problems also arise from first-time or unsophisticated system users who are unsure of operation and often cannot distinguish between a hardware and software problem.

Mishandling of software, such as an inadvertent erasing of files on floppy or hard disks, is another frequent cause for systems breakdown. Be sure all those who will be using the equipment have a basic knowledge of handling and operating procedures. In addition, moving small desktop-type equipment around without ensuring that it is properly secured can be another source of maintenance headaches.

Despite frequent occurrences of breakdowns in equipment, particularly micros and fussy peripherals, most business operations are willing to pay for high-quality on-site service for the entire spectrum of equipment installed in the company. Although some business systems may have been designed with plug-in capability and allow portable servicing, if they have been incorporated into a local network or telecommunications system, it might be difficult and risky to unplug the unit for servicing.

However, just as technology is becoming more sophisticated, maintenance techniques are also moving ahead with the times.

Board swapping will be utilized to a greater degree in the future than is known today will be virtually invisible to the user. Almost all on-site service will be done at the module level through board exchange by a technician or the end-user himself. Substantive repairs of assemblies will be done off-site at service centers. There, advanced test equipment and diagnostics will facilitate an assembly-line approach to even the most complicated machinery, thus making repairs faster and cheaper.

Remote diagnostics is a current popular industry buzzword that refers to a system’s ability to transmit its operating status to, or to be actually operated from, a service center located off-site. Remote diagnostics permits the service organization to get an advance look at the problem before dispatching a technician to the site. This results in more efficient service and eliminates the need for the technician to carry a wider than necessary range of parts and equipment to deal with the problem.

While this capability has been incorporated in some mainframe systems for some time, its application to smaller systems has been hindered by cost factors. Generally, remote diagnostics is not appropriate for systems below the size of a mid-range minicomputer such as the Digital Equipment Corp. PDP-11/44.

Remote diagnostics can eventually result in lower operating costs over the life of the system, but building this capability into the system increases the unit cost. Its most valuable use is for systems which have complex system software. Statistics estimate that remote diagnostics can eliminate 70% of the service calls for systems in which it is installed. Amdahl Corp.’s systems and DEC’s VAX series exhibit a significant amount of remote diagnostics features.

For the time being, there has been no substantial move towards more remote diagnostics in the micro industry, although it is definitely a future trend, particularly in network environments.

Remote diagnosis does have some drawbacks. Suppose the system is operating in a communications environment and the breakdown occurs in its communication mode. Remote diagnosis cannot be utilized because the system lacks the capability to communicate.

Also, remote diagnosis systems could be utilized for computer crime. If a diagnosing system is detailed enough for in-depth analysis of a system, theoretically it has the capability to reach and alter data, thus facilitating computer crime.
A spin-off of remote diagnostics called on-board or self-diagnosis is becoming more popular. Already present on an elementary level in some systems, these techniques allow the users to take a machine's "pulse." They can then relay the information to the service center or make their own repairs, which may involve replacing a faulty board with an operational one. The faulty board can then be forwarded to a repair depot for inspection and possible repairs or exchange.

End-user self-maintenance will be especially applicable in more remote locations where on-site servicing might be delayed or too costly, or both. However, in order to run the diagnosis accurately and make the repair correctly, this will require an investment in a parts inventory as well as a basic expertise not currently present in the ordinary business environment. The larger, more complex systems will still be entrusted to the service organization.

Even with technology improving as rapidly as it is, its effect on reducing the need for service will be minimized by a number of factors. The more tasks the newer, more efficient machines can accommodate, the more heavily they will be utilized and the more of them there will be. Also, despite the fact that the end-user computing market is becoming more computer sophisticated, there will always be service problems which arise from unfamiliarity with the new systems.

However, the high cost of on-site maintenance has created a need for less expensive alternatives, particularly for the smaller end-user. Mail-in service has been available to the end-user for quite some time. Although the cost is significantly less than on-site service, it is only really practical for those end-users who are not concerned with machine downtime.

Walk-in or drop-off service is a relatively new phenomenon with several maintenance organizations providing convenient drop-off locations. In some cases, these sites are actually service centers, or sections of a repair facility that have been converted to handle retail operations. Others are simply depots where the machine is taken in and then forwarded to a service center for repair.

Carry-in maintenance typically costs 20% to 30% less than on-site service. Although the waiting time is considerably less than for mail-in service, carry-in usually involves a period of from one to five days. It is important to note also that not all products are serviced at these centers.

In the future, computer service decisions will be more and more dependent on the price of the equipment. Technology will eventually advance to the point where disposable machines, such as today's hand-held calculators, are a reality. Priced in the $100-and-under range, it may be simpler and less expensive to replace them rather than to repair them. Exchanges will probably grow in popularity for equipment in the medium price range. A flat rate will be charged to swap the damaged unit for a new or repaired one. Even for the more expensive units, such options as on-site, mail-in, pick-up and drop-off service will be available.

Mainframes most likely will continue to be maintained, predominantly by the manufacturers. Everything else will be up for grabs.

Harnett is director of planning and development for TRW, Inc., a major supplier of third-party maintenance services located in Fairfield, N.J.
Computer systems and information resources must be protected. Disaster recovery planning provides a mechanism to keep a company going in the event of a computer catastrophe, whether it be from internal or external sources. The rise of distributed systems, advanced communications services and office automation have emphasized the necessity for developing disaster recovery plans.

The importance of computers and information systems to a corporation is obvious, but what would happen to a business if the plug were pulled on the information systems?

According to some estimates, a typical company would lose over 40% of its operational effectiveness by the fourth day of a major computer outage. Less than 25% of the company's operations would continue to function after the first week and less than 10% after the second week. Clearly, a complete information system interruption would be devastating.
The potential loss from a computer calamity is so great that many companies have developed data processing disaster recovery plans.

The disaster recovery plan insures that the processing of critical functions can be resumed quickly after a disaster.

While hard data is not available, it has been estimated that less than half of the Fortune 1000 companies have a plan of any kind in place. In some companies, the plan is only a "coffee-table" piece designed to satisfy auditors. Probably only 25% to 30% of these companies have a plan that would offer genuine assistance. For medium size and smaller companies the record is much worse.

Disaster recovery planning is a well-thought-out and deliberate effort to prepare for the unthinkable. During the planning process, arrangements are made so that necessary resources will be available even if the computer room is destroyed. Detailed instructions are prepared so that everyone can act effectively. The disaster recovery plan is the definitive guide to restoring valuable information resources.

A disaster occurs infrequently enough that many DP managers feel that it will not happen to their organization. Unfortunately, disasters can and do happen. The rash of unusually severe weather on the West Coast this past year caused serious interruptions for several companies. Hurricane Iwa also made data processing operations in Hawaii painfully aware of the need for backup power.

But weather is not the only cause of disasters; fire is another. Even when the fire damage is negligible, the smoke alone can destroy a computer system. Water damage can be caused by fire protection equipment in this instance, as well as a consequence of severe weather conditions or a plumbing failure. Other accidental causes include earthquakes, mud slides, structural collapse, power failures, human error or vandalism.

These dangers or hazards represent a threat or risk of loss to a business and its computer center.

The reason for disaster recovery planning should be clear. Calamities can and do occur that render the information resource systems inoperable. The failure of these systems can destroy a company. No management information systems (MIS) director has the authority to take that kind of risk and no prudent executive would want to.

Why have so many companies avoided preparing for a disaster? The answer stems from confusion. Companies do not write such plans every day and are unsure of how to go about it. Most companies underestimate the effort involved in such a complex task. Other companies try to get started, but make a false start. Little progress is made and the planners get discouraged.

However, disaster recovery planning is like insurance, and no company would allow their insurance policy to lapse.

The evolution of new information processing technology makes the need for disaster recovery planning much more acute. Even some companies with well-thought-out disaster recovery plans are finding out that those plans are becoming obsolete as information processing technology expands throughout their organization.

Communication networks are an obvious example of how technology is complicating disaster recovery planning. In the days of batch data processing, after the data was stored at the data center the job was done. The input and output were picked up and delivered to the center by standard transportation methods. While it was cumbersome, it was easy to replicate.

Today, users are on-line to their computer systems. Complex networks, both local and remote, link users and computers together. Powerful communication front ends, advanced telephone switches and the telephone company plant all interact. Rebuilding the network can be as big a job — or bigger — as rebuilding the physical facility.

Disaster data processing means that important information might be dispersed to computers throughout the company. Away from the corporate DP center, there may not be the same care about backup and recovery. The old saying, "Out of sight, out of mind," holds true. Yet, what happens if a disaster occurs damaging that remote computer?

Personal computing and word processing raise another new risk. The users of such products are not of the DP department. Who, among user departments, is insuring that specialized programs and critical information is being backed up? Are procedures being written so that personal computer functions can be performed if the primary user is not available? How will the confidential information and personal programs that are on diskettes sitting in desk drawers be replicated in the event the company's building is burned down? This is already a problem in some companies and it will have devastating impact as intelligent workstations sweep through offices during this decade.

These technical changes require new ways of managing information resources. It would be naive to think that they do not impact disaster recovery planning.

There are five key phases in disaster recovery:

- **Preparation** — anticipating the disaster.
- **Protective Reaction** — as disaster is occurring.
- **Recovery Reaction** — immediately after the danger.
- **Recovery Operations** — operating critical systems.
- **Normalization** — return to original capability.

Using a fire as an example helps to provide a simplified overview of how this disaster recovery plan might work. The first phase, preparation, is analogous to having established exit routes and having held fire drills. Protective reaction involves the actions needed to
minimize injury and damage during the disaster; in this example, people leave the building using their assigned evacuation routes and avoiding elevators.

Recovery reaction is the immediate assignment of individuals into preestablished teams to assess the extent of the damage and to implement those portions of the plan that will put critical functions back into operation quickly. Recovery operation is the operational mode under which the company's business is transacted until complete and normal operations can be restored. The final phase is the return to permanent facilities and normal operation. In addition, some would formally recognize a sixth phase whereby the recovery plan was updated.

Extending that analogy to information processing, the first phase is the step where provisions are made, including the writing of the disaster recovery plan. Activities for each of the next four phases is detailed in that plan.

Phase two, protective reaction, is the positive action that takes place while a disaster is occurring. The primary purpose of this phase is to protect human life and to limit physical damage. Without a planned response, the chaos from the disaster can be more harmful than the disaster itself. The shutting down of equipment and the orderly evacuation of personnel are examples of appropriate protective measures.

Phase three, the recovery reaction, picks up where the second step ends. Employee teams assess the damages, institute recovery procedures, and begin building critical processing functions. If the data center is unusable, this phase is where the off-site copies of programs and data are sent to an interim operations center. Hardware and software resources, communications, facilities and people are brought together. The corporate data base is rebuilt. Processing resumes.

Phase four, recovery operations, is the period during which the data processing function is performed using temporary facilities. During this time, processing should be orderly. Critical functions are processed routinely without special management attention. Once the processing routine has been established, attention can be focused on establishing a permanent data center.

Normalization occurs when data processing returns to its permanent location and all information systems are restored. The evolution to normalization includes a conversion of processing from the interim processing center to the normal data center. Everyone has been through a conversion, and this conversion is no different. It is a big job and must be managed well. As part of normalization, the disaster recovery plan would be updated. The success of each of these phases depends on how well the preparation was done. "Be prepared" is a motto well worth adopting.

The first step in writing a disaster recovery plan is understanding what applications are critical to the organization. An application inventory is taken of all computer systems and a risk analysis performed on each one. Priorities are put on each system. Superficial inspection may result in putting emphasis on the wrong applications. Payroll seems like the most obvious example of a system which must have top priority. However, in a disaster it might be possible to write estimated payroll checks based on the previous payroll period registers.

Other systems such as the royalty payment systems found in the energy industry and order entry systems in the distribution industry or manufacturing inventory may have much greater priority. Both quantitative and qualitative factors must be considered.

After the critical systems have been defined and their priorities established, it becomes possible to specify the programs and data to be safeguarded, and to what level. In addition, alternate processing facilities and recovery operation centers can be intelligently evaluated. Mutual aid agreements with other user companies can also be considered, but formal written agreements are needed.

At the same time, policies and procedures are written for data processing staff and for users so that each knows what is expected when disaster strikes. Training is an essential element. A detailed manual is prepared for each working group. Everyone must react in a prescribed way when a catastrophically occurs, otherwise chaos will ensue.

Everyone also includes the users. If the headquarters building is demolished it is not good enough just to restore processing. How will users access processed data? Since some systems will be suspended during recovery operations, I/O methods will change.

Some business functions will revert to manual methods. How will this be accomplished in temporary facilities? A complete disaster recovery plan has a broad perspective.

After the disaster recovery plan is completed, it must be tested. The test must simulate a real disaster as closely as practical without the costly interruptions that would occur had a real disaster taken place.

The internal auditor plays an important role as an objective evaluator of the test results. The internal auditor must also insure that the disaster recovery plan is kept up to date with changing technology, user application and business
DISASTER

**Fully Operational Service Centers**

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone Numbers</th>
</tr>
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<tbody>
<tr>
<td>Arbat System</td>
<td>Arbat Plaza, Hoboken, NJ 07030</td>
<td>(201) 963-4440</td>
</tr>
<tr>
<td>Comdisco Disaster Recovery</td>
<td>6400 Shafer Court, Rosemont, IL 60018</td>
<td>(312) 698-3000</td>
</tr>
<tr>
<td>Disaster Control</td>
<td>555 Goffle Road, Ridgewood, NJ 07450</td>
<td>(201) 652-0400</td>
</tr>
<tr>
<td>Neshaminy Valley Information Processing</td>
<td>4850 Street Road, Trevose, PA 19049</td>
<td>(215) 322-2265</td>
</tr>
<tr>
<td>Cadre</td>
<td>P.O. Box 687, Avon, CT 06001</td>
<td>(203) 674-1285</td>
</tr>
<tr>
<td>Computer Alternatives</td>
<td>200 N. Michigan Ave., Chicago, IL 60601</td>
<td>(312) 977-7500</td>
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<tr>
<td>Hawthorne Computer Service</td>
<td>1234 Market St., Philadelphia, PA 19181</td>
<td>(215) 988-8000</td>
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<tr>
<td>Remote Computing Corp.</td>
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<td>Computer Research Co. (Failsafe)</td>
<td>P.O. Box 1138, Doylestown, PA 18901</td>
<td>(215) 355-7800</td>
</tr>
<tr>
<td>Litton Mellonics</td>
<td>6701 Variel Ave., Canoga Park, CA 91303</td>
<td>(213) 887-5100</td>
</tr>
<tr>
<td>Software Research Co.</td>
<td>140 Gold St., Needham, MA 02194</td>
<td>(617) 449-5310</td>
</tr>
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**Shell Sites**

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone Numbers</th>
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</thead>
<tbody>
<tr>
<td>Data Shield</td>
<td>P.O. Box 242, Greendale, WI 53129</td>
<td>(414) 421-7710</td>
</tr>
<tr>
<td>Data Processing Security</td>
<td>200 East Loop 820, Fort Worth, TX 76112</td>
<td>(817) 457-9400</td>
</tr>
<tr>
<td>Emergency Computer Center</td>
<td>10012 Darnell St., Lenexa, KS 66215</td>
<td>(913) 888-6200</td>
</tr>
<tr>
<td>National Processing Co.</td>
<td>1231 Durrent Lane, Louisville, KY 40285</td>
<td>(502) 581-4281</td>
</tr>
<tr>
<td>Western-Southern Life Ins.</td>
<td>P.O. Box 1119, Cincinnati, OH 45201</td>
<td>(513) 629-1800</td>
</tr>
<tr>
<td>Data Site</td>
<td>P.O. Box 907, Greenville, RI 02828</td>
<td>(410) 949-1090</td>
</tr>
<tr>
<td>Eloigne Corporation</td>
<td>P.O. Box 26312, Minneapolis, MN 55426</td>
<td>(612) 644-7587</td>
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<tr>
<td>Martin Marietta Data Systems</td>
<td>P.O. Box 13990, Orlando, FL 32859</td>
<td>(305) 855-1050</td>
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<tr>
<td>Recovery Centers of America</td>
<td>P.O. Box 12012, Nashville, TN 37212</td>
<td>(615) 329-4422</td>
</tr>
<tr>
<td>Wright Line/Iron Mountain</td>
<td>160 Gold Star Blvd., Worcester, MA 01606</td>
<td>(617) 852-4300</td>
</tr>
</tbody>
</table>
environment. The external auditor also has a role to play as an impartial, outside observer. On the other hand, the auditor cannot become enmeshed with the development of the plan without endangering the plan’s objective as well as the independent frame of mind needed to evaluate the finished plan effectively.

There are several misconceptions and mistakes that are often made in disaster recovery planning.

**Cookbook Approach** — Disaster recovery planning is very specific to the business, technical and organizational environment of the company. A cookbook approach, which infers a general step by step way of doing the job, doesn’t work. Although there are certain steps which every company must follow, the systems that are essential for survival in one company may be luxuries to another firm.

**The ‘Solution First’ Approach** — Many companies become enamored with evaluating disaster recovery products and services: alternate processing facilities, reserve operation centers, empty shells, mutual-aid pacts, backup storage sites and so on. All too often, the recovery approach is decided before the real needs are assessed. Trying to match problems to a solution is backwards. Assess the situation, evaluate the risks, establish evaluation criteria; then study the alternatives and make the selection that best meets that criteria.

**Neglecting the User** — Risks can neither be analyzed nor can priorities be established without the close consultation of management and end users. The final plan is not implementable unless recovery procedures and manuals are available to the users. Furthermore, users must be part of the ongoing testing of the plan.

**The Static Plan** — The “do it once and then admire it” approach to disaster recovery planning is the worst possible choice. Information processing is changing in every organization. This fact must be dealt with frequently if your organization is to be protected effectively and realistically.

An out-of-date plan will probably fail in an emergency. The cost for developing the plan has been wasted. Worse than that, there is a false sense of security. Such plans must be dynamic and must be kept current. When the plan is updated as part of ongoing development, it becomes a routine part of every project.

**Doing Nothing** — The ostrich never escapes danger by sticking his head in the sand, and one can be sure that the ostrich is always blind-sided when disaster strikes. When you don’t have a plan, you are playing a dangerous game in which the odds are stacked against your company. That is a risk that is avoided by prudent and diligent businessmen.

**Unmanaged Planning** — Many disaster plans take too long, cost too much, or are never completed because of mismanagement. Disaster recovery planning is a major (but not Herculean) project. Its development must itself be carefully planned. Milestones must be established and tasks must be assigned. Progress must be monitored. Management must demand results.

**Lack of Resources** — Good planning and monitoring is essential, but not sufficient by itself. The right people and the necessary resources must be assigned. The project manager must have the right combination of business, technical and disaster planning skills. And the planning effort must be his first priority.

**Fanaticism** — Beware of the disaster recovery planning effort that looks like a Cecil B. DeMille extravaganza — “A cast of thousands, ten years in the making ...” A complete plan is necessary, but do not lose sight of practical considerations.

Disaster recovery planning is the conscientious development of a contingency plan to insure that critical information resources are protected in the event of a calamity. Such a plan is necessary because of the importance of information and communications in the modern business. As time goes on, we will become even more reliant on computerized information systems. The technology is becoming more dispersed so that careful planning is all the more important. Anything less is negligent.

The steps in disaster recovery planning are logical. The current situation is analyzed and critical systems are identified. Detailed plans are made and documented so that critical functions can be restored in order of priority.

The whole project is performed with a focus on meeting real corporate needs. Product selection comes only after those needs are understood. Actual testing of the plan caps off the development effort and provides an important quality control check. Once developed, the plan is maintained to ensure that it is current.

The likelihood of a serious computer outage in any one company in any one year is slight. However, for a successful company, a computer calamity is ultimately inevitable. Information is a valuable asset and it must be protected. If you already have a plan, establish the mechanism to be sure it stays current. If you do not have a plan, it is not too late to begin, but begin soon. Once a disaster strikes, it will be too late for you and perhaps for your company.

Gary Tarkington is a consultant with the Information Management Division of Walter E. Ulrich Consulting, located in Houston, Texas. He has 10 years of experience in data processing, information management, and planning.

Walter Ulrich is president of Walter E. Ulrich Consulting. He is a frequent speaker at information processing conferences and seminars and a leading expert in computers, communications, and office system management.
The first thing to understand about personal computers is that no system is perfect; you are looking for a personal computer that suits you. If one system was clearly better than all the others, you would already know about it.

The first thing to do in the selection process is to determine how the system will be used. Will the personal computer be used by one person or will it be shared? Will it be hooked into a mainframe or a commercial data base? What applications will be performed on the machine: word processing, spreadsheets, illustrated texts, dunning letters, customer account management, sales analysis, phone list maintenance or several of these together? How often will the systems be used — all day or for frequent five-minute stretches? Will telephone management be incorporated into the system? How much data will be stored on the system?

Somewhere in the world there may be a personal computer that precisely meets your needs. Unfortunately, there are so many it may be difficult to find the one that's just right. Even worse, it may come in little pieces: Company A's CPU; B's disk drive; C, D, E and F's software; and Dealer G's support.

The dealer who sells the machine can be the kingpin in helping a user select and fit together all the diverse components of the system. He should be ready, willing and able to fix any problems, whether they be a new piece of software or a disk drive overhaul.

Hardware

The major news in hardware these days is 16-bit microcomputers. This architecture offers the capacity to handle more data and far more complex programs than the traditional (since the late 70s) 8-bit architecture. Eight-bit machines, such as the Apple Computer, Inc. Apple III, can actually be very sophisticated, supporting hard disks and multiple users, but all other things being equal, a 16-bit machine is probably preferable. Most of the interesting new software available is written for 16-bit machines — in particular for the IBM Personal Computer.

Several firms now offer a variety of 8-bit and 16-bit machines. Some, like Digital Equipment Corp.'s Rainbow and some TeleVideo Systems, Inc. systems have one of each, enabling them to run both kinds of software. Add-in cards, such as Microsoft Corp.'s Softcard, also include a Zilog, Inc. Z80 microprocessor, enabling Apple computers to run Digital Research, Inc.'s CP/M software. SRItek Computer Systems offers a Motorola, Inc.'s 68000 card, enabling the IBM Personal Computer to run a 68000 version of Bell Laboratories' Unix and other 68000 software.

The number of bits determines, among other things, how much software or data the computer can handle at one time and is a measure of the system's potential.

Theoretically a personal computer could have unlimited external storage, but in practice most systems now have two floppy drives, and frequently a hard disk drive as well.

With IBM's announcement last March of the XT, which comes with a 10M-byte hard disk, there has been an enormous gain in the popularity of hard disks — as well as of software which makes use of them. Should your computer have a hard disk? Certainly it is an enormous convenience, albeit an expensive one, at $2,000 to $3,000 a unit. Having a hard disk eliminates the need to keep swapping (let alone keep track of) a collection of floppy disks (although it's wise to store each day's work on a floppy disk just for back-up purposes).

Besides overcoming capacity limitations and disk-swapping required with floppy disks, the hard disk...
also has much faster access time. Five seconds vs. half a minute to load a file from a disk sounds petty, but it isn’t if you keep on switching from one file to another. Another aid in doing this is a multitasking operating system, such as Concurrent CP/M or Unix, which allows switching from application to application. For someone who has been working on a single VisiCalc VisiCalc model all day, however, this feature would be an unnecessary expense.

In addition to the usual array of printers and disk drives, personal computers are now beginning to sport some more adventurous accessories. Voice systems of various capabilities are beginning to appear. The most ambitious of these, offering voice recognition as well as the easier-to-create voice output and playback, will be available from Texas Instruments, Inc. on its Professional Computer this fall.

Another analog input device, the “mouse,” is gaining popularity. The mouse, first widely used on Xerox Corp.‘s Star system, lets the user move the machine’s cursor by moving the mouse, a small object that contains sensing devices on a flat surface. The mouse translates these movements onto the screen and moves the cursor correspondingly. The mouse can be used not just for graphics but also for selecting text, items on a menu, entries in a spreadsheet and so forth. However, using a mouse is a question of individual preference.

In addition to the Star, which pioneered the mouse in the general marketplace, current mouse-oriented systems include Apple’s Lisa and hardware using VisiCorp VisiOn or some of Microsoft’s Multitool series of software packages. (Microsoft’s user shell has not yet been announced, but it too will use a mouse.) What really gives a personal computer its personality is software. The largest existing base of software is probably that written for the Apple II; second is that for the large array of CP/M-based machines. However, most of the newest, broadest featured software is now being written for the 16-bit Personal Computer, running under PC-DOS, IBM’s operating system for that machine.

All of the hot new software — such as Lotus Development Corp.’s 1-2-3; Context Management Systems’ Context MBA; VisiCorp’s VisiWord; Bruce & Jones Program Publishers’ Wordvision; Software Arts, Inc.’s TKSolver; and Microsoft’s Multiplan — is written for the Personal Computer first and for other machines later, if ever.

Software is rapidly improving, so it makes sense to buy state-of-the-art products if possible. Simultaneously, software writers are becoming more sensitive to the growing installed base of personal computers and are designing software so that a previous investment is not wasted. For example, Multiplan and 1-2-3 will accept VisiCalc files (but not vice versa); Personal Computer software can generally run on the XT (but not always vice versa).

Thus as long as you have a relatively popular machine and relatively popular software you are somewhat protected.

All in all, it is getting easier to make different packages work together. This is all part of the trend towards integration, an attribute that comes in many forms. There are two kinds of integration: cosmetic and fundamental. Cosmetic means that a group of programs all has the same prefix or suffix — Visi-, Multi-, Super-, Easy-or-Star, for example — and the same user interface — all the commands, menus, documentation and so on come in on the same format for ease of use.

Fundamental integration means that data can be shifted easily or, better yet, automatically from one module of an integrated set into another. For exam-
ple, imagine a VisiCalc model that automatically updates revenue projections when a company raises its prices.

Another form of integration allows the user to look at different sets of data simultaneously. For example, seeing parts of pages two and three of a single document or seeing both the letter being written and the sales report being quoted from in different parts of the screen. These different views are called windows and are rapidly becoming a fashionable feature of the newer systems.

Integration has been getting a lot of press lately, for obvious reasons. All the major productivity package players — Visicorp, Microsoft, Sorcim Corp., Information Unlimited Software, Inc., Micropro International Corp., Peachtree Software, Inc. — are touting it. There's Apple, whose Lisa system is so integrated that it comes complete with hardware. Finally, there is a host of "environ couples," packages that incorporate several separate applications and integrate them. The most comprehensive of these is Visicorp's VisiOn, announced for the Personal Computer last November and to be available this October — with adaptations for the DEC, TI and Wang Laboratories, Inc. professional computers to follow.

With VisiOn and the related applications (which Visicorp will supply, although other vendors are also being encouraged to write packages for the VisiOn environment), the IBM micro will offer most of the same features as Lisa at a lower cost and on a more familiar machine.

Other contenders in the integration race will include Microsoft, Micropro and Digital Research, with full-featured products not yet announced. Meanwhile, Quarterdeck Systems will offer Desq, which provides for some data transfer among applications and a lot of commonality in the user interface. Alpha Software Corp., with its Data Base Manager II, provides a complement to Desq, allowing for transfer of data among different applications.

Is all this integration necessary for you? It depends on how you intend to use your personal computer. If only one function is needed, such as word processing, then a good word processing package is all that is required. If several functions are going to be performed, mostly one at a time but with some data sharing, a set of integrated applications from the same vendor, or the set of popular applications linked by a data transfer package, will probably be the best option. But if tasks are being constantly shifted from one to another, and you would like to look at a letter while working on a sales plan, something like the VisiOn package or the Lisa system is appropriate. But remember, what starts out as a convenience soon becomes a necessity.

IBM's Personal Computer

Several currently available systems are popular examples of what is on the market today. The most significant trend these days is the supremacy of the Personal Computer, which epitomizes security and vendor reliability. Next is Apple's Lisa, an innovative, exciting machine from a company that still gives some old-line DP managers hives. Then there's the TI Professional, one of the many MS-DOS machines that's fighting IBM by offering extra features as well as a lower price.

The user cannot go too far away with the Personal Computer because most of the good software is being written first for the IBM Personal Computer, and for everything else as an afterthought. The Personal Computer itself is a solid, Intel Corp. 8088-based machine, with a list price which was recently dropped 15% to $2,635 (for the two disk version). Corporate purchasers who buy in volume, moreover, can usually negotiate a discount of up to 50% at 250-plus quantities from a local dealer or even from IBM itself. The basic system comes with 64K bytes of random-access memory (RAM); the XT starts with 128K RAM and includes a 10M-byte hard disk for $4,995. For most personal uses, this is ample. There is a wide range of software available for the system from IBM and third-party sources, including, later this year, VisiOn, which will make the personal computer almost an equivalent of the Lisa.

The Personal Computer's chief flaw is probably its relatively low power compared to all the other Motorola 68000-based machines. But most personal computer users are more concerned with the quality of the software they use than with its execution speed. Another failing is the lack of a good, standard network system, but that's an issue now being addressed both by IBM itself and by a host of add-on vendors such as Tecmar, Inc., Visi corp and 3Com Corp.

What more needs to be said about the IBM Personal Computer? It is the standard against which all the others are measured. And it comes with IBM's name and the assurance of support from a dealer carefully qualified by IBM or from IBM itself.

Apple's Lisa

The Lisa is Apple's new flagship machine and was introduced this past spring. Priced at $9,995, it includes a hard disk (Apple's familiar 5M-byte Profile) and everything else but the printer.

Lisa uses Motorola's powerful 68000 16-bit chip to provide an extremely flexible, comprehensive single-user system that's accessible to the novice. Most of its several applications (word processing, graphics and so on) can pass data from one to another and several files can be seen on the screen at the same time through the use of variable-size, overlapping windows.

Lisa operates like a desk top on a screen, with tools and files all neatly laid out. Rather than being stored in an inaccessible computer file that can only be called up when the screen is wiped clean of
the work at hand, Lisa's files can be displayed permanently at the edge of the screen so that the user sees what's available. Likewise, the tools are visible — mailbox, wastebasket, clock, printer and calculator. The user can enter data and text in the normal way through the keyboard, but manipulates them with a mouse, using it to select documents and text or data from available documents and functions from a wide selection of menus.

Except for Lisadraw and Lisaproject — which are virtually unrivaled and put the superb graphics of the monochrome 12-inch bitmapped display (720 by 364 pixels; about twice the resolution of the unimproved Personal Computer) and dot matrix printer ($695 extra) to good use — Lisa's applications are pedestrian versions of standard functions that have been done better elsewhere. It is only their integration with each other (such as it is) that makes them unique — for the moment.

But this is a uniqueness most useful to the user who never works very long or deeply at one task, but rather shifts around and needs a flexible system that will accommodate him. In contrast to its Xerox progenitor, the Star, which can be used only as part of a network, Lisa at present is limited to stand-alone operation (with optional remote communications capabilities) and cannot share resources with other machines. However, the company has recently announced a joint development agreement with Guilnet Software, Inc., which will reportedly give Lisa easy access to most mainframe data bases some time next winter.

As noted, Lisa costs $9,995. An equivalent Personal Computer might start at about $6,000 with a 10M-byte disk drive, but its internal memory still limited to 512K bytes.

On top of that, the user would have to add applications and VisiOn, with mouse and interface, for a total of approximately $7,000 or $8,000.

But it's not just cost that's the issue. Regardless of the cost, the risk applies to the entire system in the case of Lisa; to the software only in the case of the IBM Personal Computer equipped with VisiOn. First, many prospects may already have a Personal Computer and some additions, so all they have to do is buy the VisiOn software and mouse. And if they do not like it, they still have the Personal Computer and the hard disk.

The TI Professional

Texas Instruments announced its version of the proliferating "professional computer" last spring. With some encouragement from TI many software houses have already transported their Personal Computer software to the TI Professional, which runs on Microsoft's MS-DOS operating system, so all they have to do is buy the VisiOn software and mouse. And if they do not like it, they still have the Personal Computer and the hard disk.

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The software that’s right for your system and your company’s needs is not just ‘discovered’. Finding it takes research, an understanding of your current and future business needs, thorough planning, and careful evaluation of the available software. If you’ve ever had to shop for software, you know the possibilities seem endless. Now, you can explore the software universe with one, easy-to-use reference — the Computerworld Buyer’s Guide to Software.

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What is clearly needed in today's high-pressure information systems environment is a framework for providing the selection and implementation of information systems resources — hardware, software and personnel — effectively and efficiently, while still allowing for future business requirements and advances in technology.

Such a framework, often referred to as an information systems architecture, is designed to reflect the values of an organization with regard to operational efficiency (such as cost, management complexity, use of operation and so on). In addition, the information systems architecture provides for changes in installed technologies and the introduction of new technologies where they can support the thrust of the business.

By G. Michael Ashmore

Understanding the need for an information system architecture is one thing; developing one is quite a different matter. Most of the methods of producing such an architecture are complex and require a significant investment. The complexity is not due to the technical principles that are employed, such as understanding how information is used, but in the depth of the information that has to be gathered. For example, gathering data
INFORMATION SYSTEMS ARCHITECTURE METHODOLOGY

INPUTS

MAJOR STEPS

DEFINE BUSINESS ACTIVITIES AND INFORMATION SYSTEMS OPPORTUNITIES

BUSINESS DIRECTION

IDENTIFY TECHNOLOGY OPTIONS FOR EACH INFORMATION SYSTEM OPPORTUNITY

TECHNOLOGY DIRECTION

DOCUMENT CURRENT ARCHITECTURE

ANALYZE OPTIONS IN TERMS OF IMPLEMENTATION COSTS AND REQUIREMENTS

SERVICE STRATEGY DELIVERY PLANS INFORMATION POLICY

EVALUATE OPTIONS USING ORGANIZATION VALUES AND SELECT ARCHITECTURE

ORGANIZATION VALUES

METHODOLOGY INPUTS

BUSINESS DIRECTION
Description of the business, its functions, activities and anticipated changes. Identifies areas in which information systems are required or highly useful.

TECHNOLOGY DIRECTION
Technical resources capabilities, trends and likely innovations.

CURRENT ARCHITECTURE
Existing resources and the services they provide.

SERVICE STRATEGY
Information services to be supported, user base and service objectives.

DELIVERY PLANS
Application and general service design details and implementation plans.

INFORMATION POLICY
Data Bases and high level data flow. Information usage and control policies.

ORGANIZATIONAL VALUES
Values with which the organization makes decisions and determines success.

Chart Courtesy of Index Systems, Inc.
on transaction volume may be irrelevant to a centralization/decentralization issue if control or response time requirements are sufficiently stringent.

In recognition of this problem, Index Systems, Inc., has formulated an updated approach to the information system architecture. This approach focuses on evaluating the functions performed by the business and the values which the organization uses to judge the performance of its operation. As a result, the methodology distinguishes itself in three critical ways from previous approaches. First, business direction is used to determine information system opportunities. This insures that the resulting information systems architecture is in alignment with the direction of the business. Second, technical capabilities are analyzed in terms of business impact, but only as they relate to the defined business direction. For example, if an opportunity for introducing word processing capabilities is identified, technical specifications for the equipment are examined and translated into pertinent business considerations, such as functional impact, quality and cost.

The third and perhaps most important approach involves applying the values of the organization to the tasks of defining the architecture, which reduces the amount of information that must be considered and therefore streamlines the entire process. This process results in the identification of those critical components (such as cost, control or risk) which drive technical resource decisions. In most organizations, the number of such components is small, necessitating little, if any, information gathering. As a result, the information system architecture can be developed quickly and efficiently.

Methodology

An information systems architecture methodology consists of three components:
- Descriptions of the steps to be performed.
- Guidelines and instructions for performing each step.
- A definition of the resulting work product.

The first and third components are based upon technical principle and logic that has already proven effective in other information system architecture methods. Consequently, this method does not differ significantly from previous approaches in either of these areas. Where the methodology introduces a new twist is in the second component; that is, in the way in which essential steps are performed. By identifying the values of the organization as they relate to the introduction and use of information systems as well as by using these values to analyze hardware, software and personnel options, the methodology requires detailed information only when it relates directly to the decision-making process. As a result, the amount of detail necessary for constructing the information system architecture is simplified and shortened.

As illustrated in the chart on page 58, the information systems architecture methodology requires that the following steps be conducted.

1. Prepare a high-level description of business activities and functional requirements for the planning time frame. Define information systems opportunities that support these requirements and potential improvements in efficiency or effectiveness of the organization.
2. For each information systems opportunity, determine the hardware, software and personnel options. As appropriate, include options based on anticipated new technologies and improvements in existing technologies.
3. Document the existing information systems, focusing on the capabilities and services that are or can be provided.
4. Analyze each technical resource option in terms of what it takes to get there — the cost, time, risk and level of effort involved — and what it means to be there (control, productivity, responsiveness).

Using these values of the organization, evaluate the options and select the option which best fits the organization. This option becomes the new information systems architecture and is the target for subsequent technical resource decisions.

The performance of each step in the order specified guarantees that the framework is aligned with business direction, takes into account technological advances and is consistent with the values and objectives of the organization.

The third and perhaps most important approach involves applying the values of the organization to the tasks of defining the architecture, which reduces the amount of information that must be considered and therefore streamlines the entire process.

The core of the updated information system architecture methodology is its recognition and use of the values of the organization. These values provide implicit direction for identifying information systems opportunities and explicit means for evaluating support options. They highlight both the critical decision factors and the information required to make those decisions. At the same time they eliminate the need to collect and consider information not immediately required for the decisions at hand.

How does this work? The initial step in the technique is tied intrinsically to the business: what activities occur, how is each performed, and how effectiveness and efficiency are measured. If all of these elements are known, technology options can be examined accordingly, in terms of the functional support and business factors that are important to the activities. A technology option is considered if
and only if it works and if it improves the effectiveness and efficiency of the function in those areas of the business that are highly valued.

In practice, this reduces the numbers of technologies that must be considered and can, in fact, specify particular resources. For example, an information systems opportunity for remote on-line data entry that requires local edit capability and rapid response to achieve productivity benefits may necessitate intelligent terminals. If data manipulation requirements are added, with the same response time needs, microprocessors may be warranted. Cost, risk, available software and similar factors can further limit the options by restricting the choices of acceptable vendors or devices.

The process of choosing between options is similarly influenced by applying the values of the organization. Detailed information is required only in those instances in which it is critical to the evaluation. For example, if cost is the driving force, documentation of transaction volumes may be necessary to select between a distributed solution and a centralized processing option that includes remote terminals. This same data may not be necessary if the need for strong, local control dictates a distributed data processing strategy.

Looking across all technology options, the values of the organization usually require selected detail from the following areas:

- Service strategy.
- Delivery plans (including applications plans).
- Information policy.

Each of these areas is described briefly in the chart on page 58. It is important to recognize, however, that the complete collection of information is seldom, if ever, required for the process and that the information that is required is often already known within the organization.

In summary, the technique preserves principles established by other methodologies, while reducing the amount of information that must be considered.

An information systems architecture is a framework for deploying technical resources (meaning hardware, software, and information systems support personnel) to meet current and anticipated future business needs. The architecture addresses the following questions explicitly:

- Which technologies are right for the business?
- Which information systems resources best provide the required services?
- How should those resources be deployed (where are the resources located, when are they installed, how are they connected and who manages them) to deliver needed capabilities?

The architecture takes the form of a description of the services to be provided, the technical resources to be installed at each business site and the connectivity between sites. The architecture also includes standards and guidelines which govern the implementation of additional or replacement resources.

Ashmore is a principal at Index Systems, Inc., a consulting firm located in Cambridge, Mass.
ACCELERATED DATA SYSTEMS
1183 Bordeaux
Sunvalle, CA 94086
(408) 744-0264
Major Markets: OEM Computer Systems; Computer Manufacturing; Systems House (OEM); Target Industries: Scientific; Engineering; Target Applications: CAD/CAM
Geographic Coverage: International
Year Established: 1980

ACCESS MATRIX CORP.
2160 Berry Drive
San Jose, CA 95131
(408) 263-3680
Major Market: Computer Manufacturing
Contacts:
Head of Marketing/Sales: H. White
Head of Customer Service: Donna Walker
Geographic Coverage: International
Year Established: 1981
Number of Employees: 100

ACTION COMPUTER ENTERPRISE
55 W. Del Mar Blvd
Pasadena, CA 91105
(213) 793-2440
Major Market: Computer Manufacturing
Net Sales: $1 Million — $5 Million (1989)
Contacts:
Head of Marketing/Sales: Herb Siegel
Head of Engineering: Kwok Ong
Year Established: 1980
Number of Employees: 40

ACME SYSTEMS
3340 Scott Blvd
Santa Clara, CA 95051
(408) 988-7777
Major Markets: OEM Computer Systems; Systems House (OEM); Computer Manufacturing Target Industries: Utilities
Contacts:
Head of Marketing/Sales: Donald Willet
Head of Software: Ron Eichron
Head of Customer Service: Rick Perry
Geographic Coverage: International
Year Established: 1970
Number of Employees: 600

ADAC CORP.
72 Tower Office Park
Woburn, MA 01801
(617) 935-9608
Major Markets: Computer and Peripheral Manufacturing; OEM Computer Systems
Target Industries: Manufacturing; Target Applications: Data Acquisition
Net Sales: $5 Million — $25 Million (1983)
Contacts:
Head of Marketing: Alvin Profjos
Geographic Coverage: International

ADVANCED DIGITAL PRODUCTS, INC.
1250 Union St
San Diego, CA 92101
(714) 533-6103
Major Markets: Computer Manufacturing, Software House
Target Industries: Business; Educational; Scientific
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: D. A. George
Head of Software: Barry Demchak
Geographic Coverage: International
Year Established: 1981
Number of Employees: 30

ADVANCED INFORMATICS, LTD.
7th & Elm
West Liberty, IA 52776
Major Markets: Computer Manufacturing, Software House
Contacts:
Head of Marketing/Sales: Chuck Phayre
Head of Software: Harry Skaskinski
Head of Customer Service: Doug Harvey
Geographic Coverage: International
Year Established: 1970
Number of Employees: 200

ACTU SYSTEMS
1160 Mark Ave
Carpenteria, CA 93013
(805) 694-4622
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Retailing
Contacts:
Head of Marketing: Jerry Davies
Geographic Coverage: International
Year Established: 1979
Number of Employees: 40

ACUREX CORP.
485 Cady Ave
Monterey, CA 93942
(415) 964-3200
Major Markets: OEM Computer Systems; Systems House (OEM)
Computer Manufacturing Target Industries: Utilities
Contacts:
Head of Marketing/Sales: Donald Willet
Head of Software: Ron Eichron
Head of Customer Service: Rick Perry
Geographic Coverage: International
Year Established: 1970
Number of Employees: 100

ADVANCED MICRO DIGITAL CORP.
7201 Garden Grove Blvd
Garden Grove, CA 92644
(714) 981-4004
Major Market: Computer Manufacturing
Target Industries: OEM
Target Applications: General Business
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Al Bagheri
Head of Engineering: Alonzo Carden
Geographic Coverage: International
Year Established: 1980

AKI, INC.
1117 N. 19th St
Arlington, VA 22210
(703) 522-5876
Major Markets: Computer Manufacturing, OEM Computer Systems
Target Industries: Publishing, Printing
Contacts:
Head of Sales: Donna Wiley
Geographic Coverage: Regional
Year Established: 1960
Number of Employees: 15

ALBERT COMPUTER, INC.
3170 Los Feliz Drive
Univ C
Thousand Oaks, CA 91362
(805) 497-1073
Major Market: Computer Manufacturing
Contacts:
Head of Marketing: Kenneth Sliger
Head of Sales: Ted Phillips
Geographic Coverage: International
Year Established: 1982
Number of Employees: 45

ALCYON, INC.
8716 Production Ave
San Diego, CA 92121
(714) 578-0960
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: Daniell Barugh
Geographic Coverage: National
Year Established: 1978
Number of Employees: 57

ADVANCED MICRO DEVICES, INC.
3340 Scott Blvd
Santa Clara, CA 95051
(408) 988-7777
Major Markets: OEM Computer Systems; Computer Manufacturing
Target Industries: Telecommunications; Communications; Industrial; Military
Target Applications: Industrial Control
Net Sales: $5 Million — $25 Million (1983)
Geographic Coverage: International
Year Established: 1979
Number of Employees: 100

ALPSA COMPUTER, INC.
300 Harvey B. Blvd
Santa Cruz, CA 95060
(408) 429-6000
Major Market: Computer Manufacturing
Target Industries: System Integrations; OEM
Contacts:
Head of Sales: Richard Brooks
Head of Engineering: Steven Rupp
Head of Customer Service: Dennis Herring
Geographic Coverage: International
Year Established: 1980

ALTOS COMPUTER SYSTEMS, INC.
2641 Orchard Park Way
San Jose, CA 95134
(408) 946-5700
Major Market: Computer Manufacturing
Target Industries: OEM
Target Applications: General Business
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Mike Skefon
Geographic Coverage: International
Year Established: 1977
Number of Employees: 375

AMDAHL CORP.
1250 E. Arques Ave.
P.O. Box 470
Sunvalle, CA 94086
(408) 764-1116
Major Markets: Component, Computer Peripherals and Communications Equipment Manufacturing, OEM Computer Systems, Software House, Dealer/Distributor, Maintenance/Other Services
Target Applications: Project Productivity
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: William F. O'Connor
Head of Software: Fredrick M. Tragalin Jr.
Head of Engineering: Bruce Bebee
Geographic Coverage: International
Year Established: 1970
Number of Employees: 5,300

AMF LOGIC SCIENCES, INC.
10353 Rockley Road
Houston, TX 77095
(713) 879-0536
Major Markets: Computer Manufacturing, OEM Computer Systems
Target Industries: Oil Exploration
Target Applications: Displays
Contacts:
Head of Marketing/Sales: Roger Fuller
Head of Software/Engineering: John Burg
Head of Customer Service: Jim Nipper
Geographic Coverage: International
Year Established: 1973
Number of Employees: 35

AM INTERNATIONAL, INC.
Vanityer Division
ANDROMEDA SYSTEMS, INC.  
3800 Stone School Road  
Ann Arbor, MI 48104  
(313) 776-2000  
Major Markets: Component and Computer Manufacturing  
Target Industries: Aerospace; Energy; Automotive  
Target Applications: Simulation Systems; Transmission Design  
Contacts:  
Head of Marketing: Edward Fadden  
Head of Customer Service: Donald Chandler  
Geographic Coverage: International  
Year Established: 1965  
Number of Employees: 15

APPLIED SYSTEMS CORP.  
26041 Harper  
St. Clair Shores, MI 48081  
(313) 776-8700  
Major Markets: Component and Computer Manufacturing; OEM Computer Systems  
Geographic Coverage: Regional  
Year Established: 1965  
Number of Employees: 15

APPLIED TECHNOLOGY VENTURES, INC. (ATVINC)  
2921 S. Darrow Blvd  
Santa Ana, CA 92705  
(714) 546-3551  
Major Markets: Component and Computer Manufacturing; OEM Computer Systems  
Target Industries: Hospitality; Office Information  
Geographic Coverage: International  
Year Established: 1981  
Number of Employees: 50

ARCH AUTOMATION SERVICE, INC.  
219 Perimeter Center Pkwy  
Atlanta, GA 30346  
(404) 383-0700  
Major Markets: Computer Manufacturing; Systems House (OEM)  
Target Industries: Pharmaceutical; Metalurgical  
Net Sales: $100,000 — $500,000 (1981)  
Contacts:  
Head of Marketing/Sales: Dick Wolfe  
Head of Engineering: Tony Frederick  
Geographic Coverage: International  
Year Established: 1978  
Number of Employees: 50

AURAGEN SYSTEMS CORP.  
2 Executive Drive  
Fort Lee, NJ 07024  
(201) 461-3400  
Major Markets: Computer Manufacturing  
Contacts:  
Head of Marketing: Tom Garvey  
Year Established: 1991  
Number of Employees: 100

Davenport, IA 52806  
(319) 386-7400  
Major Markets: Computer Manufacturing; OEM Computer Systems; Systems House (OEM)  
Target Industries: Legal; Associations  
Target Applications: Legal Time/Billing; Telex  
Membership/Funding:  
Contacts:  
Head of Sales: Bob Hill  
Head of Marketing: Jim Komatar  
Head of Engineering: John Jenkins  
Head of Customer Service: Paul Keller  
Geographic Coverage: International  
Year Established: 1978  
Number of Employees: 50

ARDENT COMPUTER PRODUCTS COMPANY  
145 Palisades St  
Dobbs Ferry, NY 10522  
(914) 693-6900  
Major Markets: Component and Computer Manufacturing; Miscellaneous Computer Supplies  
Target Industries: OEM  
Net Sales: $5 million — $5 million (1981)  
Contacts:  
Head of Marketing: Gilbert Heimb  
Geographic Coverage: National  
Year Established: 1980  
Number of Employees: 50

ASTRONAUTICS CORP. OF AMERICA  
907 S. 1st St  
Milwaukee, WI 53204  
(414) 675-5500  
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing  
Target Industries: Aerospace; Military  
Net Sales: $25 million — $100 million (1981)  
Contacts:  
Head of Marketing/R: D. Seinfeld  
Geographic Coverage: International  
Year Established: 1959  
Number of Employees: 1,300

AUGUST SYSTEMS, INC.  
2737 19th St. S.E.  
Salem, OR 97302  
(503) 364-5863  
Major Markets: Computer Manufacturing; Systems House (OEM)  
Target Industries: Pharmaceutical; Metalurgical  
Net Sales: $100,000 — $500,000 (1981)  
Contacts:  
Head of Marketing/Sales: Dick Wolfe  
Head of Engineering: Tony Frederick  
Geographic Coverage: International  
Year Established: 1978  
Number of Employees: 50

COMPUTERWORLD BUYER'S GUIDE

VENDORS

1 Mount Pleasant Ave  
East Hanover, NJ 07936  
(201) 887-8000  
Major Markets: OEM  
Peripheral/ Terminals and Computer Systems; Miscellaneous Computer Supplies; Computer Manufacturing  
Target Industries: Printing; Telecommunications  
Contacts:  
Head of Marketing: Richard M. Flanagan  
Head of Sales: O. R. Hughes  
Head of Software: Don Campbell  
Head of Engineering: George Pickering  
Geographic Coverage: International  
Year Established: 1881  
Number of Employees: 2,500

AMNET, INC.  
101 Moree St.  
Watertown, MA 02172  
(617) 923-1850  
Major Markets: Computer and Communications Equipment Manufacturing, OEM Computer Systems; Independent House  
Target Industries: Banking; Government; Manufacturing; Airlines  
Target Applications: Bit-by-Byte; Account Balance Information; Payroll  
Net Sales: $1 million — $5 million (1981)  
Contacts:  
Head of Marketing: John Whelan  
Geographic Coverage: International  
Year Established: 1968  
Number of Employees: 75

AMTEL SYSTEMS CORP.  
3123 Alfa Ave.  
Sunnyvale, CA 94086  
(408) 734-5092  
Major Markets: Computer and Communications Equipment Manufacturing, Systems House (OEM)  
Year Established: 1978  
Number of Employees: 2,800  
Geographic Coverage: National  
Year Established: 1981  
Number of Employees: 900  
Head of Sales: Bob Hill  
Head of Marketing: Jim Komatar  
Head of Engineering: John Jenkins  
Head of Customer Service: Paul Keller  
Geographic Coverage: International  
Year Established: 1978  
Number of Employees: 50
Vendors

Vendors

**COMARK CORP.**
93 West St
COMPUTER DEVICES, INC.
P.O. Box 474
Medfield, MA 02052
(617) 359-8161

Number of Employees: 150

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 5

**COMPUTER AUTOMATION, INC.**
12330 Perry Road
Columbus, OH 43240
(614) 891-4555

Number of Employees: 15

**COMPUTER AUTOMATION, INC.**
987 Devon Park Drive
Wayne, PA 19087
(215) 697-0830

Number of Employees: 5

**COMPUTER CONSOLES, INC.**
487 Devon Park Drive
Georgetown, TX 78626

Number of Employees: 50

**COMPUTER CONSOLES, INC.**
487 Devon Park Drive
Wilmington, MA 01887
(716) 545-2855

Number of Employees: 300

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER DEVICES, INC.**
25 North Ave
Burlington, MA 01803
(617) 273-1550

Number of Employees: 45

**COMPUTER DEVICES, INC.**
25 North Ave
Burlington, MA 01803
(617) 273-1550

Number of Employees: 45

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350

**COMPUTER HARDWARE, INC.**
43500 Pell Drive
Sacramento, CA 95838
(916) 929-2020

Number of Employees: 350
Vendors

COMPUTER SYSTEMS
26401 Harper Ave
St Clair Shores, MI 48081
(313) 779-8709

Major Markets: Component, Computer and Communications Equipment Manufacturing, OEM Computer Systems
Target Industries: Industrial, Geographic Coverage: International
Number Established: 1967
Number of Employees: 20

COMPUTER TALK, INC.
2800 S. Rooney Road
Morison, CO 80465
(303) 697-5485

Major Markets: General Business
Target Industries: Equipment Manufacturing; OEM Computer
Geographic Coverage: National
Year Established: 1979
Number of Employees: 80

COMTEK, INC.
4216 McCullough
San Antonio, TX 78212
(210) 782-0908

Major Markets: Component, Computer Manufacturing, Controls, High Power Equipment
Target Industries: Military, Geographic Coverage: International
Number Established: 1981
Number of Employees: 35

CONTEMPORARY CONTROL SYSTEMS, INC.
4549 Forest Ave
Downers Grove, IL 60515
(630) 963-7070

Major Markets: OEM Computer Systems; Computer Manufacturing

Target Industries: Industrial
Target Applications: Automatic Testing, Process Monitoring, Machine Control; Scientific: Laboratory
Net Sales: $100,000 — $500,000 (1981)

Contacts:
- Head of Marketing/Sales: George Thomas
- Head of Software/Engineering: Ron Albin

Geographic Coverage: National
Year Established: 1975
Number of Employees: 9

CONTROL DATA CORP.
8100 34th Ave. South
P.O. Box 6
Minneapolis, MN 55417
(612) 853-8100

Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Miscellaneous Computer Supplies; Data Services; Maintenance/Other Services
Target Industries: Manufacturing; Government; Small Business; Education
Target Applications: CAD/CAM, Computer-Based Education; Petroleum Exploration; Electronic Utility Operation
Net Sales: More than $100 Million (1981)

Contacts:
- Head of Marketing: R.D. Schmidt
- Head of Sales: R. Baldwin
- Head of Customer Service: J.H. Caldwell

Geographic Coverage: National
Year Established: 1957
Number of Employees: 57,000

CONVERGENT TECHNOLOGIES, INC.
2500 Augustine Drive
Santa Clara, CA 95051
(408) 727-8880

Major Market: Computer Manufacturing
Target Industries: OEM
Net Sales: $25 Million — $100 Million (1982)

Contacts:
- Head of Marketing: Pauline Alker
- Head of Engineering: Bob Garow

Geographic Coverage: International
Year Established: 1979
Number of Employees: 700

CORONA DATA SYSTEMS, INC.
31234 Via Colinas
Westlake Village, CA 91361
(213) 706-1505

Major Markets: Peripheral and Computer Manufacturing
Contacts:
- Head of Marketing: P. Kramer
- Head of Sales: George McNulty

Geographic Coverage: International
Year Established: 1981
Number of Employees: 35

CORPORATE DATA SCIENCES, INC.
20174 Old Marie's Ln
San Jose, CA 95132
(408) 945-1279

Major Markets: Computer Manufacturing; OEM Computer Systems/Terminals, Software House

Net Sales: $1 Million — $5 Million (1981)

Geographic Coverage: National
Year Established: 1979
Number of Employees: 14

CORYUS SYSTEMS, INC.
2329 O'Toole Ave
San Jose, CA 95131
(408) 946-7700

Major Markets: Computer and Peripheral Manufacturing, Software House

Target Industries: Fortune 1000
Net Sales: $25 Million — $100 Million (1982)

Contacts:
- Head of Marketing: Joseph D. Hughes
- Head of Engineering: Mark C. Hahn

Geographic Coverage: International
Year Established: 1979
Number of Employees: 325

COSMOS SYSTEMS, INC.
430 Toyama
Sunnyvale, CA 94086
(408) 744-0721

Major Market: Computer Manufacturing

Contacts:
- Head of Marketing: Ray Jones

Geographic Coverage: International
Year Established: 1891
Number of Employees: 35

CRAY RESEARCH, INC.
606 Second Ave
Minneapolis, MN 55402
(612) 333-5889

Major Market: Computer Manufacturing

Contacts:
- Head of Marketing: Michael Dickey
- Head of Sales: Bruce N. Kossen
- Head of Software: Margaret A. Loftus
- Head of Engineering: Les T. Davis
- Head of Customer Service: Don Whiting

Geographic Coverage: International
Year Established: 1979
Number of Employees: 50

CRC SYSTEMS, INC.
1145 W. Collins Ave
Orange, CA 92667
(714) 833-9650

Major Market: Computer Manufacturing

Target Industries: Retail; Supermarkets

Target Applications: Management

Geographic Coverage: International
Year Established: 1983
Number of Employees: 14

CRONICOMCO, INC.
280 Bernardo Ave
Mountain View, CA 94043
(415) 964-7400

Major Markets: Component, Computer and Peripheral Manufacturing

Contacts:
- Head of Marketing: Andrew Procasin
- Head of Engineering: Dr. Roger Melton

Geographic Coverage: National

Year Established: 1979
Number of Employees: 250

CYBERSYSTEMS, INC.
7540 S. Memorial Pkwy
Huntsville, AL 35802
(205) 883-4410

Major Markets: Component and Computer Manufacturing, OEM Computer Systems

Target Industries: OEM: Manufacturing

Additional information provided for by supplier

Call Hall-Mark for Cromenico, your computer systems and peripherals source for the 80's

Hall-Mark Electronics Corp.
11333 Pogo Hill Rd.
P.O. Box 222035
Dallas, Texas 75222

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New York (212) 575-6145

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SOUTH CENTRAL
Austin (512) 258-8648

Dallas (214) 341-1147

WEST
Denver (303) 694-1662

Phoenix (602) 243-6601

San Diego (619) 268-1201

Sunnvyle (408) 773-9990

CWI TERMINAL CORP.
250 Crossways Park Drive
Woodbury, NY 11797
(516) 364-2122

Major Markets: Computer and Terminal Manufacturing; Software House

Contacts:
- Head of Marketing: B.J. Stephens

Geographic Coverage: International
Year Established: 1979
Number of Employees: 250

COMPUTERWORLD BUYER'S GUIDE

V-6
Target Applications: Machine Control, Industrial Monitoring  
Net Sales: $500,000 — $1 Million (1981)  
Contacts: Head of Marketing: L. Michael Long Head of Engineering: Dennis Sorensen  
Geographic Coverage: National  
Year Established: 1974  
Number of Employees: 25

CYB SYSTEMS, INC.  
4445 Highway 206  
Aurora, NJ 07002  
(512) 458-3224  
Lead Market: Computer Manufacturing  
Target Applications: OEM  
Target Industries: Engineering  
Manufacturing; OEM  
Geographic Coverage: National  
Year Established: 1980  
Number of Employees: 45  

DAISY SYSTEMS CORP.  
139 Kifer Court  
Sunnyvale, CA 94086  
(408) 773-9111  
Major Markets: Computer Manufacturing; OEM Computer Systems; Software House  
Manufacturing; OEM  
Geographic Coverage: International  
Year Established: 1982  
Number of Employees: 100

DATACOM CORP.  
245 E. Sixth St.  
St. Paul, MN 55101  
(612) 226-1688  
Major Markets: Computer and Communications Equipment; Manufacturing  
Target Industries: Insurance; Legal; Business  
Computer Manufacturing  
Geographic Coverage: International  
Year Established: 1979  
Number of Employees: 24

DATA GENERAL CORP.  
9725 Danco Drive  
San Antonio, TX 78284  
(512) 699-7700  
Major Markets: Software; Hardware; Communications Equipment and Control  
Manufacturing; OEM Computer Systems; Software House; Distributors/Dealer/Distributor; Customer Service  
Target Industries: Business; Educational Government  
Geographic Coverage: International  
Year Established: 1980  
Number of Employees: 250

DATAPOINT CORP.  
5470 N.W. Innisbrook Place  
Portland, OR 97229  
(503) 645-4004  
Major Markets: Computer and Communications Equipment and Control  
Manufacturing; OEM Computer Systems  
Target Industries: Manufacturing; OEM  
Distributors  
Geographic Coverage: U.S.A.  
Year Established: 1979  
Number of Employees: 80

DATA TECHNOLOGY INDUSTRIES  
791 A Whitney St.  
San Leandro, CA 94577  
(415) 838-1206  
Major Markets: Computer Manufacturing; Software House; Systems House (OEM);  
Distributor/Distributor  
Target Industries: Banking; OEM; Government  
Target Applications: Accounting; W/P; Forecasting; Marketing  
Contacts: Head of Marketing: Peter Yeatman Head of Engineering: Bernie Helling  
Geographic Coverage: International  
Year Established: 1987  
Number of Employees: 200

DATA TERMINAL & COMMUNICATION  
590 Division St.  
Campbell, CA 95008  
(408) 276-1112  
Major Markets: Peripheral and Computer Manufacturing; OEM  
Computer Systems  
Contacts: Head of Marketing: Will Horna  
Head of Customer Service: Mike Welch  
Geographic Coverage: International  
Year Established: 1983  
Number of Employees: 15

DATRION CORP.  
200 Daftrion Plaza  
Lake Oswego, OR 97034  
(503) 636-1711  
Major Markets: OEM; Computer; Systems; Peripheral and Computer Manufacturing  
Target Industries: Manufacturing; OEM Computer Systems; Software House  
Distributors  
Target Applications: Process Control  
Geographic Coverage: International  
Year Established: 1979  
Number of Employees: 40

DAVID COMPUTER, INC.  
1811 Kaiser Ave.  
Irving, CA 92714  
(714) 986-1717  
Major Market: Computer Manufacturing  
Contact Information: Head of Engineering: Hans Boeker  
Geographic Coverage: International  
Year Established: 1979  
Number of Employees: 25

DAVIDLAGE CORP.  
Suite X  
1951 Sunnyvale Ave.  
Mountain View, CA 94043  
(415) 364-9487  
Major Market: Computer  
Contact Information: Head of Marketing: Gary Hassen  
Head of Customer Service: Perry Murless  
Geographic Coverage: International  
Year Established: 1974  
Number of Employees: 50
### Vendors

<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Address</th>
<th>Contact Person</th>
<th>Industry</th>
<th>Geographic Coverage</th>
<th>Year Established</th>
<th>Number of Employees</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENELCOR, INC.</td>
<td>Huntington Beach, CA</td>
<td>Major Markets: Computer, Component, Computer Peripheral, and Communications Equipment Manufacturing</td>
<td>National</td>
<td>Year Established: 1981</td>
<td>Number of Employees: 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DICOM, INC.</td>
<td>Sunnyvale, CA</td>
<td>Major Markets: Computer, Component, Computer Peripheral, and Communications Equipment Manufacturing; Software House; Dealer/Distributor</td>
<td>National</td>
<td>Year Established: 1975</td>
<td>Number of Employees: 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIGITAL EQUIPMENT CORP.</td>
<td>148 Main St, New York, NY</td>
<td>Major Markets: Component, Computer Peripheral, and Communications Equipment Manufacturing; Software House; Dealer/Distributor</td>
<td>International</td>
<td>Year Established: 1957</td>
<td>Number of Employees: 140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIGITAL PATHWAYS, INC.</td>
<td>1500 E. Meadows Circle, Pasadena, CA</td>
<td>Major Markets: OEM Computer Systems, Peripheral and Computer Manufacturing</td>
<td>National</td>
<td>Year Established: 1975</td>
<td>Number of Employees: 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D &amp; N MICRO PRODUCTS, INC.</td>
<td>Fort Wayne, IN</td>
<td>Major Markets: Component, Computer Manufacturing, Software House, Dealer/Distributor</td>
<td>National</td>
<td>Year Established: 1977</td>
<td>Number of Employees: 50</td>
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</tr>
<tr>
<td>DIRECT, INC.</td>
<td>Santa Clara, CA</td>
<td>Major Markets: Computer and Terminal Manufacturing</td>
<td>National</td>
<td>Year Established: 1978</td>
<td>Number of Employees: 30</td>
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</tr>
<tr>
<td>DISPLAY DATA CORP.</td>
<td>2530 San Pablo, Berkeley, CA</td>
<td>Major Markets: Component, Computer Manufacturing, Software House, Dealer/Distributor</td>
<td>National</td>
<td>Year Established: 1979</td>
<td>Number of Employees: 30</td>
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<tr>
<td>DURANGO SYSTEMS, INC.</td>
<td>3000 N. 1st St, San Jose, CA</td>
<td>Major Markets: Component and Component Manufacturing; OEM Computer Systems, Software House, Dealer/Distributor</td>
<td>National</td>
<td>Year Established: 1977</td>
<td>Number of Employees: 30</td>
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### Manufacturing

<table>
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<tr>
<th>Vendor Name</th>
<th>Address</th>
<th>Contact Person</th>
<th>Industry</th>
<th>Geographic Coverage</th>
<th>Year Established</th>
<th>Number of Employees</th>
<th>Phone Number</th>
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<tbody>
<tr>
<td>DELTA PRODUCTS, INC.</td>
<td>Huntington Beach, CA</td>
<td>Major Markets: Computer, Component, Computer Manufacturing, OEM Computer Systems</td>
<td>International</td>
<td>Year Established: 1982</td>
<td>Number of Employees: 8</td>
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<tr>
<td>DENELCOR, INC.</td>
<td>Huntington Beach, CA</td>
<td>Major Markets: Computer, Component, Computer Manufacturing, OEM Computer Systems</td>
<td>International</td>
<td>Year Established: 1981</td>
<td>Number of Employees: 75</td>
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<tr>
<td>DICOM, INC.</td>
<td>Sunnyvale, CA</td>
<td>Major Markets: Computer, Component, Computer Manufacturing, OEM Computer Systems</td>
<td>National</td>
<td>Year Established: 1975</td>
<td>Number of Employees: 85</td>
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<tr>
<td>DIGITAL EQUIPMENT CORP.</td>
<td>148 Main St, New York, NY</td>
<td>Major Markets: Component, Computer Peripheral, and Communications Equipment Manufacturing; Software House; Dealer/Distributor</td>
<td>International</td>
<td>Year Established: 1957</td>
<td>Number of Employees: 140</td>
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<tr>
<td>DIGITAL PATHWAYS, INC.</td>
<td>1500 E. Meadows Circle, Pasadena, CA</td>
<td>Major Markets: OEM Computer Systems, Peripheral and Computer Manufacturing</td>
<td>National</td>
<td>Year Established: 1975</td>
<td>Number of Employees: 30</td>
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<td>Fort Wayne, IN</td>
<td>Major Markets: Component, Computer Manufacturing, Software House, Dealer/Distributor</td>
<td>National</td>
<td>Year Established: 1977</td>
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### Manufacturing; OEM

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<td>Number of Employees: 85</td>
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<td>DIGITAL EQUIPMENT CORP.</td>
<td>148 Main St, New York, NY</td>
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<td>National</td>
<td>Year Established: 1977</td>
<td>Number of Employees: 30</td>
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<tr>
<td>Company Name</td>
<td>Industry</td>
<td>Year Established</td>
<td>Gross Revenue</td>
<td>Head of Marketing</td>
<td>Head of Engineering</td>
<td>Geographic Coverage</td>
<td>Number of Employees</td>
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<td>DYNABYTE</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Jerry Keeran</td>
<td>Gary Kissinger</td>
<td>International</td>
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<tr>
<td>ECS MICROSYSTEMS, INC.</td>
<td>OEM, Dealer/Distributor</td>
<td>1982</td>
<td>$5 Million</td>
<td>Bill Roland</td>
<td>John Borders</td>
<td>National</td>
<td>70</td>
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<tr>
<td>EPIC COMPUTER PRODUCTS</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Roy Hollister</td>
<td>Gordon Walsh</td>
<td>International</td>
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<tr>
<td>EZ DATA, INC.</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Bill Robertson</td>
<td>David Van Den Berg</td>
<td>International</td>
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<tr>
<td>FACIT, INC.</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Deanna Driscoll</td>
<td>Deanna Driscoll</td>
<td>International</td>
<td>50</td>
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<tr>
<td>GLEAM SYSTEMS CORP.</td>
<td>OEM, Dealer/Distributor</td>
<td>1982</td>
<td>$5 Million</td>
<td>Bill Robertson</td>
<td>David Van Den Berg</td>
<td>International</td>
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<td>FORWAND TECHNOLOGY, INC.</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Deanna Driscoll</td>
<td>Deanna Driscoll</td>
<td>International</td>
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<td>TO COMPUTER SYSTEMS</td>
<td>OEM, Dealer/Distributor</td>
<td>1981</td>
<td>$5 Million</td>
<td>Bill Robertson</td>
<td>David Van Den Berg</td>
<td>International</td>
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<td>Vendors</td>
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</tbody>
</table>
Vendors

Engineering

Target Applications: Graphics
Contacts: Head of Marketing/Sales: Robert Angus
Head of Software: Ray Mooman
Head of Engineering: James Richard
Geographic Coverage: International Year Established: 1980
Number of Employees: 30

FOUR-PHASE SYSTEMS, INC.
Suite 1130
17 Battery Place
Cupertino, CA 95014
(408) 305-0255

Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM Computer Systems; Systems House (OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Medical; Government; Business
Net Sales: More than $100 Million (1981)

Contacts:
Head of Marketing: Tony Yates
Number of Employees: 4,500

FRANCHISE MAILING SYSTEMS
324 W. Capitol Drive
Milwaukee, WI 53216
in (414) 444-9880

Major Markets: OEM Computer Systems; Software; Dealer/Distributor; Computer Manufacturing
Target Industries: Banks; Retail
Contacts:
Head of Marketing/Software: Mark Reis
Head of Sales: Glenn Bucott
Geographic Coverage: International Year Established: 1982
Number of Employees: 65

FRANKLIN COMPUTER CORP.
7030 Colonial Highway
Pensauken, NJ 08109
(609) 488-1700

Major Markets: Component; Computer and Peripheral Manufacturing; Software House
Geographic Coverage: International Year Established: 1982
Number of Employees: 113

FRIENDS AMIS, INC.
505 Beach St.
San Francisco, CA 94133
(415) 928-2980

Major Market: Computer Manufacturing
Target Industries: Manufacturing; Distribution; Government
Contacts:
Head of Marketing: Joan David Garcia
Geographic Coverage: International Year Established: 1978
Number of Employees: 50

FUJITSU MICROELECTRONICS, INC.
Professional Microsystems Division
3220 Scott Blvd
Santa Clara, CA 95051
(408) 980-0755

Major Markets: Computer Manufacturing; OEM Computer Systems
Contacts:
Head of Sales: Michael Newman
Geographic Coverage: International Year Established: 1982
Number of Employees: 40

GAULIN COMPUTER CORP.
2440 Hacienda St.
Campbell, CA 95008
(408) 379-8000

Major Markets: Computer Manufacturing; Dealer/Distributor
Target Industries: Insurance; Sales; Field Auditions
Contacts:
Head of Marketing: John Dufty
Head of Sales: Wayne Remett
Head of Engineering: John Zippeck
Geographic Coverage: International Year Established: 1982
Number of Employees: 70

GENERAL AUTOMATION, INC.
1095 Southeast St.
P.O. Box 4883
Avon, CA 92803
(714) 778-4800

Major Markets: OEM Systems Manufacturing
Target Applications: Industrial Automation
Net Sales: More than $100 Million (1981)
Head of Marketing: Donald Heit
Head of Customer Service: Shirley Stough
Geographic Coverage: International Year Established: 1967
Number of Employees: 1,700

GENERAL ROBOTICS CORP.
C. N. Main St.
Hartford, CT 03027
(414) 673-8830

Major Markets: Component and Computer Manufacturing
Target Industries: OEM; System House
Net Sales: $91 Million — $5 Million (1981)
Contacts:
Head of Sales: Donald Woolf
Geographic Coverage: International Year Established: 1974
Number of Employees: 50

GIMIX, INC.
1337 W. 37th Place
Chicago, IL 60609
(312) 927-5510

Major Markets: OEM Computer Systems; Computer Manufacturing
Target Industries: Dealers
Contacts:
Head of Marketing: Richard Don
Geographic Coverage: International Year Established: 1975
Number of Employees: 15

GMR, INC.
1048 E. Burgrove St.
Canson, CA 90746
(713) 639-6683

Major Market: Computer Manufacturing
Target Industries: Engineering; Scientific; Education; Professional; CAD/CAM
Target Applications: Field Service
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Harvey Mushman
Geographic Coverage: International Year Established: 1977
Number of Employees: 100

GOLDEN WEST COMPUTERS
60 North 300 West
Provo, UT 84601
(801) 377-2117

Major Markets: Component; Computer and Peripheral Manufacturing; Software House
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Keith Avenett
Geographic Coverage: International Year Established: 1977
Number of Employees: 17

GOULD, INC.
SEL Computer Systems Division
9891 W. Sunrise Blvd.
Fort Lauderdale, FL 33313
(305) 587-2900

Major Markets: OEM Peripheral/Terminals, Computer Manufacturing; Software House
Target Industries: Aerospace; Military; Nuclear; Fossil Fuel
Target Applications: Flight Simulation; Energy Monitoring/Control; Lab; Computer Automation
Contacts:
Head of Marketing: John Luckett
Head of Sales: Calvin Shoemaker
Head of Software: Robert Bergman
Head of Engineering: Michael Smith
Geographic Coverage: International Year Established: 1961
Number of Employees: 2,500

GOULD, INC.
Factory Automation Division
10 Pine St. Extension
Nashua, NH 03060
(603) 880-6543

Major Markets: Dealer/Distributor; Maintenance/Other Services; Computer Manufacturing; OEM Computer Systems
Target Industries: Manufacturing
Target Applications: Production Control; Process Control
Contacts:
Head of Marketing: Robert H. Ryan
Geographic Coverage: National Year Established: 1979
Number of Employees: 50

GRID SYSTEMS CORP.
2535 Garcia Ave.
Mountain View, CA 94043
(408) 951-4800

Major Markets: Computer Manufacturing; Software House
Target Industries: Fortune 1000; Finance
Geographic Coverage: National Year Established: 1979
Number of Employees: 200

GRIMM TECHNOLOGY, INC.
Amac Division
1675 W. 9th St.
Long Beach, CA 90813

Major Markets: Computer Manufacturing
Target Industries: Engineering; Scientific; Education; Professional; CAD/CAM
Target Applications: Field Service
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Robert H. Ryan
Geographic Coverage: National Year Established: 1979
Number of Employees: 160

HARRIS CORP.
Computer Systems Division
2102 W. Cypress Creek Road
P. Lauderdale, FL 33310
(305) 587-2900

Major Markets: Computer Manufacturing; OEM Computer Systems; OEM Computer Systems Division
Target Industries: Scientific; Engineering; Education; Target Applications: Simulation; CAD/CAM
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: J. Oromon
Head of Software: Joe Payne
Geographic Coverage: National Year Established: 1967
Number of Employees: 1,000

HARTROXICS, INC.
121 N. St. Elizabeth
Tempe, AZ 85281
(602) 996-7275

Major Markets: Computer and Terminal Manufacturing; OEM Computer Systems; OEM Hardware/Software
Target Industries: Automotive Test Equipment Manufacturing
Target Applications: Language; Automotive Testing; Forth Language
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: John R. Hatting
Geographic Coverage: National Year Established: 1976
Number of Employees: 50

HEATH CO.
Benton Harbor, MI 49022

Major Markets: Dealer/Distributor; Computer, Terminal and Peripheral Manufacturing; OEM Computer Systems
Target Industries: Small Business; Education; Process Control
Net Sales: Over $100 Million (1982)
COMPUTERWORLD BUYER'S GUIDE

Vendors

Target Industries: OEM, Distributors
Net Sales: $1 Million — $5 Million (1981)
Head of Marketing: Frank Myers
Geographic Coverage: Regional
Year Established: 1977
Number of Employees: 22

INSTRUMENTATION LABORATORY, INC.
400 Pont Way
East Rutherford, NJ 07073
(201) 937-3000

Major Markets: Computer
Geographic Coverage: National
Year Established: 1940
Number of Employees: 120

INTEGRATED BUSINESS COMPUTERS, INC. (IBC)
21962 Murita St
Chatsworth, CA 91311
(213) 882-9007

Major Markets: Computer
Geographic Coverage: National
Year Established: 1980
Number of Employees: 120

INTEGRATED DIGITAL PRODUCTS
3615 E. Lee Ave
Unit A
Anaheim, CA 92806
(714) 632-9772

Major Markets: Computer
Geographic Coverage: International
Year Established: 1979
Number of Employees: 27

INTELL CORP.
System Grove
2450 W. Barden Road
Phoenix, AZ 85027
(602) 889-3800

Major Markets: Computer
Geographic Coverage: National
Year Established: 1979
Number of Employees: 5

INTELLIGENT SYSTEMS CORP.
225 Technology Park
Northboro, MA 01532
(404) 449-9881

Major Markets: Computer
Geographic Coverage: National
Year Established: 1973
Number of Employees: 20,000

INTEGRATED DIGITAL PRODUCTS
3615 E. Lee Ave
Unit A
Anaheim, CA 92806
(714) 632-9772

Major Markets: Computer
Geographic Coverage: International
Year Established: 1980
Number of Employees: 20,000

INTERNATIONAL ENTRY TECHNOLOGIES CORP.
329 Broadway
Cambridge, MA 02139

Major Markets: Computer
Geographic Coverage: National
Year Established: 1981
Number of Employees: 40

INTERTEC DATA SYSTEMS CORP.
2300 Broad River Road
Columbia, SC 29210
(803) 788-9100

Major Markets: Computer
Geographic Coverage: International
Year Established: 1973
Number of Employees: 400

INTEL CORPORATION
346 E. 72nd St.
Seattle, WA 98112
(206) 525-9000

Major Markets: Computer
Geographic Coverage: National
Year Established: 1973
Number of Employees: 5

INTERNATIONAL ENTRY SYSTEMS, INC.
450 N. E. 72nd St.
Seattle, WA 98115
(206) 525-6800

Major Markets: Computer and Terminal
Geographic Coverage: National
Year Established: 1973
Number of Employees: 5

INTERNATIONAL TECHNOLOGY CORPORATION
P.O. Box 105
Quincy, MA 02269

Major Markets: Computer
Geographic Coverage: International
Year Established: 1976
Number of Employees: 25

INTERNATIONAL TELECONTROL CORP.
P.O. Box 85
Edgerton, PA 19028
(215) 353-3323

Major Markets: Computer
Target Applications: Training

Geographic Coverage: National
Year Established: 1962
Number of Employees: 10

INTERSIL SYSTEMS, INC.
10710 Tantau Ave.
Cupertino, CA 95014
(408) 956-5000

Major Markets: Computer
Geographic Coverage: International
Year Established: 1976
Number of Employees: 20

INTERACTIVE SYSTEMS CORPORATION
TECHNOLOGY, INC.
Suite 11
5250 N. Tasma Ave.
Indianapolis, IN 46220
(317) 253-5760

Major Markets: Computer
Geographic Coverage: National
Year Established: 1982
Number of Employees: 7

INTER-CARE SYSTEMS, INC.
2044 Armacost Ave.
Los Angeles, CA 90025
(213) 806-4500

Major Markets: Computer
Geographic Coverage: National
Year Established: 1978
Number of Employees: 30

INTER CITY PAPERS, LTD.
P.O. Box 91
Springfield, OR 97477
(503) 726-7613

Major Markets: Computer
Geographic Coverage: National
Year Established: 1978
Number of Employees: 5

IPL SYSTEMS, INC.
1370 Main St.
Waltham, MA 02254
(617) 890-6820

Major Markets: Computer
Geographic Coverage: National
Year Established: 1973
Number of Employees: 250

ITHACA INTERSYSTEMS, INC.
1650 Harshaw Road
P.O. Box 81
Itahaco, NY 14850
(607) 273-2520

Major Markets: Computer and Terminal
Geographic Coverage: National
Year Established: 1979
Number of Employees: 100

ITHACO, INC.
Compuas Division
P.O. Box 647
Itahaco, NY 14850
(607) 273-7860

Major Markets: Computer
Geographic Coverage: National
Year Established: 1973
Number of Employees: 40

JONOS, LTD.
13555 Deans Way
Fullerton, CA 92831
(714) 820-0469

Major Markets: Computer
Geographic Coverage: International
Year Established: 1980
Number of Employees: 30

KONTRON ELECTRONICS
500 Price Rd.
Redwood City, CA 94063
(415) 361-1012

Major Markets: Computer
Geographic Coverage: National
Year Established: 1981
Number of Employees: 40

LABORATORY TECHNOLOGIES CORP.
328 Broadway
Cambridge, MA 02139
(617) 497-1166

Major Markets: Computer
Geographic Coverage: National
Year Established: 1980
Number of Employees: 9

LANIE'S BUSINESS PRODUCTS, INC.
1200 Chalholt Drive N.E.
Atlanta, GA 30324
(404) 329-8080

Major Markets: Computer and Office Equipment
Geographic Coverage: National
Year Established: 1982
Number of Employees: 3,000

LAZOR SYSTEMS, INC.
1050 E. Duane Ave.
Sunol, CA 94586
(408) 735-1188

Major Market: Computer
Geographic Coverage: National
Year Established: 1970
Number of Employees: 25

LEXOR CORP.
7100 Navahurst Ave.
Van Nuys, CA 91406
(213) 796-4134

Major Market: Computer
Geographic Coverage: National
Year Established: 1982
Number of Employees: 25
TO COMPUTER SYSTEMS

Vendors

CONTACTS:
Head of Marketing: Mike Connors
Geographic Coverage: International
Year Established: 1979
Number of Employees: 60

LW RESEARCH CORP.
2620 Walnut
Tustin, CA 92682
(714) 641-8850
Major Markets: Component and
Computer Manufacturing
Target Industries: Small Business
Head of Marketing: Ken Woog
Geographic Coverage: International
Year Established: 1979
Number of Employees: 40

LOBO DRIVES INTERNATIONAL
395 S. Farness Ave.
Goleta, CA 93117
(805) 963-1600
Major Markets: Computer and
Peripheral Manufacturing
Net Sales: $5 Million — $25 Million
(1981)
Contacts:
Head of Marketing: Doug Rex
Head of Engineering: Kirk Hobart
Geographic Coverage: International
Year Established: 1978
Number of Employees: 40

LOGICAL BUSINESS MACHINES
1204 Grantwood Ave.
Sun Valley, CA 91046
(804) 744-1290
Major Market: Computer
Manufacturing
Net Sales: $5 Million — $25 Million
(1981)
Contacts:
Head of Marketing: Andrea Skov-Gordon
Geographic Coverage: International
Year Established: 1974
Number of Employees: 100

MAD COMPUTER, INC.
3305 Scott Blvd.
Building 13
Santa Clara, CA 95057
(408) 980-0840
Major Market: Computer
Manufacturing
Target Industries: Banking, Medical,
Telecommunications, Commercial
Contacts:
Head of Sales: Paul Schaut
Geographic Coverage: International
Year Established: 1982
Number of Employees: 20

MAGHON COMPUTER SYSTEMS, INC.
2603 Orchard Pkwy.
San Jose, CA 95134
(408) 946-8100
Major Markets: OEM Computer
Systems, Computer Manufacturing
Net Sales: $25 Million — $100 Million
(1981)
Contacts:
Head of Marketing: Jerome J. Burke
Geographic Coverage: International
Year Established: 1977
Number of Employees: 285

MANAGEMENT ASSISTANCE, INC.
Basic Four Division
14101 Myford Road
Tustin, CA 92680
(714) 731-5100
Major Market: Computer
Manufacturing
Target Industries: Manufacturing;
Distribution, Legal; Membership
Net Sales: $1 Million — $100 Million
(1981)
Contacts:
Head of Marketing: William F. Rigby
Geographic Coverage: International
Year Established: 1979
Number of Employees: 1,000

MARTEC INTERNATIONAL
20 William St.
Westport, CT 06880
(203) 237-2119
Major Markets: Computer
Manufacturing
Target Industries: OEM
Net Sales: $25 Million — $100 Million
(1982)
Contacts:
Head of Marketing: Ted Yoshida
Head of Sales: Keith Lebo
Head of Software: Don Nadel
Geographic Coverage: International
Year Established: 1974
Number of Employees: 45

MASSCOMP
540 Great Road
Littleton, MA 01460
(617) 466-9425
Major Market: OEM Computer
Systems; Computer Manufacturing
Target Industries: Engineering, Scientific;
OEM
Target Applications: Computation, Graphics
Contact:
Head of Marketing: Allan L. Wallack
Geographic Coverage: National
Year Established: 1981
Number of Employees: 45

MEASUREMENT SYSTEMS & CONTROLS, INC.
Systems Group
1601 Orangewood Ave.
Orange, CA 92868
(714) 633-4460
Major Market: Component, Computer and
Peripheral Manufacturing
Target Industries: Education;
Research
Target Applications: Accounting, Inventory,
WP
Contact:
Head of Marketing: Dave Jeroff
Head of Engineering: Lowell Dunn
Geographic Coverage: International
Year Established: 1979
Number of Employees: 45

MEGADATA CORP.
3300 Orville Ave.
Bohemia, NY 11716
(516) 589-6800
Major Market: Computer and Office
Equipment Manufacturing
Net Sales: $1 Million — $3 Million
(1982)
Major Market: Computer and Office
Equipment Manufacturing
Geographic Coverage: International
Year Established: 1987
Number of Employees: 150

MEGA/NET CORP.
806 Rd. 17
Ramatilly, NY 07446
(973) 829-5190
Major Markets: Systems House
(OEM); Computer Manufacturing
Target Industries: Banking, Chemical
Distribution
Target Applications: EFT
Net Sales: $1 Million — $5 Million
(1981)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 40

MEPCOM INTERNATIONAL, INC.
15181 Business Ave.
Dallas, TX 75234
(214) 484-0640
Major Markets: Peripheral and
Computer Manufacturing
Target Industries: Manufacturing;
OEM, Restaurant
Target Applications: Restaurant
Management
Net Sales: $500,000 — $1 Million
(1981)
Geographic Coverage: National
Year Established: 1980
Number of Employees: 20

MICROCOMPUTER TECHNOLOGY, INC.
3304 W. Macarthur Blvd.
Santa Ana, CA 92704
(714) 979-9923
Major Markets: Component and
Computer Manufacturing, OEM
Computer Systems, Systems House
(OEM)
Target Industries: Retail
Contacts:
Head of Marketing: Paul Gans
Geographic Coverage: International
Year Established: 1980
Number of Employees: 45

MICRODATA CORP.
4000 McArthur
P.O. Box 19501
Irving, TX 75013
(214) 957-1517
Major Markets: Component and
Computer Manufacturing
OEM Computer Systems, Systems House
(1981)
Contact:
Head of Marketing: Sales: Mark Lewis
Head of Software: Art Shahan
Head of Engineering: Bruce Menn
Geographic Coverage: International
Year Established: 1979
Number of Employees: 3,000

MICROMATION, INC.
1620 Montgomery St.
San Francisco, CA 94111
(415) 596-0289
Major Market: Computer
Manufacturing
Target Industries: OEM
Net Sales: $25 Million — $100 Million
(1985)
Contacts:
Head of Marketing: James Blatz
Head of Sales: E. Boswell
Geographic Coverage: International
Year Established: 1977
Number of Employees: 100

MICROPROCESSOR SYSTEMS, INC.
215 Candle Drive
Martinsburg, WV 25751
(304) 834-2593
Major Markets: Terminal, Computer
and Peripheral Manufacturing, OEM
Computer Systems
Target Industries: OEM
Target Applications: CP/M, MP/M
Net Sales: $1 Million — $5 Million
(1981)
Contacts:
Head of Sales: Brian Pollard

Micro Sources, Inc.
356 N. Clayton Road
New Lebanon, OH 45345
(513) 687-1365
Major Markets: OEM Computer
Systems, Computer Manufacturing
Target Industries: Industrial, Military
Net Sales: $1 Million — $5 Million
(1982)
Contacts:
Head of Marketing/Sales: Wallace Culp
Head of Software: Wayne Weuch
Geographic Coverage: International
Number of Employees: 25

MICRO TECHNOLOGY UNLIMITED
2598 Headquarters St.
P.O. Box 12106
Raleigh, NC 27605
(919) 833-1458
Major Markets: Computer
Manufacturing, Software House,
OEM Computer Systems
Target Applications: Library;
Industrial
Contacts:
Head of Marketing: W.S. Smith
Geographic Coverage: International
Year Established: 1979
Number of Employees: 15

MICRO V CORP.
17791 Sky Park Circle
Irvine, CA 92714
(714) 957-1517
Major Markets: Component and
Computer Manufacturing
OEM Computer Systems, Software House
(1981)
Contact:
Head of Marketing: Sales: Mark Lewis
Head of Software: Art Shahan
Head of Engineering: Bruce Menn
Geographic Coverage: International
Year Established: 1977
Number of Employees: 10

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
220 W. Cedar St.
Olive, KS 66061
(913) 764-3273
Major Markets: Computer and
Peripheral Manufacturing
OEM
Contact:
Head of Engineering: Lowell Dunn
Geographic Coverage: International
Year Established: 1979
Number of Employees: 20

MIKRO SYSTEMS CORP.
3628 Quakerbridge Road
Mercerville, NJ 08619
(609) 890-0440
Major Markets: Computer
Manufacturing, Maintenance/Other
Services
Target Industries: OEM: Industrial,
Military
Net Sales: $100,000 — $300,000
(1981)
Contacts:
Head of Sales: Brian Pollard
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Year Established</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOSTEK CORP.</td>
<td>4261 W. Crossroads, Carrollton, TX 75006</td>
<td>(214) 496-5000</td>
<td>1970</td>
<td>3,800</td>
</tr>
<tr>
<td>NATIONAL ADVANCED SYSTEMS, INC.</td>
<td>800 E. Middletown Road</td>
<td>Mountain View, CA 94043</td>
<td>1969</td>
<td>25</td>
</tr>
<tr>
<td>MULTILITHIC SYSTEMS CORP.</td>
<td>100 S. Lake Park Ave.</td>
<td>Buffalo, NY 14203</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MODULAR COMPUTER SYSTEMS, INC. (MODCOMP)</td>
<td>100 S. Lake Park Ave.</td>
<td>Buffalo, NY 14203</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MODUTEST SYSTEMS, INC.</td>
<td>1725 W. Crossroads, Carrollton, TX 75006</td>
<td>(214) 496-5000</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MODUTEST SYSTEMS, INC.</td>
<td>4261 W. Crossroads, Carrollton, TX 75006</td>
<td>(214) 496-5000</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MONOLITHIC SYSTEMS CORP.</td>
<td>54 Inverness Circle E, Englewood, CO 80112</td>
<td>(303) 770-7400</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MOORE DESIGN SERVICES, INC.</td>
<td>5221 Central Ave.</td>
<td>Richardson, TX 75084</td>
<td>1980</td>
<td>25</td>
</tr>
<tr>
<td>MORRIN DIGITAL SCIENCES, INC.</td>
<td>5221 Central Ave.</td>
<td>Richardson, TX 75084</td>
<td>1980</td>
<td>25</td>
</tr>
<tr>
<td>MULLEN COMPUTER PRODUCTS</td>
<td>2300 American Ave.</td>
<td>P.O. Box 6514, Hayward, CA 94544</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MULLEN COMPUTER PRODUCTS</td>
<td>2300 American Ave.</td>
<td>P.O. Box 6514, Hayward, CA 94544</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>MULTITECH SYSTEMS, INC.</td>
<td>4261 W. Crossroads, Carrollton, TX 75006</td>
<td>(214) 496-5000</td>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>NATIONAL MICRO PRODUCTS, INC.</td>
<td>4261 W. Crossroads, Carrollton, TX 75006</td>
<td>(214) 496-5000</td>
<td>1970</td>
<td>25</td>
</tr>
</tbody>
</table>

**Notes:**
- Most of the companies listed are involved in the manufacturing of computer systems, computer components, and related software.
- The year established ranges from 1964 to 1982, indicating a wide range of ages for these companies.
- Contact information is provided for many of the companies, including names of key personnel and phone numbers.
- Geographic coverage varies, with some companies operating nationally and others focusing on specific regions or industries.
<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Industry/Products</th>
<th>Head of Marketing/Sales</th>
<th>Contact Info</th>
<th>Year Established</th>
<th>Net Sales (1981)</th>
<th>Geographic Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEC INFORMATION SYSTEMS, INC.</td>
<td>S Miliva Drive, Lexington, MA 02173</td>
<td></td>
<td>(617) 882-0720</td>
<td>1967</td>
<td>More than $100 Million</td>
<td>International</td>
</tr>
<tr>
<td>NORTHERN TELECOM, INC.</td>
<td>Electronic Office Systems Division Data Park</td>
<td></td>
<td>P.O. Box 1222</td>
<td>1987</td>
<td>1,100</td>
<td>International</td>
</tr>
<tr>
<td>OCTAGON COMPUTER SYSTEMS INC.</td>
<td>151 Burnell Ave. San Jose, CA 95119</td>
<td></td>
<td>(408) 225-2700</td>
<td>1979</td>
<td>$25 Million — $100 Million</td>
<td>International</td>
</tr>
<tr>
<td>OLYMPIA U.S.A., INC.</td>
<td>Rt. 2, P.O. Box 22 Somerville, NJ 08876</td>
<td></td>
<td>(201) 725-7000</td>
<td>1973</td>
<td>1,100</td>
<td>National</td>
</tr>
<tr>
<td>OMNIDATA</td>
<td>5717 Corsa Ave. Westlake Village, CA 91362</td>
<td></td>
<td>(213) 991-5810</td>
<td>1981</td>
<td>6,000</td>
<td>International</td>
</tr>
<tr>
<td>ONYX SYSTEMS, INC.</td>
<td>55 William St. Westfield, NJ 07090</td>
<td></td>
<td>(213) 237-7945</td>
<td>1967</td>
<td>1,000</td>
<td>International</td>
</tr>
<tr>
<td>OAKLEAF, INC.</td>
<td>1973 Nordhoff Place P.O. Box 44230</td>
<td></td>
<td>Chatsworth, CA 91312</td>
<td>1973</td>
<td>2,000</td>
<td>National</td>
</tr>
<tr>
<td>OBSERVATIONAL SYSTEMS, INC.</td>
<td>1103 Grand Ave. Seattle, WA 98122</td>
<td></td>
<td>(206) 329-3754</td>
<td>1981</td>
<td>400</td>
<td>National</td>
</tr>
</tbody>
</table>
### Vendors

#### OSM COMPUTER CORP.

- **Address:** 965 Clyde Ave
- **City, State:** Mountain View, CA 94043
- **Number of Employees:** 70

#### OTHONIA CORP.

- **Address:** 4750 Walnut St.
- **City, State:** Boulder, CO 80301
- **Number of Employees:** 4,440
- **Year Established:** 1980

#### PARALLEL COMPUTERS, INC.

- **Address:** 1202 Shaffer Road
- **City, State:** Same as above
- **Number of Employees:** 1,100

#### PANOCONA INDUSTRIAL CO.

- **Head of Engineering:** John D. Appel
- **Head of Customer Service:** Berme Pryor

#### PARADEYNE CORP.

- **Address:** 8550 Ulmerton Road
- **City, State:** P.O. Box 2929
- **Number of Employees:** 600

#### PHOENIX MICROSYSTEMS, INC.

- **Head of Sales:** Joe Shirokubo

#### PHOENIX DIGITAL CORP.

- **Head of Marketing:** Dave Alling

#### POCUS CORPS.

- **Address:** 22 Metty Drive
- **City, State:** Bohemia, NY 11716
- **Number of Employees:** 6

#### PENTEX OF AMERICA LTD.

- **Head of Sales:** Lawrence Culbert

#### PEGASUS DATA SYSTEMS

- **City:** Irvine, CA 92714
- **Head of Sales:** Joe Shohtoku

#### PERKIN-ELMER CORP.

- **Head of Marketing:** B. Rosenbaum

#### PHC, INC.

- **Address:** 22 Metty Drive
- **City, State:** Irvine, CA 92714
- **Number of Employees:** 14

#### PERITIC DRUM CO.

- **Address:** 8550 Ulmerton Road
- **City, State:** P.O. Box 2929
- **Number of Employees:** 600

#### PESWELL CORP.

- **Contact:** Head of Marketing: David B. Ridge

#### PESWEL CORP.

- **Address:** 2315 N. 35th Ave
- **City, State:** Phoenix, AZ 85009
- **Number of Employees:** 50

#### PERSPECTIVE TECHNOLOGIES, INC.

- **Address:** 475 E St
- **City, State:** Mountain View, CA 94043
- **Number of Employees:** 50

#### PIPER PERIPHERAL CORP.

- **Address:** 17466 Daimler Ave
- **City, State:** Irvine, CA 92714
- **Number of Employees:** 50

#### PCL SYSTEMS CORP.

- **Address:** 475 E St
- **City, State:** Mountain View, CA 94043
- **Number of Employees:** 50

#### PIRTEC COMPUTER CORP.

- **Address:** 17112 Armstrong Ave
- **City, State:** Irvine, CA 92714
- **Number of Employees:** 50

#### PNH, INC.

- **Address:** 2315 N. 35th Ave
- **City, State:** Phoenix, AZ 85009
- **Number of Employees:** 50

#### PLEASURE SYSTEMS, INC.

- **Address:** 17466 Daimler Ave
- **City, State:** Irvine, CA 92714
- **Number of Employees:** 50
Contacts: Head of Marketing: Daniel H. Reese
Head of Sales: Gerant Moller
Head of Software: Randy Handy
Geographic Coverage: International
Number of Employees: 45

PLEXUS COMPUTERS, INC.
2230 Martin Ave
Santa Clara, CA 95050
(408) 988-1755
Head of Marketing: Computer Manufacturing; OEM Computer Systems
Target Industries: OEM; Communications
Target Applications: OA
Head of Sales: $5 Million — $25 Million (1982)
Contacts: Head of Marketing: Robert G. Claussen
Head of Software: Edward J. Christiansen
Head of Engineering: Roland D. Pamper
Geographic Coverage: International Year Established: 1972
Number of Employees: 5,000

PRODIGY SYSTEMS, INC.
497 Lincoln Road
Iselin, NJ 08830
(201) 384-3121
Number of Employees: 50
Head of Marketing: Joseph DePato
Head of Engineering: Robert McImany
Head of Customer Service: Lauranne Deyodra
Geographic Coverage: International Year Established: 1978

PRODUCT ASSOCIATES, INC.
465 Convention Way
Redwood City, CA 94063
(415) 887-7777
Head of Marketing: Ken Perich
Head of Software: Gary Bennett
Head of Engineering: Skip Hanson
Geographic Coverage: National Year Established: 1969
Number of Employees: 25

PROPHET 21
2 E. Broad St.
Hopewell, NJ 08525
(609) 466-2100
Head of Marketing: Ralph Baurergrad
Head of Software: Neil Jafe
Head of Engineering: Tom Castanya
Geographic Coverage: International Year Established: 1969
Number of Employees: 45

PSITECH
2840C Walnut Ave.
Tustin, CA 92680
(714) 730-0981
Head of Marketing: Murray MacDonald
Head of Engineering: Helene MacDonald
Geographic Coverage: International Year Established: 1973
Number of Employees: 210

PRONTO COMPUTERS, INC.
2842C Wainut Ave
Tustin, CA 92680
(714) 754-4114
Head of Marketing: Murray MacDonald
Head of Software: Dale Christiansen
Head of Engineering: Helene MacDonald
Geographic Coverage: International Year Established: 1973
Number of Employees: 210

QANTEL CORP.
3170 Koshiwa St.
Torrance, CA 90505
(213) 539-6400
Head of Marketing: Frank Madren
Head of Software: Bill Gimple
Head of Engineering: Fred Ordeman
Number of Employees: 50

QANTEL CORP.
4142 Point Eden Way
Hayward, CA 94545
(415) 887-7777
Major Markets: Computer, Computer Terminal and Peripheral Manufacturing; OEM Peripheral Terminals and Computer Systems; Software House; Maintenance/Other Services; Systems House (OEM) Target Industries: Manufacturing; Transportation; Lodging; Retail
Contacts: Head of Marketing: Mike McCory
Head of Sales: John Moeller
Head of Software: Troy Lemons
Head of Engineering: Lou Pounakis
Geographic Coverage: International Year Established: 1969
Number of Employees: 600

QP CORP.
10300 Brecksville Road
Brecksville, OH 44141
(216) 526-0838
Head of Marketing: Computer Manufacturing; OEM Computer Systems
Target Industries: OEM; General Business
Target Applications: Accounting; Medical; Order Entry; Inventory
Contacts: Head of Marketing: Ken Perich
Head of Software: Gary Keefe
Head of Engineering: Dave Kelly
Geographic Coverage: International Year Established: 1979
Number of Employees: 18

QEI, INC.
60 Fadern Road
Springfield, NJ 07081
(201) 759-7400
Head of Marketing: Component and Computer Manufacturing; OEM Computer Systems; Dealer/Distributor; Software House; Maintenance/Other Services
Target Industries: Electric Power; Oil and Gas; Water Control
Target Applications: Supervisory Control and Data Acquisition
Contacts: Head of Marketing: William Stanger
Geographic Coverage: International Year Established: 1974
Number of Employees: 150

Q1 CORP.
1295 Charleston Road
Mountain View, CA 94043
(415) 494-2700
Head of Marketing: Frank Madren
Head of Software: Bill Gimple
Head of Engineering: Fred Ordeman
Number of Employees: 20

PYRAMID TECHNOLOGY CORP.
1295 Charleston Road
Mountain View, CA 94043
(415) 494-2700
Head of Marketing: Frank Madren
Head of Software: Bill Gimple
Head of Engineering: Fred Ordeman
Number of Employees: 50

TO COMPUTER SYSTEMS
V-17
Vendors

QUAY CORP.
P.O. Box 783
Eatontown, NJ 07724
(201) 542-7340
Major Markets: Computer Manufacturing
Geographic Coverage: International
Year Established: 1977
Number of Employees: 21

QUEST ELECTRONICS
2222 Walsh Ave
Santa Clara, CA 95051
(408) 988-1640
Major Markets: Computer Manufacturing
Year Established: 1968
Number of Employees: 650

RAIDAN CORP.
P.O. Box 9848
Austin, TX 78766
(512) 454-4787
Major Markets: Component and Computer Manufacturing; OEM
Computer Systems; Software House; Dealer/Distributor
Maintenance/Other Services
Contacts:
Head of Marketing: F. Scott Lagrone
Year Established: 1969
Number of Employees: 50

RAISER GRAPHICS, INC.
P.O. Box 23334
Tigard, OR 97223
(503) 622-2041
Major Markets: Computer Manufacturing; OEM Computer Systems
Target Industries: Engineering, Medical; Manufacturing
Contacts:
Head of Marketing: W. Smith
Head of Engineering: David Johnson
Geographic Coverage: International
Year Established: 1978
Number of Employees: 10

RAYTHEON CO.
Data Systems Division
1415 Boston-Providence Trpk.
Norwood, MA 02062
(617) 782-6700
Major Markets: Component, Peripheral, Communications Equipment, Office Equipment and Computer Manufacturing
Net Sales: More than $100 Million (1991)
Contacts:
Head of Marketing: James Warren
Geographic Coverage: International
Year Established: 1969
Number of Employees: 7,000

RECOGNITION EQUIPMENT, INC.
P.O. Box 222307
Irving, TX 75022
(214) 806-6000
Major Markets: OEM Peripherals/ Terminal and Computer Systems, Computer Manufacturing
Target Industries: Banking, Net Sales: More than $100 Million (1992)
Contacts:
Head of Marketing: Robert G. Reed
Head of Engineering: Israel Shreberg
Geographic Coverage: International
Year Established: 1961
Number of Employees: 2,000

RIES BUSINESS MACHINES CORP.
5540 Wabash Way
Culver City, CA 90230
(213) 641-7170
Major Markets: Computer Manufacturing
Systems House (OEM)
Target Industries: Manufacturing; General Business
Target Applications: WP; DBMS; General Business
Contacts:
Head of Marketing/Sales: Don Sullivan
Head of Software/Engineering: Bill Ang
Geographic Coverage: International
Year Established: 1978
Number of Employees: 125

REYNOLDS & REYNOLDS CO.
890 Germanoway St.
P.O. Box 1006
Dayton, OH 45401
(513) 443-2000
Major Markets: Software House; Systems House (OEM); Miscellaneous Computer Supplies; Computer Manufacturing
Target Industries: Automotive; Medical; Contracting
Target Applications: Accounting
Net Sales: More than $100 Million (1981)
Contacts:
Head of Engineering: Harry Nicholson
Geographic Coverage: National
Year Established: 1936
Number of Employees: 2,500

RIDGE COMPUTERS
586 Weddell Drive
Sunnyvale, CA 94086
(408) 745-0400
Major Market: Computer Manufacturing
Target Industries: Engineering; Scientific
Target Applications: CAD, Graphics, Engineering Computation
Contacts:
Head of Marketing: Renay Dara-Abrams
Head of Sales: William Shallace
Head of Software: Edwin Basart
Head of Engineering: Hugh Martin
Geographic Coverage: Regional
Year Established: 1980
Number of Employees: 22

R2E OF AMERICA, INC.
2545 W. County Road C
St. Paul, MN 55113
(612) 638-5800
Major Markets: OEM Computer Systems; OEM Computer Manufacturing
Target Industries: OEM
Target Applications: WP, Accounting, Program Generation
Contacts:
Head of Marketing/Sales: David Kreger
Head of Engineering: John Smoot
Geographic Coverage: National
Year Established: 1974
Number of Employees: 60

SAGE COMPUTER TECHNOLOGY
195 N. Edison Way
Suite 14
Reno, NV 89502
(702) 352-6668
Major Market: Computer Manufacturing
Contacts:
Head of Software: Bill Bonham
Head of Engineering: Wilbur Harvey
Geographic Coverage: National
Year Established: 1985
Number of Employees: 12

SANYO BUSINESS SYSTEMS CORP.
51 Joseph St.
Moonachie, NJ 07074
(201) 440-9000
Major Markets: Computer, Terminal, Peripheral and Office Equipment Manufacturing; OEM
Peripheral Terminals; Software House
Contacts:
Head of Marketing: Henry Watanabe
Head of Sales: Arthur Shebar
Head of Customer Service: Mike Zajac
Geographic Coverage: International

SCENIC COMPUTER SYSTEM CORP.
14852 N.E. 31st Circle
Redmond, WA 98052
(206) 885-5600
Major Markets: Computer Manufacturing; Software House
Contacts:
Head of Marketing: Wayne Paulson
Geographic Coverage: International
Year Established: 1981
Number of Employees: 10

SCIENTIFIC DATA SYSTEMS, INC.
344 Main St.
Vernon, CA 90911
(213) 390-8673
Major Markets: Computer Manufacturing; Software House
Target Industries: Legal; Medical; Accountants; Trash Collection
Target Applications: WP; Legal; Time and Billing; Temporary Help
Net Sales: $1 Million — $5 Million (1985)
Contacts:
Head of Software: William Scheding
Head of Engineering: Jack M. Mitchell
Geographic Coverage: National
Year Established: 1977
Number of Employees: 50

SCIENTIFIC MICRO SYSTEMS, INC.
777 E. Middletown Field
Mountain View, CA 94043
(415) 994-5700
Major Markets: Computer and Peripheral Manufacturing; OEM Computer Systems; Systems House (OEM)
Target Industries: OEM
Target Applications: Industrial; Control; Small Business
Net Sales: $5 Million — $25 Million (1991)
Contacts:
Head of Marketing: Michael A. Liccardo
Geographic Coverage: International
Year Established: 1970
Number of Employees: 175

SCI SYSTEMS, INC.
5000 Technology Drive
P.O. Box 1920
Huntsville, AL 35807
(205) 882-4800
Major Markets: Component, Computer and Terminal Manufacturing; OEM Computer Systems, Systems House (OEM)
Contacts:
Head of Engineering: Bill Stein
Geographic Coverage: Regional
Year Established: 1983
Number of Employees: 12

SEAL & COMPANY, INC.
1200 W. Lacuna
Washington, DC 20011
(202) 862-4800
Major Markets: OEM Computer Systems; Software House; Maintenance/Other Services; Computer Manufacturing
Target Industries: Process Control; Energy; Industrial
Target Applications: Energy; Industrial
Contacts:
Head of Engineering: Bill Stein
Geographic Coverage: Regional
Year Established: 1963
Number of Employees: 90

SEATTLE COMPUTER PRODUCTS
1114 Industry Drive
Seattle, WA 98168
(206) 575-1830
Major Markets: Computer Manufacturing
Contacts:
Target Applications: WP

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Geographic Coverage: International
Year Established: 1977
Number of Employees: 36

SECOND SOURCE
14712 Bentley Circle
Tustin, CA 92680
(714) 832-7724
Major Market: Computer Manufacturing
Target Industries: Scientific
Contacts:
Head of Marketing: John McNult
Geographic Coverage: International
Year Established: 1975
Number of Employees: 40

Seesq Computer Corp.
209 West St.
Annapolis, MD 21401
(301) 268-6650
Major Market: Computer Manufacturing
Year Established: 1975
Year Established: 1979
Number of Employees: 40

Sentinel Computer Corp.
9902 Clover Road
Cincinnati, OH 45242
(513) 964-8652
Major Market: Computer and Terminal Manufacturing; Software House; Systems House (OEM)
Target Industries: Distribution; Wholesales
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: James Hoffman
Year Established: 1979

Serra National Corp.
5507 Ruther St.
San Diego, CA 92111
(714) 277-8410
Major markets: Computer Manufacturing; Software House; Systems House (OEM); Data Services
Target Industries: Accounting; Energy
Target Applications: Energy Control; POS; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: David Forbes
Head of Software: Dennis Wilson
Head of Engineering: James Limb
Geographic Coverage: International
Year Established: 1969
Number of Employees: 40

Smoke Signal Broadcasting
31338 Via Colinas St.
Westlake Village, CA 91362
(213) 889-9340
Major Markets: Computer Manufacturing; Systems House (OEM)
Year Established: 1978
Number of Employees: 20

Sony Communications Products Co.
1 Sony Plaza
San Diego, CA 92121
(619) 452-8865
Major Markets: Computer Manufacturing; OEM Computer Manufacturing; Communications Equipment Manufacturing; OEM Computer Systems; Software House; Maintenance/Other Services
Target Industries: Manufacturing; Public Sector; Distribution; Airlines
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing/Sales: Jenny Donaldson
Head of Engineering: James Hunter
Geographic Coverage: International
Year Established: 1978
Number of Employees: 16

Sun Microsystems, Inc.
3204 12th Ave. N.
Minneapolis, MN 55416
(612) 929-4400
Major Markets: Computer Manufacturing; OEM Computer Manufacturing; Communications Equipment Manufacturing; OEM Computer Systems; Software House; Maintenance/Other Services
Target Industries: Manufacturing; Public Sector; Distribution; Airlines
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing: Joseph Casullo
Geographic Coverage: International
Year Established: 1962
Number of Employees: 48,000

Syenise Computer Corp.
801 Buckeye Court
Alpin, CA 90505
(408) 946-3191
Major Markets: Computer Manufacturing; Software House; Maintenance/Other Services
Target Industries: Banking; Library Services
Target Applications: Transaction Processing
Contacts:
Head of Sales: Stanton Joseph
Head of Software/Engineering: Elliot Nestle
Head of Customer Service: Jay Denny
Year Established: 1980
Number of Employees: 80

System International
Suite 222
2712 Middleburg Dr.
Columbia, SC 29204
Major Market: Computer Manufacturing
Geographic Coverage: International
Year Established: 1980
Number of Employees: 10

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SYSGON INTERNATIONAL, INC.  
1108 South High St  
South Bend, IN 46618  
(219) 287-5916  
Major Market: Computer Manufacturing  
Target Industries: Electrical/Consumer; Equipment Manufacturing  
Target Applications: Analysis; Control; Information Management; Plant Management  
Contacts:  
Head of Marketing: David Mackie  
Head of Sales: Jerry Peterson  
Head of Engineering: Larry Lautich  
Head of Customer Service: Jerry Everett  
Geographic Coverage: International  
Year Established: 1974  
Number of Employees: 4,000

TANDY CORP.  
1800 One Tandy Center  
Fort Worth, TX 76102  
(817) 393-3011  
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM Computer Systems; Software House; Dealer/Distributor; Miscellaneous Computer Supplies  
Target Industries: Legal; Medical; Real Estate; General Business  
Net Sales: More than $100 Million (1982)  
Contacts:  
Head of Marketing: Ron Stagell  
Geographic Coverage: Regional  
Year Established: 1952  
Number of Employees: 20,000

TANK CORPORATION  
4301 Poche Court W  
New Orleans, LA 70129  
(504) 254-3500  
Major Markets: Component and Computer Manufacturing; OEM Computer Systems; Systems House (OEM)  
Target Industries: Marine; Oil/Gas; Engineering  
Target Applications: Energy Management; Pipeline Control  
Contacts:  
Head of Marketing: Ben Albert  
Head of Software: J. A. Finlin  
Head of Engineering: Walter J. Bracken Jr.  
Geographic Coverage: National  
Year Established: 1976  
Number of Employees: 450

TARBELL ELECTRONICS  
505 Dovell Place  
Carson, CA 90746  
(213) 638-4251  
Major Markets: Component and Computer Manufacturing; OEM Computer Systems; Software House; Systems House (OEM)  
Net Sales: $1 Million — $3 Million (1981)  
Contacts:  
Head of Marketing: Donald E. Tarbell  
Geographic Coverage: National  
Year Established: 1969  
Number of Employees: 10

TAYLOR INSTRUMENT CO.  
5755 Main St.  
Rochester, NY 14604  
(716) 235-5000  
Major Markets: OEM Computer Systems; Component and Computer Manufacturing; Software House; Systems House (OEM); Maintenance/Other Services  
Target Industries: Engineering; Chemical; Pharmaceutical; Industrial  
Target Applications: Process Control; Information Management; Plant Management  
Contacts:  
Head of Marketing: Jerry Grader  
Head of Sales: Edward Grader  
Geographic Coverage: International  
Year Established: 1946  
Number of Employees: 3,000

TBMC, INC. (TYPE-A-LINE BUSINESS MACHINES)  
15 E. Second S  
Salt Lake City, UT 84111  
(801) 321-7500  
Major Markets: Computer Manufacturing; OEM Computer Systems; Software House; Dealer/Distributor; Miscellaneous Computer Supplies  
Target Industries: Auto Parts; Manufacturing; Legal; Medical  
Target Applications: Accounting  
Net Sales: $1 Million — $5 Million (1981)  
Contacts:  
Head of Marketing: Greg O. Bowen  
Geographic Coverage: Regional  
Year Established: 1982  
Number of Employees: 20

TECHNICO, INC.  
2901 Druid Park Drive  
Columbia, MD 21215  
(301) 699-1400  
Major Market: Computer Manufacturing; Software House; Systems House (OEM)  
Target Industries: Education; Small Business; Industrial  
Target Applications: Training; Office  
Net Sales: $1 Million — $5 Million (1981)  
Geographic Coverage: National  
Year Established: 1976  
Number of Employees: 10

TECMAR, INC.  
950 Dovien Place  
Cherry Hill, NJ 08003  
(801) 673-7117  
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM Computer Systems; Software House; Systems House (OEM)  
Net Sales: $1 Million — $5 Million (1981)  
Contacts:  
Head of Marketing: Robert D. Dostuzewel  
Geographic Coverage: International  
Year Established: 1975  
Number of Employees: 10

TELETRONIC, INC.  
P.O. Box 5550  
Beaverton, OR 97077  
(503) 677-7117  
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Software House; Maintenance/Other Services  
Target Industries: Engineering; Manufacturing; Telecommunications  
Target Applications: Test and Measurement; Graphics  
Net Sales: Over $100 Million (1981)  
Geographic Coverage: International  
Year Established: 1946  
Number of Employees: 22,000

TELCON INDUSTRIES, INC.  
1401 N.W. 99th St.  
Fl. Lauderdale, FL 33309  
(305) 972-2550  
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM Peripheral/Terminals and Computer Systems; Software House  
Target Industries: Newspaper; Telecommunications  
Contacts:  
Head of Marketing/Sales: Ted Moss  
Head of Software: George Gruber  
Head of Engineering: Rod Neman  
Geographic Coverage: International  
Year Established: 1959  
Number of Employees: 100
Vendors

Peripheral; Communications Equipment; Office and Equipment Manufacturing
Target Industries: Banking; Insurance; Legal; State/Local Government
Target Applications: Data Entry; Electronic Mail; Human Resource Management; Programmer Utilities
Net Sales: $25 Million — $100 Million (1981)
Contacts: Head of Marketing/Sales: John F. Cunningham
Head of Sales/Engineering: Frederick A. Wang
Geographic Coverage: International Year Established: 1951
Number of Employees: 19,200

WAVE MATE, INC.
14029 S. Crestrone Blvd. Hawthorne, CA 90250
(213) 978-7930
Major Markets: Computer Manufacturing
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts: Head of Marketing: Jeffrey Post Head of Engineering: Dennis Painter

WESTERN DIGITAL CORP.
2445 McCabe Way Irvine, CA 92714
(714) 391-8860
Major Markets: Component and Computer Systems; Dealer/Distributor; General Business
Target Industries: OEM; Component and Computer Systems; Dealer/Distributor
Geographic Coverage: National Year Established: 1970
Number of Employees: 803

WESTERN TELECOMPUTING CORP.
202 E. Kacy Blvd. Boxman, MT 59715
(406) 589-5811
Major Market: Computer Manufacturing
Target Industries: Pollution; Weather
Number of Employees: 10

WICAT SYSTEMS, INC.
1875 S. Oak St. P.O. Box 539 Oman, Ut. 84337
(801) 224-5400
Major Markets: Computer Manufacturing; Software House; OEM Peripheral/Terminals
Target Industries: Education; General Business
Target Applications: Accounting; VIP
Contacts: Head of Marketing: Frank Richardson
Head of Software: Tom Seal
Head of Engineering: David Bailey

XEROX CORP.
601 Longridge Road P.O. Box 1600
Stamford, CT 06904
(203) 209-8700
Major Markets: Computer; Terminal; Peripheral and Office Equipment Manufacturing; Software House; Systems House (OEM); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Government; General Business
Net Sales: Over $100 Million (1981)
Contacts: Head of Customer Service: John V. Trisworth
Geographic Coverage: International Year Established: 1906
Number of Employees: 121,000

XITEK CORP.
9811 Chancellorsville, TX 75243
(214) 349-2380
Major Markets: Component, Computer and Peripheral Manufacturing; OEM Computer Systems; Dealer/Distributor
Target Industries: Industrial Consulting
Contacts: Head of Sales: R. Ballow
Geographic Coverage: International Year Established: 1977
Number of Employees: 5

XYCOM, INC.
P.O. Box 984
Ann Arbor, MI 48106
(313) 429-4970
Major Market: Computer Manufacturing
Target Industries: Manufacturing Computers
Contacts: Head of Marketing: James McDochan
Head of Sales: Art Harmala
Geographic Coverage: International Year Established: 1969
Number of Employees: 200

ZAX CORP.
8311 Westminster Ave.
Westminster, CA 92683
(714) 989-2773
Major Market: Computer Manufacturing
Target Industries: Engineering; General Business
Net Sales: $1 Million — $5 Million (1982)
Contacts: Head of Marketing: Hal Horrocks
Geographic Coverage: International Year Established: 1976
Number of Employees: 450

WINTER CORP.
1901 South St.
Lafayette, IN 47904
(317) 742-8248
Major Markets: Software House; Computer Manufacturing; Maintenance/Other Services
Target Industries: OEM
Head of Software: Stephen E. Better
Head of Engineering: James B. Wilson
Geographic Coverage: National Year Established: 1973
Number of Employees: 12

WINTEK CORP.
14009 S. Crenshaw Bivd
Lafayette, IN 47904
(801) 772-9948
Major Markets: Software House; Computer Manufacturing; OEM Computer Systems
Target Industries: OEM Small Business
Applications: Accounting; Electronic Mail
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National Year Established: 1978
Number of Employees: 10

ZENDEX CORP.
6644 Sierra Lane
Dublin, CA 94568
(415) 820-8300
Major Markets: Component and Computer Manufacturing
Target Industries: Industrial Control
Contacts: Head of Marketing/Sales: Rob Richardson
Head of Engineering: John Hight
Geographic Coverage: International Year Established: 1979
Number of Employees: 30

ZENITH DATA SYSTEMS
1000 Milwaukee Ave
Glenville, IL 60025
(312) 391-8860
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing; OEM Peripherals; Terminals and Computer Systems; Miscellaneous Computer Supplies
Target Industries: Fortune 1000; Small Business; OEM Computer Equipment
Target Applications: OA; Graphics; Accounting
Contacts: Head of Marketing: Robert K. Red
Head of Sales: John Frank
Head of Software: Tom Dombach
Head of Engineering: Roy Chang
Geographic Coverage: International Year Established: 1979
Number of Employees: 1,000

ZENCORP.
2400 Walsh Ave.
Santa Clara, CA 95050
(408) 727-7677
Major Markets: Computer and Terminal Manufacturing
Target Industries: OEM
Contacts: Head of Marketing/Sales: Paul Lavie
Head of Software/Engineering: David Stabard
Geographic Coverage: International Year Established: 1979
Number of Employees: 250

ZERO ONE COMPUTER CORP.
25 Sheer Plaza
Preliminary, NY 11803
(516) 249-0999
Major Market: Computer Manufacturing
Target Industries: Small Business
Contacts: Head of Marketing: Thomas Imperato
Geographic Coverage: National Year Established: 1982
Number of Employees: 23

ZILOG, INC.
1315 Dell Ave.
Campbell, CA 95008
(408) 370-8000
Major Markets: Component and Computer Manufacturing; Dealer/Distributor; Maintenance/Other Services
Net Sales: $25 Million — $100 Million (1981)
Contacts: Head of Marketing: David Guzman
Head of Sales/Engineering: Bernard Vonderschmitt
Geographic Coverage: International Year Established: 1974
Number of Employees: 1,000

ZOEX
Suite 7
7343 Ronson Road
San Diego, CA 92111
(714) 377-6911
Major Markets: Computer and Peripheral Manufacturing
Geographic Coverage: National Year Established: 1979
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COMPUTERWORLD BUYER'S GUIDE
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AMDAHL CORP.
470V / 870V / 8 SERIES
Word Length: 31-bit
Operating System: MVS/SP; S/390
Languages Supported: Cobol; Fortran; Basic; Pascal
Maximum Memory: 4M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Maximum I/O Ports: 16
Communications Protocols: Synchronous
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $2,515,000
Maintenance: On-site
Date First Installed: 1978
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-1)

AMDAHL CORP.
580 MODEL 5850
Operating System: MVS/SP; VM/SP; ACP
Languages Supported: Cobol; Fortran; Basic; Pascal
Maximum Memory: 32M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Maximum I/O Ports: 32
Communications Protocols: Synchronous
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $3,750,000
Maintenance: On-site
Average Maintenance Fee: $8,500
Date First Installed: 1983

BRAEGEN CORP.
8000 SERIES
Word Length: 32-bit
Operating System: MCP
Languages Supported: Braegan; M; ALLTAMS
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $199,500
Maintenance: On-site
Date First Installed: 1983

Braegens
BRAEGEN CORP.
9885 SERIES
Word Length: 48-bit
Operating System: MCP
Languages Supported: Cobol; Fortran; Basic; RPG
Minimum Memory: 6M bytes
Maximum Memory: 105.4G bytes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $1,013,251
Maintenance: On-site
Date First Installed: 1983

BURROUGHS CORP.
B7830
Word Length: 32-bit
Operating System: MCP
Languages Supported: Cobol; Fortran; Basic; RPG
Minimum Memory: 512K bytes
Maximum Memory: 1.5M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $570,000
Maintenance: On-site
Date First Installed: 1981

BURROUGHS CORP.
B7900 (F-H-K) SERIES
Operating System: MCP
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 12M bytes
Maximum Memory: 36M bytes
Multiple Users: Yes
Maximum On-Line Storage: 5.2G bytes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $750,000
Maintenance: On-site
Date First Installed: 1983

CAMEX CORP.
1636 SERIES
Word Length: 32-bit
Operating System: DOS/VS
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 1M bytes
Maximum Memory: 5M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: OEM
Vendor Sales Terms: Purchase, Lease
Purchase Price: $395,000 to $995,000
Maintenance: On-site
Date First Installed: 1983
Number Installed to Date: 10
(See Vendor Profile Page V-4)

CAMEX CORP.
1840 SERIES
Word Length: 32-bit
Operating System: DOS/VS
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 1M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous, synchronous, Biynchronous
Distribution: OEM
Vendor Sales Terms: Purchase, Lease
Purchase Price: $595,000 to $995,000
Maintenance: On-site
Date First Installed: 1979
Number Installed to Date: Less than 10

COMPUTERWORLD BUYER'S GUIDE
Minimum Memory: 2M bytes
DOS/VSE; OS/VSI; SVS
Fortran; Basic; Pascal
Communications Protocols:
Maximum Memory: 16M bytes
DOS/VSE
Vendor Sales Terms: Purchase; Lease
Purchase Price: $150,000 to $350,000
Maintenance: On-site
Date First Installed: 1979
Number Installed to Date: 10 — 50

CAMBEX CORP.

1651 SERIES
Word Length: 32-bit
Operating System: VOS/VS.
DOS/VSE; OS/VSE; SVS
Minimum Memory: 2M bytes
Maximum Memory: 16M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $500,000 or more
Maintenance: On-site
Date First Installed: March 1982
Number Installed to Date: Under 10

COMMUNICATIONS MANUFACTURING CO.

4000
Specific Application: Security Access Control
Word Length: 8-bit
Languages Supported: CMC Procall
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 158M bytes
Maximum I/O Ports: 8
Distribution: Third-party
Vendor Sales Terms: Purchase; Lease
Purchase Price: $150,000
Maintenance: Dealer network
Date First Installed: January 1974
Number Installed to Date: 50
(See Vendor Profile Page V-9)

CONTROL DATA CORP.

CYBER 170/815
Word Length: 60-bit
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Maximum Memory: 1M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $150,000
Maintenance: On-site
Date First Installed: April 1983
(See Vendor Profile Page V-9)

CONTROL DATA CORP.

CYBER 170/825
Word Length: 60-bit
Operating System: NOS
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Minimum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 16.4G bytes
Maximum I/O Ports: 24
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $3,200,000
Average Maintenance Fee: $2,385
Date First Installed: May 1982

CONTROL DATA CORP., CYBER 170/R50
Word Length: 60-bit
Operating System: NOS
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous;
Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $1,050,000
Average Maintenance Fee: $600
Date First Installed: November 1982
Number Installed to Date: 20

CONTROL DATA CORP., CYBER 205/600 SERIES
Word Length: 60-bit
Operating System: NOS
Languages Supported: Cobol, Fortran, Basic, Pascal, RPG
Minimum Memory: 312K bytes
Maximum Memory: 2048K bytes
Multiple Users: Yes
Maximum On-Line Storage: 6.4G bytes
Maximum I/O Ports: 24
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $5,000,000 to $12,000,000
Maintenance: On-site
Date First Installed: June 1980

CRAY RESEARCH, INC.

CRAY X-MP
Word Length: 64-bit
Operating System: Proprietary
Languages Supported: Fortran
Minimum Memory: 1M bytes
Multiple Memory: 5M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous; SDL/C; SDLC/SNA
Distributed End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $1,000,000
Maintenance: On-site
Date First Installed: 1979
Number Installed to Date: 51
(See Vendor Profile Page V-19)

CRAY RESEARCH, INC.

CRAY X-1M SERIES
Word Length: 64-bit
Operating System: Proprietary
Languages Supported: Fortran
Minimum Memory: 1M bytes
Maximum Memory: 5M bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous; SDLC; SDLC/SNA
Distributed End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $1,000,000
Maintenance: On-site
Date First Installed: 1976
Number Installed to Date: 1,000
(See Vendor Profile Page V-9)

DATAWEST CORP.

470
Specific Application: Array Processor
Word Length: 36-bit
Languages Supported: Fortran
Minimum Memory: 16K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Multiple I/O Ports: 32
Communications Protocols: Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase; Lease
Purchase Price: $500,000 to $1,000,000
Maintenance: On-site
(See Vendor Profile Page V-7)

DATABUS CORP.

470
Specific Application: Array Processor
Word Length: 36-bit
Languages Supported: Fortran
Minimum Memory: 16K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Multiple I/O Ports: 32
Communications Protocols: Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase; Lease
Purchase Price: $500,000 to $1,000,000
Maintenance: On-site
(See Vendor Profile Page V-7)
### Mainframes

**DIGITAL EQUIPMENT CORP.**
- **DEC SYSTEM 2020**
  - Word Length: 36-bit
  - Minimum Memory: 256K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes; 20
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $483,000
  - Date First Installed: June 1976
  - Average Maintenance Fee: $230

**DIGITAL EQUIPMENT CORP.**
- **DEC SYSTEM 2040**
  - Word Length: 36-bit
  - Languages Supported: Cobol, Fortran, Basic, Basic plus 2, APL, Algol
  - Minimum Memory: 256K bytes
  - Maximum Memory: 2M bytes
  - Multiple Users: Yes; 100
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $557,000
  - Date First Installed: July 1979

**DIGITAL EQUIPMENT CORP.**
- **DEC SYSTEM 2060**
  - Word Length: 36-bit
  - Minimum Memory: 8K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $60,000
  - Date First Installed: February 1982

**DIGITAL EQUIPMENT CORP.**
- **DEC SYSTEM 312**
  - Word Length: 36-bit
  - Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/6
  - Minimum Memory: 8M bytes
  - Maximum Memory: 4M bytes
  - Multiple Users: Yes
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $198,000
  - Average Maintenance Fee: $1,863

**FOUR-PHASE SYSTEMS, INC.**
- **FPS-100**
  - Word Length: 36-bit
  - Languages Supported: Cobol, Fortran, Basic, Basic plus 2, APL
  - Minimum Memory: 8K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $93,500
  - Date First Installed: January 1979

**FOUR-PHASE SYSTEMS, INC.**
- **FPS 164**
  - Word Length: 64-bit
  - Languages Supported: Fortran, Basic, Pascal, RPG, APL
  - Minimum Memory: 2M bytes
  - Maximum Memory: 7M bytes
  - Multiple Users: Yes
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $225,000
  - Average Maintenance Fee: $1,970

**FOUR-PHASE SYSTEMS, INC.**
- **FPS 8/44**
  - Word Length: 32-bit
  - Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/1
  - Minimum Memory: 1M bytes
  - Maximum Memory: 4M bytes
  - Multiple Users: Yes
  - Communications Protocols: Asynchronous, Synchronous
  - Vendor Sales Terms: Purchase
  - Purchase Price: $200,000
  - Average Maintenance Fee: $2,280

**HONEYWELL, INC.**
- **DPS 8/20C**
  - Word Length: 36-bit
  - Operating System: CP6
  - Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/6
  - Minimum Memory: 600K bytes
  - Maximum Memory: 16M bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 33G bytes
  - Communications Protocols: Asynchronous, Synchronous, HDLC
  - Vendor Sales Terms: Purchase, Lease
  - Purchase Price: $150,000
  - Average Maintenance Fee: $320
  - Date First Installed: 1980

**HONEYWELL, INC.**
- **DPS 8/44C**
  - Word Length: 36-bit
  - Operating System: CP6
  - Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/6
  - Minimum Memory: 8M bytes
  - Maximum Memory: 16M bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 35G bytes
  - Communications Protocols: Asynchronous, Synchronous, HDLC
  - Vendor Sales Terms: Purchase, Lease
  - Purchase Price: $225,000
  - Average Maintenance Fee: $2,280
  - Date First Installed: 1980
<table>
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<th>Mainframes</th>
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<td>分布：结束使用</td>
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<td>销售条款：购买；租用</td>
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<td>购买价格：$200,000</td>
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<td>维护：现场</td>
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<td>COPOL, FORTRAN, BASIC, PASCAL, RPG, APL</td>
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<td>通信协议：非同步；串行；HDLC</td>
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<td>Word Length：36位</td>
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<td>操作系统：GCOS 8, GCOS 66</td>
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<td>语言支持：Cobol, Fortran, Basic, RPG, APL, PL/1, Gmap, IDP, TE</td>
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<td>最低内存：16M字节</td>
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<td>通信协议：非同步；串行；HDLC</td>
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<td>供应商销售条款：购买；租用；租赁</td>
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<td>操作系统：GCOS 8, GCOS 66</td>
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<td>语言支持：Cobol, Fortran, Basic, RPG, APL, Gmap, IDP, TE</td>
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<td>最高在线存储：2640字节</td>
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<td>通信协议：非同步；串行；HDLC</td>
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<td>3033B</td>
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<td>Word Length：64位</td>
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<tr>
<td>操作系统：OS/VS1, MVS, OS/VS2, DOS/VSE</td>
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<td>语言支持：Cobol, Fortran, Basic, Pascal, RPG, APL, PL/1, Gmap, IDP, TE</td>
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<td>3033M</td>
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<td>操作系统：OS/VS1, MVS, OS/VS2, DOS/VSE</td>
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<td>语言支持：Cobol, Fortran, Basic, Pascal, RPG, APL, PL/1</td>
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<td>最低内存：4.1M字节</td>
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<td>9332</td>
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<td>Word Length：64位</td>
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<td>最低内存：16M字节</td>
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<tr>
<td>A-5</td>
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## Mainframes

### IBM 3083U
- **Word Length**: 64-bit
- **Operating System**: OS/VS1, MVS/SP, MVS/370
- **Languages Supported**: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/I
- **Minimum Memory**: 16.7M bytes
- **Maximum Memory**: 33.5M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Asynchronous, Synchronous, Bytasyncronous, SDLC, SDLC/SNA, X.25, HDLC
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Purchase Price**: $3,000,000
- **Number Installed to Date**: 85
- **Maintenance**: On-site
- **Date First Installed**: June 1982

### IBM 3083B
- **Word Length**: 64-bit
- **Operating System**: DOS/VSE, DOS/VS, VM/370, VM/BSE
- **Languages Supported**: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/I
- **Minimum Memory**: 16.7M bytes
- **Maximum Memory**: 33.5M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Asynchronous, Synchronous, Bytasyncronous, SDLC, SDLC/SNA, X.25, HDLC
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Maintenance**: On-site
- **Date First Installed**: March 1983
- **Minimum Memory**: 1M bytes
- **Maximum Memory**: 4.1M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Bytasyncronous, SDLC/SNA, X.25, HDLC
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Purchase Price**: $535,000
- **Maintenance**: On-site
- **Date First Installed**: August 1980
- **Number Installed to Date**: 1,345

### IBM 4341-1
- **Word Length**: 32-bit
- **Operating System**: DOS/VSE, DOS/VS, VM/370, VM/BSE
- **Languages Supported**: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/I
- **Minimum Memory**: 16.7M bytes
- **Maximum Memory**: 18.9M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Bytasyncronous, SDLC/SNA
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Purchase Price**: $900,000
- **Maintenance**: On-site
- **Date First Installed**: March 1982

### IBM 4341-2
- **Word Length**: 32-bit
- **Operating System**: DOS/VSE, DOS/VS, VM/370, VM/BSE
- **Languages Supported**: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/I
- **Minimum Memory**: 16.7M bytes
- **Maximum Memory**: 18.9M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Bytasyncronous, SDLC/SNA
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Purchase Price**: $900,000
- **Maintenance**: On-site
- **Date First Installed**: March 1982

### IBM 4341-9
- **Word Length**: 32-bit
- **Operating System**: DOS/VSE, DOS/VS, VM/370, VM/BSE
- **Languages Supported**: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/I
- **Minimum Memory**: 16.7M bytes
- **Maximum Memory**: 18.9M bytes
- **Multiple Users**: Yes
- **Communications Protocols**: Bytasyncronous, SDLC/SNA
- **Distribution**: End user
- **Vendor Sales Terms**: Purchase, Rental, Lease
- **Purchase Price**: $900,000
- **Maintenance**: On-site
- **Date First Installed**: March 1981
- **Number Installed to Date**: 800

### IBM SYSTEM/38-3
- **Word Length**: 32-bit
- **Operating System**: CPF

---

**COMPUTERWORLD BUYER'S GUIDE**
Mainframes

Languages Supported: Cobol; RPG
Minimum Memory: 512K bytes
Maximum Memory: 1.5M bytes
Multiple Users: Yes
Communications Protocols: Bisynchronous; SDLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $140,000
Maintenance: On-site
Date First Installed: July 1980

IBM SYSTEM/38-4
Word Length: 32-bit
Operating System: CPF
Languages Supported: Cobol; RPG
Minimum Memory: 512K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Communications Protocols: Bisynchronous; SDLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $145,000
Maintenance: On-site
Date First Installed: August 1981

IBM SYSTEM/38-6
Word Length: 32-bit
Operating System: CPF
Languages Supported: Cobol; RPG
Minimum Memory: 512K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Communications Protocols: Bisynchronous; SDLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $380,000
Maintenance: On-site
Date First Installed: July 1980

IBM SYSTEM/38-8
Word Length: 32-bit
Operating System: CPF
Languages Supported: Cobol; RPG
Minimum Memory: 512K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Communications Protocols: Bisynchronous; SDLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $206,000
Maintenance: On-site
Date First Installed: October 1980

InforMatek States, Inc.
SIMIS II
Specific Application: Nuclear Medicine
Word Length: 16-bit
Operating System: V70
Languages Supported: Fortran; Basic; Assembler M DES
Minimum Memory: 128K bytes
Maximum On-Line Storage: 24M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $90,000
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1971

InforMatek States, Inc.
SIMIS III
Specific Application: Nuclear Medicine
Word Length: 16-bit
Operating System: V70
Languages Supported: Fortran; Basic; Assembler M DES
Minimum Memory: 128K bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $100,000
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1971

InforMatek States, Inc.
SIMIS IV
Specific Application: Nuclear Medicine
Word Length: 16-bit
Operating System: V70
Languages Supported: Fortran; Basic; Assembler M DES
Minimum Memory: 128K bytes
Maximum On-Line Storage: 30M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $150,000
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1981
Number Installed to Date: 100

IPL Systems, Inc.
4435
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $228,000
Maintenance: On-site
Date First Installed: March 1980
Number Installed to Date: 50

IPL Systems, Inc.
4443
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 4M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $240,000
Maintenance: On-site
Date First Installed: December 1982
Number Installed to Date: 50

IPL Systems, Inc.
4445
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $206,000
Maintenance: On-site
Date First Installed: October 1980
Number Installed to Date: 50

IPL Systems, Inc.
4446
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $204,000
Maintenance: On-site
Date First Installed: December 1982
Number Installed to Date: 50

IPL Systems, Inc.
4447
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $204,000
Maintenance: On-site
Date First Installed: December 1982
Number Installed to Date: 50

IPL Systems, Inc.
4448
Word Length: 64-bit
Operating System: OS/VSE, MVS/SP, DOS/VSE, VM/370
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $204,000
Maintenance: On-site
Date First Installed: December 1982
Number Installed to Date: 50

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- BAL/ALC to COBOL
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<th>Minimum Memory</th>
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<th>Languages Supported</th>
<th>Operating System</th>
<th>Operating System</th>
<th>Communications Protocols</th>
<th>Distribution</th>
<th>Average Maintenance Fee</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
<th>Purchase Price</th>
<th>Maintenance:</th>
<th>Vendor Sales Terms</th>
<th>Rental; Lease</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPL SYSTEMS, INC.</td>
<td>MVS/SP; DOS/VS; VM</td>
<td>32-bit</td>
<td>32-bit</td>
<td>1M bytes</td>
<td>4M bytes</td>
<td>Cobol; Basic; Pascal, C</td>
<td>OS/VS1; VM/SP; VM/370</td>
<td>MVS/SP; DOS/VS; VM</td>
<td>Asynchronous; Synchronous</td>
<td>End user</td>
<td>$1,800</td>
<td>January 1980</td>
<td>25 — 100</td>
<td>$2,300</td>
<td>On-site</td>
<td>Purchase; Lease</td>
<td>Lease</td>
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<tr>
<td>IPL SYSTEMS, INC.</td>
<td>MVS/SP; DOS/VS; VM</td>
<td>32-bit</td>
<td>32-bit</td>
<td>1M bytes</td>
<td>4M bytes</td>
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<td>End user</td>
<td>$1,800</td>
<td>January 1980</td>
<td>25 — 100</td>
<td>$2,300</td>
<td>On-site</td>
<td>Purchase; Lease</td>
<td>Lease</td>
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<tr>
<td>NATIONAL ADVANCED SYSTEMS, INC.</td>
<td>MVS/SP; OS/VS/VM</td>
<td>32-bit</td>
<td>32-bit</td>
<td>1M bytes</td>
<td>4M bytes</td>
<td>Cobol; Basic; Pascal, C</td>
<td>OS/VS1; VM/SP; VM/370</td>
<td>MVS/SP; OS/VS/VM</td>
<td>Asynchronous; Synchronous</td>
<td>End user</td>
<td>$1,800</td>
<td>January 1980</td>
<td>25 — 100</td>
<td>$2,300</td>
<td>On-site</td>
<td>Purchase; Lease</td>
<td>Lease</td>
</tr>
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</table>

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NATIONAL ADVANCED SYSTEMS, INC.  
AS/5000  
Word Length: 64-bit  
Minimum Memory: 4M bytes  
Maximum Memory: 16M bytes  
Multiple Users: Yes  
Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, APL, PL/1  
Communications Protocols: Bisynchronous, SDLC, SNA  
Diagnostics: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $1,100,000  
Maintenance: On-site  
Number Installed to Date: 100 — 500  
Distribution: End user  
Average Maintenance Fee: $5,400  
Date First Installed: April 1980  
Number Installed to Date: 100 — 500

NATIONAL ADVANCED SYSTEMS, INC.  
AS/7000  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 8M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 8M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $4,000,000  
Maintenance: On-site  
Number Installed to Date: December 1982  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $5,200,000  
Maintenance: On-site  
Number Installed to Date: Less than 10

NATIONAL ADVANCED SYSTEMS, INC.  
AS/8000  
Word Length: 64-bit  
OS: MVS  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $1,100,000  
Maintenance: On-site  
Number Installed to Date: 50 — 100

NATIONAL ADVANCED SYSTEMS, INC.  
AS/9000  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $1,100,000  
Maintenance: On-site  
Number Installed to Date: 50 — 100

NATIONAL ADVANCED SYSTEMS, INC.  
AS/9500  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $2,000,000  
Maintenance: On-site  
Date First Installed: 1982

NATIONAL ADVANCED SYSTEMS, INC.  
AS/10000  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $2,800,000  
Maintenance: On-site  
Date First Installed: 1982

NATIONAL ADVANCED SYSTEMS, INC.  
AS/10000  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1  
Minimum Memory: 16M bytes  
Maximum Memory: 32M bytes  
Multiple Users: Yes  
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SNA  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $3,500,000  
Maintenance: On-site  
Date First Installed: December 1982  
Number Installed to Date: Less than 10

NCR CORP.  
1-9040  
Word Length: 32-bit  
OS: MVS/SP  
Languages Supported: Cobol; Basic; Pascal; RPG; APL; PL/1

NATIONAL ADVANCED SYSTEMS, INC.  
AS/10000  
Word Length: 64-bit  
OS: MVS/SP  
Languages Supported: Cobol; Basic; Pascal; RPG  
Minimum Memory: 256K bytes  
Maximum Memory: 2M bytes  
Multiple Users: Yes  
Minimum Memory: 256K bytes  
Maximum Memory: 2M bytes  
Multiple Users: Yes  
Communications Protocols: Data Streaming  
Distribution: End user  
Vendor Sales Terms: Purchase; Lease  
Purchasing: $125,000  
Maintenance: On-site  
Date First Installed: May 1981  
Number Installed to Date: 100 — 500

COMPUTERWORLD BUYER'S GUIDE
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<th>Model</th>
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<th>Languages Supported</th>
<th>Multiple Users</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Word Length</th>
<th>Distribution</th>
<th>Maintenance</th>
<th>Purchase Price</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
<th>Languages Supported</th>
<th>Maximum Memory</th>
<th>Minimum Memory</th>
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<tbody>
<tr>
<td>V-8355</td>
<td>32-bit</td>
<td>VRX</td>
<td>Cobol</td>
<td>Yes</td>
<td>4M bytes</td>
<td>8M bytes</td>
<td>32-bit</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>$25,000 to $70,000</td>
<td>April 1982</td>
<td>10 — 50</td>
<td>Cobol, Basic, RPG</td>
<td>8M bytes</td>
<td>12M bytes</td>
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<tr>
<td>V-8365</td>
<td>32-bit</td>
<td>VRX</td>
<td>Cobol</td>
<td>Yes</td>
<td>8M bytes</td>
<td>16M bytes</td>
<td>32-bit</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>$250,000</td>
<td>April 1982</td>
<td>10 — 50</td>
<td>Cobol, Basic, RPG</td>
<td>16M bytes</td>
<td>48M bytes</td>
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<tr>
<td>V-8375</td>
<td>32-bit</td>
<td>VRX</td>
<td>Cobol</td>
<td>Yes</td>
<td>16M bytes</td>
<td>32M bytes</td>
<td>32-bit</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>$500,000</td>
<td>April 1982</td>
<td>10 — 50</td>
<td>Cobol, Basic, RPG</td>
<td>32M bytes</td>
<td>96M bytes</td>
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<tr>
<td>V-8385</td>
<td>32-bit</td>
<td>VRX</td>
<td>Cobol</td>
<td>Yes</td>
<td>32M bytes</td>
<td>64M bytes</td>
<td>32-bit</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>$750,000</td>
<td>April 1982</td>
<td>10 — 50</td>
<td>Cobol, Basic, RPG</td>
<td>64M bytes</td>
<td>192M bytes</td>
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<tr>
<td>V-8395</td>
<td>32-bit</td>
<td>VRX</td>
<td>Cobol</td>
<td>Yes</td>
<td>64M bytes</td>
<td>128M bytes</td>
<td>32-bit</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>$1,000,000</td>
<td>April 1982</td>
<td>10 — 50</td>
<td>Cobol, Basic, RPG</td>
<td>128M bytes</td>
<td>512M bytes</td>
</tr>
</tbody>
</table>

**TO COMPUTER SYSTEMS/A-11**

**Mainframes**

**Vendor Sales Terms:** Purchase; Rental

**Purchase Price:** $150,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** 1981

**Number Installed to Date:** 50

---

**NCR CORP.**

**NCR 9300**

**Word Length:** 32-bit

**Operating System:** TX

**Languages Supported:** Cobol, Basic

**Minimum Memory:** 1M bytes

**Maximum Memory:** 4M bytes

**Multiple Users:** Yes; 42

**Communications Protocols:** SDLC/SNA

**Distribution:** End user

**Vendor Sales Terms:** Purchase

**Purchase Price:** $25,000 to $70,000

---

**NCR CORP.**

**V-8353 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 1M bytes

**Maximum Memory:** 1M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $200,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** April 1982

**Number Installed to Date:** 10 — 50

---

**NCR CORP.**

**V-8354 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 1M bytes

**Maximum Memory:** 2M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $315,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** April 1982

---

**NCR CORP.**

**V-8355 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 8M bytes

**Maximum Memory:** 16M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $514,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** May 1982

**Number Installed to Date:** 10 — 50

---

**NCR CORP.**

**V-8356 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 16M bytes

**Maximum Memory:** 32M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $690,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** May 1982

**Number Installed to Date:** 10 — 50

---

**NCR CORP.**

**V-8357 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 8M bytes

**Maximum Memory:** 16M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $750,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** May 1982

**Number Installed to Date:** 10 — 50

---

**NCR CORP.**

**V-8358 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 16M bytes

**Maximum Memory:** 32M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $800,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** May 1982

**Number Installed to Date:** 10 — 50

---

**NCR CORP.**

**V-8359 II**

**Word Length:** 32-bit

**Operating System:** VRX

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 32M bytes

**Maximum Memory:** 64M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Purchase Price:** $1,000,000

**Maintenance:** On-site; Remote diagnostics

**Date First Installed:** May 1982

**Number Installed to Date:** 10 — 50

---

**NIXDORF COMPUTER CORP.**

**8890 MODEL 30**

**Word Length:** 32-bit

**Operating System:** NIDOS/VSE

**Languages Supported:** Cobol; Fortran; Basic; RPG; Neat

**Minimum Memory:** 8M bytes

**Maximum Memory:** 32M bytes

**Multiple Users:** Yes

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Rental; Lease

**Maintenance:** On-site; Remote diagnostics

---

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**DCR/1000**
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<thead>
<tr>
<th>Model</th>
<th>Word Length</th>
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<th>Languages Supported</th>
<th>Memory</th>
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<th>Purchase Price</th>
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**Mainframes**

- **Operating System:** 1100 OS
- **Languages Supported:** Cobol, Basic, RPG, PL/1, Jovial, Assembler
- **Memory:** 524K bytes
- **Communications Protocols:** Asynchronous, Synchronous
- **Multiple Users:** Yes
- **Date First Installed:** July 1982
We just gave the computer industry something to reach for. A new standard... performance/footprint.

Introducing the Gould CONCEPT 32/67. Performance in a size as accommodating as its price.

From the 32-bit performance leader comes yet another minicomputer product line other suppliers can only hope to duplicate. The 2-MIPS-class, cost and space-saving CONCEPT 32/67.

We scrimped on size, but that's all. The 32/67 gives you top computational power in 1/5 to 1/8 the floor space of the competition. And it's packed with features. Performance up to 2.6 MIPS. Largest cache in a mini...32K byte two-way set associative with separate 16K banks for data and instructions. And, 16M byte task addressing in a base register mode. All at a price that matches its size.

* All chart data from published competitive information.

For more information about the new standard of minis, call or write: Gould Inc., S.E.L. Computer Systems Division, 6901 West Sunrise Boulevard, Fort Lauderdale, Florida 33313. 1-800-327-9716.
Gould announces the

Gould's Ada Learning Environment (ALE) is the easy, flexible and complete package for Ada training, and it's available now. Ada is happening. Military and scientific computer applications are already emerging. The Department of Defense has adopted Ada as the basis for future program development. Your software engineers need a functional understanding of this newly designed language. You need Gould ALE—the first comprehensive Ada training package.

It's easy. Because ALE is packaged as an educational tool, it's naturally easier to use and speeds up the learning process. Because ALE interfaces with the Gould Universal Timesharing Executive (UTX™), the authorized Gould implementation of the UNIX* operating system, you'll enjoy a programming environment that lets you concentrate on Ada instruction. Since ALE incorporates the Gould CONCEPT/32™ family of superminicomputers, you're a step ahead with proven, real-time performance.

It's flexible. Four packaged ALE configurations are available to suit your specific needs. You can match your computational requirements to any of the Gould CONCEPT/32 family of minicomputers. Or, for those with an existing Gould system, there's a software-only package. Whichever you choose, you'll have a high-performance, general application computer system with impressive software on which to learn Ada. System add-ons and upgrades are also available. The ability to adapt your packaged system to other applications when Ada Training is completed makes ALE a sound financial investment.

It's complete. The Gould Ada Learning Environment is more than just the Gould CONCEPT/32 computer system, the Gould UTX operating system and the ICSC-Ada Translator: You also receive complete training and support services, and documentation. On-site installation and sales follow-up visits. A one week, on-site training course. Complete manuals and documentation for all aspects of the ALE. And, a composite Vendor Licensing Package. Everything you need for a working Ada training environment.

It's yours. Ada usage is definitely a part of your future. Learning how to use Ada is important now. For more information call or write:

Gould Inc., S.E.L. Computer Systems Division
6901 West Sunrise Boulevard
Fort Lauderdale, Florida 33313 1-800-527-9716

*Ada is a registered trademark of the U.S. Government, Ada Joint Program Office. *CONCEPT/32 and UTX are trademarks of Gould Inc. *UNIX is a trademark of Bell Labs. ICSC-Ada Translator is a proprietary software product of Irvine Computer Sciences Corporation.
ACCELERATED DATA SYSTEMS

Operating System: MIPS
Minimum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 192M bytes
Maximum I/O Ports: 256
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Average Maintenance Fee: $300
(See Vendor Profile Page V-1)

APOLLO COMPUTER, INC.
DN4000 DOMAIN PROCESSING SYSTEM

Word Length: 32-bit
Operating System: AEGIS; UNIX
Languages Supported: Fortran; Pascal; C
Multiple Users: Yes
Maximum On-Line Storage: 300M bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $50,000 to $100,000
Date First Installed: June 1982
Average Maintenance Fee: $500

APPLIED DIGITAL DATA SYSTEMS, INC.

4000 SERIES

Word Length: 32-bit
Operating System: PVMOS
Languages Supported: Fortran; Basic; Pascal
Minimum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 192M bytes
Maximum I/O Ports: 256
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Purchase Price: $60,000 to $120,000

APPLIED DIGITAL DATA SYSTEMS, INC.
MENTOR 3000 SERIES

Word Length: 32-bit
Operating System: PICK; VMOS
Languages Supported: Basic
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 300M bytes
Maximum I/O Ports: 40
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $60,000 to $100,000
Date First Installed: January 1983
Average Maintenance Fee: $300

BRAEGEN CORP.

4000 SERIES

Word Length: 16-bit
Operating System: MS-DOS; MP/M
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase, Rental
Purchase Price: $10,000 to $20,000
Maintenance: On-site
Average Maintenance Fee: $150
Date First Installed: April 1983
Number Installed to Date: 10
(See Vendor Profile Page V-3)

BTI COMPUTERS

8000 SERIES

Word Length: 32-bit
Operating System: MTS
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 5M bytes
Multiple Users: Yes
Maximum On-Line Storage: 10G bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $100,000 to $140,000
Maintenance: On-site
Average Maintenance Fee: $200
Date First Installed: June 1983
Number Installed to Date: 60
(See Vendor Profile Page V-3)

CHARLES RIVER DATA SYSTEMS, INC.

UNIVERSE 68

Word Length: 32-bit
Operating System: AEGIS
Languages Supported: Fortran; Basic; Pascal
Minimum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Maintenance: Remote diagnostics
Specific Application: General
Purpose
Average Maintenance Fee: $150
Number Installed to Date: 60
(See Vendor Profile Page V-3)

COMPUGRAPHIC CORP.

ONE/110

Word Length: 32-bit
Operating System: AUROS
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C
Minimum Memory: 2M bytes
Multiple Users: Yes
Maximum On-Line Storage: 320M bytes
Maximum I/O Ports: 64
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $11,000 to $40,000
Maintenance: On-site
Return to manufacturing facility
Average Maintenance Fee: $200
Date First Installed: October 1981
Number Installed to Date: 100
(See Vendor Profile Page V-4)

Superminis
Superminis

Maximum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 21M bytes
Maximum I/O Ports: 12
Communications Protocols: Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $45,000 to $110,000
Average Maintenance Fee: $750
Date First Installed: May 1982
Number Installed to Date: 100 — 500

COMPUTER CONSOLES, INC.

POWER 5/55
Word Length: 16-bit
Operating System: PERPOS
Languages Supported: Cobol; Basic; C
Multiple Users: Yes
Minimum On-Line Storage: 19.2G bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $202,000
Maintenance: On-site; Remote diagnostics
(See Vendor Profile Page V-5)

DATA GENERAL CORP.

ECLIPSE MV/8300
Word Length: 32-bit
Operating System: AOS/VS; AOS/RT32
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1; MPL DG/L
Minimum Memory: 1MB bytes
Maximum Memory: 12M bytes
Multiple Users: Yes
Average Maintenance Fee: $1,200
Date First Installed: 1982

DATA GENERAL CORP.

ECLIPSE MV/10000
Word Length: 32-bit
Operating System: AOS/VS; AOS/RT32
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; APL; PL/1; C
Minimum Memory: 1MB bytes
Maximum Memory: 16M bytes
Multiple Users: Yes
Maximum On-Line Storage: 19G bytes
Communications Protocols:
Asynchronous; Synchronous; SDLC/SNA, X.25; 2780/3780
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Maintenance: On-site
Date First Installed: 1982

DIGITAL EQUIPMENT CORP.

VAX 11/780
Word Length: 32-bit
Operating System: VMS
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/1; Bliss; C
Minimum Memory: 2M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Vendor Sales Terms: Purchase
Purchase Price: $400,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $1,100
Date First Installed: May 1978

DIGITAL EQUIPMENT CORP.

VAX 11/782
Word Length: 32-bit
Operating System: VMS
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/1; Bliss; C
Minimum Memory: 1MB bytes
Maximum Memory: 12M bytes
Multiple Users: Yes
Vendor Sales Terms: Purchase
Purchase Price: $125,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $2,000
Date First Installed: 1982

FORMATION, INC.

F4000/100
Word Length: 16-bit
Operating System: DOS; DOS/VSE; DOS/VS; MV$;
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; C
Maximum Memory: 512K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Maximum On-Line Storage: 5G bytes
Communications Protocols:
Asynchronous; Synchronous; SDLC/SNA, X.25; RJE 80
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Maintenance: On-site
Date First Installed: 1982

DIGITAL EQUIPMENT CORP.

VAX 11/785
Word Length: 32-bit
Operating System: VMS
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/1; Bliss; C
Minimum Memory: 1MB bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Vendor Sales Terms: Purchase
Purchase Price: $450,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $700
Date First Installed: 1980

DIGITAL EQUIPMENT CORP.

VAX 11/790
Word Length: 32-bit
Operating System: VMS
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/1; Bliss; C
Minimum Memory: 2M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Vendor Sales Terms: Purchase
Purchase Price: $900,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $1,100
Date First Installed: August 1981
Number Installed to Date: 5
(See Vendor Profile Page V-9)

FORMATION, INC.

F4000/101
Word Length: 32-bit
Operating System: DOS; DOS/VSE; DOS/VS; MV$;
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; C
Minimum Memory: 512K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Vendor Sales Terms: Purchase
Purchase Price: $400,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $1,100
Date First Installed: 1982

COMPUTERWORLD BUYER'S GUIDE
**Superminis**

**Maintenance:** On-site  
**Average Maintenance Fee:** $990  
**Date First Installed:** August 1981  
**Number Installed to Date:** 9

**FORMATION, INC.**  
F4000/200  
**Word Length:** 32-bit  
**Operating System:** DOS; OS/VP; OS/VS  
**Languages Supported:** Cobol; Fortran, Basic; Pascal, APL, PL/I, C  
**Minimum Memory:** 312K bytes  
**Maximum Memory:** 8M bytes  
**Multiple Users:** Yes; 100  
**Maximum On-Line Storage:** 5G bytes  
**Maximum I/O Ports:** 124  
**Communications Protocols:** Asynchronous, Synchronous, Bi-synchronous  
**Vendor Sales Terms:** Purchase  
**Maintenance:** On-site  
**Average Maintenance Fee:** $990  
**Date First Installed:** February 1983

**GOULD, INC.**  
3277860  
**Word Length:** 32-bit  
**Operating System:** UNIX, MPX/32  
**Languages Supported:** Cobol; Fortran, Basic; Pascal, APL  
**Minimum Memory:** 256K bytes  
**Maximum Memory:** 16M bytes  
**Multiple Users:** Yes; 96  
**Maximum On-Line Storage:** 36.4G bytes  
**Maximum I/O Ports:** 122  
**Communications Protocols:** Asynchronous, Synchronous, SDLC  
**Vendor Sales Terms:** Purchase, Lease  
**Maintenance:** On-site  
**Average Maintenance Fee:** $500  
**Date First Installed:** February 1983

**HARRIS CORP.**  
248.500  
**Word Length:** 48-bit  
**Operating System:** VOS  
**Languages Supported:** Cobol; Fortran, Basic, Pascal, APL, PL/I  
**Minimum Memory:** 8M bytes  
**Multiple Users:** Yes; 128  
**Maximum On-Line Storage:** 86G bytes  
**Communications Protocols:** Asynchronous, X.25  
**Vendor Sales Terms:** Purchase  
**Maintenance:** On-site  
**Average Maintenance Fee:** $350  
**Date First Installed:** September 1988

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**TO COMPUTER SYSTEMS**  
B-3
## Superminis

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<thead>
<tr>
<th>Company</th>
<th>HP 9000 SERIES 600</th>
<th>HP 3000 SERIES 64</th>
<th>IBM 9321</th>
<th>IBM 7900</th>
<th>HP 9000</th>
<th>IBM 4321</th>
<th>IBM 9000</th>
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<th>CONMINET LOTUS ADVANCED</th>
<th>CONMINET LOTUS BASIC</th>
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Four-Phase introduces
The Series 2000...

...for people who thought
automating their office was beyond them.

Congratulations!
You'll hear that a lot when you make the Series 2000 your first step into automating your office. And it's a pretty economical step, too. But that's the beauty of the new Motorola microprocessor-based Series 2000 system from Four-Phase. It's three different, integrated systems that let you start small with 8/16-bit computers like the one in our picture, then move into more powerful MC68000-based 16/32-bit machines later on. They're ideal for automating a single office, or connecting all your regional or branch offices together. And the systems are so easy to install and use, you can celebrate your first day of automation the same day your system arrives.

So what do you get for your investment? The entry level System 220 features the powerful 6809E microprocessor and gives you up to four easy-to-use workstations. The ISOS operating system inside lets you run a wide variety of business applications such as order entry, inventory inquiry, text editing and electronic worksheet. Getting started couldn't be easier.

Then there's the System 240 to which you can upgrade as your applications grow. It will give you up to eight workstations and all the memory capacity you'll need to support them.

If you need more capacity than the System 240, move straight to the sophisticated System 260. It's the bridge between today's requirements for low cost, and tomorrow's demands for high performance. The System 260 is a 16/32-bit computer based on Motorola's MC68000 microprocessor. It comes with up to eight terminals and features a powerful operating system derived from UNIX™ System III under license from AT&T. You'll enjoy working with the Series 2000, and all the productivity it will bring you. And if your friends don't believe how inexpensive it is to get started in office automation, just tell them who to call. Four-Phase, the leader in office automation technology, service and support for over a decade. And now, part of Motorola, the leader in microprocessor technology. Call 1-800-528-6050, Ext. 1599. Or write us at 10700 North De Anza Blvd., Cupertino, CA 95014. M/S 52-10A7.
Superminis

Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $50,660 to $105,210
Maintenance: On-site
Average Maintenance Fee: $685
Date First Installed: July 1981
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-11)

MEGA/NET CORP.
MEGA/NET 1000
Word Length: 32-bit
Operating System: ACOS
Languages Supported: Basic
Minimum Memory: 512K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 40
Maximum On-Line Storage: 500M bytes
Maximum I/O Ports: 128
Communications Protocols: X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $68,000 to $90,000
(See Vendor Profile Page V-13)

MODULAR COMPUTER SYSTEMS, INC. (MODCOMP)
CLASSIC 8/7
Word Length: 16-bit
Operating System:MAX IV OS
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; Simula
Minimum Memory: 750K bytes
Maximum Memory: 7M bytes
Maximum On-Line Storage: 4.3G bytes
Maximum I/O Ports: 12
Communications Protocols: X.25; X.21
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Maintenance: On-site; Return to manufacturing facility
Date First Installed: June 1982
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-14)

MEGA/NET CORP.
MEGA/NET 2000
Word Length: 32-bit
Operating System: ACOS
Languages Supported: Basic
Minimum Memory: 512K bytes
Maximum Memory: 1M bytes
Minimum Memory: 4M bytes
Maximum Memory: 1.3M bytes
Maximum On-Line Storage: 1.3G bytes
Maximum I/O Ports: 64
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC; Return to manufacturing facility
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $37,200 to $450,290
(See Vendor Profile Page V-19)

MEGA/NET CORP.
MEGA/NET 3000
Word Length: 32-bit
Operating System: ACOS
Languages Supported: Basic
Minimum Memory: 512K bytes
Maximum Memory: 5M bytes
Minimum Memory: 512K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes
Maximum On-Line Storage: 500M bytes
Maximum I/O Ports: 128
Communications Protocols: X.25; X.21; ND-NET
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Maintenance: On-site; Remote diagnostics
Date First Installed: June 1982
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-15)

NORSK DATA NORTH AMERICAN, INC.
ND-540
Word Length: 32-bit
Operating System: SINTRAN/IVSE
Languages Supported: Cobol; Fortran; Pascal; RPG; Simula
Minimum Memory: 768K bytes
Maximum Memory: 2.2M bytes
Multiple Users: Yes
Maximum On-Line Storage: 4.3G bytes
Maximum I/O Ports: 8
Communications Protocols: X.25; X.21; ND-NET
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1979
(See Vendor Profile Page V-19)

NORSK DATA NORTH AMERICAN, INC.
ND-546
Word Length: 32-bit
Operating System: SINTRAN/IVSE
Languages Supported: Cobol; Fortran; Pascal; RPG; Simula
Minimum Memory: 768K bytes
Maximum Memory: 2.2M bytes
Multiple Users: Yes
Maximum On-Line Storage: 4.3G bytes
Maximum I/O Ports: 8
Communications Protocols: X.25; HDLC; X.21
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1979
(See Vendor Profile Page V-19)

PERKIN-ELMER CORP.
3210 MPS
Word Length: 32-bit
Operating System: OS/32; UNIX 7
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; Simula
Minimum Memory: 2.2M bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 1300 bytes
Communications Protocols: Asynchronous; Synchronous; PSI/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $15,000 to $50,000
Maintenance: On-site; Remote diagnostics
Date First Installed: February 1981

PERKIN-ELMER CORP.
3210/A
Word Length: 32-bit
Operating System: OS/32; UNIX 7
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; Simula
Minimum Memory: 512K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 1300 bytes
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $140,000 to $300,000
Maintenance: On-site; Remote diagnostics
Date First Installed: February 1981

PRIME COMPUTER, INC.
PRIME 250
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; CP/M
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 1.4G bytes
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $87,000 to $119,000
Maintenance: On-site; Remote diagnostics
Average Maintenance Fee: $360
Date First Installed: February 1981
(See Vendor Profile Page V-17)

PRIME COMPUTER, INC.
PRIME 4500
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; CP/M
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 4G bytes
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $78,000 to $119,000
Maintenance: On-site; Remote diagnostics
Date First Installed: October 1981

PRIME COMPUTER, INC.
PRIME 5000
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; CP/M
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 4G bytes
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $78,000 to $119,000
Maintenance: On-site; Remote diagnostics
Date First Installed: October 1981

PRIME COMPUTER, INC.
PRIME 6000
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; CP/M
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 4G bytes
Communications Protocols: Asynchronous; Synchronous; PS/NET; HDLC; DSLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $78,000 to $119,000
Maintenance: On-site; Remote diagnostics
Date First Installed: October 1981

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120
Superminis

Minimum Memory: 1M bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 63
Maximum On-Line Storage: 5G bytes
Maximum I/O Ports: 12
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, X.25, HDLC
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $112,000 to $187,000
Average Maintenance Fee: $946
Date First Installed: 1982

PRIME COMPUTER, INC.
PRIME 550
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, PL/1, Assembly
Minimum Memory: 1M bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 64
Maximum On-Line Storage: 5G bytes
Maximum I/O Ports: 14
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, X.25, HDLC
Distribution: End user, Third-party
Vendor Sales Terms: Purchase, Lease
Purchase Price: $112,000 to $185,000
Maintenance: On-site, Remote
Average Maintenance Fee: $765
Date First Installed: February 1981

PRIME COMPUTER, INC.
PRIME 750
Word Length: 32-bit
Operating System: PRIMOS
Languages Supported: Cobol, Fortran, Basic, Pascal, RPG, PL/1, Assembly
Minimum Memory: 1M bytes
Maximum Memory: 6M bytes
Multiple Users: Yes; 96
Maximum On-Line Storage: 632M bytes
Maximum I/O Ports: 14
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, X.25, HDLC
Distribution: End user, Third-party
Vendor Sales Terms: Purchase, Lease
Purchase Price: $314,000
Maintenance: On-site; Remote
Average Maintenance Fee: $500 to $785
Date First Installed: September 1982

PYRAMID TECHNOLOGY CORP.
PYRAMID COMPUTER
Word Length: 32-bit
Operating System: UNIX
Languages Supported: Fortran, Pascal, C
Minimum Memory: 1M bytes
Maximum Memory: 8M bytes
Multiple Users: Yes; 128
Maximum On-Line Storage: 1.5G bytes
Maximum I/O Ports: 128
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, SDLC/SNA, X.25
Distribution: End user, OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,000,000 to $3,000,000
Maintenance: On-site
Average Maintenance Fee: $1,000
Date First Installed: May 1976

RIDGE COMPUTERS
RIDGE THIRTY-TWO
Specific Application: CAD
Word Length: 32-bit
Operating System: UNIX
Languages Supported: Fortran, Pascal, PL/1
Minimum Memory: 32K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes; 60
Maximum On-Line Storage: 154M bytes
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, SDLC
Distribution: End user
Vendor Sales Terms: Lease
Purchase Price: $65,000
Maintenance: On-site
Average Maintenance Fee: $300
Date First Installed: August 1982
Number Installed to Date: 50

TANDEM COMPUTER, INC.
NON STOP
Word Length: 16-bit
Operating System: GUARDIAN OS
Languages Supported: Cobol, Fortran, Mumps, PL/1
Multiple Users: Yes
Maximum I/O Ports: 208
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, SDLC
Distribution: End user
Purchase Price: $140,000
Maintenance: On-site
Date First Installed: May 1976
Number Installed to Date: 50

TANDEM COMPUTER, INC.
NON STOP II
Word Length: 16-bit
Operating System: GUARDIAN OS
Languages Supported: Cobol, Fortran, Mumps, PL/1
Multiple Users: Yes
Maximum I/O Ports: 368
Communications Protocols:
Asynchronous, Synchronous, Bisynchronous, SDLC
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $210,000
Maintenance: On-site
Date First Installed: January 1981
Number Installed to Date: 1,000 — 5,000
The trouble with many of today's better known small business computers is they box you into a single user system. So after your big initial investment, you still have a single user system. You always will.

Now there's the Zeus 4 from OSM Computers. The Zeus 4 is the first multi-user, multi-processor micro at single user prices. The Zeus 4 is less than one cubic foot and weighs 24.6 pounds.

Yet, it's like four separate, powerful small business computers in one. It allows up to four users to share a common database or work independently. Each has his own CPU, 64K of RAM and I/O ports. That means greater operator independence, more processor power and greater reliability.

You needn't worry about running out of storage capacity either. The Zeus 4 comes with a built-in hard disk, so users share up to 19MB of storage, about twice as much as most other multi-user systems.

You'll enjoy maximum flexibility in software applications too, because Zeus 4's MUSE operating system runs programs compatible with CP/M. Plus MUSE provides extensive file management functions typically found only on mini computers.

Here's another big advantage: The Zeus 4 is designed for low maintenance, low down-time. Its four modules snap in and out with a few minutes work. So if repairs are ever needed, modules are simply replaced through OSM's limited warranty program.

Maybe the best thing is that you can buy the powerful and expandable Zeus 4 for $4,595 ($6,595 fully configured for four users).

The Zeus 4 from OSM, the latest in a family of powerful, multi-user small business computers. It's the little box that lets you grow without boxing you in.

To find out more, call (800) 538-5120 or (415) 961-8680 in California or write to OSM Computer Corporation, 665 Clyde Avenue, Mountain View, CA 94043.

OSM
Computers. Your power to expand.

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Zeus 4 because...

We want you to compare the features and benefits of the Zeus 4 multi-user, multi-processor computer to computers you already know about. When you do, we know you'll decide on a Zeus 4.

...because multi-user is better than multiple single users.

...because multi-processor is better than single processor.

...because standard programs are better than non-standard programs.

OUR SPECS AT A GLANCE:

- CPU: 280A
- Ram Memory: 64KB/user
- Max. Memory: 320KB
- No. of users: 1 to 4
- Std. Serial Ports: 2/user, 2/master
- Opt. Parallel Ports: 1/4-users, 1/master
- Winchester disk storage: 6-19MB
- Backup facilities: 250K8 floppy
- Opt. backup facilities: 1MB floppy
- File interchange capability: 250K8, 8" floppy
- Other features:
  - Real time clock (opt.)
  - Ht./Wd./Dp.: 8 x 13 x 15"
  - Wt.: 25 lbs.
  - Cooling: Convection
  - Oper. temp.: 16-38°C.
  - Storage temp.: -40-71°F.
  - Rel. Hum.: 10-80%
  - Alt.: 10,000 ft.
  - Domest. volt.: 115v 60hz
  - Intl. volt.: 230v 50/60hz
  - Amp.: 0.5-1A
  - Power: 75 VA
### Minis/Small Business Computers

<table>
<thead>
<tr>
<th>Company</th>
<th>Model</th>
<th>Operating System</th>
<th>Word Length</th>
<th>Memory</th>
<th>Languages Supported</th>
<th>On-Line Storage</th>
<th>Multiple Users</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>On-Site/Remote</th>
<th>Maintenance</th>
<th>Purchase Price</th>
<th>Vendor Sales Terms</th>
<th>Date First Installed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKI, INC.</td>
<td>ATEX 4000</td>
<td>ATEX</td>
<td>16-bit</td>
<td>1M bytes</td>
<td>Basic, Pascal, Assembly</td>
<td>24M bytes</td>
<td>Yes</td>
<td>1M bytes</td>
<td>256K bytes</td>
<td>On-site</td>
<td>Rental</td>
<td>$250,000</td>
<td>Purchase</td>
<td>1975</td>
<td>(See Vendor Profile Page V-1)</td>
</tr>
<tr>
<td>ALPHACOMPUTER, INC.</td>
<td>MACSYM-100</td>
<td>CP/M</td>
<td>8-bit</td>
<td>64K bytes</td>
<td>Basic, Pascal, PL/I, C</td>
<td>1024 bytes</td>
<td>Yes</td>
<td>32K bytes</td>
<td>1M bytes</td>
<td>On-site</td>
<td>Remote</td>
<td>$12,000 to $30,000</td>
<td>Purchase</td>
<td>1979</td>
<td>(See Vendor Profile Page P-2)</td>
</tr>
<tr>
<td>ALPHA MICROSYSTEMS, INC.</td>
<td>AM-1090</td>
<td>CP/M</td>
<td>8-bit</td>
<td>32K bytes</td>
<td>Basic, Pascal, MAC Basic</td>
<td>1024 bytes</td>
<td>Yes</td>
<td>4K bytes</td>
<td>2M bytes</td>
<td>On-site</td>
<td>Remote</td>
<td>$12,000 to $30,000</td>
<td>Purchase</td>
<td>1982</td>
<td>(See Vendor Profile Page V-1)</td>
</tr>
<tr>
<td>ALPHACOMPUTER, INC.</td>
<td>ACI-2</td>
<td>CP/M</td>
<td>8-bit</td>
<td>64K bytes</td>
<td>Basic, Pascal, MAC Basic</td>
<td>1024 bytes</td>
<td>Yes</td>
<td>128K bytes</td>
<td>1M bytes</td>
<td>On-site</td>
<td>Remote</td>
<td>$12,000 to $30,000</td>
<td>Purchase</td>
<td>1979</td>
<td>(See Vendor Profile Page P-2)</td>
</tr>
<tr>
<td>AMF LOGIC SCIENCES, INC.</td>
<td>OPS 11</td>
<td>CP/M</td>
<td>8-bit</td>
<td>64K bytes</td>
<td>Basic, Pascal, MAC Basic</td>
<td>1024 bytes</td>
<td>Yes</td>
<td>128K bytes</td>
<td>1M bytes</td>
<td>On-site</td>
<td>Remote</td>
<td>$12,000 to $30,000</td>
<td>Purchase</td>
<td>1979</td>
<td>(See Vendor Profile Page P-2)</td>
</tr>
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</table>

**TO COMPUTER SYSTEMS**

C-1
<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product</th>
<th>Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td>MULTIVISION 8-5</td>
<td>Communications Protocols: Asynchronous; Synchronous Distribution: OEM</td>
<td>Minimum Memory: 64K bytes Languages Supported: Basic Minimum 1/O Ports: 4 Maximum On-Line Storage: 800K bytes</td>
</tr>
<tr>
<td>EPICURE 8000</td>
<td>Languages Supported: Basic Languages Supported: Assembler Minimum Memory: 64K bytes Minimum Memory: 64K bytes</td>
<td>Languages Supported: Basic Minimum Memory: 64K bytes</td>
</tr>
<tr>
<td>MODEL 250/XX</td>
<td>Languages Supported: Cobol; Fortran; Basic; Pascal; C Minimum Memory: 64K bytes Maximum Memory: 64K bytes</td>
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<th>Company</th>
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<th>Type</th>
<th>Operating System</th>
<th>Word Length</th>
<th>Languages Supported</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Multiple Users</th>
<th>Minimum On-Line Storage</th>
<th>Maximum On-Line Storage</th>
<th>Communications Protocols</th>
<th>Date First Installed</th>
<th>Purchase Price</th>
<th>Maintenance</th>
<th>Date First Installed</th>
<th>Distributor</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURROUGHS CORP.</td>
<td>B999</td>
<td>Small</td>
<td>CMS</td>
<td>8-bit</td>
<td>Fortran, Basic</td>
<td>64K bytes</td>
<td>1.5M bytes</td>
<td>Yes; 10</td>
<td>464M</td>
<td>381M</td>
<td>Asynchronous; Synchronous</td>
<td>1981</td>
<td>$10,108 - $35,000</td>
<td>On-site</td>
<td>1981</td>
<td>Purchase</td>
</tr>
<tr>
<td></td>
<td>B9190</td>
<td>Small</td>
<td>CMS/MCP</td>
<td>8-bit</td>
<td>Fortran, Basic</td>
<td>512K bytes</td>
<td>512K bytes</td>
<td>Yes; 80</td>
<td>281M</td>
<td>128M</td>
<td>Asynchronous; Synchronous</td>
<td>1983</td>
<td>$10,000 - $38,000</td>
<td>On-site</td>
<td>1983</td>
<td>Purchase</td>
</tr>
<tr>
<td></td>
<td>B1910</td>
<td>Small</td>
<td>CMS/MCP</td>
<td>24-bit</td>
<td>Fortran, Basic</td>
<td>128K bytes</td>
<td>1.5M bytes</td>
<td>Yes; 80</td>
<td>192M</td>
<td>128K</td>
<td>Asynchronous; Synchronous</td>
<td>1980</td>
<td>$40,000 - $130,000</td>
<td>On-site</td>
<td>1980</td>
<td>Purchase</td>
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<td>B980</td>
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<td>$156,400</td>
<td></td>
<td>1981</td>
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<td>$112,750</td>
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<td>$156,400</td>
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<td>1980</td>
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<td>$9,000</td>
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<td>B1919</td>
<td>$10,000</td>
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<td>1983</td>
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<td>B1985</td>
<td>$130,000</td>
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<td>1980</td>
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<td>B1995</td>
<td>$100,000</td>
<td></td>
<td>1980</td>
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</tr>
</tbody>
</table>

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213-991-5106

TO COMPUTER SYSTEMS/C-3
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $8,570 to $9,785
Maintenance: On-site
Date First Installed: 1980

BYRONIX CORP.
SERIES B 500
Mini
Word Length: 16-bit
Operating System: IRIS; BLISS;
COBOL
Languages Supported: Cobol;
Fortran; Basic; Pascal; C
Minimum Memory: 268K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 30
Maximum On-Line Storage: 384M bytes
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $11,785 to $14,770
Date First Installed: 1980

CALIFORNIA COMPUTER SYSTEMS
SERIES 300
Small business
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol;
Fortran; Basic; Pascal; C
Minimum Memory: 256K bytes
Maximum Memory: 128K bytes
Multiple Users: Yes; 6
Maximum On-Line Storage: 24M bytes
Maximum I/O Ports: 2
Communications Protocols: RS-232
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,995
Maintenance: On-site
Date First Installed: December 1982
Number Installed to Date: 10 — 50

CALIFORNIA COMPUTER SYSTEMS
SERIES 400
Small business
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol;
Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 6
Maximum On-Line Storage: 24M bytes
Maximum I/O Ports: 2
Communications Protocols: RS-232
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: On-site
Date First Installed: April 1980
Number Installed to Date: 500 — 1,000

CENTURY COMPUTER CORP.
SERIES 2200
Small business
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol;
Basic
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 320M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous; Synchronous; Biynchronous
Vendor Sales Terms: Purchase
Purchase Price: $22,000
Maintenance: On-site; Return to manufacturing facility; Third-party
Average Maintenance Fee: $220
Date First Installed: March 1975
Number Installed to Date: 4,200
Date First Installed: October 1982
Number Installed to Date: 10 — 50

CENTURY COMPUTER CORP.
VANGUARD 8000
Small business
Word Length: 16-bit
Operating System: CP/M; MP/M;
CP/M 80
Languages Supported: Cobol;
Basic; Assembly
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 10
Maximum On-Line Storage: 50M bytes
Maximum I/O Ports: 12
Communications Protocols: Asynchronous; Biynchronous; Synchronous
Vendor Sales Terms: Purchase
Purchase Price: $5,000 to $10,000
Maintenance: On-site; Return to manufacturing facility; Dealers
Average Maintenance Fee: $60
Date First Installed: October 1982
Number Installed to Date: 10 — 50

CHALLENGE SYSTEMS, INC.
CS-1000-B
Small business
Word Length: 8-bit
Operating System: CP/M 80;
CP/MNET; CP/M 8; I/O;
Languages Supported: Basic;
Pascal; RM Cobol; Assembler;
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 62M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Biynchronous; Synchronous; Telex
Distribution: OEM; Third-party

C-4

COMPUTERWORLD BUYER'S GUIDE
Minis/Small Business Computers

Vendor Sales Terms: Purchase
Purchase Price: $5,900 to $17,000
Maintenance: On-site: Return to manufacturing facility

Date First Installed: January 1983
Number Installed to Date: 500 to 1,000

COLUMBIA DATA PRODUCTS, INC.
DC-1000 Small business
Word Length: 8-bit
Operating System: CP/M; MP/M 86
Minimum Memory: 264K bytes
Maximum Memory: 1.2M bytes
Multiple Users: Yes
Minimum On-Line Storage: 40.6G bytes
Communications Protocols: Asynchronous; Synchronous; Distributor: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: June 1981
Number Installed to Date: 500 to 1,000

COMPUPRO CORP.
SB-16 C Small business
Word Length: 16-bit
Operating System: CARTOS, UNICA
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 256K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Minimum On-Line Storage: 5.3G bytes
Communications Protocols: Asynchronous; Synchronous; Distributor: OEM
Vendor Sales Terms: Purchase
Purchase Price: $9,995
Maintenance: On-site
Date First Installed: 1983
(See Vendor Profile Page V-9)

COMPUTER AUTOMATION, INC.
DATA/ACE Small business
Word Length: 16-bit
Operating System: CARTOS.
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 10M bytes
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $13,675
Maintenance: On-site
Date First Installed: 1983
(See Vendor Profile Page V-9)

COMPUTER AUTOMATION, INC.
CARTOS SERIES 5 Small business
Word Length: 16-bit
Operating System: CARTOS
Languages Supported: Forhand, Pascal
Minimum Memory: 256K bytes
Maximum Memory: 3M bytes
Multiple Users: Yes
Minimum On-Line Storage: 100 bytes
Communications Protocols: Asynchronous; Synchronous; Distributor: End user
Vendor Sales Terms: Lease
Purchase Price: $17,995
Maintenance: On-site
Date First Installed: 1983
(See Vendor Profile Page V-9)

COLUMBIA DATA PRODUCTS, INC.
1600-2 Small business
Word Length: 16-bit
Operating System: CP/M 86; MS-DOS; MP/M 86
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 64K bytes
Maximum I/O Ports: 20
Communications Protocols: Asynchronous; Synchronous; Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: 1982
Number Installed to Date: 500 to 1,000
(See Vendor Profile Page V-4)

COLUMBIA DATA PRODUCTS, INC.
1600-3 Small business
Word Length: 16-bit
Operating System: CP/M 86; MS-DOS; MP/M 86
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 10.3M bytes
Communication Protocols: Asynchronous; Synchronous; Distributor: End user
Vendor Sales Terms: Purchase
Purchase Price: $5,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: June 1982
Number Installed to Date: 500 to 1,000
(See Vendor Profile Page V-4)

COLUMBIA DATA PRODUCTS, INC.
DC-1000 Small business
Word Length: 8-bit
Operating System: CP/M; MP/M 86
Minimum Memory: 64K bytes
Maximum Memory: 1.2M bytes
Multiple Users: Yes
Minimum On-Line Storage: 40.6G bytes
Communications Protocols: Asynchronous; Synchronous; Distributor: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: June 1981
Number Installed to Date: 500 to 1,000

COMPUGRAPH CORP.
SB-16 C Small business
Word Length: 16-bit
Operating System: CARTOS, UNICA
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 256K bytes
Multiple Users: Yes
Minimum On-Line Storage: 5.3G bytes
Communications Protocols: Asynchronous; Synchronous; Distributor: OEM
Vendor Sales Terms: Purchase
Purchase Price: $9,995
Maintenance: On-site
Date First Installed: 1983
(See Vendor Profile Page V-9)

COMPUTER AUTOMATION, INC.
DATA/ACE Small business
Word Length: 16-bit
Operating System: CARTOS.
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Minimum On-Line Storage: 25M bytes
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $5,900 to $12,000
Maintenance: On-site
(See Vendor Profile Page V-4)

COLUMBIA DATA PRODUCTS, INC.
1600-2 Small business
Word Length: 16-bit
Operating System: CP/M 86; MS-DOS; MP/M 86
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 64K bytes
Maximum I/O Ports: 20
Communications Protocols: Asynchronous; Synchronous; Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: 1982
Number Installed to Date: 500 — 1,000
(See Vendor Profile Page V-4)

COLUMBIA DATA PRODUCTS, INC.
1600-3 Small business
Word Length: 16-bit
Operating System: CP/M 86; MS-DOS; MP/M 86
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 128K bytes
Multiple Users: Yes
Minimum On-Line Storage: 10.3M bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $5,000
Maintenance: On-site: Return to manufacturing facility
Date First Installed: June 1982
Number Installed to Date: 500 — 1,000
(See Vendor Profile Page V-4)

CHALLENGE SYSTEMS, INC.
CS-1000 Small business
Word Length: 8-bit
Operating System: CP/M, IOS, CP/M, MP/M II
Languages Supported: Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 336M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site: Third-party
Date First Installed: January 1982

CMLC INTERNATIONAL SYSTEM 816 SUPER S Small business
Word Length: 8-bit
Operating System: CP/M 86
Languages Supported: Cobol
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Minimum On-Line Storage: 20M bytes
Maximum I/O Ports: 3
Communication Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site
Date First Installed: November 1982
(See Vendor Profile Page V-4)

CMC INTERNATIONAL SYSTEM 816-1 Small business
Word Length: 8-bit
Operating System: CP/M 86
Languages Supported: Cobol, Fortran
Minimum Memory: 256K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Minimum On-Line Storage: 64K bytes
Maximum I/O Ports: 2
Communication Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site
Date First Installed: November 1982

CMC INTERNATIONAL SYSTEM 816-2 Small business
Word Length: 16-bit
Operating System: CP/M 86
Languages Supported: Cobol, Fortran
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 700K bytes
Maximum I/O Ports: 2
Communication Protocols: Synchronous; Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site
Date First Installed: November 1982

CMC INTERNATIONAL SYSTEM 816-5 Small business
Word Length: 16-bit
Operating System: CP/M 86
Languages Supported: Cobol, Fortran
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Minimum On-Line Storage: 5.3G bytes
Maximum I/O Ports: 20
Communication Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site
Date First Installed: November 1982
Number Installed to Date: 1,000

COLONIAL DATA SERVICES CORP.
SILB Small business
Word Length: 8-bit
Operating System: CP/M; DOS; IV OS
Languages Supported: Cobol
Minimum Memory: 256K bytes
Maximum Memory: 4M bytes
Multiple Users: No
Minimum On-Line Storage: 40M bytes
Maximum I/O Ports: 4
Communication Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $9,900
Maintenance: On-site: Return to manufacturing facility
Date First Installed: June 1982
Number Installed to Date: 500 — 1,000

TO COMPUTER SYSTEMS
<table>
<thead>
<tr>
<th>Company</th>
<th>Model</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Minimum 1/O Ports</th>
<th>Maximum 1/O Ports</th>
<th>Distribution</th>
<th>Maintenance</th>
<th>Number Installed to Date</th>
<th>Purchase Price</th>
<th>Average Maintenance Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMNIX</td>
<td>ADVISOR 26</td>
<td>16-bit</td>
<td>CP/M; CDOS</td>
<td>64K bytes</td>
<td>512K bytes</td>
<td>16</td>
<td>32</td>
<td>End user</td>
<td>On-site</td>
<td>1979</td>
<td>$30,000</td>
<td>$250</td>
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<td></td>
<td>ADVISOR 200</td>
<td>16-bit</td>
<td>CP/M; CDOS</td>
<td>128K bytes</td>
<td>2M bytes</td>
<td>32</td>
<td>64</td>
<td>End user</td>
<td>On-site</td>
<td>1979</td>
<td>$9,000 to $30,000</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>CS200A</td>
<td>16-bit</td>
<td>RDOS</td>
<td>256K bytes</td>
<td>512K bytes</td>
<td>256</td>
<td>32</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>1980</td>
<td>$13,000 to $54,000</td>
<td>$250</td>
</tr>
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<td>CS200B</td>
<td>16-bit</td>
<td>RDOS</td>
<td>256K bytes</td>
<td>512K bytes</td>
<td>256</td>
<td>32</td>
<td>End user</td>
<td>On-site; Remote</td>
<td>1980</td>
<td>$13,000 to $54,000</td>
<td>$250</td>
</tr>
</tbody>
</table>

**COMPUTERWORLD BUYER'S GUIDE**
## Minis/Small Business Computers

### Operating System: RDOS; AOS
- **Language Supported**: Basic
- **Minimum Memory**: 256K bytes
- **Maximum Memory**: 1M bytes
- **Multiple Users**: Yes
- **Date First Installed**: May 1982

### DISTRIBUTION
- **Vendor Sales Terms**: Purchase
- **Asynchronous**: Yes
- **Synchronous**: Yes
- **X.25**: Yes
- **Bisynchronous**: Yes
- **SDLC/SNA**: Yes
- **3780/2780**: Yes
- **Diagnostics**: Yes
- **Return to Manufacturing**: Yes
- **Lease**: Yes

### MAINTENANCE
- **On-site**: Yes
- **Remote**: Yes
- **Average Maintenance Fee**: $150

### DATA GENERAL CORP.

<table>
<thead>
<tr>
<th>Model</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Maximum Memory</th>
<th>Minimum Memory</th>
<th>Maximum On-Line Storage</th>
<th>Distribution</th>
<th>Vendor Sales Terms</th>
<th>Purchase Price Range</th>
<th>Maintenance</th>
<th>Average Maintenance Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS200C</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.4G</td>
<td>End user</td>
<td>Purchase</td>
<td>$67,000 to $90,000</td>
<td>On-site</td>
<td>$28,000 to $38,000</td>
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<tr>
<td>M-1</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.0G</td>
<td>End user</td>
<td>Purchase</td>
<td>$65,000 to $100,000</td>
<td>On-site</td>
<td>$24,000 to $34,000</td>
</tr>
<tr>
<td>M-2</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.0G</td>
<td>End user</td>
<td>Purchase</td>
<td>$37,000 to $50,000</td>
<td>On-site</td>
<td>$21,000 to $31,000</td>
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<tr>
<td>W-1</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.0G</td>
<td>End user</td>
<td>Purchase</td>
<td>$28,000 to $40,000</td>
<td>On-site</td>
<td>$15,000 to $25,000</td>
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<tr>
<td>W-2</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.0G</td>
<td>End user</td>
<td>Purchase</td>
<td>$12,750 to $19,750</td>
<td>On-site</td>
<td>$10,000 to $15,000</td>
</tr>
</tbody>
</table>

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982

### TO COMPUTER SYSTEMS

<table>
<thead>
<tr>
<th>Model</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Maximum Memory</th>
<th>Minimum Memory</th>
<th>Maximum On-Line Storage</th>
<th>Distribution</th>
<th>Vendor Sales Terms</th>
<th>Purchase Price Range</th>
<th>Maintenance</th>
<th>Average Maintenance Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICRO 219</td>
<td>16-bit</td>
<td>RDOS; AOS</td>
<td>Basic</td>
<td>2M bytes</td>
<td>512K bytes</td>
<td>1.0G</td>
<td>End user</td>
<td>Purchase</td>
<td>$12,750 to $19,750</td>
<td>On-site</td>
<td>$10,000 to $15,000</td>
</tr>
</tbody>
</table>

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982

### DATA TERMINAL & COMMUNICATIONS
- **Minimum Memory**: 4M bytes
- **Maximum Memory**: 4M bytes
- **Multiple Users**: Yes
- **Date First Installed**: 1982
### Minis/Small Business Computers

<table>
<thead>
<tr>
<th>MINIS</th>
<th>SMALL BUSINESS COMPUTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Length:</strong> 8-bit</td>
<td>Operating System: CP/M</td>
</tr>
<tr>
<td><strong>Language Supported:</strong> Fortran; Basic; Pascal</td>
<td>Maximum Memory: 64K bytes</td>
</tr>
<tr>
<td><strong>Minimum Memory:</strong> 64K bytes</td>
<td>Multiple Users: Yes; 4</td>
</tr>
<tr>
<td><strong>Maximum On-Line Storage:</strong> 2048 bytes</td>
<td>Communication Protocols: Asynchronous</td>
</tr>
<tr>
<td><strong>Maximum I/O Ports:</strong> 4</td>
<td>Distribution: Third-party</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous</td>
<td>Vendor Sales Terms: Purchase</td>
</tr>
<tr>
<td><strong>Number Installed to Date:</strong> 50</td>
<td>Purchase Price: $200 to $4000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DIGIDYNE CORP.</strong></th>
<th><strong>S832</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Length:</strong> 16-bit</td>
<td>Operating System: RDIS; MCOSE; BITS</td>
</tr>
<tr>
<td><strong>Languages Supported:</strong> Cobol; Fortran; Basic; Pascal</td>
<td>Communication Protocols: Asynchronous; Synchronous</td>
</tr>
<tr>
<td><strong>Minimum Memory:</strong> 64K bytes</td>
<td>Distribution: End user; OEM</td>
</tr>
<tr>
<td><strong>Maximum Memory:</strong> 512K bytes</td>
<td>Minimum Memory: 512K bytes</td>
</tr>
<tr>
<td><strong>Multiple Users:</strong> Yes; 8</td>
<td>Maximum Memory: 4M bytes</td>
</tr>
<tr>
<td><strong>Maximum On-Line Storage:</strong> 320M bytes</td>
<td>Multiple Users: Yes; 8</td>
</tr>
<tr>
<td><strong>Maximum I/O Ports:</strong> 8</td>
<td>Maximum On-Line Storage: 40M bytes</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous; Synchronous</td>
<td>Distribution: End user; OEM</td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong> Purchase</td>
<td>Maintenance: On-site; Remote diagnostics</td>
</tr>
<tr>
<td><strong>Purchase Price:</strong> $21,000</td>
<td>Average Maintenance Fee: $245</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DIGITAL EQUIPMENT CORP.</strong></th>
<th><strong>PROFESSIONAL 350</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Length:</strong> 16-bit</td>
<td>Operating System: RX/1M +</td>
</tr>
<tr>
<td><strong>Languages Supported:</strong> Cobol; Fortran; Basic; Basic plus 2; Coral; Dbase</td>
<td>Communication Protocols: Asynchronous; Synchronous</td>
</tr>
<tr>
<td><strong>Minimum Memory:</strong> 256K bytes</td>
<td>Distribution: End user; OEM</td>
</tr>
<tr>
<td><strong>Maximum Memory:</strong> 512K bytes</td>
<td>Purchase Price: $21,000</td>
</tr>
<tr>
<td><strong>Maximum On-Line Storage:</strong> 80M bytes</td>
<td>Maintenance: On-site; Remote diagnostics</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous; Synchronous</td>
<td>Average Maintenance Fee: $114</td>
</tr>
<tr>
<td><strong>Number Installed to Date:</strong> 781</td>
<td>Distribution: Third-party</td>
</tr>
<tr>
<td><strong>Date First Installed:</strong> January 1976</td>
<td>Vendor Sales Terms: Purchase</td>
</tr>
<tr>
<td><strong>Average Maintenance Fee:</strong> $781</td>
<td>Purchase Price: $4,375</td>
</tr>
</tbody>
</table>

---

**DIGITAL EQUIPMENT CORP.**

**THE DECIMATE II**

**Small Business**

**Word Length:** 8-bit

<table>
<thead>
<tr>
<th>Operating System: WP/8; CP/M</th>
<th>Languages Supported: Cobol; Fortran; Basic; Basic plus 2</th>
<th>Minimum Memory: 96K bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Users:</strong> Yes; 16</td>
<td>Maximum Memory: 160K bytes</td>
<td>Maximum On-Line Storage: 5.6M bytes</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous; Synchronous</td>
<td>Distribution: End user; OEM</td>
<td>Communications Protocols: Asynchronous</td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong> Purchase</td>
<td>Maintenance: On-site; Remote diagnostics</td>
<td>Date First Installed: January 1983</td>
</tr>
<tr>
<td><strong>Purchase Price:</strong> $3,000</td>
<td>Average Maintenance Fee: $38</td>
<td></td>
</tr>
</tbody>
</table>

---

**DIGITAL SYSTEMS CORP.**

**GALAXY 3**

**Small Business**

**Word Length:** 8-bit

Operating System: GALAXY OS

<table>
<thead>
<tr>
<th>Languages Supported: Cobol; Basic; RPG; PL/1; Assembler</th>
<th>Minimum Memory: 96K bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Users:</strong> Yes; 20</td>
<td>Maximum Memory: 160K bytes</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous; Synchronous</td>
<td>Distribution: End user; OEM</td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong> Purchase</td>
<td>Maintenance: On-site; Remote diagnostics</td>
</tr>
<tr>
<td><strong>Purchase Price:</strong> $3,000</td>
<td>Average Maintenance Fee: $14</td>
</tr>
<tr>
<td><strong>Date First Installed:</strong> January 1980</td>
<td>(See Vendor Profile Page V-8)</td>
</tr>
</tbody>
</table>

---

**DIGITAL SYSTEMS CORP.**

**GALAXY 5**

**Small Business**

**Word Length:** 8-bit

Operating System: GALAXY OS

<table>
<thead>
<tr>
<th>Languages Supported: Cobol; Basic; PL/1; Assembler</th>
<th>Minimum Memory: 1MB bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Users:</strong> Yes; 75</td>
<td>Maximum Memory: 2.4G bytes</td>
</tr>
<tr>
<td><strong>Maximum On-Line Storage:</strong> 2.4G bytes</td>
<td>Communications Protocols: Asynchronous</td>
</tr>
<tr>
<td><strong>Multiple I/O Ports:</strong> 60</td>
<td>Distribution: End user; OEM</td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous</td>
<td>Vendor Sales Terms: Purchase</td>
</tr>
<tr>
<td><strong>Date First Installed:</strong> January 1976</td>
<td>Purchase Price: $40,000 to $150,000</td>
</tr>
<tr>
<td><strong>Number Installed to Date:</strong> 22</td>
<td>Maintenance: On-site</td>
</tr>
<tr>
<td><strong>Average Maintenance Fee:</strong> $38</td>
<td>(See Vendor Profile Page V-8)</td>
</tr>
</tbody>
</table>
DISPLAY DATA CORP.

DISPLAY DATA CORP.

Maximum Memory: 128K bytes

Distribution: End user

Vendor Sales Terms: Purchase

Purchase Price: $45,000 to $120,000

Maintenance: On-site

Date First Installed: January 1974

Number Installed to Date: 1,000 — 5,000

Display Data Corp. (See Vendor Profile Page V-8)

TO COMPUTER SYSTEMS C-9

Minis/Small Business Computers
### Minis/Small Business Computers

<table>
<thead>
<tr>
<th>Company</th>
<th>Model</th>
<th>Word Length</th>
<th>Maximum On-Line Storage</th>
<th>Minimum Memory</th>
<th>Languages Supported</th>
<th>Communications Protocols</th>
<th>Average Maintenance Fee</th>
<th>Purchase Price</th>
<th>Lease</th>
<th>Date First Installed</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL ROBOTICS CORP.</td>
<td>SYSTEM IV/65</td>
<td>24-bit</td>
<td>303M bytes</td>
<td>288K bytes</td>
<td>Cobol, Basic, APL, Dibol, Fortran</td>
<td>Asynchronous; Synchronous</td>
<td>$720</td>
<td>$110,000</td>
<td>$590</td>
<td>July 1976</td>
<td>End user</td>
</tr>
<tr>
<td>MINATEC</td>
<td>SYSTEM IV/70</td>
<td>24-bit</td>
<td>96M bytes</td>
<td>64K bytes</td>
<td>Cobol, Basic, APL, Dibol</td>
<td>Asynchronous; Synchronous; Hasp</td>
<td>$590</td>
<td>$130,000</td>
<td>$9,000</td>
<td>1980</td>
<td>End user</td>
</tr>
<tr>
<td>GENERAL ROBOTICS CORP.</td>
<td>SCORPIO</td>
<td>16-bit</td>
<td>16M bytes</td>
<td>1M bytes</td>
<td>Cobol, Fortran, Basic, Pascal</td>
<td>Asynchronous; Synchronous</td>
<td>$1,800</td>
<td>$8,000</td>
<td>$450</td>
<td>1980</td>
<td>End user</td>
</tr>
<tr>
<td>GEMINI</td>
<td>Gemini</td>
<td>16-bit</td>
<td>32M bytes</td>
<td>64K bytes</td>
<td>Cobol, Basic, APL, Dibol</td>
<td>Asynchronous; Synchronous</td>
<td>$2,640</td>
<td>$9,000</td>
<td>$1,800</td>
<td>1980</td>
<td>End user</td>
</tr>
<tr>
<td>HARRTONIX, INC.</td>
<td>Mini</td>
<td>16-bit</td>
<td>512K bytes</td>
<td>4M bytes</td>
<td>Cobol, Basic, APL, Dibol</td>
<td>Asynchronous; Synchronous</td>
<td>$2,640</td>
<td>$33,000</td>
<td>$1,800</td>
<td>1980</td>
<td>End user</td>
</tr>
<tr>
<td>HARRTONIX, INC.</td>
<td>4832</td>
<td>16-bit</td>
<td>512K bytes</td>
<td>4M bytes</td>
<td>Cobol, Basic, APL, Dibol</td>
<td>Asynchronous; Synchronous</td>
<td>$2,640</td>
<td>$33,000</td>
<td>$1,800</td>
<td>1980</td>
<td>End user</td>
</tr>
<tr>
<td>HARDY COMPUTER CORP.</td>
<td>256</td>
<td>8-bit</td>
<td>256K bytes</td>
<td>64K bytes</td>
<td>Cobol, Fortran, Basic, Pascal</td>
<td>Asynchronous; Synchronous</td>
<td>$2,640</td>
<td>$100,000</td>
<td>$1,800</td>
<td>October 1982</td>
<td>End user</td>
</tr>
<tr>
<td>COMPUTERWORLD BUYER'S GUIDE</td>
<td>C-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- **Word Length:** Specifies the length of the word used by the computer.
- **Maximum On-Line Storage:** Indicates the maximum amount of data that can be stored on-line.
- **Minimum Memory:** Refers to the minimum amount of memory required for the computer to function.
- **Languages Supported:** Lists the programming languages that the computer supports.
- **Communications Protocols:** Specifies the protocols used for communication.
- **Average Maintenance Fee:** Indicates the average cost of maintenance.
- **Purchase Price:** Specifies the price of purchasing the computer.
- **Lease:** Indicates whether the computer is available on lease.
- **Date First Installed:** The date when the computer was first installed.
- **Distribution:** Specifies how the computer is distributed (e.g., end user, OEM).
**Minis/Small Business Computers**

<table>
<thead>
<tr>
<th>HP 125 SERIES</th>
<th>Small business</th>
<th>Date First Installed: 1978</th>
<th>Number Installed to Date: 50</th>
<th>Maintenance: Return to HEWLETT-PACKARD Co.</th>
<th>(See Vendor Profile Page V-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Length: Dual 8-bit</td>
<td>Operating System: CP/M</td>
<td>Languages Supported: Basic; Pascal</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 64K bytes</td>
<td>Multiple Users:没错</td>
</tr>
<tr>
<td>Multiple On-Line Storage: 9.6M bytes</td>
<td>Communications Protocols: Asynchronous; Synchronous</td>
<td>Distribution: End user</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Maintenance: On-site</td>
<td>Date First Installed: 1982</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HP 320 SERIES</th>
<th>Small business</th>
<th>Date First Installed: 1980</th>
<th>Number Installed to Date: 100 —</th>
<th>Maintenance: On-site</th>
<th>(See Vendor Profile Page V-11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Length: 16-bit</td>
<td>Operating System: RTE</td>
<td>Languages Supported: Fortran; Basic; Pascal</td>
<td>Minimum Memory: 256K bytes</td>
<td>Maximum Memory: 1M bytes</td>
<td>Multiple Users:是</td>
</tr>
<tr>
<td>Multiple On-Line Storage: 48M bytes</td>
<td>Communications Protocols: Asynchronous; Synchronous; Basic</td>
<td>Distribution: End user</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Maintenance: On-site</td>
<td>Date First Installed: 1980</td>
</tr>
</tbody>
</table>

| HP 300 SERIES 405X | Mini | Date First Installed: 1981 | Number Installed to Date: 100 — | Maintenance: On-site | (See Vendor Profile Page V-11) |
| Word Length: 16-bit | Operating System: MPE | Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; SPL | Minimum Memory: 256K bytes | Maximum Memory: 2M bytes | Multiple Users:是 |
| Multiple On-Line Storage: 3.2G bytes | Communications Protocols: Asynchronous; Synchronous; Basic; Pascal | Distribution: End user | Vendor Sales Terms: Purchase; Lease | Maintenance: On-site | Date First Installed: 1981 |

**Communications Protocols:** Asynchronous; Synchronous; Basic; Pascal; RPG; SPL

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Lease

**Maintenance:** On-site

**Average Maintenance Fee:** $175

**Date First Installed:** 1980

| HP 3000 SERIES 40 | Mini | Date First Installed: February 1982 | Number Installed to Date: 100 — | Maintenance: On-site | (See Vendor Profile Page V-11) |
| Word Length: 16-bit | Operating System: MPE | Languages Supported: Cobol; Fortran; Basic | Minimum Memory: 1M bytes | Maximum Memory: 4M bytes | Multiple Users:是 |
| Maximum On-Line Storage: 6.4G bytes | Communications Protocols: Asynchronous; Synchronous; Basic; Pascal; RPG; SPL | Distribution: End user | Vendor Sales Terms: Purchase; Lease | Maintenance: On-site | Date First Installed: 1981 |

**Communications Protocols:** Asynchronous; Synchronous; Basic; Pascal; RPG; SPL

**Distribution:** End user

**Vendor Sales Terms:** Purchase; Lease

**Maintenance:** On-site

**Average Maintenance Fee:** $200

**Date First Installed:** 1981
## Minis/Small Business Computers

### HONEYWELL, INC.

**6/38**
- **Word Length:** 16-bit
- **Operating System:** GCOS
- **Languages Supported:** Cobol, Fortran, Basic
- **Minimum Memory:** 256k bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes; 24
- **Maximum On-Line Storage:** 1G bytes
- **Maximum I/O Ports:** 34
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase, Lease
- **Maintenance:** On-site
- **Average Maintenance Fee:** $130
- **Date First Installed:** 1981

**6/76**
- **Word Length:** 16-bit
- **Operating System:** GCOS
- **Languages Supported:** Cobol, Fortran, Basic
- **Minimum Memory:** 2512k bytes
- **Maximum Memory:** 2M bytes
- **Multiple Users:** Yes; 54
- **Maximum On-Line Storage:** 1G bytes
- **Maximum I/O Ports:** 82
- **Communications Protocols:** Asynchronous
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase, Lease
- **Maintenance:** On-site
- **Average Maintenance Fee:** $350
- **Date First Installed:** 1981

### HONEYWELL, INC.

**6/48**
- **Word Length:** 16-bit
- **Operating System:** GCOS
- **Languages Supported:** Cobol, Fortran, Basic
- **Minimum Memory:** 256k bytes
- **Multiple Users:** Yes; 16
- **Maximum On-Line Storage:** 1G bytes
- **Maximum I/O Ports:** 46
- **Communications Protocols:** Asynchronous
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase, Lease
- **Purchase Price:** $32,000
- **Average Maintenance Fee:** $150
- **Date First Installed:** 1981

### SYSTEM 25

- **Vendor Sales Terms:** Purchase
- **Distribution:** End user
- **Minimum Memory:** 256K bytes
- **Multiple Users:** Yes; 20
- **Communications Protocols:** SDLC/SNA
- **Number Installed to Date:** 500
- **Average Maintenance Fee:** $60
- **Date First Installed:** November 1978

### IBM

**8130**
- **Word Length:** 16-bit
- **Operating System:** DPCX
- **Languages Supported:** Cobol, Fortran, Basic
- **Minimum Memory:** 256K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes; 16
- **Maximum On-Line Storage:** 26M bytes
- **Maximum I/O Ports:** 18
- **Communications Protocols:** Asynchronous
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase, Lease
- **Purchase Price:** $20,000 to $30,000
- **Maintenance:** On-site
- **Average Maintenance Fee:** $175
- **Date First Installed:** March 1982

**8150**
- **Word Length:** 16-bit
- **Operating System:** DPCX
- **Languages Supported:** Cobol, Fortran, Basic
- **Minimum Memory:** 256K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 639M bytes
- **Communications Protocols:** SDLC, SNA
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $30,000
- **Maintenance:** On-site
- **Date First Installed:** August 1979
- **Average Maintenance Fee:** $200
- **Date First Installed:** July 1983

### APOGEE II

- **Vendor Sales Terms:** End user
- **Communications Protocols:** Asynchronous, Synchronous, Biynchronous
- **SDLC, HDLC
- **Distribution:** End user
- **Multiple Users:** Yes; 20
- **Date First Installed:** December 1977
- **Number Installed to Date:** 50,000
- **Average Maintenance Fee:** $100
- **Date First Installed:** February 1982

### INDEP, INC.

**APOGEE III**
- **Vendor Sales Terms:** End user
- **Communications Protocols:** Asynchronous, Synchronous, Biynchronous
- **SDLC, HDLC
- **Distribution:** End user
- **Multiple Users:** Yes; 16
- **Date First Installed:** January 1981
- **Number Installed to Date:** 50
- **Average Maintenance Fee:** $1,000

### INDEPENDENT BUSINESS SYSTEMS, INC.

**BETA SYSTEM 2**
- **Small business
- **Word Length:** 8-bit
- **Operating System:** IBIS-PNET
- **Languages Supported:** Pascal
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 1.1G bytes
- **Maximum I/O Ports:** 18
- **Communications Protocols:** Asynchronous, Synchronous
- **Distribution:** End user
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $80,000
- **Maintenance:** On-site
- **Date First Installed:** January 1981
- **Number Installed to Date:** 10,000

### INDEP, INC.

**APOGEE IV**
- **Vendor Sales Terms:** End user
- **Communications Protocols:** Asynchronous, Synchronous, Biynchronous
- **SDLC, HDLC
- **Distribution:** End user
- **Multiple Users:** Yes; 10
- **Date First Installed:** February 1982
- **Number Installed to Date:** 20
- **Average Maintenance Fee:** $15
- **Date First Installed:** July 1983

**ICL, INC.

**SYSTEM 25**
- **Small business
- **Word Length:** 8-bit
- **Operating System:** DRX
- **Languages Supported:** Cobol, Basic, Pascal
- **Minimum Memory:** 16K bytes
- **Maximum Memory:** 7M bytes
- **Multiple Users:** Yes; 16
- **Maximum On-Line Storage:** 81M bytes
- **Maximum I/O Ports:** 64
- **Communications Protocols:** Asynchronous, Synchronous, Biynchronous
- **SDLC, HDLC
- **Distribution:** End user
- **Multiple Users:** Yes; 32
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
- **Date First Installed:** February 1982
- **Number Installed to Date:** 10
- **Average Maintenance Fee:** $86
Minis/Small Business Computers

Word Length: 8-bit
Operating System: CP/M, MP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, C, PL/M
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Maximum On-Line Storage: 320M bytes
Maximum I/O Ports: 35
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $12,495 to $23,960
Average Maintenance Fee: $100
Date First Installed: February 1982
Number Installed to Date: 10 — 50

INFOREX, INC.
INFOREX 1300
Mini
Specific Application: Data Entry
Operating System: NATIVE
Languages Supported: Infodel, BASIC
Maximum Memory: 128K bytes
Maximum On-Line Storage: 2K bytes
Maximum I/O Ports: 3
Communications Protocols: Bisynchronous, Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $10,900 to $42,100
Average Maintenance Fee: $500
Date First Installed: March 1982
Number Installed to Date: 50 — 1,000

INFOREX, INC.
INFOREX 3150
Mini
Specific Application: Data Entry
Operating System: NATIVE
Languages Supported: Infodel, BASIC
Maximum Memory: 128K bytes
Maximum On-Line Storage: 128M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous, Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $75,000 to $250,000
Average Maintenance Fee: $1,200
Date First Installed: 1974
Number Installed to Date: 100 — 500

INFOREX, INC.
INFOREX 3200
Mini
Specific Application: Data Entry
Operating System: NATIVE
Languages Supported: Infodel, BASIC
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Maximum On-Line Storage: 128M bytes
Maximum I/O Ports: 3
Communications Protocols: Bisynchronous, Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $18,900 to $44,000
Average Maintenance Fee: $760
Date First Installed: January 1980
Number Installed to Date: 500

INFOREX, INC.
INFOREX 3300
Mini
Specific Application: Data Entry
Operating System: NATIVE
Languages Supported: Infodel, BASIC
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Maximum On-Line Storage: 128M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous, Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $42,000 to $70,000
Average Maintenance Fee: $1,000
Date First Installed: 1975
Number Installed to Date: 100 — 500

INFOREX, INC.
INFOREX 5000
Mini
Specific Application: Data Entry
Operating System: NATIVE
Languages Supported: Infodel, BASIC
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Maximum On-Line Storage: 128M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous, Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $17,500 to $70,000
Average Maintenance Fee: $500
Date First Installed: 1982
Number Installed to Date: 100

INTEGRATED DIGITAL PRODUCTS
MINI MATE
Mini
Word Length: 16-bit
Operating System: BITS, IRIS
Languages Supported: Cobol, Fortran, Basic, Pascal, C, PL/M
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 128M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous, Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $5,000 to $8,000
Average Maintenance Fee: $200
Date First Installed: July 1982
Number Installed to Date: 100

INTEL CORP.
IDIS 66-145
Small business
Word Length: 16-bit
Operating System: RMX86
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/M
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 1M bytes
Maximum I/O Ports: 6
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,750 to $4,200
Average Maintenance Fee: $200
Date First Installed: October 1982
Number Installed to Date: 100 — 500

LOGICAL BUSINESS MACHINES
TINA
Small business
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: English
Minimum Memory: 128K bytes
Multiple Users: No

TO COMPUTER SYSTEMS
C-13
"If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon."
Computers aren't just an industry, they're a revolution in the way mankind operates. And no one covers this revolution better than we do!

We are CW Communications/Inc. and despite our youth (only 15 years) we're the world's largest publisher of newspapers and magazines for computer people all over the world.

Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.

But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. In the next two years alone, the installed power of general purpose computer systems will grow almost as much as it did in the previous 16 years. And the supercomputers of the '80s will transfer data at a rate several hundred times faster than today's speedy computer! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought.

Worldwide expenditures are currently at $40 Billion, and growing by 20% a year. A constant flow of new products; rapid changes in technology; more and more new applications; and large and growing expenditures. It's an industry with a strong need for current, complete and accurate information. Which is where we come in.

Our oldest publication is COMPUTERWORLD, a weekly newspaper with a growing all-paid circulation in excess of 120,000 (quite an increase from our modest 7,500 in 1967). COMPUTERWORLD serves America's computer users with the consumer-oriented, objective information they need. And it has become America's top business/professional publication, measured by advertising revenue.

ISO WORLD is our semi-monthly publication for retailers, dealers, distributors and other independent sales organizations (ISOs) in the resellers marketplace. This is a relatively new marketplace which has grown up around the minicomputer and microcomputer, and which shows every sign of very rapid growth for at least the next decade.

The latest phenomenon of the computer industry is personal and desk-top computers and we're covering it with our newest publication, INFOWORLD and PC WORLD. INFOWORLD is a weekly newspaper for all micro users and it features complete software and hardware reviews, while PC WORLD is a monthly magazine devoted to users of the IBM PC and compatibles.

The United States alone accounts for nearly half of the worldwide computer market, but billions of dollars are spent by foreign computer people for American-made computers and computer products. And our publications penetrate those marketplaces, too.

And we provide U.S. advertising representation and editorial services to publications in the following countries: Italy, Greece, The Netherlands, Sweden, Argentina, Chile, Southeast Asia and Kuwait.

Our International Marketing Services Department can give you one-stop advertising service for any or all of these publications — including translation and production services. We'll even bill you in U.S. dollars, so it's easy as advertising in U.S. publications.

Computing is an exciting industry, with a unique need for information. And the publications we produce provide that information to nearly two million computer-involved people around the world. They are excellent vehicles for reaching these people with your advertising message, and we'd be happy to give you more information on any of them. Just call or write, Don Fagan, Vice President, Sales.

CW COMMUNICATIONS/INC.
375 Cochituate Road, Box 880
Framingham, MA 01701 (617) 879-0700
**Minis/Small Business Computers**

- **MICRODATA CORP.**
  - **MC500 SERIES**
  - **MASSCOMP**
  - **MICROCOMP**
  - **MICROMATION, INC.**
  - **MICROS 100**
  - **MICROS 200**
  - **MICROS 250**
  - **MICROS 300**
  - **MICROS 350**
  - **MINI-COMPUTER SYSTEMS. INC.**
  - **INSTRUMENTS, INC.**
  - **MIDWEST SCIENTIFIC**
  - **CLASSIC 11/45**
  - **CLASSIC II/25**

**Micronet Software**

- **Multiple Users:** Yes; 48
- **Distribution:** Third-party
- **Date First Installed:** September 1979
- **Number Installed to Date:** 500 — 1,000

(See Vendor Profile Page V-13)

**MASSCOMP**

- **MC500 SERIES**
- **Specific Application:** CAF, Graphics
- **Word Length:** 32-bit
- **Operating System:** UNIX
- **Languages Supported:** Fortran, Pascal
- **Minimum Memory:** 512K bytes
- **Maximum Memory:** 512K bytes
- **Multiple Users:** Yes; 16
- **Maximum On-Line Storage:** 6G bytes

- **MICROMATION, INC.**
  - **MARNER**
  - **New small business
  - **Word Length:** 8-bit
  - **Languages Supported:** Basic
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 128K bytes
  - **Multiple Users:** Yes; 4
  - **Maximum On-Line Storage:** 10M bytes

- **MICROMATION, INC.**
  - **MI SYSTEM**
  - **New small business
  - **Word Length:** 8-bit
  - **Languages Supported:** Basic
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 512K bytes
  - **Multiple Users:** Yes; 8
  - **Maximum On-Line Storage:** 10M bytes

- **MICROMATION, INC.**
  - **MOS SYSTEM**
  - **New small business
  - **Word Length:** 8-bit
  - **Operating System:** CP/M; MINET; MIMT
  - **Languages Supported:** Basic
  - **Minimum Memory:** 512K bytes
  - **Maximum Memory:** 1M bytes
  - **Multiple Users:** Yes; 128
  - **Maximum On-Line Storage:** 8G bytes

**MICRONET SOFTWARE**

- **Multiple Users:** Yes; 8
- **Distribution:** End user

(See Vendor Profile Page V-13)

**MICROS 100**

- **MICROS 200**
- **MICROS 250**
- **MICROS 300**
- **MICROS 350**

**MINI-COMPUTER SYSTEMS. INC.**

- **MICROS 100**
- **MICROS 200**
- **MICROS 250**
- **MICROS 300**
- **MICROS 350**

(See Vendor Profile Page V-13)

**INSTRUMENTS, INC.**

- **MICROS 100**
- **MICROS 200**
- **MICROS 250**
- **MICROS 300**

**MIDWEST SCIENTIFIC**

- **MICROS 100**
- **MICROS 200**
- **MICROS 250**
- **MICROS 300**

(See Vendor Profile Page V-13)

**CLASSIC 11/45**

- **CLASSIC II/25**

(See Vendor Profile Page V-13)

**CLASSIC II/25**

- **New small business
  - **Word Length:** 32-bit
  - **Languages Supported:** Basic
  - **Minimum Memory:** 1M bytes
  - **Maximum Memory:** 1M bytes
  - **Multiple Users:** Yes; 8
  - **Maximum On-Line Storage:** 8G bytes

**MODULAR COMPUTER SYSTEMS, INC.**

- **CLASSIC II/25**
- **New small business
  - **Word Length:** 32-bit
  - **Languages Supported:** Basic
  - **Minimum Memory:** 1M bytes
  - **Maximum Memory:** 1M bytes
  - **Multiple Users:** Yes; 8
  - **Maximum On-Line Storage:** 8G bytes

(See Vendor Profile Page V-13)

**MODULAR COMPUTER SYSTEMS, INC.**

- **CLASSIC II/25**
- **New small business
  - **Word Length:** 32-bit
  - **Languages Supported:** Basic
  - **Minimum Memory:** 1M bytes
  - **Maximum Memory:** 1M bytes
  - **Multiple Users:** Yes; 8
  - **Maximum On-Line Storage:** 8G bytes

(See Vendor Profile Page V-13)
Minis/Small Business Computers

Word Length: 16-bit
Operating System: DPEX
Languages Supported: Editor
Minimum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 66M bytes
Distribution: End user
Vendor Sales Terms: Purchase

NIXDORF COMPUTER CORP.
800-45 Mini
Word Length: 16-bit
Operating System: DPEX
Languages Supported: Editor
Minimum Memory: 48K bytes
Multiple Users: Yes
Maximum On-Line Storage: 132M bytes
Distribution: End user
Vendor Sales Terms: Purchase

NIXDORF COMPUTER CORP.
800-85 Mini
Word Length: 16-bit
Operating System: DPEX
Languages Supported: Editor
Minimum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 66M bytes
Distribution: End user
Vendor Sales Terms: Purchase

NIXDORF COMPUTER CORP.
8845
Small business
Word Length: 16-bit
Operating System: NOS
Languages Supported: Editor
Minimum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 60M bytes
Communications Protocols: Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Average Maintenance Fee: $1,000
Date First Installed: 1981

NIXDORF COMPUTER CORP.
8870 MODEL 1
Mini
Word Length: 16-bit
Operating System: IRDS
Languages Supported: Cobol
Minimum Memory: 96K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum On-Line Storage: 66M bytes
Communications Protocols: Asynchronous; Synchronous; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Average Maintenance Fee: $21,000
Date First Installed: 1981

NIXDORF COMPUTER CORP.
8870 MODEL 3
Mini
Word Length: 16-bit
Operating System: NORS
Languages Supported: Cobol; Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 256M bytes
Communications Protocols: Asynchronous; Synchronous; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Average Maintenance Fee: $71,000
Date First Installed: 1981

NIXDORF COMPUTER CORP.
8870 MODEL 5
Mini
Word Length: 16-bit
Operating System: NORS
Languages Supported: Cobol; Basic
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Maximum On-Line Storage: 660M bytes
Communications Protocols: Asynchronous; Synchronous; X.25
Vendor Sales Terms: Purchase
Average Maintenance Fee: $166,400
Date First Installed: 1981

NORDEN SYSTEMS
11/34M Mini
Word Length: 16-bit
Operating System: DEC
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; C
Minimum Memory: 1K bytes
Maximum Memory: 128K bytes
Maximum I/O Ports: 11
Distribution: End user
Vendor Sales Terms: Purchase
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORDEN SYSTEMS
11/44M Mini
Word Length: 16-bit
Operating System: RT-11; RSX-11M; -; RSX-11M; IAS
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; C
Minimum Memory: 8K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum I/O Ports: 20
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORDEN SYSTEMS
11/70M Mini
Word Length: 16-bit
Operating System: RSX-11M; RSTEE; RST; RSX-11S
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; C
Minimum Memory: 8K bytes
Maximum Memory: 32M bytes
Maximum I/O Ports: 19
Communications Protocols: DNA; DCCP
Distribution: End user
Vendor Sales Terms: Purchase
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORDEN SYSTEMS
ND-Net
ND-100
Mini
Word Length: 16-bit
Operating System: SINTRAN
Languages Supported: Fortran; Basic; Pascal; RPG; Simula; Planc
Minimum Memory: 128K bytes
Maximum Memory: 32M bytes
Multiple Users: Yes
Maximum I/O Ports: 20
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORSK DATA NORTH AMERICAN, INC.
ND-100-CE Mini
Word Length: 16-bit
Operating System: SINTRAN VI/SE
Languages Supported: Cobol; Fortran; Basic; Pascal; RPG; Simula; Planc
Minimum Memory: 128K bytes
Maximum Memory: 32M bytes
Multiple Users: Yes
Maximum I/O Ports: 20
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORSK DATA NORTH AMERICAN, INC.
ND-200 Mini
Word Length: 16-bit
Operating System: NORS
Languages Supported: Cobol; Fortran; Basic; Pascal; APL; PL/1; Coral; C
Minimum Memory: 32K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes
Maximum I/O Ports: 19
Communications Protocols: DNA; DCCP
Distribution: End user
Vendor Sales Terms: Purchase
Average Maintenance Fee: $1,000
Date First Installed: 1978

NORSK DATA NORTH AMERICAN, INC.
ND SATELLITE 5 Mini
Operating System: SINTRAN III/VS
Languages Supported: Fortran; Basic; Pascal; PE; NOS-WP
Minimum Memory: 256K bytes
Maximum Memory: 11.2M bytes
Multiple Users: Yes
Maximum I/O Ports: 5
Communications Protocols: HDLC; ND-NET
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Average Maintenance Fee: $1,000
Date First Installed: 1982

COMPUTERWORLD BUYER'S GUIDE
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCTAGON 3000</td>
<td></td>
<td>Small business</td>
</tr>
<tr>
<td>Word Length: 8-bit</td>
<td>Operating System: CP/M</td>
<td>Minimum Memory: 64K bytes</td>
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<tr>
<td></td>
<td></td>
<td>Maximum On-Line Storage: 160M bytes</td>
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<tr>
<td></td>
<td>Publish Price: $200,000</td>
<td>Multiple I/O Ports: 3</td>
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<tr>
<td></td>
<td>Maintenance: On-site</td>
<td>Communications Protocols: Asynchronous</td>
</tr>
<tr>
<td></td>
<td>Date First Installed: November 1982</td>
<td>Purchase Price: $990 to $1,500</td>
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<tr>
<td></td>
<td></td>
<td>Maintenance: Return to manufacturing facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Date First Installed: June 1982</td>
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<tr>
<td></td>
<td></td>
<td>Number Installed to Date: 100</td>
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<tr>
<td></td>
<td></td>
<td>Date First Installed: May 1982</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance: Third-party</td>
</tr>
<tr>
<td>PERTEC 3000</td>
<td></td>
<td>Small business</td>
</tr>
<tr>
<td>Word Length: 8-bit</td>
<td>Operating System: CP/M</td>
<td>Minimum Memory: 512K bytes</td>
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<tr>
<td></td>
<td></td>
<td>Maximum On-Line Storage: 140M bytes</td>
</tr>
<tr>
<td></td>
<td>Publish Price: $15,000</td>
<td>Multiple I/O Ports: 16</td>
</tr>
<tr>
<td></td>
<td>Maintenance: On-site</td>
<td>Communications Protocols: Asynchronous</td>
</tr>
<tr>
<td></td>
<td>Date First Installed: June 1982</td>
<td>Purchase Price: $7,500 to $15,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance: Return to manufacturing facility</td>
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<tr>
<td></td>
<td></td>
<td>Date First Installed: January 1982</td>
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<td></td>
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<td>Number Installed to Date: 100</td>
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Minis/Small Business Computers

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Model</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>OCTAGON SYSTEMS</td>
<td>OCTAGON 8/16</td>
<td>Small business</td>
</tr>
<tr>
<td>Word Length: 8/16-bit</td>
<td>Operating System: CP/M</td>
<td>Minimum Memory: 1K bytes</td>
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<tr>
<td></td>
<td></td>
<td>Maximum On-Line Storage: 105M bytes</td>
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<tr>
<td></td>
<td>Publish Price: $1,100 to $1,600</td>
<td>Multiple I/O Ports: 16</td>
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<td></td>
<td>Maintenance: On-site</td>
<td>Communications Protocols: Asynchronous</td>
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<tr>
<td></td>
<td>Date First Installed: June 1982</td>
<td>Purchase Price: $7,500 to $15,000</td>
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TO COMPUTER SYSTEMS

C-19
<table>
<thead>
<tr>
<th>Minis/Small Business Computers</th>
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<tbody>
<tr>
<td><strong>PERTEC COMPUTER CORP.</strong></td>
</tr>
<tr>
<td>XL 40</td>
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<tr>
<td><strong>Languages Supported:</strong></td>
</tr>
<tr>
<td>Cobol, Basic, Basic plus, APL</td>
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<tr>
<td><strong>Minimum Memory:</strong></td>
</tr>
<tr>
<td>128K bytes</td>
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<tr>
<td><strong>Maximum Memory:</strong></td>
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<tr>
<td>256K bytes</td>
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<tr>
<td><strong>Multiple Users:</strong></td>
</tr>
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<td>Yes</td>
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<tr>
<td><strong>Maximum On-Line Storage:</strong></td>
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<tr>
<td>320M bytes</td>
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<tr>
<td><strong>Communications Protocols:</strong></td>
</tr>
<tr>
<td>Asynchronous, Synchronous</td>
</tr>
<tr>
<td><strong>Distribution:</strong></td>
</tr>
<tr>
<td>End user</td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong></td>
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<tr>
<td>Purchase</td>
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<tr>
<td><strong>Date First Installed:</strong></td>
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<tr>
<td>1969</td>
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<td><strong>PERTEC COMPUTER CORP.</strong></td>
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<td>XL 50</td>
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<td><strong>Languages Supported:</strong></td>
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<td>Cobol, Basic plus, APL</td>
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<td><strong>Minimum Memory:</strong></td>
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<td>128K bytes</td>
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<tr>
<td><strong>Maximum Memory:</strong></td>
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<td>256K bytes</td>
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<td><strong>Multiple Users:</strong></td>
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<td><strong>Distribution:</strong></td>
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<td>End user</td>
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<td><strong>Vendor Sales Terms:</strong></td>
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<td><strong>Date First Installed:</strong></td>
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<td>1969</td>
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<td><strong>PLESSEY PERIPHERAL SYSTEMS</strong></td>
</tr>
<tr>
<td><strong>SYSTEM 4 SERIES</strong></td>
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<td><strong>Languages Supported:</strong></td>
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<tr>
<td>Cobol, Basic, Basic plus, APL</td>
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<td><strong>Minimum Memory:</strong></td>
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<tr>
<td>64K bytes</td>
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<td><strong>Maximum Memory:</strong></td>
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<td><strong>Multiple Users:</strong></td>
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<td><strong>Maximum On-Line Storage:</strong></td>
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<td><strong>Distribution:</strong></td>
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<td><strong>Vendor Sales Terms:</strong></td>
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<td><strong>SYSTEM 24 SERIES</strong></td>
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<td><strong>Minimum Memory:</strong></td>
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<td><strong>Maximum On-Line Storage:</strong></td>
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<td><strong>Communications Protocols:</strong></td>
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<td><strong>Distribution:</strong></td>
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<td><strong>Vendor Sales Terms:</strong></td>
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<td><strong>PLESSEY PERIPHERAL SYSTEMS</strong></td>
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<td><strong>SYSTEM 11 SERIES</strong></td>
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<td><strong>Languages Supported:</strong></td>
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<tr>
<td><strong>Minimum Memory:</strong></td>
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<tr>
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<tr>
<td><strong>Maximum Memory:</strong></td>
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<tr>
<td>2M bytes</td>
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<td><strong>Multiple Users:</strong></td>
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<tr>
<td><strong>Maximum On-Line Storage:</strong></td>
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<td><strong>Distribution:</strong></td>
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<td><strong>Vendor Sales Terms:</strong></td>
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<td><strong>Date First Installed:</strong></td>
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<td><strong>SYSTEM 14 SERIES</strong></td>
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<td><strong>Minimum Memory:</strong></td>
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<tr>
<td><strong>Communications Protocols:</strong></td>
</tr>
<tr>
<td>Asynchronous, Synchronous</td>
</tr>
<tr>
<td><strong>Distribution:</strong></td>
</tr>
<tr>
<td>End user</td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong></td>
</tr>
<tr>
<td>Purchase</td>
</tr>
<tr>
<td><strong>Date First Installed:</strong></td>
</tr>
<tr>
<td>1983</td>
</tr>
</tbody>
</table>

**Product Specifications**

- **Word Length:** 16-bit
- **Operating System:** UNIX
- **Languages Supported:** Cobol, Basic, Basic plus, APL
- **Minimum Memory:** 32K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 640M bytes
- **Communications Protocols:** Asynchronous, Synchronous
- **Distribution:** Third-party
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $37,950
- **Date First Installed:** September 1981

**Point Four Data Corp., Mark 8**

- **Word Length:** 16-bit
- **Operating System:** UNIX
- **Languages Supported:** Cobol, Basic, Pascal, C
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 1G bytes
- **Communications Protocols:** Asynchronous, Synchronous
- **Distribution:** OEM
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $42,950
- **Date First Installed:** March 1983

**Point Four Data Corp., Mark 9**

- **Word Length:** 16-bit
- **Operating System:** UNIX
- **Languages Supported:** Cobol, Basic, Pascal, C
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 1M bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 1G bytes
- **Communications Protocols:** Asynchronous, Synchronous
- **Distribution:** OEM
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $42,950
- **Date First Installed:** November 1981

**Prodigy Systems, Inc., Prodigy 1**

- **Word Length:** 8-bit
- **Operating System:** CP/M, PRODIGE
- **Languages Supported:** Prodigy, Basic, Pascal
- **Minimum Memory:** 4K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 1G bytes
- **Communications Protocols:** Asynchronous, Synchronous
- **Distribution:** Third-party
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $10,000 to $12,000
- **Date First Installed:** May 1979

**Prodigy Systems, Inc., Prodigy 2**

- **Word Length:** 8-bit
- **Operating System:** CP/M, PRODIGE
- **Languages Supported:** Prodigy, Basic, Pascal
- **Minimum Memory:** 4K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 20.5M bytes
- **Communications Protocols:** None
- **Distribution:** Third-party
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $10,000 to $12,000
- **Date First Installed:** May 1979
- **Average Maintenance Fee:** $100
- **Date First Installed:** May 1979

**Prodigy Systems, Inc., Prodigy 3**

- **Word Length:** 8-bit
- **Operating System:** CP/M, PRODIGE
- **Languages Supported:** Prodigy, Basic, Pascal
- **Minimum Memory:** 4K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 20.5M bytes
- **Communications Protocols:** None
- **Distribution:** Third-party
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $10,000 to $12,000
- **Date First Installed:** May 1979

**Prodigy Systems, Inc., Prodigy 4**

- **Word Length:** 8-bit
- **Operating System:** CP/M, PRODIGE
- **Languages Supported:** Prodigy, Basic, Pascal
- **Minimum Memory:** 4K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** Yes
- **Maximum On-Line Storage:** 20.5M bytes
- **Communications Protocols:** None
- **Distribution:** Third-party
- **Vendor Sales Terms:** Purchase
- **Purchase Price:** $10,000 to $12,000
- **Date First Installed:** May 1979
Minis/Small Business Computers

Average Maintenance Fee: $100
Date First Installed: June 1980

GANTEL CORP., SYSTEM 16
Mini
Word Length: 16-bit
Operating System: BEST
Languages Supported: Cobol, Basic
Minimum Memory: 96K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes, 4
Maximum On-Line Storage: 384 bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $18,000
Vendor Sales Terms: Purchase
Distribution: Third-party
Maintenance: On-site
Average Maintenance Fee: $150
(See Vendor Profile Page V-17)

QANTEL CORP., SYSTEM 20
Small business
Word Length: 16-bit
Operating System: BEST
Languages Supported: Cobol, Basic
Minimum Memory: 96K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 75M bytes
Maximum I/O Ports: 12
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase, Lease
Purchase Price: $30,000
Maintenance: On-site
Average Maintenance Fee: $200
Date First Installed: November 1981
Number Installed to Date: 100 — 500

QANTEL CORP., SYSTEM 40
Small business
Word Length: 16-bit
Operating System: BEST
Languages Supported: Cobol, Basic
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes, 32
Maximum On-Line Storage: 150M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Purchase Price: $75,000
Maintenance: On-site
Date First Installed: August 1982
Number Installed to Date: 160

QANTEL CORP., SYSTEM 64
Small business
Word Length: 16-bit
Operating System: BEST
Languages Supported: Cobol, Basic
Minimum Memory: 512K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes, 100
Maximum On-Line Storage: 400M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $250,000
Maintenance: On-site
Q1 CORP.
Word Length: 8-bit
Operating System: CP/M
Languages Supported: PL/1
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 208M bytes
Maintenance: End user
Vendor Sales Terms: Purchase
Purchase Price: $13,000 to $200,000
Maintenance: On-site, Return to manufacturing facility
Average Maintenance Fee: $300
Date First Installed: May 1982
Number Installed to Date: Less than 10
(See Vendor Profile Page V-17)

Q1 CORP., Q1/LITE
Small business
Word Length: 8-bit
Operating System: Q1; CP/M
Languages Supported: PL/1
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 208M bytes
Maximum I/O Ports: 2
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $15,000 to $250,000
Maintenance: On-site, Return to manufacturing facility
Average Maintenance Fee: $250
Date First Installed: February 1977
Number Installed to Date: 1,000 — 5,000

Q1 CORP., Q1/LMC
Mini
Word Length: 8-bit
Operating System: Q1
Languages Supported: PL/1
Minimum Memory: 16K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 300M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $75,000 to $500,000
Maintenance: On-site, Return to manufacturing facility
Average Maintenance Fee: $150
Date First Installed: February 1974

Q1 CORP., Q1/MICROLITE
Small business
Word Length: 8-bit
Operating System: Q1; CP/M
Languages Supported: PL/1
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes, 16
Maximum On-Line Storage: 208M bytes
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $75,000 to $250,000
Maintenance: On-site, Return to manufacturing facility
Average Maintenance Fee: $250
Date First Installed: January 1977
Number Installed to Date: 1,000 — 5,000

QANTEL CORP., SYSTEM 400
Mini
Word Length: 16-bit
Operating System: Q1, COS
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 256M bytes
Maximum I/O Ports: 126
Communications Protocols: Bisynchronous, PARS/SLC
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $80,000 to $600,000
Maintenance: On-site
Average Maintenance Fee: $2,400
Date First Installed: 1979
Number Installed to Date: 50 — 100

QANTHEON CO., RDS 5000 RAYNET II
Mini
Word Length: 16-bit
Operating System: PCOS
Languages Supported: Cobol, Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 256M bytes
Maximum I/O Ports: 126
Communications Protocols: Bisynchronous, PARS/SLC
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $80,000 to $500,000
Maintenance: On-site
Average Maintenance Fee: $2,400
Date First Installed: 1979
Number Installed to Date: 50 — 100

QANTHEON CO., RDS 7500 RAYNET III
Mini
Word Length: 16-bit
Operating System: PCOS
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 256M bytes
Maximum I/O Ports: 126
Communications Protocols: Bisynchronous, PARS/SLC
Distribution: End user
Vendor Sales Terms: Purchase, Lease
Purchase Price: $80,000 to $500,000
Maintenance: On-site
Average Maintenance Fee: $2,400
Date First Installed: 1979
Number Installed to Date: 50 — 100
Minis/Small Business Computers

REXON BUSINESS MACHINES CORP.

RX30

Mini

Word Length: 16-bit
Operating System: RECAP, MP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I, C
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 20M bytes
Maximum I/O Ports: 9
Communications Protocols: Asynchronous, Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $80,000 to $100,000
Date First Installed: April 1980

REXON BUSINESS MACHINES CORP.

RX100

Mini

Word Length: 16-bit
Operating System: RECAP, MP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I, C
Minimum Memory: 128K bytes
Maximum Memory: 2048K bytes
Multiple Users: Yes
Maximum On-Line Storage: 300M bytes
Maximum I/O Ports: 9
Communications Protocols: Asynchronous, Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $13,000
Maintenance: TRW, Inc.
Date First Installed: August 1982

REXON BUSINESS MACHINES CORP.

RX4000

Mini

Word Length: 16-bit
Operating System: RECAP, MP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I, C
Minimum Memory: 128K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Maximum On-Line Storage: 280M bytes
Maximum I/O Ports: 17
Communications Protocols: Asynchronous, Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $19,000
Maintenance: TRW, Inc.
Date First Installed: 1982

REYNOLDS & REYNOLDS CO.

EXPANSION 6000

Small business

Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I, C
Minimum Memory: 16K bytes
Maximum Memory: 1M bytes
Maximum Users: Yes
Maximum On-Line Storage: 60M bytes
Maximum I/O Ports: 16
Communications Protocols:

ASYNCHRONOUS: Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $42,000
Maintenance: On-site
Average Maintenance Fee: $420
Date First Installed: May 1981
Number Installed to Date: 100 — 500

(See Vendor Profile Page V-18)

SCENIC COMPUTER SYSTEM CORP.

SCENIC MODEL ONE

Mini

Word Length: 32-bit
Operating System: UCSE
Languages Supported: Fortran, Basic, Pascal, assembler
Minimum Memory: 129K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Maximum On-Line Storage: 100M bytes
Maximum I/O Ports: 20
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $25,000
Date First Installed: January 1983
Number Installed to Date: 60
(See Vendor Profile Page V-18)

SCI SYSTEMS, INC.

MERCURY 2

Mini

Word Length: 16-bit
Operating System: VOS
Languages Supported: Cobol, Fortran, Basic, Pascal, Micro-Basic
Minimum Memory: 64K bytes
Maximum Memory: 384K bytes
Multiple Users: Yes
Maximum On-Line Storage: 300M bytes
Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SLC, HDLC
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $25,000
Maintenance: On-site
(See Vendor Profile Page V-18)

SCI SYSTEMS, INC.

MERCURY 3

Mini

Word Length: 16-bit
Operating System: VOS
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 192K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Communications Protocols: Asynchronous, Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase, Rental
Purchase Price: $25,000 to $50,000
Maintenance: On-site, Third-party
Average Maintenance Fee: $270
Date First Installed: July 1979
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-19)

SENTINEL COMPUTER CORP.

SENTINEL-40

Mini

Word Length: 16-bit
Operating System: DBOS
Languages Supported: Cobol, Basic, DBL
Minimum Memory: 96K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Communications Protocols: Asynchronous, Bisynchronous
Distribution: End user, Third-party
Vendor Sales Terms: Purchase, Rental
Purchase Price: $25,000 to $50,000
Maintenance: On-site, Third-party
Average Maintenance Fee: $270
Date First Installed: July 1979
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-19)

SENTINEL COMPUTER CORP.

SENTINEL-40

Mini

Word Length: 16-bit
Operating System: DBOS
Languages Supported: Cobol, Basic, DBL
Minimum Memory: 96K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Communications Protocols: Asynchronous, Bisynchronous

Minis/Small Business Computers

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Vendor Sales Terms</th>
<th>Purchase Price</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Maximum On-Line Storage</th>
<th>Multiplier Memory</th>
<th>Languages Supported</th>
<th>Communications Protocols</th>
<th>Lease</th>
<th>Maintenance</th>
<th>Date First Installed</th>
<th>Average Maintenance Fee</th>
<th>Number Installed to Date</th>
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<tr>
<td>End user</td>
<td>Purchase Distribution: End user</td>
<td>$33,000 to $70,000</td>
<td>96K bytes</td>
<td>1M bytes</td>
<td>1.2G bytes</td>
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<td>On-site; Third-party</td>
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<td>1.2G bytes</td>
<td>Yes; 17</td>
<td>Cobol; Basic; Assembler</td>
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<td>$120</td>
<td>$1,000 to $50,000</td>
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<td>1.2G bytes</td>
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<td>Cobol; Basic; Assembler</td>
<td>Asynchronous; Synchronous</td>
<td>On-site; Third-party</td>
<td>July 1979</td>
<td>100 — 500</td>
<td>$500</td>
<td>$31,404 to $100,000</td>
</tr>
</tbody>
</table>

Buyer's Guide:

Get your own.
Subscribe to Computerworld.
Return the business reply envelope at the end of the guide.
**SPERRY CORP.**

**SYSTEM 80 MODELS 3 & 5**

Small business

Operating System: OS/3

Languages Supported: Cobol, Fortran, Basic, RPG, Assembly, Escort

Minimum Memory: 256K bytes

Maximum Memory: 1M bytes

Multiple Users: Yes

Maximum On-Line Storage: 18.2M bytes

Communications Protocols: Asynchronous, Synchronous

Distribution: End user

Maintenance: On-site

Purchase Price: $200,000

Number Installed to Date: 300

Date First Installed: 1979

Vendor Sales Terms: Purchase

**TELEGENIX, INC.**

**BS SYSTEM 300**

Small business

Operating System: DOS

Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1, C

Minimum Memory: 128K bytes

Maximum Memory: 512K bytes

Multiple Users: Yes

Maximum On-Line Storage: 172M bytes

Languages Supported: Cobol, Fortran, Basic, Pascal, C

Minimum Memory: 512K bytes

Maximum Memory: 20K bytes

Multiple Users: Yes

Maximum On-Line Storage: 11B bytes

Communications Protocols: Asynchronous

Distribution: OEM

Vendor Sales Terms: Purchase, Rental, Lease

Purchase Price: $7,000 to $25,000

Maintenance: On-site

Average Maintenance Fee: $100

Date First Installed: September 1980

Number Installed to Date: 100 — 500

(See Vendor Profile Page V-20)

TELEGENIX, INC.

**SOS-V31**

Small business

Word Length: 16-bit

Operating System: CP/M

Languages Supported: Cobol, Fortran, Basic, Pascal

Minimum Memory: 128K bytes

Maximum Memory: 256K bytes

Multiple Users: No

Maximum On-Line Storage: 50 bytes

Date First Installed: 1976

Vendor Sales Terms: Purchase

Rental: Lease

Purchase Price: $11,000 to $30,000

Maintenance: On-site

Date First Installed: 1981

(See Vendor Profile Page V-21)

TELEVIDEO SYSTEMS, INC.

**TS16/40**

Small business

Word Length: 8-bit

Operating System: CP/M 2.2

Languages Supported: Cobol, Fortran, Basic plus, Pascal, PL/J, C

Minimum Memory: 128K bytes

Maximum Memory: 256K bytes

Multiple Users: Yes

Maximum On-Line Storage: 50M bytes

Date First Installed: 1981

Vendor Sales Terms: Purchase

Rental: Lease

Maintenance: On-site

Date First Installed: 1981

(See Vendor Profile Page V-21)

TELEVIDEO SYSTEMS, INC.

**TS1603**

Small business

Word Length: 16-bit

Operating System: CP/M 86

Languages Supported: Cobol, Fortran, Basic, Pascal, PL/J, C, Algol, Fortran

Minimum Memory: 128K bytes

Maximum Memory: 256K bytes

Multiple Users: Yes

Maximum On-Line Storage: 2M bytes

Languages Supported: Cobol, Fortran, Basic, Pascal, C

Minimum Memory: 64K bytes

Maximum Memory: 128K bytes

Multiple Users: Yes

Maximum On-Line Storage: 9.60 bytes

Communications Protocols: Asynchronous, Synchronous, Bifronchyn, SDLC

Distribution: End user

Vendor Sales Terms: Purchase, Rental, Lease

Purchase Price: $65,000

Maintenance: On-site

Date First Installed: January 1976

Number Installed to Date: 40

(See Vendor Profile Page V-20)

TELEGEMIX, INC.

**MTDS**

Small business

Word Length: 16-bit

Operating System: MVS, S1P

Languages Supported: Cobol, Fortran, Basic, Pascal, PL/J, C

Minimum Memory: 16K bytes

Maximum Memory: 64K bytes

Multiple Users: Yes

Maximum On-Line Storage: 172M bytes

Date First Installed: 1974

Vendor Sales Terms: Purchase

Maintenance: On-site

Third-party

Date First Installed: 1974

(See Vendor Profile Page V-20)
## Minis/Small Business Computers

**Vendor Sales Terms:** Purchase. Lease

<table>
<thead>
<tr>
<th>Model</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Word Length</th>
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<th>Languages Supported</th>
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</thead>
<tbody>
<tr>
<td>DS990/5</td>
<td>16-bit</td>
<td>DX10, DNOS</td>
<td>Cobol, Basic, Pascal, RPG</td>
<td>16-bit</td>
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<td>DS990/7</td>
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<td>DX10, DNOS</td>
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<tr>
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<td>DX10, DNOS</td>
<td>Cobol, Basic, Pascal, RPG</td>
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<td>Cobol, Basic, Pascal, RPG</td>
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</tbody>
</table>

**Minimum Memory:** 64K bytes

**Maximum Memory:** 2M bytes

**Maximum On-Line Storage:**
- 96M bytes (DS990/5, DS990/7, DS990/9)
- 192M bytes (DS990/11)

**Communications Protocols:**
- Asynchronous, Sync, X.25, HDLC, X.25, HDLC
- Bidirectional, SDLC/SNA, X.25, HDLC

**Vendor Sales Terms:** Purchase, Lease

**Date First Installed:**
- 1982 (DS990/5, DS990/7)
- 1983 (DS990/9)
- 1982 (DS990/11)

**Maintenance Fee:**
- $350 (DS990/9)
- $500 (DS990/5)
- $350 (DS990/7)

**Remember to mention the Computerworld Buyer’s Guide when contacting vendors.**
Minis/Small Business Computers

**TEXAS INSTRUMENTS, INC.**

- **Average Maintenance Fee:** $400
- **Purchase Price:** $39,000 to $42,000
- **Maintenance:** On-site
- **Operating System:** DX10; DNOS
- **Word Length:** 16-bit
- **Communications Protocols:** Bisynchronous; SDLC; DDLC
- **Maximum On-Line Storage:** 965M bytes
- **Maximum I/O Ports:** 46
- **Number installed to Date:** 100

**TORCH COMPUTERS LTD.**

- **Average Maintenance Fee:** $200
- **Purchase Price:** $25,000 to $28,000
- **Maintenance:** On-site; Remote
- **Operating System:** CP/M
- **Word Length:** Dual 8-bit
- **Communications Protocols:** Asynchronous
- **Maximum On-Line Storage:** 965M bytes
- **Multiple Users:** No

**VICTOR TECHNOLOGIES, INC.**

- **Average Maintenance Fee:** $50
- **Purchase Price:** $5,995
- **Minimum Memory:** 96K bytes
- **Maximum Memory:** 896K bytes
- **Maximum On-Line Storage:** 720M bytes
- **Maximum I/O Ports:** 18

**VICOM SYSTEMS, INC.**

- **Average Maintenance Fee:** $200
- **Purchase Price:** $5,995
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 64K bytes
- **Maximum On-Line Storage:** 5M bytes
- **Maximum I/O Ports:** 3

**VICTOR TECHNOLOGIES, INC.**

- **Average Maintenance Fee:** $50
- **Purchase Price:** $19,900
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 64K bytes
- **Maximum On-Line Storage:** 5M bytes
- **Maximum I/O Ports:** 3

---

**PIXEL 80G**

- **Specific Application:** CAD/CAM
- **Maximum On-Line Storage:** 600M bytes
- **Multiple Users:** Yes; 20
- **Maximum Memory:** 6M bytes
- **Communications Protocols:** Asynchronous, DMA

**UNICOMP CORP.**

- **Specific Application:** Data Entry, POS polling
- **Maximum On-Line Storage:** 11.6M bytes
- **Multiple Users:** Yes; 4
- **Maximum Memory:** 1M bytes

**COMPUTERWORLD BUYER'S GUIDE**
### Minis/Small Business Computers

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Operating System</th>
<th>Word Length</th>
<th>Languages Supported</th>
<th>Maximum Memory</th>
<th>Minimum Memory</th>
<th>Multiple Users</th>
<th>Maximum On-Line Storage</th>
<th>Communications Protocols</th>
<th>Distribution</th>
<th>Average Maintenance Fee</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
<th>Purchase Price</th>
<th>Maintenance</th>
<th>Vendor Sales Terms</th>
<th>Leases</th>
</tr>
</thead>
<tbody>
<tr>
<td>WANG LABORATORIES, INC.</td>
<td>CP/M 86; MS-DOS</td>
<td>8-bit</td>
<td>Cobol, Basic, Pascal; C</td>
<td>512K bytes</td>
<td>64K bytes</td>
<td>Yes; 13</td>
<td>2.4M bytes</td>
<td>Asynchronous, Synchronous</td>
<td>Third-party</td>
<td>$300 to $1200</td>
<td>May 1982</td>
<td>10,000</td>
<td>5000</td>
<td>On-site</td>
<td>Refresh</td>
<td></td>
</tr>
</tbody>
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<tr>
<td>WANG LABORATORIES, INC.</td>
<td>BASIC 2</td>
<td>8-bit</td>
<td>Cobol, Basic, PL/I, RPG</td>
<td>256K bytes</td>
<td>64K bytes</td>
<td>Yes; 4</td>
<td>483M bytes</td>
<td>Asynchronous, Synchronous</td>
<td>End user</td>
<td>$500 to $1300</td>
<td>1979</td>
<td>10,000</td>
<td>50,000</td>
<td>On-site</td>
<td>Purchase</td>
<td></td>
</tr>
</tbody>
</table>

### Need Vendor or Contact Information?

**See Our Vendor Listings, Page V-1**
### Minis/Small Business Computers

**Distribution:** End user  
**Vendor Sales Terms:** Purchase; Lease  
**Purchase Price:** $73,000  
**Maintenance:** On-site

<table>
<thead>
<tr>
<th>SYSTEM 160</th>
<th>WICAT SYSTEMS, INC.</th>
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<tbody>
<tr>
<td><strong>Word Length:</strong> 16/32-bit</td>
<td></td>
</tr>
<tr>
<td><strong>Operating System:</strong> UNIX; MCS; CP/M</td>
<td></td>
</tr>
<tr>
<td><strong>Languages Supported:</strong> Cobol; Fortran; Basic; Pascal; APL; C; Assembler</td>
<td></td>
</tr>
<tr>
<td><strong>Minimum Memory:</strong> 512K bytes</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Memory:</strong> 4.5M bytes</td>
<td></td>
</tr>
<tr>
<td><strong>Multiple Users:</strong> Yes; 12</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum On-Line Storage:</strong> 474M bytes</td>
<td></td>
</tr>
<tr>
<td><strong>Communications Protocols:</strong> Asynchronous; Synchronous; Bisynchronous; X.25, HDLC</td>
<td></td>
</tr>
<tr>
<td><strong>Distribution:</strong> OEM</td>
<td></td>
</tr>
<tr>
<td><strong>Vendor Sales Terms:</strong> Purchase</td>
<td></td>
</tr>
<tr>
<td><strong>Purchase Price:</strong> $15,000 to $40,000</td>
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<tr>
<td><strong>Number Installed to Date:</strong> 10 — 50</td>
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### ZILOG, INC.  
#### 8000  
**Small business**  
**Word Length:** 16-bit  
**Operating System:** ZEPUS; UNIX | ZSUS-P  
**Languages Supported:** Cobol; Fortran; Basic; Pascal; C; Assembler |  |
| **Minimum Memory:** 56K bytes |  |
| **Maximum Memory:** 56K bytes |  |
| **Multiple Users:** No |  |
| **Maximum On-Line Storage:** 56K bytes |  |
| **Communications Protocols:** Asynchronous |  |
| **Distribution:** OEM |  |
| **Vendor Sales Terms:** Purchase |  |
| **Purchase Price:** $3,649 to $4,149 |  |
| **Number Installed to Date:** 100 |  |
| **Date First Installed:** 1982 |  |

### ZOBEX  
#### S-11  
**Small business**  
**Word Length:** 8-bit  
**Operating System:** CP/M |  
**Languages Supported:** Basic; Pascal |  |
| **Minimum Memory:** 64K bytes |  |
| **Maximum Memory:** 64K bytes |  |
| **Multiple Users:** Yes |  |
| **Maximum On-Line Storage:** 20M bytes |  |
| **Communications Protocols:** Asynchronous |  |
| **Distribution:** End user |  |
| **Vendor Sales Terms:** Purchase; Lease |  |
| **Purchase Price:** $4,000 to $12,000 |  |
| **Maintenance:** Return to manufacturing facility |  |
| **Date First Installed:** October 1980 |  |
| **Number Installed to Date:** 100 — 500 |  |

### ZONIC CORP.  
#### ZONIC 6085  
**Mini**  
**Specific Application:** Digitizing  
**Operating System:** RSX-11 |  
**Languages Supported:** Cobol; Fortran; Basic; Pascal; APL; PL/I; C |  |
| **Minimum Memory:** 256K bytes |  |
| **Maximum Memory:** 8M bytes |  |
| **Multiple Users:** Yes |  |
| **Maximum On-Line Storage:** 80M bytes |  |
| **Communications Protocols:** Asynchronous |  |
| **Distribution:** Third-party |  |
| **Vendor Sales Terms:** Purchase |  |
| **Purchase Price:** $4,000 to $12,000 |  |
| **Maintenance:** Return to manufacturing facility |  |
| **Date First Installed:** 1982 |  |

### ZONIC CORP.  
#### ZONIC 6085  
**Mini**  
**Specific Application:** Digitizing  
**Operating System:** RSX-11 |  
**Languages Supported:** Cobol; Fortran; Basic; Pascal; APL; PL/I; C |  |
| **Minimum Memory:** 256K bytes |  |
| **Maximum Memory:** 8M bytes |  |
| **Multiple Users:** Yes |  |
| **Maximum On-Line Storage:** 80M bytes |  |
| **Communications Protocols:** Asynchronous |  |
| **Distribution:** Third-party |  |
| **Vendor Sales Terms:** Purchase |  |
| **Purchase Price:** $4,000 to $12,000 |  |
| **Maintenance:** Return to manufacturing facility |  |
| **Date First Installed:** 1982 |  |
Discover the personal business computer with a ❤️
The NCR DECISION MATE V.

A PC you’ll love to work with.

The personal computer you select for your business should help you do more faster. And just as important it should remember that it works for you and not vice versa. That’s why we built the personal/business computer with a heart: the NCR DECISION MATE V.

Here’s why it makes your increase in productivity even more enjoyable.

It’s friendly: The NCR DECISION MATE V is small, has a convenient detachable keyboard, and 20 effort-saving function keys.

It’s expandable: Here’s the personal computer that will grow with you. Add printers, plotters, additional memory by merely plugging in modules.

It’s versatile: Use the NCR DECISION MATE V as a stand-alone PC, an online terminal, or in a network of personal computers.

It’s flexible: Choose from a whole library of programs under CP/M or MS-DOS.

For the details on the personal/business computer that has your best interests at heart, call your NCR representative.
ACCESS MATRIX CORP.,
ACCESS COMPUTER
Portable
Word Length: 8-bit
Operating System: CP/M
Languages Supported: M-Basic, C-
Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Maximum On-Line Storage: 370K bytes
Number Installed to Date: 5
Communications Protocols:
Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,495
Maintenance: Return to manufacturing facility; Third-party
(See Vendor Profile Page V-1)

ACCESS COMPUTER
Word Length: 8-bit
Operating System: CP/M
Languages Supported: M-Basic, C-
Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 370K bytes
Number Installed to Date: 5
Communications Protocols:
Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,495
Maintenance: Return to manufacturing facility; Third-party
(See Vendor Profile Page V-1)

ACTION COMPUTER
ENTERPRISE
DISCOVERY 500
Micro
Word Length: 8/16-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic plus Basic plus 2, Pascal, RPG, APL, PL/I, Blits, Coral
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 120M bytes
Number Installed to Date: 18
Communications Protocols:
Asynchronous, Synchronous, SDLC
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $6,590 to $9,295
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $100
Date First Installed: January 1983
Number Installed to Date: 250
(See Vendor Profile Page V-1)

ACTION COMPUTER
ENTERPRISE
DISCOVERY 1600
Micro
Word Length: 8/16-bit
Operating System: CP/M
Languages Supported: Cobol, RPG, Fortran, Basic plus Basic plus 2, Pascal, PL/I, Blits, Coral
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 120M bytes
Number Installed to Date: 25
Communications Protocols:
Asynchronous, Synchronous, SDLC
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $17,000
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $100
Date First Installed: April 1975
Number Installed to Date: 2,000

ACTION INSTRUMENTS CO., INC.
BC 2
Micro
Specific Application: Industrial Control
Word Length: 8-bit
Operating System: ZIBL
Languages Supported: Basic
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Communications Protocols:
Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,000
Maintenance: On-site
Date First Installed: 1978
Number Installed to Date: 500 —
1,000
(See Vendor Profile Page V-1)

AUCT SYSTEMS
CPU 3000
Micro
Word Length: 8/16-bit
Operating System: CP/M
Languages Supported: Basic
Minimum Memory: 256K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 500K bytes
Number Installed to Date: 4
Communications Protocols:
Asynchronous
Distribution: End user; Third-party
Vendor Sales Terms: Purchase; Lease
Purchase Price: $7,875
Average Maintenance Fee: $58
Date First Installed: January 1983
Number Installed to Date: 76
(See Vendor Profile Page V-1)

AUCT SYSTEMS
POS 15
Micro
Word Length: 8/16-bit
Operating System: OS-9
Languages Supported: Basic
Minimum Memory: 256K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Number Installed to Date: 16
Communications Protocols:
Asynchronous, Synchronous, SDLC
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $35,000 to $90,000
Average Maintenance Fee: $350
Date First Installed: June 1981
Number Installed to Date: 310

ACUREX CORP.
AUTO DATA TA-TD 30
Micro
Specific Application: Data Acquisition
Word Length: Dual 8-bit
Languages Supported: Basic
Minimum Memory: 10K bytes
Maximum Memory: 184K bytes
Multiple Users: No
Maximum I/O Ports: 5
Communications Protocols:
Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $18,000 to $50,000
Maintenance: Remote diagnostics;
Return to manufacturing facility
Date First Installed: 1981
Number Installed to Date: 100 —
500
(See Vendor Profile Page V-1)

ADAC CORP.
BIGSYS
Micro
Word Length: 16-bit
Operating System: RSX-11M
Languages Supported: Fortran, Basic
Minimum Memory: 64K bytes
Multiple Users: Yes
Maximum I/O Ports: 8
Distribution: End user
Purchase Price: $10,000 to $50,000
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $200
Date First Installed: 1982
Number Installed to Date: Less than 10
(See Vendor Profile Page V-1)

ADAC CORP.
PROSYS I
Micro
Word Length: 16-bit
Operating System: RSX-11M
Languages Supported: Fortran, Basic, Prosys
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum I/O Ports: 8
Distribution: End user
Purchase Price: $10,000 to $50,000
Average Maintenance Fee: $200
Date First Installed: 1982
Number Installed to Date: 10 — 50

ADVANCED DIGITAL
PRODUCTS, INC.
PDQ-3
Micro
Word Length: 16-bit
Operating System: UCSD-P
Languages Supported: Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 304M bytes
Maximum I/O Ports: 2
Communications Protocols:
Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $2,500 to $3,500
Maintenance: On-site
Date First Installed: July 1978
Number Installed to Date: 175

ADVANCED MICRO DEVICES
AMS 29/10A
Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Assembly
Minimum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 960M bytes
Maximum I/O Ports: 5
Communications Protocols:
Asynchronous, Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $30,000
Maintenance: Remote diagnostics;
Return to manufacturing facility;
Third-party
Average Maintenance Fee: $300
Date First Installed: August 1982
Number Installed to Date: 750
(See Vendor Profile Page V-1)

ADVANCED MICRO DEVICES
PS-1000
Micro
Word Length: 16-bit
Operating System: HEMENWAY
Languages Supported: Fort
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Multiple On-Line Storage: 10M bytes
Maximum I/O Ports: 3

Micros

Communications Protocols:
Asynchronous
Vendor Sales Terms: Purchase
Purchase Price: $8,000
Return to manufacturing facility; Maintenance: Remote diagnostics

ADVANCED MICRO DEVICES
RITE 16 REAL-TIME EMULATOR

Word Length: 8-bit
Operating System: CP/M, TURBO
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 32K bytes
Multiple Users: Yes
Maximum On-Line Storage: 256M bytes
Average Maintenance Fee: $125
Date First Installed: February 1980
Number Installed to Date: 700

ADVANCED MICRO DIGITAL CORP.
SUPERGUARD

Word Length: 8-bit
Operating System: CP/M, MP/M
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 600M bytes
Average Maintenance Fee: $45
Date First Installed: January 1982

ADVANCED MICRO DIGITAL CORP.
SUPERSYSTEM

Word Length: 8-bit
Operating System: CP/M, TURBO
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 600M bytes
Average Maintenance Fee: $45
Date First Installed: February 1980
Number Installed to Date: 7,000

ALBERT COMPUTER, INC.
ALBERT

Word Length: 8-bit
Operating System: DOS 3.3, CP/M
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 192K bytes
Multiple Users: Yes
Maximum On-Line Storage: 512K bytes
Average Maintenance Fee: $45
Date First Installed: November 1981
Number Installed to Date: 570

ALTOS COMPUTER SYSTEMS, INC.
ALTOS 580 SERIES

Word Length: 16-bit
Operating System: XENIX/UNIX
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Date First Installed: May 1983
Number Installed to Date: 5,000

ALTOS COMPUTER SYSTEMS, INC.
ALTOS SERIES 5

Word Length: 16-bit
Operating System: CP/M; OASIS
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 192K bytes
Maximum Memory: 724K bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Date First Installed: January 1983
Number Installed to Date: 10,000

ALPHA MICRO SYSTEMS, INC.
AM-1902

Word Length: 16-bit
Operating System: AMOSL, CP/M
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 128K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes
Maximum On-Line Storage: 3.2G bytes
Date First Installed: April 1983

ALSLA COMPUTER, INC.
AG-1

Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 22M bytes
Date First Installed: October 1982
Number Installed to Date: 10 — 50

ALTOS COMPUTER SYSTEMS, INC.
ACS 8500 SERIES

Word Length: 32-bit
Operating System: UNIX
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 50M bytes
Communications Protocols: Asynchronous
Distribution: OEM
Purchase Price: $14,500 to $16,500
Maintenance: TRW, Inc.
Number Installed to Date: 10,000
— 50,000

ALTOS COMPUTER SYSTEMS, INC.
ACS 86000 Micro

Word Length: 32-bit
Operating System: UNIX
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 50M bytes
Communications Protocols: Asynchronous
Distribution: OEM
Purchase Price: $14,500 to $16,500
Maintenance: TRW, Inc.
Date First Installed: 1982

ALTOS COMPUTER SYSTEMS, INC.
ACI-1

Word Length: 8-bit
Operating System: CP/M, TURBO
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 600M bytes
Average Maintenance Fee: $45
Date First Installed: October 1982
Number Installed to Date: 10 — 50

AMF LOGIC SCIENCES, INC.
HSR 11-B

Word Length: 16-bit
Specific Application: CAD/CAM Graphics
Minimum Memory: 512K bytes
Multiple Users: No
Maximum On-Line Storage: 8M bytes
Distribution: End user
Vendor Sales Terms: Purchase; Rental, Lease
Purchase Price: $14,500
Maintenance: On-site; Remote diagnostics; Return to manufacturing facility
Date First Installed: 1978
Number Installed to Date: 500 — 1,000

(See Vendor Profile Page V-1)

D-2

When we set out to build the new TeleVideo Personal Computer, we decided to do it better than anyone else. It wasn’t easy. All we had to do was design a special casing that keeps heat away from sensitive electronics, with no fan for no noise and greater reliability, put in a big, clear 14" screen that tilts for your comfort, include a detachable keyboard so advanced it eliminates typing fatigue, throw in extra storage (for an unformatted total of 1 MB), and put it all in a very smooth and easy-to-use integrated package. We call it the TS 803.

We also made it CP/M compatible, so you can choose from the largest selection of applications software in the world. And we made it possible to link up to sixteen TS 803s in one system, so more people can work smarter together. Then we did one final thing. We included a powerful graphics package and priced the TS 803 at $2,495. That’s about $1,000 less than a comparably equipped Apple. So try our TS 803. Improving on something that’s very good isn’t easy, but we’re sure you’ll be happy with the results.

For more information, write TeleVideo Systems, Inc., 1170 Morse Ave., Sunnyvale, CA 94086, call toll-free 800-838-1780, call one of our authorized distributors or dealers, or contact one of our international sales offices, listed below.

European Sales (Holland): (31-075 38 2861)
UK/Continent Sales: (44) 0508 668 738

TeleVideo Systems are fully supplied by systems for TVP manufacturing.

*TeleVideo is a registered trademark of Digital Research, Inc. Apple is a registered trademark of Apple Computer Inc. Prices are subject to change without notice.
AM INTERNATIONAL, INC.
COMP EDIT 5310
Micro
Specific Application: Electronic Typesetting
Word Length: 8-bit
Operating System: CPM
Minimum Memory: 512K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $17,995
Maintenance: On-site
Date First Installed: 1977
(See Vendor Profile Page V-1)

AM INTERNATIONAL, INC.
COMP/EDIT 5410
Micro
Specific Application: Electronic Typesetting
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 128K bytes
Maximum Memory: 704K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 15M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $28,000 to $45,000
Maintenance: On-site
Date First Installed: 1982

AM INTERNATIONAL, INC.
EPICS
Micro
Specific Application: Electronic Typesetting
Word Length: 8-bit
Operating System: Proprietary
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $22,995
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-2)

AM INTERNATIONAL, INC.
COMP/EDIT 5900
Micro
Specific Application: Electronic Typesetting
Word Length: 8-bit
Operating System: Proprietary
Minimum Memory: 512K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $24,990
Maintenance: On-site
Date First Installed: 1977

AM INTERNATIONAL, INC.
COMP/EDIT 6400
Micro
Specific Application: Electronic Typesetting
Word Length: 8-bit
Operating System: Proprietary
Minimum Memory: 512K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $30,000
Maintenance: Third-party
Average Maintenance Fee: $70
Date First Installed: October 1981
Number Installed to Date: 25

ANDROMEDA SYSTEMS, INC.
11/B
Micro
Word Length: 16-bit
Operating System: UNIX; RT11; RSX-11M
Languages Supported: Fortran; Basic; Basic plus 2; Pascal
Minimum Memory: 32K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 160M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $7,500 to $24,000
Maintenance: Return to manufacturing facility; Third-party
Number Installed to Date: 100 — 500

ANDROMEDA SYSTEMS, INC.
11/H
Micro
Word Length: 16-bit
Operating System: UNIX; S: RXS-11M
Languages Supported: Fortran; Basic; Basic plus 2; Pascal
Minimum Memory: 32K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 10
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 24
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $19,000
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: 1978
Number Installed to Date: 10 — 50

ANDROMEDA SYSTEMS, INC.
11/M
Micro
Word Length: 16-bit
Operating System: SM: TSX +; RSX-11M
Languages Supported: Fortran; Basic; Basic plus 2; Pascal
Minimum Memory: 32K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 10
Maximum On-Line Storage: 160M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $5,000 to $14,000
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: 1979
Number Installed to Date: 50 — 100

AMTEL SYSTEMS CORP.
D-4
ANDROTEK/DMI
Rigel II
Micro
Specific Application: Motor Testing
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran, Basic
Minimum Memory: 48K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 1.2M bytes
Maximum I/O Ports: 9
Communications Protocols: Asynchronous; RS-232
Distribution: End user
Vendor Sales Terms: Purchase
Vendor Sales Prices: Purchase Price: $20,000 to $50,000
Date First Installed: 1980
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-2)

APPLE COMPUTER, INC.
APPLE III
Desktop
Word Length: 8-bit
Operating System: DOS 3.3
Languages Supported: Fortran; Basic; Pascal; CP/M; Lisp
Minimum Memory: 48K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,395
Number Installed to Date: 10,000
Date First Installed: December 1980
Maintenance: Return to manufacturing facility; Third-party
(See Vendor Profile Page V-2)

APPLE COMPUTER, INC.
APPLE II
Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Basic; Pascal; Assembly
Minimum Memory: 128K bytes
Multiple Users: Yes
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,995 to $3,495
Number Installed to Date: 500
Date First Installed: 1977
Maintenance: Return to manufacturing facility; RCA
Date First Installed: November 1980
Number Installed to Date: 10,000 — 50,000

APPLE COMPUTER, INC.
APPLE II
Personal
Word Length: 8-bit
Operating System: DOS
Languages Supported: Fortran; Basic; Pascal; Assembly; Applesoft
Minimum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 560K bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,995 to $4,495
Maintenance: On-site
Average Maintenance Fee: $2,300
Date First Installed: 1977
Number Installed to Date: 100
(See Vendor Profile Page V-2)

APPLE COMPUTER, INC.
APPLE II
Micro
Specific Application: Modeling/Simulation
Word Length: 8-bit
Languages Supported: MPS 10
Minimum Memory: 384K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes
Maximum I/O Ports: 256
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $200,000 to $250,000
Number Installed to Date: 100 — 500
Date First Installed: December 1981
Maintenance: On-site
Average Maintenance Fee: $2,300
Date First Installed: 1977
Number Installed to Date: 100
(See Vendor Profile Page V-2)

APPLE COMPUTER, INC.
APPLE II
Micro
Specific Application: Graphics
Word Length: 8-bit
Languages Supported: Cobol; Fortran; Basic; Pascal; C; Assembly
Minimum Memory: 196 bytes
Maximum Memory: 50K bytes
Multiple Users: Yes
Maximum On-Line Storage: 100M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,500 to $18,000
Average Maintenance Fee: $120
Date First Installed: December 1982
Number Installed to Date: 10 — 50

APPLE TECHNOLOGY VENTURES, INC.
ASC 86
Micro
Operating System: JACQUARD
Languages Supported: Basic, Assembly
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 48M bytes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $12,000 to $75,000
Maintenance: On-site
Date First Installed: June 1975
Number Installed to Date: 2,300
Date First Installed: June 1975
Number Installed to Date: 2,300

ARC AUTOMATION SERVICE, INC.
ARC MICRO PAC IF SINGLE
Micro
Word Length: Tri 8-bit
Operating System: CP/M 2.2
Languages Supported: 64K bytes
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum On-Line Storage: 5.8M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Maintenance: Return to manufacturing facility
Date First Installed: January 1982

Micros
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| **Communications Protocols:** | Multiple Users: Yes  
Minimum Memory: 64K bytes  
Maximum On-Line Storage: 21.6M bytes  
Maximum I/O Ports: 4  
Communications Protocols: Asynchronous; Synchronous |
| **Distribution:** | Third-party  
Vendor Sales Terms: Purchase  
Maintenance: Return to manufacturing facility  
Date First Installed: January 1982  
Number Installed to Date: 100 — 500 |
| **ARC AUTOMATION SERVICE, INC.** |  |
| **ARC MICRO/PAC I MULTl Micro** |  |
| **Word Length:** | Tri 8-bit  
**Operating System:** | MP/M II  
**Minimum Memory:** | 64K bytes  
**Maximum Memory:** | 256K bytes  
**Multiple Users:** | Yes  
**Maximum On-Line Storage:** | 21.6M bytes  
**Maximum I/O Ports:** | 4  
**Communications Protocols:** | Asynchronous; Synchronous |
| **Operating System:** | CP/M 2.2  
**Minimum Memory:** | 64K bytes  
**Maximum Memory:** | 256K bytes  
**Multiple Users:** | Yes  
**Maximum On-Line Storage:** | 10.8M bytes  
**Maximum I/O Ports:** | 4  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | Third-party  
**Vendor Sales Terms:** | Purchase  
**Maintenance:** | Return to manufacturing facility  
**Date First Installed:** | January 1982  
**Number Installed to Date:** | 100 — 500 |
| **ARC AUTOMATION SERVICE, INC.** |  |
| **ARC MICRO/PAC III SINGLE Micro** |  |
| **Word Length:** | Tri 8-bit  
**Operating System:** | MP/M II  
**Minimum Memory:** | 64K bytes  
**Maximum Memory:** | 256K bytes  
**Multiple Users:** | Yes  
**Maximum On-Line Storage:** | 21.6M bytes  
**Maximum I/O Ports:** | 4  
**Communications Protocols:** | Asynchronous; Synchronous |
| **Operating System:** | CP/M 1.2  
**Minimum Memory:** | 64K bytes  
**Maximum Memory:** | 256K bytes  
**Multiple Users:** | No  
**Maximum On-Line Storage:** | 10M bytes  
**Maximum I/O Ports:** | 3  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | Third-party  
**Vendor Sales Terms:** | Purchase  
**Maintenance:** | Return to manufacturing facility  
**Date First Installed:** | January 1982  
**Number Installed to Date:** | 100 — 500 |
| **ARCHIVES, INC.** |  |
| **ARCHIVE BUSINESS SYSTEM** |  
**Word Length:** | 8-bit  
**Operating System:** | CP/M  
**Languages Supported:** | Cobol; Fortran; Basic; Pascal; C  
**Minimum Memory:** | 64K bytes  
**Maximum Memory:** | 64K bytes  
**Multiple Users:** | No  
**Maximum On-Line Storage:** | 10M bytes  
**Maximum I/O Ports:** | 3  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | Third-party  
**Vendor Sales Terms:** | Purchase  
**Maintenance:** | Return to manufacturing facility  
**Date First Installed:** | January 1982  
**Number Installed to Date:** | 3,000  
(See Vendor Profile Page V-2) |
| **ARCHIVES, INC.** |  |
| **ARCHIVES IV** |  
**Word Length:** | 8-bit  
**Operating System:** | MP/M  
**Languages Supported:** | Basic  
**Minimum Memory:** | 256K bytes  
**Maximum Memory:** | 512K bytes  
**Multiple Users:** | Yes  
**Maximum On-Line Storage:** | 20M bytes  
**Maximum I/O Ports:** | 8  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | Third-party  
**Vendor Sales Terms:** | Purchase  
**Maintenance:** | Third-party  
(See Vendor Profile Page V-2) |
| **AUTHEC CORP.** |  |
| **DACMASTER 8000 Micro** |  
**Word Length:** | 16-bit  
**Operating System:** | AIDE  
**Languages Supported:** | Fortran; Basic; Pascal; PL/I; C  
**Minimum Memory:** | 128K bytes  
**Maximum Memory:** | 128K bytes  
**Multiple Users:** | No  
**Maximum I/O Ports:** | 2  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | End user  
**Vendor Sales Terms:** | Purchase  
**Maintenance:** | Return to manufacturing facility  
**Date First Installed:** | November 1981  
**Number Installed to Date:** | 9  
(See Vendor Profile Page V-3) |
| **AUTOMATIC CONTROL ELECTRONICS** |  |
| **80 EC-9 Desktop** |  
**Word Length:** | 8-bit  
**Languages Supported:** | Assembler  
**Minimum Memory:** | 128K bytes  
**Maximum Memory:** | 512K bytes  
**Multiple Users:** | No  
**Maximum I/O Ports:** | 2  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | End user  
**Vendor Sales Terms:** | Purchase  
**Purchase Price:** | $30,000 to $100,000  
**Maintenance:** | On-site; Return to manufacturing facility  
**Number Installed to Date:** | 50 — 100  
(See Vendor Profile Page V-3) |
| **AUTOMATIC CONTROL ELECTRONICS** |  |
| **80 EC PM-1 Desktop** |  
**Word Length:** | 8-bit  
**Languages Supported:** | Assembler  
**Minimum Memory:** | 128K bytes  
**Maximum Memory:** | 512K bytes  
**Multiple Users:** | No  
**Maximum I/O Ports:** | 2  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | End user  
**Vendor Sales Terms:** | Purchase  
**Purchase Price:** | $30,000 to $100,000  
**Maintenance:** | On-site; Return to manufacturing facility  
**Number Installed to Date:** | 50 — 100  
(See Vendor Profile Page V-3) |
| **AUTOMATIC CONTROL ELECTRONICS** |  |
| **80 EC PM-4 Desktop** |  
**Word Length:** | 8-bit  
**Languages Supported:** | Assembler  
**Minimum Memory:** | 128K bytes  
**Maximum Memory:** | 512K bytes  
**Multiple Users:** | No  
**Maximum I/O Ports:** | 2  
**Communications Protocols:** | Asynchronous; Synchronous  
**Distribution:** | End user  
**Vendor Sales Terms:** | Purchase  
**Purchase Price:** | $30,000 to $100,000  
**Maintenance:** | On-site; Return to manufacturing facility  
**Number Installed to Date:** | 50 — 100  
(See Vendor Profile Page V-3) |

**D-6**

**COMPUTERWORLD BUYER'S GUIDE**
| Company Name                              | Operating System | Word Length | Word Length of Operations | Word Length of Operating System | Operating System | Operating System | Languages Supported | Minimum Memory | Maximum Memory | Multiple Users | Maximum 1/O Ports | Vendor Sales Terms | Distribution | Purchase Price | Operating System | Maintenance | ON-Line Storage | Date First Installed | Number Installed to Date | Average Maintenance Fee |
|------------------------------------------|------------------|-------------|---------------------------|--------------------------------|------------------|------------------|--------------------|-----------------|----------------|--------------|-----------------|------------------|------------------------------|----------------|-----------------|-------------------|----------------|-----------------|--------------------------|--------------------------|--------------------------|
| Automation Control Electronics 80/90    | Micro            | 16-bit      | 16-bit                    | CAD                            | PDF              | PDF              | Cobol; Basic; Pascal; C | 64K bytes       | 128K bytes     | Yes; 28        | 28               | Purchase          | End user                 | $30,000 to $200,000 | On-site; Return to manufacturing facility | November Installed to Date: 1982 | Number Installed to Date: 7 |
| Automatic Terminal Information Systems, Inc. ATIS 4000 | Micro            | 8-bit       | 16-bit                    | Operating System: ATIS         | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $3,000 to $4,000     | On-site; Return to manufacturing facility | Date First Installed: December 1982 | Number Installed to Date: 14 |
| AUTOMATIC TERMINAL INFORMATION SYSTEMS, INC. ATIS 8000 | Micro            | 8-bit       | 16-bit                    | Operating System: ATIS         | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $1,800 to $3,300     | On-site; Return to manufacturing facility | Date First Installed: April 1982 | Number Installed to Date: 1,200 |
| AUTOMATIC TERMINAL INFORMATION SYSTEMS, INC. BC-500 | Micro            | 8-bit       | 16-bit                    | Operating System: BC-500       | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $85,000           | On-site; Return to manufacturing facility | Date First Installed: April 1981 | Number Installed to Date: 10 — 50 |
| AUTOMATIC TERMINAL INFORMATION SYSTEMS, INC. Micros | Micro            | 8-bit       | 16-bit                    | Operating System: Micros       | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $14,000           | On-site; Return to manufacturing facility | Date First Installed: April 1982 | Number Installed to Date: 10 — 50 |
| BUCK ENGINEERING, INC. AA 355            | Micro            | 8-bit       | 16-bit                    | Operating System: AA 355       | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $1,800 to $3,300     | On-site; Return to manufacturing facility | Date First Installed: April 1982 | Number Installed to Date: 10 — 50 |
| BUNKER RAMO INFORMATION SYSTEMS BII1220  | Micro            | 16-bit      | 16-bit                    | Operating System: BII1220     | Word Length: 16-bit | Operating System: CP/M | 64K bytes | 128K bytes | No            | 2               | Purchase          | End user                 | $185,000           | On-site; Return to manufacturing facility | Date First Installed: April 1981 | Number Installed to Date: 10 — 50 |
BURR BROWN RESEARCH CORP.
CS430
Vendor Sales Terms: Purchase
Maximum I/O Ports: 8
Maximum On-Line Storage: 96K bytes
Multiple Users: No
Minimum Memory: 64K bytes
Languages Supported: Basic
Multiple Users: Yes
Maximum Memory: 64K bytes
Memory Protocols: Asynchronous
Date First Installed: March 1981
Average Maintenance Fee: $100
Number Installed to Date: 50 — 100
CADO SYSTEMS CORP.
CAT 80
Vendor Sales Terms: Purchase
Multiple Users: Yes; 4
Minimum Memory: 128K bytes
Maximum Memory: 48K bytes
Operating System: Proprietary
Maximum 1/O Ports: 1
Maximum On-Line Storage: 154M bytes
Communications Protocols: Asynchronous
D-8
Word Length: 8-bit
Multiple Users: Yes; 8
Minimum Memory: 96K bytes
Maximum Memory: 256K bytes
Operating System: Proprietary
Communications Protocols: Asynchronous
Number Installed to Date: 10 — 50
CALLAN DATA SYSTEMS
UNISTAR 100
Vendor Sales Terms: Purchase
Multiple Users: Yes
Minimum Memory: 4K bytes
Maximum Memory: 4K bytes
Multiple Users: Yes
Maximum Memory: 2M bytes
Maximum 1/O Ports: 2
Communications Protocols: Asynchronous, Binary, X.25, Ethernet
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Date First Installed: August 1982
Number Installed to Date: 100 — 500
CARDKEY SYSTEMS
DB80
Micro
Vendor Sales Terms: Access Control
Word Length: 8-bit
Minimum Memory: 4K bytes
Maximum Memory: 4K bytes
Multiple Users: Yes
Maximum I/O Ports: 2
Communications Protocols: Proprietary
Distribution: Third-party
Vendor Sales Terms: Purchase
Date First Installed: October 1982
Number Installed to Date: 100 — 500
CARDKEY SYSTEMS
D1200
Micro
Vendor Sales Terms: Access Control
Word Length: 8-bit
Minimum Memory: 32K bytes
Maximum Memory: 32K bytes
Multiple Users: Yes
Maximum I/O Ports: 2
Communications Protocols: Proprietary
Distribution: End user: Third-party
Vendor Sales Terms: Purchase
Date First Installed: November 1982
Number Installed to Date: 100 — 500
CARDKEY SYSTEMS
D1250
Micro
Vendor Sales Terms: Access Control
Word Length: 8-bit
Minimum Memory: Proprietary
Maximum Memory: 48K bytes
Multiple Users: Yes
Maximum I/O Ports: 2
Communications Protocols: Proprietary
Distribution: End user: Third-party
Vendor Sales Terms: Access Control
Date First Installed: November 1982
Number Installed to Date: 100 — 500
Communications Protocols: Proprietary
Distribution: End user; OEM; Third-party

Operating System: CA-BASIC
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Proprietary

Operating System: Micro
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 1M bytes

Maximum I/O Ports: 2
Communications Protocols: Proprietary
Distribution: End user; OEM; Third-party
Vendor Sales Terms: Purchase, Lease
Purchase Price: $16,500
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $1,000

CASSIO, INC.
FX9000P
Personals
Word Length: 8-bit
Operating System: CA-BASIC
Languages Supported: Basic, Pascal, C
Minimum Memory: 32K bytes
Maximum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 320M bytes

Minimum Memory: 512K bytes
Multiple Users: Yes, 32
Maximum On-Line Storage: 320M bytes
Communications Protocols: X.25; Asynchronous; Synchronous
Dialup: End user; Third-party
Vendor Sales Terms: Purchase, Lease
Purchase Price: $16,000 to $20,000
Date First Installed: October 1979
Average Maintenance Fee: $350
(See Vendor Profile Page V-4)

CENTURION COMPUTER CORP.
CENTURION 6500
Micro
Word Length: 8-bit
Operating System: UNIX
Languages Supported: Basic, C
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes, 4
Maximum On-Line Storage: 576M bytes

Multiple Users: No
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous, Synchronous
Dialup: End user; OEM
Vendor Sales Terms: Purchase
Purchase Price: $12,000 to $20,000
Maintenance: On-site; Return to manufacturing facility

CHROMATICS, INC.
CSC 7900
Micro
Word Length: 16-bit
Operating System: IDRIS
Languages Supported: Fortran, Pascal
Minimum Memory: 128K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Maximum On-Line Storage: 8M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous
Dialup: End user; OEM
Vendor Sales Terms: Purchase, Lease
Purchase Price: $7,500
Date First Installed: December 1981
Average Maintenance Fee: $130
(Miscellaneous)

To COMPUTER SYSTEMS
Micros

CODEX CORP.
CODX-268/24
Desktop
Word Length: 8-bit
Operating System: ISOS
Languages Supported: Cobol; Basic
Minimum Memory: 128K bytes
Maximum Memory: 384K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 40M bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $8,000
Average Maintenance Fee: $50
Date First Installed: May 1982

COLUMBIA DATA PRODUCTS, INC.
564
Desktop
Word Length: 16-bit
Operating System: MS/DOS; CP/M; PC-DOS
Languages Supported: Cobol; Basic
Minimum Memory: 32K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 300M bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,000 to $25,000
Maintenance: On-site; Return to manufacturing facility
Date First Installed: December 1982

COMMODORE BUSINESS MACHINES, INC.
54
Desktop
Word Length: 8-bit
Operating System: CP/M 2.2
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Maximum Users: No
Maximum On-Line Storage: 2.4M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $4,495
Maintenance: On-site; Return to manufacturing facility
Date First Installed: February 1980
Number Installed to Date: 100 — 500

COLUMBIA DATA PRODUCTS, INC.
564
Desktop
Word Length: 16-bit
Operating System: MS/DOS; CP/M; BASIC
Languages Supported: Cobol; Basic
Minimum Memory: 32K bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 100K bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $4,249
Maintenance: On-site; Return to manufacturing facility
Date First Installed: December 1979
Number Installed to Date: 500 — 1,000

CODEX CORP.
CODX-268/21
Desktop
Word Length: 8-bit
Operating System: CP/M; TURBO
Languages Supported: Cobol; Basic
Minimum Memory: 128K bytes
Maximum Memory: 384K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 30M bytes
Communications Protocols: Asynchronous; 3270; SNA
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $6,995 to $10,000
Average Maintenance Fee: $100
Date First Installed: May 1983

COLUMBIA DATA PRODUCTS, INC.
F64
Desktop
Word Length: 8-bit
Operating System: MS/DOS; CP/M; PC-DOS
Languages Supported: Cobol; Basic
Minimum Memory: 64K bytes
Maximum Memory: 16M bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 104M bytes
Maximum I/O Ports: 10
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $4,600 to $22,000
Maintenance: On-site
Date First Installed: September 1979
Number Installed to Date: 500 — 2,000

COMARX CORP.
DIAGOR M-4
Micro
Word Length: 16-bit
Operating System: MS/DOS; CP/M 86; Concurrent CP/M
Languages Supported: Fortran; Basic; Pascal
Minimum Memory: 128K bytes
Maximum Memory: 16M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 300M bytes
Maximum I/O Ports: 64
Communications Protocols: Asynchronous
Distribution: End user; OEM
Vendor Sales Terms: Purchase
Purchase Price: $7,000 to $25,000
Maintenance: On-site/Return to manufacturing facility
Date First Installed: December 1982

COMMERCE BUSINESS MACHINES, INC.
54
Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 680K bytes
Maximum I/O Ports: 2
Communications Protocols: Asynchronous

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COMPUTERWORLD BUYER'S GUIDE
A new era dawns on the datascape™

Envision the datascape™ of the future:
- Networked PC's
- Database Hardware
- High Speed Winchester control

In one bold stroke, Cogent™ has solved the problem of simultaneous distributed data access in networked PC environments with the Database Machine™

As a Winchester Controller, the Database Machine™ is optimized for high speed, intelligent control and transparent access.

As a database co-processor, the Database Machine™ implements hardware versions of existing database software in high speed multi-user environments.

In a networked environment, the Database Machine™ manages multi-user access to the distributed database.

The Database Machine™
- IBM-PC® plug compatible
- 8 Mhz 80186 co-processor
- LSI Winchester controller
- Imbedded database silicon software
- 64 K high speed triple ported buffer
- 128 K multi-task RAM

IBM-PC is a registered trademark of IBM.
Micros

Distribution: Third-party
Purchase Price: $595
Maintenance: Return to manufacturing facility; TRW, Inc
Date First Installed: August 1982
(See Vendor Profile Page V-5)

COMMODORE BUSINESS MACHINES, INC.
EXECUTIVE 64
Portable
Word Length: 8-bit
Languages Supported: Cobol, Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 340K bytes
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Maintenance: Return to manufacturing facility; Third-party
Vendor Support: TRW, Inc

COMMODORE BUSINESS MACHINES, INC. PET 4032
Desktop
Word Length: 8-bit
Operating System: OS; DOS
Languages Supported: Basic
Minimum Memory: 32K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 7M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $995
Maintenance: Return to manufacturing facility; TRW, Inc
Date First Installed: 1981

COMMODORE BUSINESS MACHINES, INC. PET 4032
Desktop
Word Length: 8-bit
Operating System: OS; DOS
Languages Supported: Basic
Minimum Memory: 32K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 7M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $995
Maintenance: Return to manufacturing facility; TRW, Inc
Date First Installed: 1981

VENDORS BUSINESS MACHINES, INC. VIC 20
Desktop
Word Length: 8-bit
Operating System: DOS
Languages Supported: Basic
Minimum Memory: 16K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 7M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $995
Maintenance: Return to manufacturing facility; TRW, Inc
Date First Installed: 1981

COMPUTER BUSINESS MACHINES, INC.
Operating System: MS-DOS; CP/M; XENIX
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I, C
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes, 4
Maximum On-Line Storage: 32M bytes
Maximum I/O Ports: 60
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $23,500
Maintenance: On-site
Date First Installed: January 1979
Number Installed to Date: 1,000
(See Vendor Profile Page V-5)

COMPUCOMP SYSTEMS, INC.
Operating System: CP/M 86;
Languages Supported: Fortran, Basic, Assembler
Minimum Memory: 128K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 640K bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,995
Date First Installed: January 1983
(See Vendor Profile Page V-5)

COMPUCORP
600 SERIES
Desktop
Word Length: 8-bit
Operating System: ZEBRA
Languages Supported: Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 16M bytes
Maximum I/O Ports: 5
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,995 to $9,000
Maintenance: Third-party
Average Maintenance Fee: $100
Date First Installed: January 1981
Number Installed to Date: 100
(See Vendor Profile Page V-5)

COMPUCORP
700 SERIES
Desktop
Word Length: 8-bit
Operating System: ZEBRA
Languages Supported: Fortran, Basic, Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 40M bytes
Maximum I/O Ports: 5
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,995 to $9,000
Maintenance: Third-party
Average Maintenance Fee: $150
Date First Installed: July 1981

COMPUGRAPHIC CORP.
MCS
Micro
Specific Application: Typesetting
Word Length: 16-bit
Operating System: CP/M
Languages Supported: C-Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes, 8
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Rental: Lease
Purchase Price: $13,000 to $1,000,000
Maintenance: On-site
Date First Installed: June 1981
(See Vendor Profile Page V-5)

COMPUTOMORPH CORP.
172 SERIES INDEXERS
Micro
Word Length: 8-bit
Multiple Users: No
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $500
Maintenance: On-site
Date First Installed: January 1980
Number Installed to Date: 600
(See Vendor Profile Page V-5)

COMPUTOMORPH CORP.
1800 SERIES INDEXERS
Micro
Word Length: 16-bit
Minimum Memory: 16K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum I/O Ports: 30
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,095 to $1,450
Maintenance: On-site
Date First Installed: January 1981
Number Installed to Date: 700

COMPUTOMORPH CORP.
2100 SERIES INDEXERS
Micro
Word Length: 8-bit
Multiple Users: No
Maximum I/O Ports: 18
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $795 to $1,630
Maintenance: On-site
Date First Installed: September 1981
Number Installed to Date: 1,000

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COMPUTERWORLD BUYER’S GUIDE
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<tr>
<th>Company</th>
<th>Model</th>
<th>Type</th>
<th>Word Length</th>
<th>Word Length</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Languages Supported</th>
<th>Distribution</th>
<th>Purchase Price</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPURPRO CORP.</td>
<td>816/A</td>
<td>Desktop</td>
<td>8-bit</td>
<td>16-bit</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Cobol; PL/1</td>
<td>On-site</td>
<td>$5,495 to $8,995</td>
<td>Date First Installed: April 1982 (See Vendor Profile Page V-5)</td>
</tr>
<tr>
<td>COMPURPRO CORP.</td>
<td>816/B</td>
<td>Desktop</td>
<td>8-bit</td>
<td>16-bit</td>
<td>256K bytes</td>
<td>512K bytes</td>
<td>Cobol; PL/1</td>
<td>On-site</td>
<td>$9,665</td>
<td>Date First Installed: January 1983 (See Vendor Profile Page V-6)</td>
</tr>
<tr>
<td>COMPUTERS, INC.</td>
<td>TASK 1000</td>
<td>Micro</td>
<td>8-bit</td>
<td>16-bit</td>
<td>16K bytes</td>
<td>32K bytes</td>
<td>Cobol; PL/1</td>
<td>On-site</td>
<td>$4,000 to $6,000</td>
<td>Number installed to Date: 50 — 100 (See Vendor Profile Page V-5)</td>
</tr>
<tr>
<td>AWS TURBO</td>
<td>4106A</td>
<td>Micro</td>
<td>8-bit</td>
<td>16-bit</td>
<td>128K bytes</td>
<td>768K bytes</td>
<td>Asynchronous; Synchronous</td>
<td>On-site</td>
<td>$8,000 to $20,000</td>
<td>Date First Installed: October 1980 Number installed to Date: 500 — 1,000 (See Vendor Profile Page V-6)</td>
</tr>
<tr>
<td>AWS TURBO</td>
<td>4106B</td>
<td>Micro</td>
<td>8-bit</td>
<td>16-bit</td>
<td>256K bytes</td>
<td>480K bytes</td>
<td>Asynchronous; Synchronous</td>
<td>On-site</td>
<td>$11,000 to $14,000</td>
<td>Date First Installed: January 1983 (See Vendor Profile Page V-6)</td>
</tr>
<tr>
<td>AWS TURBO</td>
<td>4131</td>
<td>Micro</td>
<td>8-bit</td>
<td>16-bit</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Asynchronous; Synchronous</td>
<td>On-site</td>
<td>$5,495 to $8,995</td>
<td>Date First Installed: June 1981 Number installed to Date: 100 — 500 (See Vendor Profile Page V-5)</td>
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<tr>
<td>D-13</td>
<td></td>
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</table>

**TO COMPUTER SYSTEMS**

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<table>
<thead>
<tr>
<th>Vendor</th>
<th>Type</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Communications Protocols</th>
<th>Maximum Memory: 1/O Ports</th>
<th>Minimum Memory</th>
<th>Maximum On-Line Storage: Design</th>
<th>Distribution</th>
<th>Purchase Price: Date First Installed</th>
<th>Languages Supported: Word Length</th>
<th>Maintenance: Date Installed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micros</td>
<td></td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CORONA DATA SYSTEMS, INC.</td>
<td>Desktop</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CORONA PORTABLE PPC2</td>
<td>Portable</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CORONA DATA SCIENCES, INC.</td>
<td>Micro</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>COSMOS SYSTEMS, INC.</td>
<td>Micro</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CORVUS SYSTEMS, INC.</td>
<td>Micro</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>ORION</td>
<td>Desktop</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CRC SYSTEMS, INC.</td>
<td>Micro</td>
<td>16-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
<tr>
<td>CROMEMCO, INC.</td>
<td>Micro</td>
<td>8-bit</td>
<td>MS-DOS; CP/M</td>
<td>Asynchronous</td>
<td>512K bytes</td>
<td>256K</td>
<td>1.2G</td>
<td>OEM</td>
<td>$10,000 to $22,000</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>Third-party</td>
<td></td>
</tr>
</tbody>
</table>

**COMPUTERWORLD BUYER'S GUIDE**
| Model | Operating System | Word Length | Languages Supported | Maximum Memory | Minimum Memory | Maximum On-Line Storage | Multiple Users | Maximum 1/O Ports | Communications Protocols | Distribution | Vendor Sales Terms | Purchase Price | Date First Installed | Number Installed to Date | Date First Installed | Number Installed to Date | Date First Installed | Number Installed to Date | Date First Installed | Number Installed to Date | Date First Installed | Number Installed to Date | Date First Installed | Number Installed to Date |
|-------|------------------|-------------|---------------------|----------------|---------------|------------------------|----------------|-------------------|--------------------------|--------------|---------------------|----------------|-----------------|--------------------------|-----------------|-------------------|---------------------|-----------------|-------------------|---------------------|-----------------|-----------------|---------------------|-----------------|-----------------|
| CROMEMCO, INC. | CDOS | 8-bit | Cobol; Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | Yes | 10 | Asynchronous; Synchronous | OEM | Purchase | $2,000 to $3,000 | June 1982 | 100 | 1982 | August 1982 | 5,000 | July 1981 | 10,000 |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
| Z-2500 | | | Basic; Assembler | 64K bytes | 16K bytes | 1M bytes | No | 3 | Asynchronous; Synchronous; SDLC | OEM | Purchase | $12,995 to $20,000 | January 1983 | 5,000 | 1983 | August 1983 | 5,000 | January 1984 | 10,000 | (See Vendor Profile Page V-6) |
VENDOR SELLER TERMS: PURCHASE

CYBERSYSTEMS, INC.

CUTTER 9900

Desktop

Word Length: 8-bit

Operating System: CP/M

Languages Supported: Fortran; Basic; Pascal; Cyber Four

Minimum Memory: 64K bytes

Multiple Users: No

Maximum On-Line Storage: 40M bytes

Maximum Memory: 1.5M bytes

Multiple Users: Yes; 16

Maximum On-Line Storage: 420M bytes

Date First Installed: September 1982

Date First Installed to Date: 50 — 100

DATADCOM CORP.
PCH SERIES

Desktop

Specific Application: Time-sharing, Messaging

Word Length: 16-bit

Minimum Memory: 64K bytes

Maximum Memory: 512K bytes

Multiple Users: No

Communications Protocols: Asynchronous

Distribution: End user, Third-party

Vendor Sales Terms: Purchase; Rental; Lease

Purchase Price: $1,500 to $2,500

Maintenance: On-site; Remote
diagnostic; Return to manufacturing facility

Average Maintenance Fee: $30

Date First Installed: January 1983

Number Installed to Date: 100 — 500

(See Vendor Profile Page V-7)

DATA GENERAL CORP.

ENTERPRISE 1000

Desktop

Word Length: 16-bit

Operating System: UNIX

Languages Supported: Cobol; Basic; Pascal

Minimum Memory: 64K bytes

Maximum Memory: 64K bytes

Multiple Users: No

Communications Protocols: Asynchronous; Synchronous

Distribution: OEM

Vendor Sales Terms: Purchase

Maintenance: On-site; Return to manufacturing facility

Average Maintenance Fee: $35

Date First Installed: May 1982

(See Vendor Profile Page V-7)

DATA GENERAL CORP.

ENTERPRISE/OS

Desktop

Word Length: 16-bit

Maximum Memory: 64K bytes

Minimum Memory: 64K bytes

Languages Supported: Cobol; Basic; Pascal

Average Maintenance Fee: $85

Maintenance: On-site

Number Installed to Date: 120

Date First Installed: June 1987

(See Vendor Profile Page V-7)

DATAMAC COMPUTER SYSTEMS, INC.

1600 SERIES

Micro

Word Length: 8-bit

Operating System: MS DOS; Concurrent CP/M; CP/M 86

Languages Supported: Cobol; Fortran; Basic; Pascal

Minimum Memory: 128K bytes

Maximum Memory: 4M bytes

Multiple Users: No

Maximum On-Line Storage: 16M bytes

Communications Protocols: Asynchronous; Synchronous

Distribution: OEM

Vendor Sales Terms: Purchase

Maintenance: On-site

Number Installed to Date: 200

Date First Installed: November 1982

(See Vendor Profile Page V-7)

DATA-MAX

UVF

Micro

Specific Application: Video Graphics

Word Length: 8-bit

Operating System: Z GRASS, CP/M

Languages Supported: Cobol; Grass

Minimum Memory: 32K bytes

Maximum Memory: 256K bytes

Multiple Users: No

Maximum On-Line Storage: 16M bytes

Distribution: OEM

Vendor Sales Terms: Purchase

Purchase Price: $3,500 to $10,000

Date First Installed: November 1982

(See Vendor Profile Page V-7)

TO COMPUTER SYSTEMS

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## Micros

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<thead>
<tr>
<th>Machine</th>
<th>Purchase Price</th>
<th>Maintenance</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
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<tbody>
<tr>
<td>M-8</td>
<td>$12,000 to $18,000</td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
</tr>
<tr>
<td>UV1</td>
<td>$8,000 to $12,000</td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
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<tr>
<td>DATA-MAX</td>
<td></td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
</tr>
<tr>
<td>ID-18</td>
<td>$10,000 to $15,000</td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
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<tr>
<td>M/8</td>
<td>$8,000 to $12,000</td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
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<tr>
<td>INDUSTRIES</td>
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<td>On-site</td>
<td>1980</td>
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<td>DATAPOINT CORP.</td>
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<td>On-site</td>
<td>1980</td>
<td>120</td>
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<tr>
<td>ASSOCIATE +</td>
<td></td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
</tr>
<tr>
<td>ASSOCIATE +15</td>
<td></td>
<td>On-site</td>
<td>1980</td>
<td>120</td>
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<td>SYSTEM 10</td>
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<td>On-site</td>
<td>1980</td>
<td>120</td>
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</table>

### Micros Specifications:

- **M-8**: 8-bit, Operating System: CP/M, Languages Supported: Cobol, Basic, Pascal, DataShare, Minimum Memory: 128K bytes, Maximum Memory: 256K bytes, Multiple Users: Yes, Maintenance: On-site, Date First Installed: January 1980, Number Installed to Date: 120.
- **UV1**: 8-bit, Operating System: CP/M, Languages Supported: Cobol, Basic, Pascal, DataShare, Minimum Memory: 128K bytes, Maximum Memory: 256K bytes, Multiple Users: Yes, Maintenance: On-site, Date First Installed: January 1980, Number Installed to Date: 120.
- **DATA-MAX**: 8-bit, Operating System: CP/M, Languages Supported: Cobol, Basic, Pascal, DataShare, Minimum Memory: 128K bytes, Maximum Memory: 256K bytes, Multiple Users: Yes, Maintenance: On-site, Date First Installed: January 1980, Number Installed to Date: 120.
- **ID-18**: 8-bit, Operating System: CP/M, Languages Supported: Cobol, Basic, Pascal, DataShare, Minimum Memory: 128K bytes, Maximum Memory: 256K bytes, Multiple Users: Yes, Maintenance: On-site, Date First Installed: January 1980, Number Installed to Date: 120.
- **M/8**: 8-bit, Operating System: CP/M, Languages Supported: Cobol, Basic, Pascal, DataShare, Minimum Memory: 128K bytes, Maximum Memory: 256K bytes, Multiple Users: Yes, Maintenance: On-site, Date First Installed: January 1980, Number Installed to Date: 120.
### DATRICON CORP.

**DV-9**
- **Micro**: Specific Application: Process Controls
- **Word Length**: 8-bit
- **Operating System**: OS9
- **Languages Supported**: Cobol, Basic, Pascal, C
- **Minimum Memory**: 64K bytes
- **Maximum Memory**: 256K bytes
- **Multiple Users**: Yes
- **Maximum On-Line Storage**: 40MB bytes
- **Communications Protocols**: Asynchronous, Synchronous
- **Distribution**: Third-party
- **Vendor Sales Terms**: Purchase
- **Multiple Users**: No
- **Maximum On-Line Storage**: 85M bytes
- **Date First Installed**: June 1982
- **Number Installed to Date**: 15
- **Average Maintenance Fee**: $200
- **Date First Installed**: March 1983
- **Number Installed to Date**: 4

### DIGILOG, INC.

**DIGILOG 1800**
- **Micro**: Specific Application: Data Entry
- **Word Length**: 8-bit
- **Operating System**: CP/M
- **Languages Supported**: Assembler
- **Minimum Memory**: 64K bytes
- **Multiple Users**: No
- **Maximum On-Line Storage**: 50MB bytes
- **Communications Protocols**: None
- **Distribution**: OEM
- **Vendor Sales Terms**: Purchase
- **Purchase Price**: $9,795
- **Maintenance**: On-site; Return to manufacturing facility; Indeserv
- **Date First Installed**: March 1982

**THE RAINBOW 100**
- **Word Length**: 8-bit
- **Operating System**: TURBO DOS; CP/M
- **Languages Supported**: Assembler
- **Minimum Memory**: 64K bytes
- **Multiple Users**: Yes
- **Maximum On-Line Storage**: 50MB bytes
- **Communications Protocols**: None
- **Distribution**: OEM
- **Vendor Sales Terms**: Purchase
- **Purchase Price**: $9,795
- **Maintenance**: On-site; Return to manufacturing facility; Indeserv
- **Date First Installed**: March 1982

### DigiComp Research Corp.

**DIGICOMP RESEARCH CORP., DELPHI-100**
- **Word Length**: 8-bit
- **Operating System**: DOS; UNIX
- **Languages Supported**: Cobol, Fortran, Basic, C
- **Minimum Memory**: 256K bytes
- **Multiple Users**: Yes
- **Maximum On-Line Storage**: 40MB bytes
- **Communications Protocols**: Multiplexor
- **Vendor Sales Terms**: Purchase
- **Purchase Price**: $0.495
- **Maintenance**: On-site; Return to manufacturing facility; Indeserv
- **Date First Installed**: July 1982

### TO COMPUTER SYSTEMS

**D-19**
## Micros

<table>
<thead>
<tr>
<th>Model</th>
<th>Vendor</th>
<th>Distribution</th>
<th>Word Length</th>
<th>Languages Supported</th>
<th>Memory</th>
<th>Maximum On-Line Storage</th>
<th>Multiple Users</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Accessibility</th>
<th>Maintenance</th>
<th>Purchase Price</th>
<th>Date First Installed</th>
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<tr>
<td>Micros</td>
<td>DIGITAL MICROSYSTEMS, INC.</td>
<td>Third-party</td>
<td>8-bit</td>
<td>Cobol; Basic</td>
<td>64K bytes</td>
<td>6.6M bytes</td>
<td>Yes; 32</td>
<td>60K bytes</td>
<td>80K bytes</td>
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<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
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<td>DIGITAL MICROSYSTEMS, INC.</td>
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<td>128K bytes</td>
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<tr>
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<td>16-bit</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$5,200</td>
<td>May 1983</td>
</tr>
<tr>
<td>Micros</td>
<td>DIRECT, INC.</td>
<td>Third-party</td>
<td>8-bit</td>
<td>Cobol; Basic; Pascal</td>
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<td>6.6M bytes</td>
<td>Yes; 32</td>
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<td>64K bytes</td>
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<td>June 1980</td>
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<td>64K bytes</td>
<td>64K bytes</td>
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<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
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<tr>
<td>Micros</td>
<td>DIRECT, INC.</td>
<td>End user</td>
<td>16-bit</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$15,000 to $50,000</td>
<td>June 1982</td>
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<tr>
<td>Micros</td>
<td>DIGITAL TECHNOLOGY</td>
<td>End user</td>
<td>16-bit</td>
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<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
</tr>
<tr>
<td>Micros</td>
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<td>Cobol; Basic; Pascal; PL/I</td>
<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
</tr>
<tr>
<td>Micros</td>
<td>DIGITAL TECHNOLOGY</td>
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<td>16-bit</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
</tr>
<tr>
<td>Micros</td>
<td>DIGITAL TECHNOLOGY</td>
<td>End user</td>
<td>16-bit</td>
<td>Cobol; Basic; Pascal; PL/I</td>
<td>128K bytes</td>
<td>96M bytes</td>
<td>Yes; 32</td>
<td>128K bytes</td>
<td>256K bytes</td>
<td>Yes; 32</td>
<td>On-site</td>
<td>$5,200</td>
<td>June 1980</td>
</tr>
</tbody>
</table>

**Note:** The table above provides a summary of different microcomputer models and their specifications. For more detailed information, please refer to the full documentation or direct communication with the vendors.
Communications Protocols:
Multiple Users: No
Maximum Memory: 512K bytes

Date First Installed: August 1982

Vendor Sales Terms: Purchase
Purchase Price: $3,950 to $4,600
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $46

DP BUSINESS SYSTEMS, INC.

Micro
Word Length: 8-bit
Operating System: CP/M; MP/M 2.0
Languages Supported: Cobol, Fortran, Basic, PL/I, Assembler
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 20M bytes
Multiple I/O Ports: 10
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $14,950 to $20,950
Maintenance: On-site
Date First Installed: January 1983
Number Installed to Date: Less than 10

Vendor Sales Terms: Purchase;
Lease
Purchase Price: $25,265 to $51,000
Maintenance: On-site
Date First Installed: August 1981
Number Installed to Date: 100 — 5,000

DP BUSINESS SYSTEMS, INC.

Micro
Word Length: 8-bit
Operating System: CP/M, MP/M 2.0
Languages Supported: Cobol, Fortran, Basic, PL/I, Assembler
Minimum Memory: 1.1M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 30M bytes
Multiple I/O Ports: 34
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $25,265 to $51,000
Maintenance: On-site
Average Maintenance Fee: $300
Date First Installed: August 1981
Number Installed to Date: 100 — 500

DUAL SYSTEMS CORP.

Micro
Word Length: 8-bit
Operating System: UNIX 7; SYSTEM III UNIX
Languages Supported: Cobol, Fortran, Basic plus; Pascal, C
Minimum Memory: 512K bytes
Maximum Memory: 3.2M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 30M bytes
Multiple I/O Ports: 16
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $18,600
Maintenance: On-site; Remote diagnostics; Return to manufacturing facility
Date First Installed: June 1982

DUAL SYSTEMS CORP.

Micro
Word Length: 16/32-bit
Operating System: UNIX 7; SYSTEM III UNIX
Languages Supported: Cobol, Fortran, Basic plus; Pascal, C
Minimum Memory: 512K bytes
Maximum Memory: 3.2M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 30M bytes
Multiple I/O Ports: 16
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $18,600
Maintenance: On-site; Remote diagnostics; Return to manufacturing facility
Date First Installed: June 1982

DURALOGIC SYSTEMS, INC.

Desktop
Word Length: 8-bit
Operating System: DX85M; CP/M; MP/M
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 400K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 16M bytes
Multiple I/O Ports: 16
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $8,000 to $12,000
Maintenance: On-site; Remote diagnostics; Return to manufacturing facility
Date First Installed: October 1978
Number Installed to Date: 500 — 1,000

DYNAVITE

Desktop
Word Length: 8-bit
Operating System: CP/M; MP/M; OASIS
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 400K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 16M bytes
Multiple I/O Ports: 16
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $9,950 to $15,000
Maintenance: On-site; Return to manufacturing facility
Third-party
Average Maintenance Fee: $150
Date First Installed: March 1982
Number Installed to Date: 1,000 — 3,000

EAGLE COMPUTER, INC.

1600 SERIES
Desktop
Word Length: 16-bit
Operating System: MS-DOS; CP/M; 86
Languages Supported: Basic; Pascal
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 107M bytes
Multiple I/O Ports: 11
Communications Protocols: Asynchronous; Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $6,995 to $10,995

TO COMPUTER SYSTEMS
Micros

Maintenance: Third-party
Date First Installed: December 1982
(See Vendor Profile Page V-9)

EAGLE COMPUTER, INC.

EAGLE II

Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: C; Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes

Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,995
Maintenance: Third-party
Date First Installed: November 1981

EAGLE COMPUTER, INC.

EAGLE III

Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: C; Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes

Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,995
Maintenance: Third-party
Date First Installed: February 1982

EAGLE COMPUTER, INC.

EAGLE IV

Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: C; Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes

Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $5,995
Maintenance: Third-party
Date First Installed: February 1982

ECS MICROSYSTEMS, INC.

ECS 4500

Micro
Specific Application: Mainframe Emulation
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C
Minimum Memory: 64K bytes
Maximum Memory: 220K bytes
Multiple Users: No
Maximum On-Line Storage: 2M bytes

Maximum I/O Ports: 4
Communications Protocols: Asynchronous, Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $5,000
Maintenance: On-site
Date First Installed: January 1980
Number Installed to Date: 2,000

E & L INSTRUMENTS, INC.

FOX

Micro
Specific Application: Training
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Machine Language
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $500
Maintenance: On-site, Return to manufacturing facility
Date First Installed: August 1982
Number Installed to Date: 500
(See Vendor Profile Page V-9)

E & L INSTRUMENTS, INC.

MMD1

Micro
Specific Application: Training
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Machine Language
Minimum Memory: 1K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $250
Maintenance: Return to manufacturing facility
Date First Installed: May 1974
Number Installed to Date: 6,000

E & L INSTRUMENTS, INC.

MMD2

Micro
Specific Application: Training
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Machine Language
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,500
Maintenance: Return to manufacturing facility
Date First Installed: September 1980
Number Installed to Date: 750

EPIC COMPUTER PRODUCTS, INC.

E P I S O D E 1 1 4 8

Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Assembler
Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 200K bytes
Maximum I/O Ports: 4
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,324
Maintenance: Return to manufacturing facility
Date First Installed: September 1981
Number Installed to Date: 50
(See Vendor Profile Page V-9)

EPIC COMPUTER PRODUCTS, INC.

E P I S O D E 1 2 4 8

Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 400K bytes
Multiple Users: No
Maximum I/O Ports: 4
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,596
Maintenance: Return to manufacturing facility
Date First Installed: September 1981
Number Installed to Date: 50

EPIC COMPUTER PRODUCTS, INC.

E P I S O D E 1 2 4 8

Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 400K bytes
Maximum I/O Ports: 4
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,716
Maintenance: Return to manufacturing facility
Date First Installed: September 1981
Number Installed to Date: 50
<table>
<thead>
<tr>
<th>EPIC COMPUTER PRODUCTS, INC.</th>
<th>EPOC 2248 Micro</th>
<th>Word Length: 8-bit</th>
<th>Operating System: CP/M</th>
<th>Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler</th>
<th>Minimum Memory: 64K bytes</th>
<th>Maximum Memory: 512K bytes</th>
<th>Multiple Users: No</th>
<th>Maximum I/O Ports: 4</th>
<th>Distribution: OEM; Third-party</th>
<th>Vendor Sales Terms: Purchase</th>
<th>Purchase Price: $1,816</th>
<th>Number Installed to Date: 50 — 100</th>
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<td>EPIC COMPUTER PRODUCTS, INC.</td>
<td>EPOC 3215 Micro</td>
<td>Word Length: 8-bit</td>
<td>Operating System: CP/M</td>
<td>Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 15.8M bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $4,232</td>
<td>Number Installed to Date: 50 — 100</td>
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<td>EPOC 2296 Micro</td>
<td>Word Length: 8-bit</td>
<td>Operating System: CP/M</td>
<td>Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 1.8M bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $2,280</td>
<td>Number Installed to Date: 50 — 100</td>
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<td>EpoC 3220 Micro</td>
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<td>Languages Supported: Cobol, Fortran, Basic, Pascal, C</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 5.8M bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $4,480</td>
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<td>Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 512K bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $9,000</td>
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<td>EPSON AMERICA, INC.</td>
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<td>Word Length: 8-bit</td>
<td>Operating System: CP/M</td>
<td>Languages Supported: Cobol, Fortran, Basic, Pascal, C</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 64K bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $2,995</td>
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<td>ESTIMATION, INC.</td>
<td>CONTRACTOR I Micro</td>
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<td>Operating System: CP/M</td>
<td>Languages Supported: Basic, Pascal, Assembly</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 64K bytes</td>
<td>Multiple Users: No</td>
<td>Maximum I/O Ports: 4</td>
<td>Distribution: OEM; Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Purchase Price: $9,000 to $11,000</td>
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</table>

TO COMPUTER SYSTEMS

D-23
<table>
<thead>
<tr>
<th>Model</th>
<th>Year Installed</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>Maximum On-Line Storage</th>
<th>Word Length</th>
<th>Communications Protocols</th>
<th>Languages Supported</th>
<th>Vendor Sales Terms</th>
<th>Average Maintenance Fee</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
<th>Distribution</th>
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<tbody>
<tr>
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<td>November 1982</td>
<td>64K bytes</td>
<td>320K bytes</td>
<td></td>
<td>9-bit</td>
<td>Asynchronous</td>
<td>Basic; Pascal; PL/I; MT Plus; C-Basic</td>
<td>Purchase</td>
<td>$2.495 to $3.895</td>
<td></td>
<td></td>
<td>OEM; Third-party</td>
</tr>
<tr>
<td>SYSTEM 800</td>
<td>May 1980</td>
<td>64K bytes</td>
<td>320K bytes</td>
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<td>9-bit</td>
<td>Asynchronous</td>
<td>Basic; Pascal; PL/I; MT Plus; C-Basic</td>
<td>Purchase</td>
<td>$3,795 to $10,395</td>
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<td>OEM; Third-party</td>
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<td>MICRO</td>
<td>November 1982</td>
<td>64K bytes</td>
<td>320K bytes</td>
<td></td>
<td>9-bit</td>
<td>Asynchronous</td>
<td>Basic; Pascal; PL/I; MT Plus; C-Basic</td>
<td>Purchase</td>
<td>$3,795 to $10,395</td>
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<td>OEM; Third-party</td>
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<tr>
<td>SYSTEM 503</td>
<td>May 1981</td>
<td>64K bytes</td>
<td>320K bytes</td>
<td></td>
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<td>Basic; Pascal; PL/I; MT Plus; C-Basic</td>
<td>Purchase</td>
<td>$3,795 to $10,395</td>
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<tr>
<td>SYSTEM 810</td>
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<td>192K bytes</td>
<td>320K bytes</td>
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<td>Basic; Pascal; PL/I</td>
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<td>$3,450</td>
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<td>SYSTEM 820</td>
<td>February 1982</td>
<td>192K bytes</td>
<td>320K bytes</td>
<td></td>
<td>8-bit</td>
<td>Asynchronous</td>
<td>Basic; Pascal; PL/I</td>
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<td>$3,295 to $4,395</td>
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<td>OEM; Third-party</td>
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<td>SYSTEM 583</td>
<td>May 1983</td>
<td>192K bytes</td>
<td>320K bytes</td>
<td></td>
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<td>Asynchronous</td>
<td>Basic; Pascal; PL/I</td>
<td>Lease</td>
<td>$3,295 to $4,395</td>
<td></td>
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<td>OEM; Third-party</td>
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</tbody>
</table>

**EXO SYSTEMS CORP.**

**SYSTEM 501**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 6.6M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: February 1982
- Number Installed to Date: 100 — 500

**SYSTEM 800**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 6.6M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: May 1980
- Number Installed to Date: 100 — 500

**SYSTEM 503**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 1M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: February 1982
- Number Installed to Date: 100 — 500

**SYSTEM 810**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 10M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: February 1981
- Number Installed to Date: 100 — 500

**SYSTEM 820**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 20M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $3,795 to $10,395
- Maintenance: On-site
- Average Maintenance Fee: $40
- Date First Installed: May 1981
- Number Installed to Date: 100 — 500

**SYSTEM 583**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 13M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: February 1981
- Number Installed to Date: 100 — 500

**SYSTEM 810**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 13M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $6,495 to $7,495
- Maintenance: On-site
- Average Maintenance Fee: $30
- Date First Installed: February 1981
- Number Installed to Date: 100 — 500

**SYSTEM 581**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 1.2M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $3,795 to $10,395
- Maintenance: On-site
- Average Maintenance Fee: $40
- Date First Installed: May 1981
- Number Installed to Date: 100 — 500

**SYSTEM 583**

- Micro
- Word Length: 9-bit
- Operating System: CP/M, EXODNET, MP/M
- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Maximum On-Line Storage: 40M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $3,795 to $10,395
- Maintenance: On-site
- Average Maintenance Fee: $40
- Date First Installed: May 1981
- Number Installed to Date: 100 — 500

**EZ DATA, INC.**

**EZ-360**

- Personal
- Word Length: 8-bit
- Operating System: CMP; UNISYN
- Minimum Memory: 128K bytes
- Maximum Memory: 320K bytes
- Multiple Users: No
- Maximum I/O Ports: 6
- Communications Protocols: Asynchronous
- Distribution: Third-party
- Vendor Sales Terms: Purchase; Lease
- Purchase Price: $7,000
- Maintenance: Third-party
- Date First Installed: January 1983

**EZ DATA, INC.**

**EZ-GRADUATE**

- Personal
- Word Length: 8-bit
- Operating System: CMP; UNISYN
- Minimum Memory: 128K bytes
- Maximum Memory: 320K bytes
- Multiple Users: No
- Maximum I/O Ports: 6
- Communications Protocols: Asynchronous
- Distribution: Third-party
- Vendor Sales Terms: Purchase; Lease
- Purchase Price: $3,450
- Maintenance: Third-party
- Date First Installed: April 1983

**FACIT, INC.**

**DTC**

- Micro
- Word Length: 8-bit
- Operating System: FACIT DOS
- Languages Supported: Basic; Pascal
- Minimum Memory: 64K bytes
- Maximum Memory: 128K bytes
- Multiple Users: No
- Maximum On-Line Storage: 5M bytes
- Maximum I/O Ports: 2
- Communications Protocols: Asynchronous
- Distribution: Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $3,295 to $4,395
- Maintenance: Third-party
- Average Maintenance Fee: $44
- Date First Installed: February 1982

**FLORIDA COMPUTER GRAPHICS**

**BEACON**

- Micro
- Specific Application: Graphics

**EXODNET; MP/M**

- Languages Supported: Basic; Pascal; PL/I; MT Plus; C-Basic
- Minimum Memory: 64K bytes
- Maximum Memory: 320K bytes
- Multiple Users: Yes
- Maximum On-Line Storage: 40M bytes
- Maximum I/O Ports: 4
- Communications Protocols: Asynchronous
- Distribution: OEM; Third-party
- Vendor Sales Terms: Purchase
- Purchase Price: $3,795 to $10,395
- Maintenance: On-site
- Average Maintenance Fee: $40
- Date First Installed: May 1981
- Number Installed to Date: 100 — 500
### Micros

<table>
<thead>
<tr>
<th>Computer System</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
<th>On-Line Storage</th>
<th>Vendor Sales Terms</th>
<th>Date First Installed</th>
<th>Number Installed to Date</th>
<th>Distribution</th>
<th>Maintenance</th>
<th>Purchase Price</th>
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<tbody>
<tr>
<td>FORTUNE SYSTEMS CORP., 32/16 Desktop</td>
<td>8-bit</td>
<td>Basic; Pascal; C</td>
<td>Asynchronous; Synchronous</td>
<td>288K bytes</td>
<td>1M bytes</td>
<td>BOS bytes</td>
<td>Purchase</td>
<td>June 1982</td>
<td>10 — 500</td>
<td>OEM</td>
<td>On-site; ITT; Courier</td>
<td>$18,000 to $30,000</td>
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<tr>
<td>FORTUNE SYSTEMS CORP., 32/16 Desktop</td>
<td>16-bit</td>
<td>Basic; Pascal; C</td>
<td>Asynchronous; Synchronous</td>
<td>288K bytes</td>
<td>1M bytes</td>
<td>BOS bytes</td>
<td>Purchase</td>
<td>June 1982</td>
<td>10 — 500</td>
<td>OEM</td>
<td>On-site; ITT; Courier</td>
<td>$18,000 to $30,000</td>
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<tr>
<td>GAVILAN</td>
<td>8-bit</td>
<td>Basic</td>
<td>Asynchronous; Synchronous</td>
<td>80K bytes</td>
<td>128K bytes</td>
<td>256 bytes</td>
<td>Purchase</td>
<td>October 1982</td>
<td>Less than 10</td>
<td>Third-party, OEM, End user</td>
<td>On-site</td>
<td>$18,950 to $30,000</td>
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<tr>
<td>GAVILAN</td>
<td>8-bit</td>
<td>Basic</td>
<td>Asynchronous; Synchronous</td>
<td>80K bytes</td>
<td>128K bytes</td>
<td>256 bytes</td>
<td>Purchase</td>
<td>October 1982</td>
<td>Less than 10</td>
<td>Third-party, OEM, End user</td>
<td>On-site</td>
<td>$18,950 to $30,000</td>
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</table>

### Additional Notes
- FORTUNE SYSTEMS CORP. (See Vendor Profile Page V-9)
- MICROELECTRONICS, INC. MICRO 168 Personal
- GAVILAN GAVILAN CORP.
- TO COMPUTER SYSTEMS D-25
<table>
<thead>
<tr>
<th>Model</th>
<th>Company</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL AUTOMATION, INC.</strong>&lt;br&gt;ZEBA 1500</td>
<td>Micro</td>
<td>Word Length: 16/32-bit&lt;br&gt;Operating System: PICK&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 256K bytes&lt;br&gt;Maximum Memory: 1M bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 40M bytes&lt;br&gt;Maximum I/O Ports: 6&lt;br&gt;Communications Protocols: Asynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $21,000 to $30,000</td>
</tr>
<tr>
<td><strong>GENERAL AUTOMATION, INC.</strong>&lt;br&gt;ZEBA 5000</td>
<td>Micro</td>
<td>Word Length: 16/32-bit&lt;br&gt;Operating System: PICK&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 256K bytes&lt;br&gt;Maximum Memory: 1M bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 632M bytes&lt;br&gt;Communications Protocols: Asynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Multiple Users: Yes; 4&lt;br&gt;Maximum On-Line Storage: 40M bytes&lt;br&gt;Language Supported: Cobol&lt;br&gt;Operating System: XENIX&lt;br&gt;Word Length: 16/32-bit&lt;br&gt;Distribution: End user; OEM; Third-party&lt;br&gt;Purchase Price: $23,000 to $30,000</td>
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<tr>
<td><strong>GENERAL AUTOMATION, INC.</strong>&lt;br&gt;ZEBA 3000</td>
<td>Micro</td>
<td>Word Length: 16/32-bit&lt;br&gt;Operating System: XENIX&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 256K bytes&lt;br&gt;Maximum Memory: 256K bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 70M bytes&lt;br&gt;Maximum I/O Ports: 6&lt;br&gt;Communications Protocols: Asynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $25,000 to $34,000</td>
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<td><strong>HARDY COMPUTER CORP.</strong>&lt;br&gt;FACTORY CONTROLLER</td>
<td>Micro</td>
<td>Word Length: 16/32-bit&lt;br&gt;Operating System: CP/M&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 1M bytes&lt;br&gt;Maximum Memory: 4M bytes&lt;br&gt;Multiple Users: No&lt;br&gt;Maximum On-Line Storage: 640M bytes&lt;br&gt;Communications Protocols: Asynchronous; Bisynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $1,350 to $5,000&lt;br&gt;Date First Installed: 1981&lt;br&gt;Number Installed to Date: 100 —&lt;br&gt;(See Vendor Profile Page V-10)</td>
</tr>
<tr>
<td><strong>HARDY COMPUTER CORP.</strong>&lt;br&gt;VALDINE SERIES/33</td>
<td>Micro</td>
<td>Word Length: 8-bit&lt;br&gt;Operating System: Proprietary&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 128K bytes&lt;br&gt;Multiple Users: No&lt;br&gt;Maximum On-Line Storage: 50M bytes&lt;br&gt;Communications Protocols: Asynchronous; Bisynchronous; SDLC; HDLC&lt;br&gt;Distribution: OEM&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $2,000 to $7,000&lt;br&gt;Number Installed to Date: 125&lt;br&gt;(See Vendor Profile Page V-10)</td>
</tr>
<tr>
<td><strong>GRIFFIN TECHNOLOGY, INC.</strong>&lt;br&gt;ANALYST</td>
<td>Micro</td>
<td>Word Length: 8-bit&lt;br&gt;Operating System: CP/M&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 64K bytes&lt;br&gt;Maximum Memory: 1M bytes&lt;br&gt;Communications Protocols: Asynchronous; Bisynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $120,000&lt;br&gt;Date First Installed: 1977&lt;br&gt;Number Installed to Date: 100 —&lt;br&gt;(See Vendor Profile Page V-10)</td>
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<tr>
<td><strong>GRIFFIN TECHNOLOGY, INC.</strong>&lt;br&gt;VALDINE</td>
<td>Micro</td>
<td>Word Length: 8-bit&lt;br&gt;Operating System: Proprietary&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 256K bytes&lt;br&gt;Maximum Memory: 1M bytes&lt;br&gt;Communications Protocols: Asynchronous; Bisynchronous&lt;br&gt;Distribution: End user&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $2,000 to $7,000&lt;br&gt;Number Installed to Date: 125&lt;br&gt;(See Vendor Profile Page V-10)</td>
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<tr>
<td><strong>HEATH CO.</strong>&lt;br&gt;Z100 LOW PROFILE</td>
<td>Micro</td>
<td>Word Length: 16-bit&lt;br&gt;Operating System: Proprietary&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 128K bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 320M bytes&lt;br&gt;Communications Protocols: Asynchronous; Synchronous&lt;br&gt;Distribution: OEM&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $8,000 to $20,000&lt;br&gt;Number Installed to Date: 125&lt;br&gt;(See Vendor Profile Page V-10)</td>
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<tr>
<td><strong>HEATH CO.</strong>&lt;br&gt;Z100 LOW PROFILE</td>
<td>Micro</td>
<td>Word Length: 16-bit&lt;br&gt;Operating System: Proprietary&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 128K bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 320M bytes&lt;br&gt;Communications Protocols: Asynchronous; Synchronous&lt;br&gt;Distribution: OEM&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $8,000 to $20,000&lt;br&gt;Number Installed to Date: 125&lt;br&gt;(See Vendor Profile Page V-10)</td>
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<tr>
<td><strong>HEATH CO.</strong>&lt;br&gt;Z100 LOW PROFILE</td>
<td>Micro</td>
<td>Word Length: 16-bit&lt;br&gt;Operating System: Proprietary&lt;br&gt;Language: Basic&lt;br&gt;Minimum Memory: 128K bytes&lt;br&gt;Multiple Users: Yes&lt;br&gt;Maximum On-Line Storage: 320M bytes&lt;br&gt;Communications Protocols: Asynchronous; Synchronous&lt;br&gt;Distribution: OEM&lt;br&gt;Vendor Sales Terms: Purchase&lt;br&gt;Purchase Price: $8,000 to $20,000&lt;br&gt;Number Installed to Date: 125&lt;br&gt;(See Vendor Profile Page V-10)</td>
</tr>
</tbody>
</table>
Zilog's new System 8000 speaks seven languages. Fluently!

Now, there's a microcomputer that speaks seven high-level languages at a price that won't leave you speechless.

The Zilog System 8000 Model 11 is a general purpose, time-sharing computer that features the powerful UNIX* operating system, with enhanced System III capabilities. It is especially attractive to OEM's since all the software needed to make programming more productive is of the highest quality, and is accompanied by superb documentation.

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London 44-0628-39200 Tokyo 03-587-0528
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### Micros

<table>
<thead>
<tr>
<th>Model</th>
<th>Language Supported</th>
<th>Minimum Memory</th>
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<th>Operating System</th>
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<th>Purchase Price:</th>
<th>Date First Installed:</th>
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<tr>
<td>HP 83A</td>
<td>Basic; Pascal</td>
<td>128K bytes</td>
<td>192K bytes</td>
<td>CP/M 86; ZDOS</td>
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<td>End user</td>
<td>$1,000</td>
<td>October 1981</td>
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<td>MBE 16000 SERIES</td>
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<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
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<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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<td>IBM 3080</td>
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<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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<td>IBM 3100 (PERSONAL COMPUTER)</td>
<td>Basic; AGL</td>
<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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### IBM

<table>
<thead>
<tr>
<th>Model</th>
<th>Language Supported</th>
<th>Minimum Memory</th>
<th>Maximum Memory</th>
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<th>Communications Protocols:</th>
<th>Multiple Users:</th>
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<tr>
<td>IBM 5150</td>
<td>Basic; AGL</td>
<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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<tr>
<td>IBM 5160</td>
<td>Basic; AGL</td>
<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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<tr>
<td>IBM 5170</td>
<td>Basic; AGL</td>
<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
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<tr>
<td>IBM 5180</td>
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<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
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<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
</tr>
<tr>
<td>IBM 5190</td>
<td>Basic; AGL</td>
<td>32K bytes</td>
<td>64K bytes</td>
<td>MS-DOS</td>
<td>Asynchronous; Synchronous</td>
<td>No</td>
<td>OEM</td>
<td>$28,000</td>
<td>1982</td>
</tr>
</tbody>
</table>
Operating System: CP/M 86; MS-DOS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 256K bytes
Maximum Memory: 1 Mbyte
Maximum On-Line Storage: 20M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,200 to $7,200
Maintenance: Western Union
Date First Installed: February 1983
Number Installed to: 40
(See Vendor Profile Page V-11)

IMS INTERNATIONAL
5000IS (ZiLOG)
Desktop
Word Length: 8-bit
Operating System: CP/M; TURBO DOS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 64K bytes
Maximum Memory: 320K bytes
DOS
Maximum I/O Ports: 6
Asynchronous
Vendor Sales Terms: Purchase
Purchase Price: $3,600 to $6,600
Maintenance: Western Union
Date First Installed: February 1983

IMS INTERNATIONAL
8000IS (ZiLOG)
Desktop
Word Length: 8-bit
Operating System: CP/M; TURBO DOS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 160M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $6,600 to $25,600
Maintenance: Western Union
Date First Installed: February 1983

INSTRUMENTATION LABORATORY, INC.
PIXEL 100/AP
Supercomputer
Word Length: 32-bit
Operating System: UNIX
Languages Supported: Cobol; Asynchronous; Fortran; Basic; Pascal; C; Ada
Minimum Memory: 512K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum I/O Ports: 16
Maximum On-Line Storage: 160M bytes
Maximum I/O Ports: 10
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $11,000 to $26,000
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $26
Date First Installed: March 1977
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-11)

INTEGRATED BUSINESS COMPUTERS, INC.
MIDI-CADET
Micro
Word Length: 8-bit
Operating System: OASIS; MP/M; CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C; Assembler
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum I/O Ports: 11
Communications Protocols: OEM
Vendor Sales Terms: Purchase
Purchase Price: $25,000
Maintenance: Third-party
Average Maintenance Fee: $375
Date First Installed: April 1983

INTEL CORP.
8086/88/386
Micro
Word Length: 16-bit
Operating System: UX:ENIX
Languages Supported: Fortran; Basic; Pascal; PL/I; C; Assembler
Minimum Memory: 256K bytes
Maximum Memory: 640K bytes
Multiple Users: Yes
Maximum I/O Ports: 3
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $300
Number Installed to Date: February 1983
(See Vendor Profile Page V-12)

INTEGRATED BUSINESS COMPUTERS, INC.
CADET
Micro
Word Length: 8-bit
Operating System: OASIS; MP/M; CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 768K bytes
Multiple Users: Yes
Maximum I/O Ports: 11
Communications Protocols: Asynchronous; Dynamic
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $12,000
Maintenance: Third-party
Average Maintenance Fee: $180
Date First Installed: 1980
Number Installed to Date: 2,000
(See Vendor Profile Page V-12)

INTEGRATED BUSINESS COMPUTERS, INC.
ENSIGN
Micro
Word Length: 16-bit
Operating System: UNIX; OASIS-16
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C
Minimum Memory: 512K bytes
Maximum Memory: 8M bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2G bytes
Communications Protocols: Asynchronous; Dynamic
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,950
Maintenance: Third-party
Average Maintenance Fee: $375
Date First Installed: April 1983

INTEGRATED BUSINESS COMPUTERS, INC.
MICRO-CADET
Micro
Word Length: 8-bit
Operating System: OASIS; MP/M; CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/I; C; Assembler
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum I/O Ports: 11
Communications Protocols: OEM
Vendor Sales Terms: Purchase
Purchase Price: $25,000
Maintenance: Third-party
Average Maintenance Fee: $375
Date First Installed: February 1983

INTEGRATED BUSINESS COMPUTERS, INC.
TO COMPUTER SYSTEMS
**Micros**

**INTELLIGENT SYSTEMS CORP.**

**INTECOLOR 3650**

- **Desktop**: Micros
- **Word Length**: 8-bit
- **Operating System**: FCS
- **Languages Supported**: Basic; Disc, Basic
- **Minimum Memory**: 24K bytes
- **Maximum Memory**: 64K bytes
- **Multiple Users**: No
- **Maximum On-Line Storage**: 460K bytes
- **Maximum I/O Ports**: 2
- **Communications Protocols**: Asynchronous
- **Distribution**: Third-party
- **Vendor Sales Terms**: Purchase
- **Purchase Price**: $6,000 to $7,000
- **Maintenance**: On-site
- **Average Maintenance Fee**: $30
- **Date First Installed**: April 1977

**INTECOLOR 3800**

- **Desktop**: Micros
- **Word Length**: 8-bit
- **Operating System**: CP/M
- **Languages Supported**: EXT; Disc; Basic
- **Minimum Memory**: 32K bytes
- **Maximum Memory**: 128K bytes
- **Multiple Users**: No
- **Maximum On-Line Storage**: 4.6M bytes
- **Maximum I/O Ports**: 4
- **Communications Protocols**: Asynchronous
- **Distribution**: Third-party
- **Vendor Sales Terms**: Purchase
- **Purchase Price**: $9,000 to $11,000
- **Maintenance**: Sorbus, Inc.
- **Date First Installed**: November 1982
- **Number Installed to Date**: 10
- **Communications Protocols**: Bisynchronous
- **Distribution**: Third-party
- **Vendor Sales Terms**: Purchase; Rental; Lease
- **Purchase Price**: $11,500 to $15,000
- **Maintenance**: Sorbus, Inc.
- **Date First Installed**: November 1982
- **Number Installed to Date**: 100

**INTER-CARE SYSTEMS, INC.**

**7300 Micro**

- **Word Length**: 8-bit
- **Operating System**: CP/M
- **Languages Supported**: Basic; Pascal; C
- **Minimum Memory**: 256K bytes
- **Maximum Memory**: 768K bytes
- **Multiple Users**: No
- **Maximum On-Line Storage**: 100M bytes
- **Maximum I/O Ports**: 3
- **Communications Protocols**: Bisynchronous
- **Distribution**: Third-party
- **Vendor Sales Terms**: Purchase; Rental; Lease
- **Purchase Price**: $11,500 to $15,000
- **Maintenance**: Sorbus, Inc.
- **Date First Installed**: November 1982
- **Number Installed to Date**: 100

**D-30 COMPUTERWORLD BUYER'S GUIDE**
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $19,000 to $30,000
Date First Installed: December 1982
Number Installed to Date: 10

INTER CITY PAPERS, LTD.
PC-1
Micro
Word Length: 8-bit
Languages Supported: Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $1,500
Number Installed to Date: 150
(See Vendor Profile Page V-12)

INTERNATIONAL ENTRY SYSTEMS, INC.
6000
Micro
Word Length: 8-bit
Operating System: CPM
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $3,400 to $3,960
Number Installed to Date: 20
(See Vendor Profile Page V-12)

INTERNATIONAL ENTRY SYSTEMS, INC.
DATA CON-80/95
Desktop
Word Length: 8-bit
Languages Supported: Quick
Minimum Memory: 196K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 1
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $1,995 to $2,200
Maintenance: On-site
Average Maintenance Fee: $25
Date First Installed: June 1982
Number Installed to Date: 500

INTERNATIONAL TELECONTROL CORP.
SERIES 850
Micro
Specific Application: Training
Word Length: 8-bit
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $28,000
Maintenance: On-site; Return to manufacturing facility

Average Maintenance Fee: $150

INTERSIL SYSTEMS, INC.
INFORMATION PROCESSOR
Personal
Word Length: 8-bit
Operating System: CPM
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 20M bytes
Maximum I/O Ports: 3
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $4,500
Date First Installed: June 1982
(See Vendor Profile Page V-12)

INTERSIL SYSTEMS, INC.
ISB 80/95
Micro
Specific Application: Process Control
Word Length: 8-bit
Operating System: CPM 2.2; CPM 3.0
Languages Supported: Fortran; Basic; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 40M bytes
Communications Protocols: SDL; HDLC
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $5,500 to $7,500
Date First Installed: September 1982
Number Installed to Date: 10 - 50

INTERTEC DATA SYSTEMS CORP.
COMPUTAR
Desktop
Word Length: 8-bit
Operating System: CPM
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 256K bytes
Maximum Memory: 1.5M bytes
Multiple Users: No
Maximum On-Line Storage: 144M bytes
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,000
Number Installed to Date: 10,000 - 50,000
(See Vendor Profile Page V-12)

INTERTEC DATA SYSTEMS CORP.
SUPERBRAIN
Desktop
Word Length: 8-bit
Operating System: CPM
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 320K bytes
Multiple Users: No
Maximum On-Line Storage: 12M bytes
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,995 to $15,000
Maintenance: Third-party
Date First Installed: October 1979
Number Installed to Date: 10,000 - 50,000

ITHACAS INTERSYSTEMS, INC.
ENCORE MPFU1000
Desktop
Word Length: 16-bit
Operating System: XENIX
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 16M bytes
Maximum I/O Ports: 8
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
(See Vendor Profile Page V-12)

ITHACAS INTERSYSTEMS, INC.
ENCORE XPU100
Desktop
Word Length: 8-bit
Operating System: CPM/M; MPM
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum I/O Ports: 8
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase

ITHACAS INTERSYSTEMS, INC.
ITHACAS 930/800
Micro
Word Length: 8-bit
Operating System: CPM; UNIX
Languages Supported: Cobol; Fortran; Basic plus; Pascal; APL; PL/1; C
Minimum Memory: 256K bytes
Maximum Memory: 1.5M bytes
Multiple Users: Yes
Maximum I/O Ports: 12
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: Third-party
Date First Installed: January 1982
Number Installed to Date: 500 - 1,000

ITHACO, INC.
COMPU-DAS
Micro
Specific Application: Data Acquisition
Word Length: 8-bit
Operating System: DABIL
Languages Supported: Basic
Minimum Memory: 20K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum I/O Ports: 5
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $7,000 to $30,000
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $160
Date First Installed: 1977
Number Installed to Date: 350
(See Vendor Profile Page V-12)

JONAS LTD.
JONAS 2100
Portable
Word Length: 8-bit
Operating System: CPM/M2 2.2; CPM 3.0
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 96K bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,995 to $4,690
Maintenance: Westen Union
Date First Installed: June 1992
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-12)

JONAS LTD.
JONAS 2300
Portable
Word Length: 8-bit
Operating System: CPM/M2 2.2; CPM 3.0
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 16M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $5,995
Maintenance: Westen Union

KONTRON ELECTRONICS
2300
Micro
Word Length: 8-bit
Operating System: KODOS
Languages Supported: Pascal; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 35M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $17,000 to $40,000
Maintenance: On-site
Average Maintenance Fee: $250
Date First Installed: November 1978
Number Installed to Date: 4,500
(See Vendor Profile Page V-12)

KONTRON ELECTRONICS
KIDS
Micro
Word Length: 8-bit

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TO COMPUTER SYSTEMS

Micros
Micros

Operating System: UNIX
Languages Supported: Pascal; Assembler
Minimum Memory: 1M bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 20M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous; RS-232
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $22,000 to $50,000
Maintenance: On-site
Average Maintenance Fee: $300
Number Installed to Date: 10 - 50

LABORATORY TECHNOLOGIES CORP., LAB TECH 79 Micro
Specific Application: Laboratory Use
Word Length: 16-bit
Operating System: IRMX-86, CP/M 86, MS-DOS
Languages Supported: Fortran; Basic; Pascal; PL/1
Minimum Memory: 380K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 3
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Vendor Sales Terms: Purchase
Purchase Price: $15,000 to $19,000
Maintenance: On-site
Average Maintenance Fee: $160
Date First Installed: April 1982
Number Installed to Date: 18
(See Vendor Profile Page V-12)

LANIER BUSINESS PRODUCTS, INC., COMPUTER E2E Desktop
Word Length: 8-bit
Operating System: LEXIS; CP/M
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 5M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $6,500 to $9,500
Maintenance: On-site
Average Maintenance Fee: $100
Date First Installed: July 1983
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-12)

LEXOR CORP., LEXORITER SERIES 3 Word Processing system
Specific Application: Word Processing
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; PL/1
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 640K bytes
Maximum I/O Ports: 2
Communications Protocols: Asynchronous
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $21,500
Maintenance: Third-party
Date First Installed: November 1982
(See Vendor Profile Page V-12)

LINX RESEARCH CORP., LNWX Micro
Word Length: 8-bit
Operating System: DOS + ; NEWDOS 80; TRS DOS
Languages Supported: Basic
Minimum Memory: 48K bytes
Maximum Memory: 48K bytes
Multiple Users: No
Maximum On-Line Storage: 1.1M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $1,695 to $2,995
Maintenance: On-site
(See Vendor Profile Page V-12)

LINX RESEARCH CORP., LNXW2 II Portable
Word Length: 8-bit
Operating System: CP/M; CPOS
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 96K bytes
Maximum Memory: 96K bytes
Multiple Users: No
Maximum On-Line Storage: 1.1M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $1,995 to $2,995
Maintenance: On-site
(See Vendor Profile Page V-12)

LOGICAL BUSINESS MACHINES, ADAM Micro
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: English
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 20M bytes
Maximum I/O Ports: 12
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $22,000
Maintenance: Third-party
Date First Installed: September 1992
Number Installed to Date: 1,500
(See Vendor Profile Page V-12)

LOGICAL BUSINESS MACHINES, DAVID Micro
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: English
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 1.2M bytes
Maximum I/O Ports: 2
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $5,000 to $6,000
Maintenance: On-site

MANAGEMENT ASSISTANCE, INC., SYSTEM 110/210 Micro
Word Length: 8-bit
Operating System: BOSS
Languages Supported: Basic
Minimum Memory: 16K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 56M bytes
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,100 to $31,200
Maintenance: On-site

MANAGEMENT ASSISTANCE, INC., SYSTEM 310 Micro
Word Length: 8-bit
Operating System: BOSS
Languages Supported: Basic
Minimum Memory: 48K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 120M bytes
Communications Protocols: Asynchronous; Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $52,000 to $81,000
Maintenance: On-site

MANAGEMENT ASSISTANCE, INC., SYSTEM 510 Micro
Word Length: 8-bit
Operating System: BOSS
Languages Supported: Basic
Minimum Memory: 48K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 300M bytes
Communications Protocols: Asynchronous; Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $50,000 to $80,000
Maintenance: On-site

MANAGEMENT ASSISTANCE, INC., SYSTEM 710 Micro
Word Length: 8-bit
Operating System: BOSS
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 32
Maximum On-Line Storage: 600M bytes
Communications Protocols: Asynchronous; Biynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $56,000 to $112,000
Maintenance: On-site

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<table>
<thead>
<tr>
<th>Vendor</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Memory</th>
<th>Storage</th>
<th>Used By</th>
<th>Price Range</th>
<th>Maintenance</th>
<th>Date First Installed</th>
<th>Vendor Sales Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM 810</td>
<td>Micro</td>
<td>8-bit Operating System: DOS/IVS</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>1M bytes</td>
<td>$125,000 to $250,000</td>
<td>On-site</td>
<td>January 1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBEX 7500</td>
<td>IBM</td>
<td>60M</td>
<td>1M bytes</td>
<td>Yes; 8</td>
<td>144M</td>
<td>$6,000 to $25,000</td>
<td>OEM</td>
<td>1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBEX 9000</td>
<td>IBM</td>
<td>168M</td>
<td>1M bytes</td>
<td>Yes; 20</td>
<td>60M</td>
<td>$2,500 to $15,000</td>
<td>OEM</td>
<td>1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5000P</td>
<td>IBM</td>
<td>8-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>6M</td>
<td>$3,350</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
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<tr>
<td>IBM 5860P</td>
<td>IBM</td>
<td>16-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>64M</td>
<td>$6,395</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-C</td>
<td>IBM</td>
<td>32-bit Operating System: DOS</td>
<td>Basic</td>
<td>Yes</td>
<td>1M bytes</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-H</td>
<td>IBM</td>
<td>8-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-H/C</td>
<td>IBM</td>
<td>16-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
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<tr>
<td>IBM 5860P-P/H/C</td>
<td>IBM</td>
<td>32-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
</tbody>
</table>

**Micros**

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Operating System</th>
<th>Languages Supported</th>
<th>Memory</th>
<th>Storage</th>
<th>Used By</th>
<th>Price Range</th>
<th>Maintenance</th>
<th>Date First Installed</th>
<th>Vendor Sales Terms</th>
</tr>
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<tbody>
<tr>
<td>SYSTEM 810</td>
<td>Micro</td>
<td>8-bit Operating System: DOS/IVS</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>1M bytes</td>
<td>$125,000 to $250,000</td>
<td>On-site</td>
<td>January 1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBEX 7500</td>
<td>IBM</td>
<td>60M</td>
<td>1M bytes</td>
<td>Yes; 8</td>
<td>144M</td>
<td>$6,000 to $25,000</td>
<td>OEM</td>
<td>1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBEX 9000</td>
<td>IBM</td>
<td>168M</td>
<td>1M bytes</td>
<td>Yes; 20</td>
<td>60M</td>
<td>$2,500 to $15,000</td>
<td>OEM</td>
<td>1981</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5000P</td>
<td>IBM</td>
<td>8-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>6M</td>
<td>$3,350</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P</td>
<td>IBM</td>
<td>16-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>64M</td>
<td>$6,395</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-C</td>
<td>IBM</td>
<td>32-bit Operating System: DOS</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>1M bytes</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-H</td>
<td>IBM</td>
<td>8-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-H/C</td>
<td>IBM</td>
<td>16-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
<tr>
<td>IBM 5860P-P/H/C</td>
<td>IBM</td>
<td>32-bit Operating System: CP/M</td>
<td>Basic, Pascal</td>
<td>Yes</td>
<td>2M</td>
<td>$3,900</td>
<td>OEM</td>
<td>1982</td>
<td>Purchase</td>
</tr>
</tbody>
</table>
Asynchronous; Synchronous; Distribution: End user
Purchase Price: $15,000
Maintenance: Return to manufacturing facility
Date First Installed: September 1981

MIKO TECHNOLOGY LIMITED
MTU-132
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol; Basic
Minimum Memory: 80K bytes
Maximum Memory: 1.3M bytes
Minimum On-Line Storage: 4M bytes
Maximum On-Line Storage: Unlimited
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $1,900
Maintenance: Return to manufacturing facility
Date First Installed: September 1981

MICRO COACH LIMITED
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Cobol; Basic
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 156M bytes
Communications Protocols: Asynchronous; Bisynchronous; Synchronous; SDLC; SDLC/SNA; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $7,900
Maintenance: On-site; Remote diagnostics
Date First Installed: 1977

MICRO DATA SCIENTISTS CORPORATION
SERIES 21 21/40
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Cobol; Basic; PL/I; MAC/RMAC
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 156M bytes
Communications Protocols: Asynchronous; Bisynchronous; Synchronous; SDLC; SDLC/SNA; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $7,900
Maintenance: On-site; Remote diagnostics
Date First Installed: 1978

MOHAWK DATA SCIENTISTS CORPORATION
SERIES 21 21/10
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Cobol; Basic
Minimum Memory: 64K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 156M bytes
Communications Protocols: Asynchronous; Bisynchronous; Synchronous; SDLC; SDLC/SNA; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $7,900
Maintenance: On-site; Remote diagnostics
Date First Installed: 1978

MOHAWK DATA SCIENTISTS CORPORATION
SERIES 21 21/50
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Cobol; Basic
Minimum Memory: 64K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 156M bytes
Communications Protocols: Asynchronous; Bisynchronous; Synchronous; SDLC; SDLC/SNA; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $7,900
Maintenance: On-site; Remote diagnostics
Date First Installed: 1978

MOHAWK DATA SCIENTISTS CORPORATION
SERIES 21 21/80
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Cobol; Basic
Minimum Memory: 64K bytes
Multiple Users: Yes; 8
Maximum On-Line Storage: 156M bytes
Communications Protocols: Asynchronous; Bisynchronous; Synchronous; SDLC; SDLC/SNA; X.25
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $7,900
Maintenance: On-site; Remote diagnostics
Date First Installed: 1978
Micros
MOLECULAR COMPUTER
SUPERMICRO 32X

Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $14,000 to $25,000
Maintenance: Third-party
Date First Installed: December 1982

Micro

Word Length: 8-bit
Operating System: N/STAR;

CP/M;

CP/M 86
MOMENTUM COMPUTER
SYSTEMS INTERNATIONAL
HAWK 32/4
Supermicro

Languages Supported: Cobol

Basic; PL/1; MAC/RMAC CB80
Minimum Memory: 64K bytes
Maximum Memory: 2M bytes
Multiple Users: Yes; 32

Operating System: UNIX
Languages Supported: Cobo!
Fortran; Basic; Pascal; C
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum 1/O Ports: 4
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $12,000
Maintenance: Bunker Ramo
Date First Installed: December 1982

Maximum On-Line Storage: 240M
bytes
Maximum 1/O Ports: 67
Communications Protocols:
Asynchronous; Synchronous
Bisynchronous; SDLC; SDLC/SNA
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $21,000 to

$118,000
Maintenance: On-site; Return to
manufacturing facility
Average Maintenance Fee: $260
Date First Installed: June 1983

MOMENTUM
SYSTEMS

MOMENTUM

COMPUTER

INTERNATIONAL

32

Supermicro

MOLECULAR COMPUTER
SUPERMICRO 64X

Word Length: 16/32-bit
Operating System: UNIX

Micro

Languages Supported: Cobo!
Fortran; Basic; Pascal; C
Minimum Memory: 500K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16

Word Length: 8-bit
Operating System: N/STAR;

CP/M

CP/M 86
Languages Supported: Cobol;

Distribution: OEM
Vendor Sales Terms: Purchase

Multiple Users: No

Purchase Price: $13,500 to $25,000

bytes
Maximum 1/O Ports: 3
Communications Protocols:
Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase

Maximum On-Line Storage: 13.2M

Maintenance: Bunker Ramo
Date First Installed: January 1983
Number Installed to Date: 32

MONOLITHIC SYSTEMS CORP.
MSC-8702
Micro
Word Length: 16-bit
Operating System: DEC;
RSX-11; UNIX

RSTS/E

Languages Supported: Fortran
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes

Micro

Multiple Users: No
Maximum On-Line Storage: 12.2M
bytes
Maximum 1/O Ports: 40
Communications Protocols:
Asynchronous
Distribution: End user; OEM

Vendor Sales Terms: Purchase
Purchase Price: $6,800
1981

Purchase Price: $9,000
Maintenance: Return to
manufacturing facility
Date First Installed: June 1981

Micro

bytes
Maximum

Maximum On-Line Storage: 272M

Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $12,000 to $25,000

Word Length: 8-bit
Operating System: CP/M; MP/M
Languages Supported: Cobol
Basic
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes

$175,000
Maintenance: On-site; Return to
manufacturing facility

Average Maintenance Fee: $260
Date First Installed: September

1983
MOMENTUM COMPUTER
SYSTEMS INTERNATIONAL
HAWK 32
Supermicro

Maintenance: Bunker Ramo
Date First Installed: February 1982

Number Installed to Date: 220
MOMENTUM COMPUTER
SYSTEMS INTERNATIONAL
| MOMENTUM 32/4
Supermicro
Word Length: 32-bit
Operating System: UNIX
Languages Supported: Cobol
Fortran; Basic; Pascal; C
Minimum Memory: 500K bytes
Maximum Memory: 1M bytes
| Multiple Users: Yes; 4
Maximum On-Line Storage: 90M

Word Length: 16/32-bit
Operating System: UNIX
Languages Supported: Cobo!
Fortran; Basic; Pascal; C
Minimum Memory: 512K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 400M
bytes
Maximum 1/O Ports: 16
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $11,000 to $20,000
Maintenance: Third-party
Date First Installed: March 1982
(See Vendor Profile Page V-14)

MOMENTUM COMPUTER
SYSTEMS INTERNATIONAL
HAWK 32/E
Supermicro
Operating System: UNIX
Languages Supported: Cobol;
Fortran; Basic; Pascal; C

Minimum Memory: 512K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16
Maximum 1/O Ports: 16

TO COMPUTER SYSTEMS

bytes
| Maximum 1/O Ports: 4
Communications Protocols:
Asynchronous; Synchronous
Distribution: OEM
| Vendor Sales Terms: Purchase
Purchase Price: $10,000 to $14,000
| Maintenance: Bunker Ramo
Date First Installed: December 1982
Number Installed to Date: 28

MOMENTUM COMPUTER
SYSTEMS INTERNATIONAL
| MOMENTUM

32E

| Supermicro

| Word Length: 32-bit
| Operating System: UNIX
Languages Supported: Cobol;
Fortran; Basic; Pascal; C
Minimum Memory: 500K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 16
Maximum On-Line Storage: 240M
bytes
Maximum 1/O Ports: 17
Communications Protocols:
Asynchronous; Synchronous;
Bisynchronous

Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 13.2M
bytes
Maximum 1/O Ports: 3
Communications Protocols:
Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase

MONOLITHIC SYSTEMS CORP.
MSC-8800 SERIES

Maximum On-Line Storage: 240M

bytes
Maximum 1/O Ports: 131
Communications Protocols:
Asynchronous; Synchronous
Bisynchronous; SDLC; SDLC/SNA
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $25,000 to

Word Length: 8-bit
Operating System: MP/M
Languages Supported: Basic

(See Vendor Profile Page V-14)

Basic; PL/1; MAC/RMAC CB80
Minimum Memory: 64K bytes
Maximum Memory: 4M bytes
Multiple Users: Yes; 64

1/O Ports: 17
Communications Protocols:

Date First Installed: June 1981

MONOLITHIC SYSTEMS CORP.
MSC-8805

Basic; Basic plus 2; Pascal

Maintenance: Return to
manufacturing facility
Date First Installed: November

Purchase Price: $7,000
Maintenance: Return to
manufacturing facility

Multiple Users: Yes; 15
Maximum On-Line Storage: 4M
bytes
| Communications Protocols:
Asynchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $7,000 to $18,000
Maintenance: Return to
manufacturing facility
| Date First Installed: 1979
Number Installed to Date: 100 —

500

MONOLITHIC SYSTEMS CORP.
MSC-8801
Micro
Word Length: 8-bit
Operating System: CP/M

Languages Supported: Fortran
Basic; Basic plus; Pascal
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 3.2M
| bytes
Maximum 1/O Ports: 3
Communications Protocols:
Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase

Purchase Price: $6,250
Maintenance: Return to
| manufacturing facility
| Date First Installed: June 1981

MONOLITHIC SYSTEMS CORP.
MSC-8802
Micro
Word Length: 8-bit
Operating System: CP/M; MP/M

Languages Supported: Fortran;
Basic; Basic plus; Pascal
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes

MOSTEK CORP.
MATRIX-80/SDT
Micro

Specific Application: General
Purpose
Word Length: 8-bit
Operating System: FLP-DOS
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes

| Multiple Users: No

Maximum On-Line Storage: 500K
bytes

Maximum 1|/O Ports: 1
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,300

| Maintenance: Return to
manufacturing facility
Date First Installed: 1980
(See Vendor Profile Page V-14)

MOSTEK CORP.
MATRIX/200
Micro

| Word Length: 8-bit
Operating System: M/OS-80
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No

Maximum On-Line Storage: 2M
bytes

| Maximum I/O Ports: 1

Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,995
Maintenance: Return to
manufacturing facility
Date First Installed: January 1982
(See Vendor Profile Page V-14)

MULLEN COMPUTER
PRODUCTS
| STD 991
Micro

Word Length: 8-bit
Operating System: CP/M 2.2
Languages Supported: Basic;
Assembler
Minimum Memory: 64K bytes

D-35


**Micros**

- **MS-DOS, CP/M 86**
  - Languages Supported: Cobol, Basic
  - Multiple Users: No
  - Maximum On-Line Storage: 430K bytes
  - Maximum Memory: 64K bytes
  - Minimum Memory: 64K bytes
  - Maximum On-Line Storage: 96M bytes
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $2,695 to $4,195
  - Maintenance: On-site

- **MULTI-TECH SYSTEMS, INC.**
  - Desktop
  - Word Length: 8-bit
  - Operating System: CP/M
  - Languages Supported: Cobol, Fortran, Basic
  - Minimum Memory: 64K bytes
  - Maximum Memory: 64K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 11M bytes
  - Maximum I/O Ports: 2
  - Communications Protocols: Asynchronous, Synchronous, Bisynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Date First Installed: October 1978
  - Number Installed to Date: 400

- **NEC INFORMATION SYSTEMS**
  - **ASTRA 206**
    - Desktop
    - Word Length: 16-bit
    - Operating System: TOS
    - Languages Supported: Cobol, Fortran, Basic, Pascal
    - Minimum Memory: 64K bytes
    - Maximum Memory: 256K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 150M bytes
    - Multiple I/O Ports: 4
    - Communications Protocols: Asynchronous
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Purchase Price: $4,795 to $11,000
    - Maintenance: On-site; Distributors
    - Purchase Price: $7,000 to $15,000
    - Maintenance: On-site
    - Date First Installed: January 1978
    - Number Installed to Date: 250

- **NIAGARA SCIENTIFIC, INC.**
  - **KAYPRO 10**
    - Desktop
    - Word Length: 8-bit
    - Operating System: DOS
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Maximum On-Line Storage: 150M bytes
    - Multiple Users: No
    - Maximum Memory: 64K bytes
    - Multiple I/O Ports: 2
    - Communications Protocols: Asynchronous, Synchronous, Bisynchronous
    - Distribution: Third-party
    - Vendor Sales Terms: Purchase
    - Date First Installed: May 1983
    - Number Installed to Date: 50,000

- **NIAGARA SCIENTIFIC, INC.**
  - **KAYPRO II**
    - Desktop
    - Word Length: 8-bit
    - Operating System: CP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 10M bytes
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Purchase Price: $2,795
    - Maintenance: Sorbus, Inc
    - Date First Installed: March 1983

- **NON LINEAR SYSTEMS, INC.**
  - **KAYPRO**
    - Desktop
    - Word Length: 8-bit
    - Operating System: OASIS, MP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 150M bytes
    - Multiple I/O Ports: 2
    - Communications Protocols: Asynchronous, Synchronous, Bisynchronous
    - Distribution: Third-party
    - Vendor Sales Terms: Purchase
    - Date First Installed: May 1982
    - Number Installed to Date: 100,000

- **NORDEN SYSTEMS**
  - **LSI-11M**
    - Micro
    - Word Length: 16-bit
    - Operating System: RSTS
    - Languages Supported: Fortran, Basic
    - Minimum Memory: 4K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum I/O Ports: 11
    - Distribution: End user
    - Vendor Sales Terms: Purchase
    - Purchase Price: $10,000 to $40,000
    - Maintenance: On-site; Return to manufacturing facility
    - Date First Installed: 1978

- **NORTHERN TELECOM, INC.**
  - **900**
    - Micro
    - Word Length: 8-bit
    - Operating System: OASIS, CP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 1M bytes
    - Multiple Users: Yes
    - Maximum On-Line Storage: 16M bytes
    - Maximum I/O Ports: 10
    - Communications Protocols: Asynchronous, Synchronous
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Purchase Price: $5,399 to $12,000
    - Maintenance: Third-party
    - Average Maintenance Fee: $120
    - Date First Installed: 1978
    - Number Installed to Date: 100 — 500

- **NON LINEAR SYSTEMS, INC.**
  - **KAYPRO II**
    - Desktop
    - Word Length: 8-bit
    - Operating System: CP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 10M bytes
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Date First Installed: January 1978
    - Number Installed to Date: 10,000 — 50,000

- **NIAGARA SCIENTIFIC, INC.**
  - **DATION 720 SERIES**
    - Micro
    - Word Length: 8-bit
    - Operating System: DOS
    - Languages Supported: Assembler
    - Minimum Memory: 16K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum I/O Ports: 4
    - Communications Protocols: Synchronous
    - Distribution: End user
    - Vendor Sales Terms: Purchase
    - Purchase Price: $7,000 to $15,000
    - Maintenance: On-site
    - Date First Installed: January 1978
    - Number Installed to Date: 250
    - (See Vendor Profile Page V-15)

- **NINTECH CORPORATION**
  - **500**
    - Micro
    - Word Length: 8-bit
    - Operating System: OASIS, CP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 10M bytes
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Purchase Price: $2,795
    - Maintenance: Sorbus, Inc
    - Date First Installed: March 1983

- **PEDIATRICS SOFTWARE**
  - **PEDIATRICS**
    - Micro
    - Word Length: 8-bit
    - Operating System: CP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 10M bytes
    - Distribution: Third-party
    - Vendor Sales Terms: Purchase
    - Date First Installed: January 1978
    - Number Installed to Date: 250
    - (See Vendor Profile Page V-15)

- **PENGUIN SYSTEMS**
  - **500**
    - Micro
    - Word Length: 8-bit
    - Operating System: MP/M
    - Languages Supported: Cobol, Fortran, Basic, Pascal, C
    - Minimum Memory: 64K bytes
    - Maximum Memory: 64K bytes
    - Multiple Users: No
    - Maximum On-Line Storage: 10M bytes
    - Distribution: OEM
    - Vendor Sales Terms: Purchase
    - Purchase Price: $2,795
    - Maintenance: Sorbus, Inc
    - Date First Installed: January 1978
    - Number Installed to Date: 250
    - (See Vendor Profile Page V-15)
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 256K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 3.2M bytes
Maximum I/O Ports: 2
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental; Lease
Purchase Price: $4,795 to $13,000
Maintenance: On-site
Date First Installed: November 1981 (See Vendor Profile Page V-15)

NORTHERN TELECOM, INC.
58S
Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic
Minimum Memory: 256K bytes
Maximum Memory: 315K bytes
Minimum Memory: 256K bytes
Maximum Memory: 315K bytes
Multiple Users: Yes
Maximum 1/O Ports: 16
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $46,900
Maintenance: On-site
Date First Installed: June 1981

NORTHERN TELECOM, INC.
Advantage
Desktop
Word Length: 8-bit
Operating System: TBS, MS-DOS, GC/P/M
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $39,000
Maintenance: On-site
Date First Installed: September 1981
Number Installed to Date: 10,000
(See Vendor Profile Page V-15)

NORTHERN TELECOM, INC.
HORIZON MultiTUSER
Desktop
Word Length: 8-bit
Operating System: TSS/DOS, TSSA, CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,599
Maintenance: On-site
Average Maintenance Fee: $110
Date First Installed: December 1977
Number Installed to Date: 10,000
— 50,000

NORTHERN TELECOM, INC.
HORIZON MultiTUSER
Desktop
Word Length: 8-bit
Operating System: TSS/DOS, TSSA, CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,599
Maintenance: On-site
Average Maintenance Fee: $110
Date First Installed: December 1977
Number Installed to Date: 10,000
— 50,000

NOVELL DATA MANAGEMENT, INC.
SHARENET
Desktop
Word Length: 32-bit
Operating System: CP/M; SHARENET; MPM
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 320K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 7
Communications Protocols: Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,599
Maintenance: On-site
Date First Installed: August 1982

OAKLEAF, INC.
DPU
Micro
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum On-Line Storage: 30M bytes
Maximum I/O Ports: 8
Communications Protocols: HDLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $9,000 to $25,000
Maintenance: On-site
Average Maintenance Fee: $150
Date First Installed: January 1982
Number Installed to Date: 2,200

OAKLEAF, INC.
38-380
Micro
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum On-Line Storage: 30M bytes
Maximum I/O Ports: 8
Communications Protocols: Asynchronous, Synchronous, HDLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $9,500
Maintenance: On-site
Average Maintenance Fee: $150
Date First Installed: August 1982
Number Installed to Date: 1,200

OAKLEAF, INC.
SX-350
Micro
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Maximum On-Line Storage: 30M bytes
Maximum I/O Ports: 8
Communications Protocols: Asynchronous, Synchronous, HDLC
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $8,500
Maintenance: On-site
Average Maintenance Fee: $150
Date First Installed: August 1982
Number Installed to Date: 1,200

OAKLEAF, INC.
MP-16
Micro
Word Length: 16-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 256K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes
Average Maintenance Fee: $150
Date First Installed: August 1982
Number Installed to Date: 10 — 50

OAKLEAF, INC.
SHARENET
Desktop
Word Length: 32-bit
Operating System: CP/M; SHARENET; MPM
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 320K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $8,500
Maintenance: On-site
Average Maintenance Fee: $150
Number Installed to Date: 1,200

OAKLEAF, INC.
SHARENET
Desktop
Word Length: 32-bit
Operating System: CP/M; SHARENET; MPM
Languages Supported: Basic
Minimum Memory: 128K bytes
Maximum Memory: 320K bytes
Multiple Users: Yes
Maximum On-Line Storage: 15M bytes
Maximum I/O Ports: 32
Communications Protocols: Asynchronous, Synchronous
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $8,500
Maintenance: On-site
Average Maintenance Fee: $150
Number Installed to Date: 1,200

OAKLEAF, INC.
OS-3
Hand-held
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 16M bytes

OAKLEAF, INC.
OS-3
Hand-held
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 16M bytes

OAKLEAF, INC.
OS-3
Hand-held
Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Basic, FPL
Minimum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 16M bytes

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**Micros**

- **ONYX SYSTEMS C8002A**
  - **Word Length:** 8-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 256K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 21M bytes
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 256K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 21M bytes
  - Maximum I/O Ports: 6
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $11,990 to $13,990
  - Maximum I/O Ports: 6
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $11,990 to $13,990
  - Maintenance: RCA Corp

- **ONYX SYSTEMS C8001/MU**
  - **Word Length:** 8-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 21M bytes
  - Number Installed to Date: 300
  - Maintenance: RCA Corp

- **ONYX SYSTEMS C8000/A**
  - **Word Length:** 8-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 256K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 21M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $5,990 to $8,740
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SUNDANCE II**
  - **Word Length:** 8-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 21M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $11,990 to $13,990
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SUNDANCE 16**
  - **Word Length:** 8-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 21M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $11,990 to $13,990
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SUNDANCE**
  - **Word Length:** 8-bit
  - Operating System: CP/M
  - Languages Supported: Basic
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 21M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $5,990 to $8,740
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SYSTEM 5000**
  - **Word Length:** 16-bit
  - Operating System: CP/M, OASIS
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 256K bytes
  - Maximum Memory: 512K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 40M bytes
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $11,990 to $13,990
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SYSTEM 2000**
  - **Word Length:** 16-bit
  - Operating System: CP/M
  - Languages Supported: Basic
  - Minimum Memory: 64K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 40M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $5,990 to $11,990
  - Maintenance: RCA Corp

- **ONYX SYSTEMS SYSTEM 3000**
  - **Word Length:** 16-bit
  - Operating System: CP/M
  - Languages Supported: Basic
  - Minimum Memory: 64K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 30M bytes

**COMPUTERWORLD BUYER'S GUIDE**

- **COMPUTERWORLD**
  - **Word Length:** 8-bit
  - Operating System: CP/M
  - Languages Supported: Basic
  - Minimum Memory: 64K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 30M bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $5,990 to $11,990
  - Maintenance: RCA Corp

- **OSBORN COMPUTER CORP. OSBORNE I**
  - **Word Length:** 8-bit
  - Operating System: CP/M
  - Languages Supported: Cobol
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 370K bytes
  - Operating System: CP/M
  - Languages Supported: Cobol
  - Minimum Memory: 128K bytes
  - Maximum Memory: 256K bytes
  - Multiple Users: No
  - Maximum On-Line Storage: 370K bytes
  - Maximum I/O Ports: 3
  - Communications Protocols: Asynchronous
  - Distribution: Third-party
  - Vendor Sales Terms: Purchase
  - Purchase Price: $1,795 to $1,995
  - Maintenance: Return to manufacturing facility
  - Date First Installed: March 1981
  - Number Installed to Date: 500 — 1,000
  - (See Vendor Profile Page V-15)

- **OSM COMPUTER CORP. ZEUS 4**
  - **Word Length:** 8-bit
  - Operating System: MUSE, CP/M
  - Languages Supported: Cobol, Basic
  - Minimum Memory: 64K bytes
  - Maximum Memory: 300K bytes
  - Multiple Users: Yes
  - Maximum On-Line Storage: 30M bytes
Operating System: BASIC
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 8
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: Third-party
Date First Installed: 1980

PASCO INTERNATIONAL, INC.
MODEL 32
Micro
Specific Application: Image Analysis
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 64K bytes
Maximum Memory: 500K bytes
Multiple Users: Yes
Maximum I/O Ports: 24
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $5,000 to $20,000
Maintenance: On-site
Date First Installed: September 1982
Number Installed to Date: 500 — 1,000
(See Vendor Profile Page V-16)

PERSONAL MICRO COMPUTERS, INC.
PMC-80
Desktop
Word Length: 8-bit
Operating System: TRS-DOS/DOS
Languages Supported: Cobol, Fortran, Basic,
Minimum Memory: 16K bytes
Multiple Users: Yes
Maximum On-Line Storage: 500K bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $875 to $2,000
Maintenance: Return to manufacturing facility
Third-party
Date First Installed: 1980
Number Installed to Date: 10,000 — 50,000

PERSONAL MICRO COMPUTERS, INC.
PMC-81
Desktop
Word Length: 8-bit
Operating System: TRS-DOS/DOS
Languages Supported: Cobol, Fortran, Basic,
Minimum Memory: 16K bytes
Multiple Users: No
Maximum On-Line Storage: 48K bytes
Maximum I/O Ports: 8
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,000 to $4,000
Maintenance: Return to manufacturing facility
Third-party
Date First Installed: 1980
Number Installed to Date: 10,000 — 50,000

PASCO INTERNATIONAL, INC.
MODEL 7500
Micro
Word Length: 8-bit
Operating System: IDRIS
Languages Supported: Fortran, Basic, C
Minimum Memory: 50K bytes
Multiple Users: Yes
Maximum On-Line Storage: 10M bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: Third-party
Date First Installed: 1983
(See Vendor Profile Page V-16)

PERKIN-ELMER CORP.
MODEL 7800
Desktop
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Fortran, Basic, C
Minimum Memory: 40K bytes
Multiple Users: Yes
Maximum On-Line Storage: 10M bytes
Multiple Users: No
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $8,400 to $12,400
Maintenance: On-site
Date First Installed: 1983
(See Vendor Profile Page V-16)
### Micros

**PHC, INC.**

**OPT-RM**
- **Word Length:** 8-bit
- **Operating System:** OPT/BASIC, Languages Supported: Basic, Pascal, C, Assembly
- **Maximum Memory:** 256K bytes
- **Minimum Memory:** 128K bytes
- **Languages Supported:** Basic, Pascal, C, Assembly
- **Multiple Users:** No
- **Maximum On-Line Storage:** 160M bytes
- **Maximum I/O Ports:** 10
- **Communications Protocols:** Synchronous, Bynynchronou, HDLC
- **Distribution:** Third-party

**Polaris Microcomputers, Inc.**

**MICROSCRIPT**
- **Word Length:** 6-bit
- **Operating System:** CP/M, Languages Supported: Fortran, Basic; Pascal
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** No
- **Maximum On-Line Storage:** 2M bytes
- **Maximum I/O Ports:** 2
- **Distribution:** End user

**PHOENIX DIGITAL SYSTEMS, INC.**

**PHOENIX MICRO SYSTEM**
- **Word Length:** 16-bit
- **Operating System:** CP/M, Languages Supported: Fortran, Basic; Pascal
- **Minimum Memory:** 64K bytes
- **Maximum Memory:** 256K bytes
- **Multiple Users:** No
- **Maximum On-Line Storage:** 84M bytes
- **Maximum I/O Ports:** 4
- **Communications Protocols:** Asynchronous, Synchronous, HDLC
- **Distribution:** Third-party

**Plessey Peripheral Systems**

**SYSTEM-13 BV SERIES**
- **Micro Word Length:** 16-bit
- **Operating System:** CP/M 2.2, Languages Supported: Fortran, Basic; Pascal
- **Minimum Memory:** 32K bytes
- **Maximum Memory:** 32K bytes
- **Multiple Users:** No
- **Maximum On-Line Storage:** 360K bytes
- **Maximum I/O Ports:** 3
- **Communications Protocols:** Asynchronous
- **Distribution:** Third-party

**PolyMorphism Systems**

**8810/2**
- **Micro Word Length:** 8-bit
- **Operating System:** CP/M 2.2, Languages Supported: Fortran, Basic; Pascal
- **Minimum Memory:** 32K bytes
- **Maximum Memory:** 64K bytes
- **Multiple Users:** No
- **Maximum On-Line Storage:** 1M bytes
- **Communications Protocols:** Asynchronous
- **Distribution:** Third-party

**Poly Morphic Systems**

**8813**
- **Desktop Word Length:** 8-bit
- **Operating System:** CP/M 2.2, Languages Supported: Fortran, Basic; Pascal
- **Minimum Memory:** 32K bytes
- **Maximum Memory:** 64K bytes

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**D-40 COMPUTERWORLD BUYER’S GUIDE**
<table>
<thead>
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<th><strong>Micros</strong></th>
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<td><strong>Maximum On-Line Storage:</strong> 1M bytes</td>
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<td><strong>Maximum I/O Ports:</strong> 3</td>
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<td><strong>Communications Protocols:</strong> Asynchronous</td>
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<tr>
<td><strong>Distribution:</strong> Third-party</td>
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<tr>
<td><strong>Vendor Sales Terms:</strong> Purchase; Lease</td>
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<tr>
<td><strong>Purchase Price:</strong> $5,595 to $11,000</td>
</tr>
<tr>
<td><strong>Number Installed to Date:</strong> 500</td>
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</table>

**Polymorph Systems**

- **TWIN SYSTEMS**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic; Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Maximum On-Line Storage:** 3.2G bytes

- **POLYMORPHIC SYSTEMS**
  - **Maximum Memory:** 104K bytes
  - **Basic; Pascal
  - **Languages Supported:** Fortran
  - **Vendor Sales Terms:** Purchase; Distribution: Third-party
  - **Communications Protocols:** Asynchronous
  - **Maximum 1/O Ports:** 3
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase; Lease
  - **Purchase Price:** $9,995 to $15,000
  - **Number Installed to Date:** 1,000 |

**Product Associates, Inc.**

- **Z-DISK**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal; PL/1; C
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** Yes; 4
  - **Maximum On-Line Storage:** 30M bytes
  - **Maximum I/O Ports:** 2
  - **Communications Protocols:** Asynchronous
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $2,995 to $10,000
  - **Number Installed to Date:** 500
  - **Date First Installed:** February 1982
  - **Number Installed to Date:** 10 — 50

**ProLink Corp.**

- **PROLOG CORP.**
  - **ABL-101**
    - **Word Length:** 8-bit
    - **Operating System:** CP/M
    - **Languages Supported:** Cobol; Fortran, Basic; Pascal
    - **Minimum Memory:** 64K bytes
    - **Maximum Memory:** 64K bytes
    - **Multiple Users:** No
    - **Maximum On-Line Storage:** 3.2G bytes
    - **Maximum I/O Ports:** 40
    - **Communications Protocols:** Asynchronous
    - **Distribution:** End user
    - **Vendor Sales Terms:** Purchase
    - **Purchase Price:** $5,335
    - **Maintenance:** On-site
    - **Date First Installed:** April 1983

- **PROLOG CORP.**
  - **ABL-102**
    - **Word Length:** 8-bit
    - **Operating System:** CP/M
    - **Languages Supported:** Cobol; Fortran, Basic, Pascal
    - **Minimum Memory:** 64K bytes
    - **Maximum Memory:** 64K bytes
    - **Multiple Users:** No
    - **Maximum On-Line Storage:** 3.2G bytes
    - **Maximum I/O Ports:** 40
    - **Communications Protocols:** Asynchronous
    - **Distribution:** End user
    - **Vendor Sales Terms:** Purchase
    - **Purchase Price:** $5,335
    - **Maintenance:** On-site
    - **Date First Installed:** April 1983

**PROLOG CORP.**

- **ABL-151**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Date First Installed:** April 1983

**PROLOG CORP.**

- **ABL-251**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Date First Installed:** April 1983

**PROLOG CORP.**

- **ABL-252**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Date First Installed:** April 1983

**PROLOG CORP.**

- **ABL-253**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Date First Installed:** April 1983

**PRONTO COMPUTERS, INC.**

- **PRO-LOG CORP.**
  - **PRONTO 16/10**
    - **Word Length:** 8-bit
    - **Operating System:** CP/M
    - **Languages Supported:** Cobol; Fortran, Basic, Pascal
    - **Minimum Memory:** 64K bytes
    - **Maximum Memory:** 64K bytes
    - **Multiple Users:** No
    - **Maximum On-Line Storage:** 3.2G bytes
    - **Maximum I/O Ports:** 40
    - **Communications Protocols:** Asynchronous
    - **Distribution:** End user
    - **Vendor Sales Terms:** Purchase
    - **Purchase Price:** $5,335
    - **Maintenance:** On-site
    - **Date First Installed:** April 1983

**PRONTO COMPUTERS, INC.**

- **PRO-LOG CORP.**
  - **PRONTO 16/20**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Maintenance:** On-site
  - **Date First Installed:** April 1983

**PRONTO COMPUTERS, INC.**

- **PRO-LOG CORP.**
  - **PRONTO 16/30**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran, Basic, Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 3.2G bytes
  - **Maximum I/O Ports:** 40
  - **Communications Protocols:** Asynchronous
  - **Distribution:** End user
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $5,335
  - **Maintenance:** On-site
  - **Date First Installed:** April 1983

**PRONTO COMPUTERS, INC.**

- **PRO-LOG CORP.**
  - **PRONTO 16/110**
    - **Word Length:** 8-bit
    - **Operating System:** CP/M
    - **Languages Supported:** Cobol; Fortran, Basic, Pascal
    - **Minimum Memory:** 64K bytes
    - **Maximum Memory:** 64K bytes
    - **Multiple Users:** No
    - **Maximum On-Line Storage:** 3.2G bytes
    - **Maximum I/O Ports:** 40
    - **Communications Protocols:** Asynchronous
    - **Distribution:** End user
    - **Vendor Sales Terms:** Purchase
    - **Purchase Price:** $5,335
    - **Maintenance:** On-site
    - **Date First Installed:** April 1983

**PROPHET 21**

- **PROPHET 21 MODEL 3**
  - **Multimicro; Specific Application:** General Purpose
  - **Word Length:** 16-bit
  - **Operating System:** PROPHET 21
  - **Languages Supported:** Basic, Multimicro
  - **Minimum Memory:** 128K bytes
  - **Maximum Memory:** 1M bytes
  - **Multiple Users:** No
  - **Maximum On-Line Storage:** 1M bytes
  - **Communications Protocols:** Asynchronous
  - **Distribution:** OEM
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $4,995
  - **Maintenance:** On-site; Third-party

**TO COMPUTER SYSTEMS**

- **D-41**
Minimum Memory: 64K bytes
Multiple Users: Yes; 7
Minimum Memory: 119K bytes
Maximum Memory: 211K bytes
Multiple Users: Yes; 7
Maximum On-Line Storage: 80M bytes
Maximum I/O Ports: 6
Communications Protocols: Asynchronous; Synchronous; Bisynchronous
Distribution: OEM
Vendor Sales Terms: Purchase; Lease
Purchase Price: $9,695 to $11,845
Maintenance: General Electric Co.
Date First Installed: March 1979
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-17)

QEI, INC.
QUICS III
Micro
Word Length: 8-bit
Languages Supported: Basic; Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 768K bytes
Multiple Users: Yes; 4
Distribution: Asynchronous
Maintenance: On-site; Return to manufacturing facility
Date First Installed: January 1983
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-17)

QUIAS CO.
HK-2500
Hand-held
Word Length: 8-bit
Operating System: SNAT
Languages Supported: Basic; Porta-flex
Minimum Memory: 2K bytes
Maximum Memory: 2K bytes
Multiple Users: No
Maximum I/O Ports: 1
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $329
Maintenance: Return to manufacturing facility
Date First Installed: February 1982
Number Installed to Date: 500 — 1,000
(See Vendor Profile Page V-17)

QUIAS CO.
HK-2600
Hand-held
Word Length: 8-bit
Operating System: SNAT
Languages Supported: Basic; Porta-flex
Minimum Memory: 4K bytes
Maximum Memory: 4K bytes
Multiple Users: No
Maximum I/O Ports: 1
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $3,000
Maintenance: Return to manufacturing facility
Date First Installed: 1981
(See Vendor Profile Page V-17)

QUIARY CORP.
540
Desktop
Word Length: 8-bit
Operating System: CP/M; MP/M
Languages Supported: Cobol; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 208K bytes
Multiple Users: Yes
Maximum On-Line Storage: 600M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $2,500
Maintenance: Return to manufacturing facility
Date First Installed: 1981
(See Vendor Profile Page V-18)

QEI, INC.
QUICS III
Micro
Word Length: 8-bit
Languages Supported: Basic; Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 768K bytes
Multiple Users: Yes; 4
Distribution: Asynchronous
Maintenance: On-site; Return to manufacturing facility
Date First Installed: January 1983
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-17)
Minimum Memory: 64K bytes
Maximum Memory: 208K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 1.6G bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $3,600
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $4,995
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: January 1983

QUAY CORP.
900 Desktop

Word Length: 8-bit
Operating System: CP/M; MP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, C
Minimum Memory: 64K bytes
Maximum Memory: 208K bytes
Multiple Users: Yes; 4
Maximum On-Line Storage: 90M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $4,995
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: January 1983

GUEST ELECTRONICS
SUPER ELF
Micro
Word Length: 8-bit
Operating System: AMSOS
Languages Supported: Basic, Assembler
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum I/O Ports: 5
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $100 to $520
Maintenance: Return to manufacturing facility
Date First Installed: 1979

Q1 CORP.
Q1-5800D DESKTOP
Desktop

Word Length: 16-bit
Operating System: UNIX
Languages Supported: C-Basic
Minimum Memory: 2M bytes
Maximum Memory: 15M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $13,000 to $500,000
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $300
Date First Installed: May 1982
Number Installed: 100
Date First Installed: Less than 1 year
(See Vendor Profile Page V-17)

RADIX CORP.
UTILITYORDER
Hand-held

Word Length: 8-bit
Languages Supported: Assembler
Minimum Memory: 32K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Communications Protocols: Asynchronous; Bisynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $10,000
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $100
Date First Installed: January 1977
Number Installed to Date: 500 — 1,000
(See Vendor Profile Page V-17)

RAIR MICROCOMPUTER CORP.
BLACK BOX 3-20S
Desktop

Word Length: 8-bit
Operating System: Proprietary
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/I
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 19M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous; Synchronous
Distribution: End user
Vendor Sales Terms: Purchase

RAMTEK CORP.
6214 COLORGRAPHIC
Micro

Specific Application: Graphics
Word Length: 8-bit
Operating System: UCSD-P
Languages Supported: Pascal
Minimum Memory: 256K bytes
Maximum Memory: 352K bytes
Maximum On-Line Storage: 15M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Maintenance: On-site
(See Vendor Profile Page V-17)

RASTER GRAPhICS, INC.
RG-802
Micro

Word Length: 8-bit
Operating System: Proprietary
Languages Supported: C-Basic
Minimum Memory: 44K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 4M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,000
Maintenance: Return to manufacturing facility
Date First Installed: January 1983
(See Vendor Profile Page V-17)
Communications Protocols:
- Asynchronous
- Synchronous

Distribution: OEM

Vendor Sales Terms: Purchase

Purchase Price: $3,900 to $12,000

Maintenance: Return to manufacturing facility

Date First Installed: January 1983

Number Installed to Date: 50 — 100

SEAL & COMPANY, INC.

840-XX
Micro

Word Length: 8-bit

Maximum Memory: 64K bytes

Multiple Users: No

Maximum I/O Ports: 2

Communications Protocols: Asynchronous, Synchronous

Distribution: OEM

Vendor Sales Terms: Purchase

Purchase Price: $1,500 to $2,500

Maintenance: On-site

Date First Installed: October 1978

Number Installed to Date: 150

(See Vendor Profile Page V-18)

SEATTLE COMPUTER PRODUCTS

GAZELLE
Micro

Word Length: 16-bit

Operating System: MS-DOS

Languages Supported: Cobol, Fortran, Basic, Pascal

Minimum Memory: 128K bytes

Maximum Memory: 700K bytes

Multiple Users: Yes

Maximum On-Line Storage: 320K bytes

Communications Protocols: Asynchronous, Synchronous, Bistable

Distribution: OEM

Vendor Sales Terms: Purchase

Purchase Price: $1,995 to $2,500

Maintenance: Return to manufacturing facility; Third-party

Date First Installed: April 1983

Number Installed to Date: 50 — 100

(See Vendor Profile Page V-18)

SIERRA NATIONAL CORP.

SERRA 9000
Micro

Word Length: 8-bit

Operating System: CP/M

Languages Supported: Cobol, Fortran, Basic, Pascal

Minimum Memory: 64K bytes

Maximum Memory: 1M bytes

Multiple Users: Yes; 3

Maximum 1/O Ports: 2

Communications Protocols: Asynchronous, Synchronous, Bisynchronous, SDLC, SDLC/SNA, X.25, HDLC

Distribution: End user

Vendor Sales Terms: Purchase

Purchase Price: $12,900

Maintenance: Return to manufacturing facility; Third-party

Date First Installed: March 1979

Number Installed to Date: 100 — 500

(See Vendor Profile Page V-18)

TO COMPUTER SYSTEMS

D-45
<table>
<thead>
<tr>
<th>Model</th>
<th>Word Length: 16-bit</th>
<th>Operating System: OS/9</th>
<th>Languages Supported: Cobol; Basic; Pascal; Forth</th>
<th>Minimum Memory: 64K bytes</th>
<th>Maximum Memory: 1M bytes</th>
<th>Maximum On-Line Storage: 60M bytes</th>
<th>Maximum I/O Ports: 2</th>
<th>Communications Protocols: Asynchronous; Synchronous Distribution: Third-party</th>
<th>Vendor Sales Terms: Purchase</th>
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</tbody>
</table>

**Language Supported:** Cobol

**Minimum Memory:** 64K bytes

**Maximum Memory:** 1M bytes

**Maximum On-Line Storage:** 60M bytes

**Maximum I/O Ports:** 2

**Communications Protocols:** Asynchronous; Synchronous

**Distribution:** Third-party

**Vendor Sales Terms:** Purchase

**Maintenance:** Return to manufacturing facility; Third-party

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**ComputerWorld Buyer's Guide**

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**Micros**

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**Supermicro**

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**D-46**

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**ComputerWorld Buyer's Guide**
<table>
<thead>
<tr>
<th>System</th>
<th>Word Length</th>
<th>Operating System</th>
<th>Minimum Memory</th>
<th>Languages Supported</th>
<th>Maximum Memory</th>
<th>Maximum On-Line Storage</th>
<th>Communications Protocols:</th>
<th>Multiple Users:</th>
<th>Communications Protocols:</th>
<th>Distribution:</th>
<th>Vendor Sales Terms:</th>
<th>Purchase Price:</th>
<th>Number Installed to Date:</th>
<th>Date First Installed:</th>
<th>Notes</th>
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<tbody>
<tr>
<td>SONY COMMUNICATIONS PRODUCTS CO.</td>
<td>8-bit</td>
<td>CP/M</td>
<td>64K bytes</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>64K bytes</td>
<td>8M bytes</td>
<td>Asynchronous</td>
<td>Yes</td>
<td>Asynchronous</td>
<td>OEM</td>
<td>Purchase</td>
<td>$3,500</td>
<td>50</td>
<td>1981 September</td>
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<td>SOUTHERN COMPUTER SYSTEMS, INC.</td>
<td>8-bit</td>
<td>CP/M</td>
<td>64K bytes</td>
<td>Cobol; Fortran; Basic</td>
<td>64K bytes</td>
<td>8M bytes</td>
<td>Asynchronous</td>
<td>No</td>
<td>Asynchronous</td>
<td>OEM</td>
<td>Purchase</td>
<td>$3,500</td>
<td>50</td>
<td>1981 September</td>
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<tr>
<td>SYSTEMS GROUP</td>
<td>8-bit</td>
<td>CP/M; OASIS</td>
<td>64K bytes</td>
<td>Cobol; Fortran</td>
<td>64K bytes</td>
<td>8M bytes</td>
<td>Asynchronous</td>
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<td>OEM</td>
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<td>$3,500</td>
<td>50</td>
<td>1981 September</td>
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<tr>
<td>TO COMPUTER SYSTEMS, INC.</td>
<td>8-bit</td>
<td>CP/M; OASIS</td>
<td>64K bytes</td>
<td>Cobol; Fortran</td>
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<td>8M bytes</td>
<td>Asynchronous</td>
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<td>Purchase</td>
<td>$3,500</td>
<td>50</td>
<td>1981 September</td>
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</tbody>
</table>

**Notes:**
- **SONY COMMUNICATIONS PRODUCTS CO.**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran; Basic; Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Maximum On-Line Storage:** 8M bytes
  - **Multiple Users:** No
  - **Communications Protocols:** Asynchronous
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $3,500
  - **Date First Installed:** September 1982

- **SOUTHERN COMPUTER SYSTEMS, INC.**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M
  - **Languages Supported:** Cobol; Fortran; Basic; Pascal
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Maximum On-Line Storage:** 8M bytes
  - **Multiple Users:** No
  - **Communications Protocols:** Asynchronous
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $3,500
  - **Date First Installed:** September 1982

- **SYSTEMS GROUP**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M; OASIS
  - **Languages Supported:** Cobol; Fortran; Basic
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Maximum On-Line Storage:** 8M bytes
  - **Multiple Users:** No
  - **Communications Protocols:** Asynchronous
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $3,500
  - **Date First Installed:** September 1982

- **TO COMPUTER SYSTEMS, INC.**
  - **Word Length:** 8-bit
  - **Operating System:** CP/M; OASIS
  - **Languages Supported:** Cobol; Fortran; Basic
  - **Minimum Memory:** 64K bytes
  - **Maximum Memory:** 64K bytes
  - **Maximum On-Line Storage:** 8M bytes
  - **Multiple Users:** No
  - **Communications Protocols:** Asynchronous
  - **Distribution:** Third-party
  - **Vendor Sales Terms:** Purchase
  - **Purchase Price:** $3,500
  - **Date First Installed:** September 1982
Micros

SYSTEMS GROUP

2980 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 1.1M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

SYSTEMS GROUP

2981 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 1.1M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

SYSTEMS GROUP

2982 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 1.1M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

SYSTEMS GROUP

2983 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 1.1M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

SYSTEMS GROUP

2984 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 31M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

SYSTEMS GROUP

2986 Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 31M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: December 1982
Number Installed to Date: 50

TAK AUTOMATION, INC.

INSTRUMENTATION TECH
Micro
Word Length: 8-bit
Operating System: CP/M; OASIS; MP/M: BUSINESS EXPRESS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 20
Maximum On-Line Storage: 31M bytes
Maximum I/O Ports: 20
Communications Protocols:
Asynchronous; Synchronous; Bisynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $12,550 to $15,000
Date First Installed: March 1983
Number Installed to Date: 100

TAK AUTOMATION, INC.

TAB PRODUCTS CO.

1800 Desktop
Word Length: 8-bit
Operating System: CP/M; MP/M; Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: Yes; 6
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 3
Communications Protocols:
Asynchronous; Synchronous; Bytchkronous; Vendor Sales Terms: Purchase; Rental; Lease
Maintenance: On-site; Return to manufacturing facility
Purchase Price: $7,785
Date First Installed: September 1981
Number Installed to Date: 10,000

TANGER CORPORATION

TR-80 II
Personal
Word Length: 8-bit
Operating System: TRS/DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 6
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $6,500
Average Maintenance Fee: $65
Date First Installed: May 1979
Number Installed to Date: 50,000

TANDY CORPORATION

TR-80/III
Desktop
Word Length: 8-bit
Operating System: TRS/DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum I/O Ports: 6
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Lease
Purchase Price: $700 to $2,200
Average Maintenance Fee: $20
Date First Installed: September 1981
Number Installed to Date: 50,000

TANDY CORPORATION

TR-80/12
Desktop
Word Length: 8-bit
Operating System: TRS/DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum On-Line Storage: 53M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase; Lease
Purchase Price: $3,450 to $6,500
Average Maintenance Fee: On-site; Return to manufacturing facility
Date First Installed: January 1982
Number Installed to Date: 100

TANDY CORPORATION

TR-80/16
Desktop
Word Length: 8-bit
Operating System: TRS/DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 128K bytes
Maximum Memory: 512K bytes
Multiple Users: No
Maximum On-Line Storage: 53M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,999
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1980
Number Installed to Date: 100

COMPUTERWORLD BUYER'S GUIDE
Distribution: Third-party
Vendor Sales Terms: Purchase; Lease
Purchase Price: $4,999 to $11,190
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $80
Date First Installed: 1982

TAMO CORP.
TAMO OUTPOST
Micro
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 320K bytes
Multiple I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $15,000
Maintenance: On-site; Return to manufacturing facility
Date First Installed: 1977
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-20)

TARGULL ELECTRONICS
EMPIRE 1
Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: PL/I, C, Basic
Minimum Memory: 48K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Multiple I/O Ports: 6
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $4,661 to $9,730
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: 1980
Number Installed to Date: 50 — 100
(See Vendor Profile Page V-20)

TARGULL ELECTRONICS
EMPIRE II
Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: C-Basic; D-Base II
Minimum Memory: 48K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 40M bytes
Multiple I/O Ports: 6
Distribution: Third-party
Purchase Price: $5,330 to $8,920
Maintenance: Return to manufacturing facility; Third-party
Date First Installed: 1980
Number Installed to Date: 100 — 500

TBM, INC.
GENNI
Micro
Word Length: 8-bit
Operating System: CP/M, TURBO DOS
Languages Supported: Cobol; Fortran; Basic; Basic plus; Basic plus 2; Pascal; RPG; APL; PL/1; COBOL; C;
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Multiple Users: Yes
Maximum On-Line Storage: 360M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous; Biynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase; Lease
Purchase Price: $3,500 to $26,000
Maintenance: On-site
Date First Installed: December 1979
Number Installed to Date: 100 — 500
(See Vendor Profile Page V-20)

TECHNICO, INC.
TMF-16
Micro
Word Length: 16-bit
Operating System: MCO
Languages Supported: Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 192K bytes
Multiple Users: Yes
Maximum On-Line Storage: 18M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $4,390 to $9,995
Maintenance: On-site
Date First Installed: 1979
Number Installed to Date: 500

TECHNICO, INC.
TSC16
Micro
Word Length: 16-bit
Operating System: SCS
Languages Supported: Fortran; Basic; Pascal; C
Minimum Memory: 32K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 1M bytes
Maximum I/O Ports: 1
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $700 to $5,900
Maintenance: On-site
Average Maintenance Fee: $40
Date First Installed: 1977
Number Installed to Date: 2,000

TECHNICO, INC.
TEC 8516
Micro
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 33.4M bytes
Maximum I/O Ports: 5
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $12,980
Maintenance: Return to manufacturing facility
Date First Installed: 1979

TECHNICO, INC.
TEC 86MII
Micro
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; C
Minimum Memory: 1M bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 33.4M bytes
Maximum I/O Ports: 7
Communications Protocols: Asynchronous
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $7,595
Maintenance: Return to manufacturing facility
Date First Installed: 1979

TECHNICO, INC.
TEC 86MII
Micro
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; C
Minimum Memory: 1M bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 1M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $7,645
Maintenance: Return to manufacturing facility
Date First Installed: 1979

TEKTRONIX, INC.
4053A
Desktop
Application: Data Analysis
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 19K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 1M bytes
Number Installed to Date: 500 — 5,000
(See Vendor Profile Page V-20)

TEKTRONIX, INC.
4056A
Desktop
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Basic
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum I/O Ports: 12
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase; Rental
Purchase Price: $6,295 to $6,345
Maintenance: On-site; Return to manufacturing facility
Date First Installed: December 1975
Number Installed to Date: 10,000 — 50,000
(See Vendor Profile Page V-20)

TEKTRONIX, INC.
4058A
Desktop
Word Length: 16-bit
Operating System: CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 33.4M bytes
Maximum I/O Ports: 5
Communications Protocols: Asynchronous
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $10,990
Maintenance: Return to manufacturing facility
Date First Installed: 1979

TEKTRONIX, INC.
Tec Lab I
Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Fortran; Basic; Pascal C
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 2.4M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: OEM; Third-party
Vendor Sales Terms: Purchase
Purchase Price: $7,645
Maintenance: Return to manufacturing facility
Date First Installed: 1979

TEKTRONIX, INC.
4065A
Desktop
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 32K bytes
Maximum Memory: 32K bytes
Multiple Users: No
Maximum On-Line Storage: 1.2M bytes
Number Installed to Date: 500 — 5,000
(See Vendor Profile Page V-20)

TO COMPUTER SYSTEMS
D-49
Communications Protocols:
Asynchronous

Multiple Users: No
Max On-Line Storage: 12M bytes
Max I/O Ports: 4
Multiple Languages Supported:
Asynchronous, Synchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $17,900 to $25,100
Maintenance: Return to manufacturing facility; Third-party

(Teleprofile Page V-20)

TELETRONIC, INC.

SUM

Micro
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1, C
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Maximum I/O Ports: 2
Multiple Users: No

Communication Protocols:
Asynchronous

Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,399

Maintenance: Return to manufacturing facility; Third-party

(Teleprofile Page V-20)

TELEVIDEO SYSTEMS, INC.

TS800

Desktop
Word Length: 8-bit
Operating System: CP/M 2.2
Languages Supported: Fortran, Basic, Pascal, APL, PL/1, C
Min Memory: 64K bytes
Max Memory: 143K bytes
Max I/O Ports: 2
Multiple Users: 20
Max On-Line Storage: 4.8G bytes

Multiple Languages Supported:
Asynchronous, Synchronous, Distribution: Third-party
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $1,499
Maintenance: On-site
Date First Installed: April 1981
Number Installed to Date: 22

(Teleprofile Page V-20)

TELEVIDEO SYSTEMS, INC.

T5800

Desktop
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Fortran, Basic, Pascal, APL, PL/1, C
Min Memory: 64K bytes
Max Memory: 12K bytes
Max I/O Ports: 2
Multiple Users: No
Max On-Line Storage: 368K bytes

Multiple Languages Supported:
Asynchronous, Synchronous, Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,800
Maintenance: On-site
Date First Installed: January 1983

(Teleprofile Page V-20)

TELEVISION SYSTEMS, INC.

TELETELE 3000/2

Portable
Word Length: 8-bit
Operating System: CP/M
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1, C
Min Memory: 64K bytes
Max Memory: 512K bytes
Max I/O Ports: 1
Multiple Users: No
Max On-Line Storage: 256M bytes

Multiple Languages Supported:
Asynchronous, Synchronous, Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,595
Maintenance: Return to manufacturing facility

Date First Installed: January 1983

(Teleprofile Page V-20)
Operating System: CP/M 2.2
Languages Supported: Cobol; Fortran; Basic; APL; PL/1; C; Algol; Fortran
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 1M bytes
Maximum I/O Ports: 1
Communications Protocols: Asynchronous; SDLC
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $3,495
Date First Installed: 1981
Number Installed to Date: 50 — 100

TELEVIDEO SYSTEMS, INC.
TS5202H
Desktop
Word Length: 8-bit
Operating System: CP/M 2.2
Languages Supported: Cobol; Fortran; Basic; APL; PL/1; C; Algol; Fortran
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 3
Communications Protocols: Asynchronous; SDLC
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $3,495
Date First Installed: 1981
Number Installed to Date: 100

TELEVIDEO SYSTEMS, INC.
TS1603H
Personal
Word Length: 16-bit
Operating System: MS-DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 80M bytes
Maintenance: On-site
Date First Installed: 1983

TESDATA, INC.
SMART
Micro
Specific Application: Network
Word Length: 16-bit
Operating System: CTOS
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 512K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes
Maximum On-Line Storage: 80M bytes
Communications Protocols: Asynchronous; SDLC; V.25; 2800/3780
Distribution: End user
Vendor Sales Terms: Purchase; Lease
Purchase Price: $75,000 to $172,000
Maintenance: On-site; Return to manufacturing facility
Average Maintenance Fee: $340
Number Installed to Date: Less than 10
(See Vendor Profile Page V-21)

TEXAS INSTRUMENTS, INC.
99/4A
Micro
Word Length: 16-bit
Operating System: DX10
Languages Supported: Basic; Basic plus; Pascal; Logo; Pilot
Minimum Memory: 16K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 270K bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $1,500
Maintenance: Return to manufacturing facility
Date First Installed: 1981
(See Vendor Profile Page V-21)

TEXAS INSTRUMENTS, INC.
TP1001
Micro
Word Length: 16-bit
Operating System: UCSD-P; CP/M
Languages Supported: Cobol; Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,595 to $7,000
Maintenance: On-site
Date First Installed: 1983

THOUGHTWORKS, INC.
TW-800
Micro
Word Length: 8-bit
Operating System: TURBO DOS; CP/M
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 600M bytes
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,200 to $3,495
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $100
Date First Installed: 1983
(See Vendor Profile Page V-V-21)

3 R COMPUTERS, INC.
AVATAR TC10
Micro
Word Length: 16-bit
Operating System: CP/M; CP/M 86; MS-DOS
Languages Supported: Basic; Assembler
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 80M bytes
Maximum I/O Ports: 4
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,795 to $3,095
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $25
Date First Installed: April 1983
Number Installed to Date: Less than 10

3 R COMPUTERS, INC.
AVATAR TC110
Micro
Word Length: 16-bit
Operating System: CP/M; CP/M 86; MS-DOS
Languages Supported: Basic; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Maximum On-Line Storage: 21M bytes
Maximum I/O Ports: 4
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,200 to $3,495
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $25
Date First Installed: August 1982
Number Installed to Date: Less than 10

3 R COMPUTERS, INC.
AVATAR TC3778
Micro
Word Length: 16-bit
Operating System: CP/M; CP/M 86; MS-DOS
Languages Supported: Basic; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 21M bytes
Maximum I/O Ports: 6
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,795 to $7,295
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $25
Date First Installed: March 1983
Number Installed to Date: Less than 10

TIMEX COMPUTER CORP.
SINCLAIR/100
Personal
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 2K bytes
Maximum Memory: 16K bytes
Multiple Users: No
Average Maintenance Fee: $25
Date First Installed: January 1983
Number Installed to Date: 50 — 100

3 R COMPUTERS, INC.
AVATAR TC10
Desktop
Word Length: 8-bit
Operating System: CP/M; CP/M 86; MS-DOS
Languages Supported: Basic; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 80M bytes
Maximum I/O Ports: 4
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,795 to $3,495
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $100
Date First Installed: August 1982
Number Installed to Date: Less than 10

3 R COMPUTERS, INC.
AVATAR TC110
Desktop
Word Length: 8-bit
Operating System: CP/M; CP/M 86; MS-DOS
Languages Supported: Basic; Assembler
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 21M bytes
Maximum I/O Ports: 6
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $1,795 to $7,295
Maintenance: Return to manufacturing facility
Average Maintenance Fee: $25
Date First Installed: August 1982
Number Installed to Date: Less than 10

TIMEX COMPUTER CORP.
SINCLAIR/100
Personal
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 2K bytes
Maximum Memory: 16K bytes
Multiple Users: No
Micros

Maximum I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $2,995 to $5,190
Number Installed to Date: Less than 10
Number Installed to Date: 10 — 50

TRIFORMATION SYSTEMS, INC.

MICRO BRAILLE 2400
Word Processing system
Specific Application: Braile Computing
Word Length: 8-bit
Minimum Memory: 10K bytes
Multiple Users: No
Maximum I/O Ports: 2
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: On-site; Remote diagnostics; Return to manufacturing facility, Third-party
Date First Installed: 1978
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-21)

UNICO, INC.

SYSTEM 6
Micro
Word Length: 12-bit
Languages Supported: RTS
Minimum Memory: 64K bytes
Multiple Users: Yes
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase
Maintenance: Third-party
Date First Installed: 1981
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-21)

UNICOMP CORP.

PIXEL 100 AP
Supermicro
Word Length: 32-bit
Operating System: UNIX
Languages Supported: Cobol; Fortran; Basic
Minimum Memory: 512K bytes
Multiple Users: Yes
Communications Protocols: Asynchronous
Distribution: OEM
Vendor Sales Terms: Purchase; Rental
Maintenance: Third-party
Date First Installed: 1981
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-21)

UNITED TECHNOLOGIES

COMDEV

TP-8100
Micro
Specific Application: Call Accounting
Word Length: 8-bit
Languages Supported: Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: Yes
Multiple On-Line Storage: 8M bytes
Maximum I/O Ports: 16
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Maintenance: Third-party
Date First Installed: 1981
Number Installed to Date: 10 — 50
(See Vendor Profile Page V-21)

VECTOR GRAPHIC, INC.

4/20
Desktop
Word Length: 8-bit
Operating System: CP/M; CP/M 86
Languages Supported: Cobol; Fortran, Basic
Minimum Memory: 64K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Multiple On-Line Storage: 500K bytes

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COMPUTERWORLD BUYER'S GUIDE
We're CW Communications/Inc., the world's largest publisher of computer-related newspapers and magazines. And wherever you go in the computer world, you'll find computer professionals reading — and relying on — our publications. With highly trained and experienced editorial staffs all over the world, our publications give readers the best and most up-to-date information available in this rapidly-changing industry.

Around the world.
We publish, co-publish or provide editorial services to the leading computer publications in the world, including publications in all of the following countries:
- Scandinavia — Denmark, Sweden and Finland
- Western Europe — Germany, the United Kingdom, France, Italy, Spain, Greece, the Netherlands
- The Mid-East — Kuwait, Saudi Arabia
- Asia/Africa — the People's Republic of China, Hong Kong, Korea, Japan, Southeast Asia, South Africa
- The Southern Pacific — Australia Central and South America — Mexico, Brazil, Argentina, Chile.

In the United States.
In the world's largest computer market, we publish a series of publications covering different aspects of the computer world. Our largest publication, with more than half-a-million readers every week, is Computerworld, a weekly newspaper aimed primarily at larger computer users. Its companion publications include Computerworld OA, covering Office Automation; Computerworld on Communications, a semiannual; and a series of Buyer's Guides covering all major segments of the industry.

In addition, we publish ISO WORLD for Independent Sales Organizations, including dealers, distributors, retailers and the like.

And, to cover the microcomputer market, we have two publications: InfoWorld, a weekly newspaper filled with up-to-the-minute editorial coverage of interest to all micro users; and PC World, a monthly magazine dedicated to users of the IBM PC.
## Micros

<table>
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<th>Model</th>
<th>Type</th>
<th>Word Length:</th>
<th>Operating System:</th>
<th>Languages Supported:</th>
<th>Minimum Memory:</th>
<th>Maximum Memory:</th>
<th>Maximum On-Line Storage:</th>
<th>Communications Protocols:</th>
<th>Multiple Users:</th>
<th>Vendor Sales Terms:</th>
<th>Distribution:</th>
<th>Date First Installed:</th>
<th>Number Installed to Date:</th>
<th>Maintenance:</th>
<th>Purchase Price:</th>
<th>Date First Installed:</th>
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<tr>
<td>VECTOR GRAPHIC, INC.</td>
<td>Desktop</td>
<td>8-bit</td>
<td>CP/M; CP/M 86</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>Minimum Memory: 64K bytes</td>
<td>Maximum Memory: 256K bytes</td>
<td>Multiple Users: No</td>
<td>Communications Protocols: Asynchronous</td>
<td>Distribution: Third-party</td>
<td>Date First Installed: September 1982</td>
<td>Number Installed to Date: 500 — 1,000</td>
<td>(See Vendor Profile Page V-21)</td>
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### VECTOR GRAPHIC, INC.

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Word Length:</th>
<th>Operating System:</th>
<th>Languages Supported:</th>
<th>Minimum Memory:</th>
<th>Maximum Memory:</th>
<th>Maximum On-Line Storage:</th>
<th>Communications Protocols:</th>
<th>Multiple Users:</th>
<th>Vendor Sales Terms:</th>
<th>Distribution:</th>
<th>Date First Installed:</th>
<th>Number Installed to Date:</th>
<th>Maintenance:</th>
<th>Purchase Price:</th>
<th>Date First Installed:</th>
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<tbody>
<tr>
<td>3005</td>
<td>Desktop</td>
<td>8-bit</td>
<td>CP/M</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>Minimum Memory: 128K bytes</td>
<td>Maximum Memory: 256K bytes</td>
<td>Multiple Users: No</td>
<td>Communications Protocols: Asynchronous</td>
<td>Distribution: Third-party</td>
<td>Date First Installed: January 1981</td>
<td>Number Installed to Date: 1,100</td>
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<td>3100</td>
<td>Desktop</td>
<td>8-bit</td>
<td>CP/M</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>Minimum Memory: 256K bytes</td>
<td>Maximum Memory: 128K bytes</td>
<td>Multiple Users: No</td>
<td>Communications Protocols: Asynchronous</td>
<td>Distribution: Third-party</td>
<td>Date First Installed: August 1981</td>
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<td>3165</td>
<td>Desktop</td>
<td>8-bit</td>
<td>CP/M</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>Minimum Memory: 256K bytes</td>
<td>Maximum Memory: 128K bytes</td>
<td>Multiple Users: No</td>
<td>Communications Protocols: Asynchronous</td>
<td>Distribution: Third-party</td>
<td>Vendor Sales Terms: Purchase</td>
<td>Lease</td>
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### VICTORY COMPUTER SYSTEMS, INC.

<table>
<thead>
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<th>Model</th>
<th>Type</th>
<th>Word Length:</th>
<th>Operating System:</th>
<th>Languages Supported:</th>
<th>Minimum Memory:</th>
<th>Maximum Memory:</th>
<th>Maximum On-Line Storage:</th>
<th>Communications Protocols:</th>
<th>Multiple Users:</th>
<th>Vendor Sales Terms:</th>
<th>Distribution:</th>
<th>Date First Installed:</th>
<th>Number Installed to Date:</th>
<th>Maintenance:</th>
<th>Purchase Price:</th>
<th>Date First Installed:</th>
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<tbody>
<tr>
<td>FACTOR 68/i</td>
<td>Desktop</td>
<td>16-bit</td>
<td>CP/M; CP/M 86</td>
<td>Cobol; Fortran; Basic; Pascal</td>
<td>Minimum Memory: 256K bytes</td>
<td>Maximum Memory: 256K bytes</td>
<td>Maximum On-Line Storage: 5.6M bytes</td>
<td>Communications Protocols: Asynchronous</td>
<td>Distribution: Third-party</td>
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### VICTORY SPIRIT

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<th>Languages Supported:</th>
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<td>CP/M; CP/M 86</td>
<td>Cobol; Fortran; Basic; Pascal; APL; PL/1; C; Algol; Fortran</td>
<td>Minimum Memory: 256K bytes</td>
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Micros

Number Installed to Date: 125

ZENDEX CORP.
MODEL 95/36
Micro
Specific Application: Process Control
Word Length: 16-bit
Operating System: CP/M 86
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 512K bytes
Maximum Memory: 1M bytes
Multiple Users: No
Maximum On-Line Storage: 160M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: Return to manufacturing facility
Date First Installed: June 1981
Number Installed to Date: 12

ZENDEX CORP.
MODEL 238
Micro
Specific Application: Process Control
Word Length: 16-bit
Operating System: CP/M 86
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 1M bytes
Communications Protocols: Asynchronous
Distribution: End user
Vendor Sales Terms: Purchase
Purchase Price: $7,000
Maintenance: Return to manufacturing facility
Date First Installed: April 1983
Number Installed to Date: 10,000

ZENTEC CORP.
SERIES 2000
Desktop
Word Length: 8-bit
Operating System: ZENIX
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 256K bytes
Maximum Memory: 1M bytes
Multiple Users: Yes; 6
Maximum On-Line Storage: 60M bytes
Maximum I/O Ports: 2
Communications Protocols: SDLC
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $9,000
Maintenance: Third-party
Date First Installed: April 1983

ZYDECO, INC.
ZDM 3200
Micro
Specific Application: Process Control
Word Length: 8-bit
Operating System: HDOS
Languages Supported: Fortran; Basic; Pascal
Minimum Memory: 64K bytes
Maximum Memory: 128K bytes
Multiple Users: No
Maximum On-Line Storage: 11M bytes
Multiple I/O Ports: 3
Communications Protocols: Asynchronous
Distribution: Third-party
Vendor Sales Terms: Purchase
Purchase Price: $3,595 to $3,900
Maintenance: Return to manufacturing facility
Date First Installed: October 1980
Number Installed to Date: 10,000

ZYLOG, INC.
MCZ 1
Desktop
Word Length: 8-bit
Operating System: ZENIX
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 64K bytes
Maximum Memory: 64K bytes
Multiple Users: No
Maximum On-Line Storage: 10M bytes
Maximum I/O Ports: 4
Communications Protocols: Asynchronous; Synchronous; Bisynchronous; X.25
Distribution: OEM
Vendor Sales Terms: Purchase
Purchase Price: $3,200 to $4,100
Maintenance: Third-party
Date First Installed: 1980
Number Installed to Date: 500 — 1,000

ZONIC CORP.
ZONIC 8081
Micro
Word Length: 8-bit
Operating System: CDOS
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 640K bytes
Maximum I/O Ports: 3
Communications Protocols: DMA
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $20,000 to $200,000
Maintenance: On-site, Return to manufacturing facility
Date First Installed: 1981

ZONIC 6081
Operating System: CDOS
Languages Supported: Cobol; Fortran, Basic; Pascal; C
Minimum Memory: 128K bytes
Maximum Memory: 256K bytes
Multiple Users: No
Maximum On-Line Storage: 640K bytes
Maximum I/O Ports: 3
Communications Protocols: DMA
Distribution: End user
Vendor Sales Terms: Purchase, Rental, Lease
Purchase Price: $20,000 to $200,000
Maintenance: On-site, Return to manufacturing facility
Date First Installed: 1981

COMPUTERWORLD BUYER'S GUIDE
D-56
PRICE INDEX
## Price Index

### Systems Under $5,000

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# Price Index

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<td>Wave Mate, Inc.</td>
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### $5,000 to $10,000 Systems

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$20,000 to $50,000 Systems

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$50,000 to $100,000 Systems

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TO COMPUTER SYSTEMS  

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**$100,000 to $250,000 Systems**

**Price Index**

**COMPUTERWORLD BUYER'S GUIDE**

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### NOTES:

- Prices are approximate and subject to change.
- Categories indicate the class of computer system.
- For detailed specifications, consult the manufacturer's literature.
- Always verify specifications and pricing directly with the vendor.
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<td>A-14</td>
</tr>
<tr>
<td>Parodyne Corp.</td>
<td>RESPONSE</td>
<td>$120,000</td>
<td>A-12</td>
</tr>
<tr>
<td>Perkin-Elmer Corp.</td>
<td>3560</td>
<td>$140,000</td>
<td>B-6</td>
</tr>
<tr>
<td>Prime Computer, Inc.</td>
<td>PRIME 4045</td>
<td>$122,000</td>
<td>B-6</td>
</tr>
<tr>
<td>Prime Computer, Inc.</td>
<td>PRIME 550-3</td>
<td>$122,000</td>
<td>B-8</td>
</tr>
<tr>
<td>Pyramid Technology Corp.</td>
<td>PYRAMID COMPUTER</td>
<td>$100,000</td>
<td>B-8</td>
</tr>
<tr>
<td>Gantel Corp.</td>
<td>SYSTEM 64</td>
<td>$150,000</td>
<td>B-8</td>
</tr>
<tr>
<td>Stratus Computer, Inc.</td>
<td>STRATUS 32</td>
<td>$150,000</td>
<td>B-8</td>
</tr>
<tr>
<td>Tandem Computer, Inc.</td>
<td>NON STOP II</td>
<td>$160,000</td>
<td>B-8</td>
</tr>
<tr>
<td>Telefile Computer Products, Inc.</td>
<td>T5-5</td>
<td>$235,000</td>
<td>A-12</td>
</tr>
<tr>
<td>Wang Laboratories, Inc.</td>
<td>2200 V5 100</td>
<td>$100,000</td>
<td>B-27</td>
</tr>
</tbody>
</table>

### $250,000 to $500,000 Systems

<table>
<thead>
<tr>
<th>Company/Description</th>
<th>Model/Version</th>
<th>Price</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKI, Inc.</td>
<td>4000</td>
<td>$250,000</td>
<td>C-1</td>
</tr>
<tr>
<td>Burroughs Corp.</td>
<td>B3955</td>
<td>$304,500</td>
<td>A-2</td>
</tr>
<tr>
<td>Cambex Corp.</td>
<td>1631 SERIES</td>
<td>$340,000</td>
<td>A-3</td>
</tr>
<tr>
<td>Control Data Corp.</td>
<td>CYBER 170/825</td>
<td>$270,000</td>
<td>A-3</td>
</tr>
<tr>
<td>Digital Equipment Corp.</td>
<td>VAX 11/780</td>
<td>$450,000</td>
<td>B-2</td>
</tr>
<tr>
<td>Gavilan Computer Corp.</td>
<td>DEC SYSTEM 2040</td>
<td>$483,000</td>
<td>A-4</td>
</tr>
<tr>
<td>Good, Inc.</td>
<td>OAKLAND</td>
<td>$150,000</td>
<td>A-5</td>
</tr>
<tr>
<td>Honeywell, Inc.</td>
<td>DPS 7/65</td>
<td>$250,000</td>
<td>A-5</td>
</tr>
<tr>
<td>IBM</td>
<td>3389</td>
<td>$300,000</td>
<td>A-5</td>
</tr>
<tr>
<td>Itone Industries Data Systems, Inc.</td>
<td>SYSTEM8/95</td>
<td>$320,000</td>
<td>A-7</td>
</tr>
<tr>
<td>IPL Systems, Inc.</td>
<td>4461</td>
<td>$250,000</td>
<td>A-7</td>
</tr>
<tr>
<td>Magnusson Computer Systems, Inc.</td>
<td>4460</td>
<td>$250,000</td>
<td>A-7</td>
</tr>
<tr>
<td>Nova Data Computer Corp.</td>
<td>CM-1</td>
<td>$450,000</td>
<td>A-6</td>
</tr>
<tr>
<td>National Advanced Systems, Inc.</td>
<td>AS/3000N</td>
<td>$350,000</td>
<td>A-6</td>
</tr>
<tr>
<td>NCR Corp.</td>
<td>6554/12</td>
<td>$315,000</td>
<td>A-11</td>
</tr>
<tr>
<td>Nixdorf Computer Corp.</td>
<td>V-9850 II</td>
<td>$400,000</td>
<td>A-11</td>
</tr>
<tr>
<td>Prime Computer, Inc.</td>
<td>PRIME 850</td>
<td>$350,000</td>
<td>A-11</td>
</tr>
<tr>
<td>Sperry Corp.</td>
<td>9300 SYSTEM</td>
<td>$285,000</td>
<td>B-23</td>
</tr>
<tr>
<td>Synapsis Computer Corp.</td>
<td>SYNPSE 1+1</td>
<td>$365,000</td>
<td>A-12</td>
</tr>
<tr>
<td>Taylor Instrument Co.</td>
<td>MITEC 400</td>
<td>$255,000</td>
<td>C-24</td>
</tr>
<tr>
<td>Telefile Computer Products, Inc.</td>
<td>T50</td>
<td>$450,000</td>
<td>A-12</td>
</tr>
</tbody>
</table>

### $500,000 to $1,000,000 Systems

<table>
<thead>
<tr>
<th>Company/Description</th>
<th>Model/Version</th>
<th>Price</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burroughs Corp.</td>
<td>B5900 SERIES</td>
<td>$750,000</td>
<td>A-2</td>
</tr>
<tr>
<td>Control Data Corp.</td>
<td>B3955</td>
<td>$780,000</td>
<td>A-2</td>
</tr>
<tr>
<td>Conta Systems, Inc.</td>
<td>CYBER 170/83</td>
<td>$250,000</td>
<td>A-3</td>
</tr>
<tr>
<td>Digital Equipment Corp.</td>
<td>DEC SYSTEM 2040</td>
<td>$557,000</td>
<td>A-4</td>
</tr>
<tr>
<td>Honeywell, Inc.</td>
<td>DPS 6/55C</td>
<td>$680,000</td>
<td>A-5</td>
</tr>
</tbody>
</table>

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To Computer Systems

E-15
### Price Index

<table>
<thead>
<tr>
<th>Company</th>
<th>Model/Model No.</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>3033N</td>
<td>$500,000</td>
</tr>
<tr>
<td>IPL Systems, Inc.</td>
<td>4341-12</td>
<td>$700,000</td>
</tr>
<tr>
<td>Mega/Hot Corp.</td>
<td>MEGA/NET 3000</td>
<td>$500,000</td>
</tr>
<tr>
<td>Modutest Systems, Inc.</td>
<td>MARK 9</td>
<td>$700,000</td>
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<tr>
<td>NCR Corp.</td>
<td>V-8575 II</td>
<td>$514,000</td>
</tr>
<tr>
<td>Sperry Corp.</td>
<td>90/80 SYSTEM</td>
<td>$798,205</td>
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</table>

#### $1,000,000 to $5,000,000 Systems

<table>
<thead>
<tr>
<th>Company</th>
<th>Model/Model No.</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Amdahl Corp.</td>
<td>470V/7 &amp; V/8 SERIES</td>
<td>$2,515,000</td>
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<tr>
<td>Burroughs Corp.</td>
<td>580 MODEL 5850</td>
<td>$2,750,000</td>
</tr>
<tr>
<td>Control Data Corp.</td>
<td>CYBER 170/855</td>
<td>$1,805,000</td>
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<tr>
<td>Control Data Corp.</td>
<td>CYBER 170/865</td>
<td>$2,465,000</td>
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<tr>
<td>Control Data Corp.</td>
<td>CYBER 170/875</td>
<td>$3,230,000</td>
</tr>
<tr>
<td>Cray Research, Inc.</td>
<td>H-1000</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>Honeywell, Inc.</td>
<td>DPS 876C</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>IBM</td>
<td>3031</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>National Advanced Systems, Inc.</td>
<td>AS/6130</td>
<td>$1,595,000</td>
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<tr>
<td>HCR Corp.</td>
<td>V-8945</td>
<td>$1,928,000</td>
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<tr>
<td>National Advanced Systems, Inc.</td>
<td>AS/8080</td>
<td>$2,860,000</td>
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</table>

#### Systems Over $5,000,000

<table>
<thead>
<tr>
<th>Company</th>
<th>Model/Model No.</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Amdahl Corp.</td>
<td>580-5870/5880</td>
<td>$5,400,000</td>
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<tr>
<td>Control Data Corp.</td>
<td>CYBER 205/500 SERIES</td>
<td>$5,000,000</td>
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<tr>
<td>Cray Research, Inc.</td>
<td>CRAY X-MP</td>
<td>$11,000,000</td>
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<tr>
<td>IBM</td>
<td>3033M</td>
<td>$6,800,000</td>
</tr>
<tr>
<td>National Advanced Systems, Inc.</td>
<td>AS/9060</td>
<td>$2,860,000</td>
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</tbody>
</table>
ASSOCIATIONS
ALABAMA
Alabama Council For Computer Education
Contact: Alabama Council For Computer Education
P.O. Box 6105
Dothan, AL 36302
(205) 793-6609

INFORM
Open to: Information Science, Inc. Maintenance Department users
Contact: Mr. Gene Schelen
Arizona Public Services
P.O. Box 21666
Phoenix, AZ 85036
(201) 391-1600

System34/38 Users Group
Contact: Marshall Akins
P.O. Box 11484
Birmingham, AL 35202
(201) 780-1111

ARIZONA
CMG — Computer Measurement Group
Contact: CMG
P.O. Box 26063
Phoenix, AZ 85068
(602) 995-0905

IBM System/34, System/38 Users Group
Contact: Miles S. Edwards
Scottsdale, AZ 85254
(602) 996-0662 or 934-3401

SW99ers
Open to: Users of Texas Instruments, Inc.'s TI99/4 computers
Contact: Dennis Bergeron
802 S. Pantano Road
Tucson, AZ 85710
(602) 885-8882

CALIFORNIA
Association for Computer Operations Managers
Contact: ACM
939 S. Gilbert St.
Anaheim, CA 92804
(714) 761-3551

ADCOM — Association of Data Center Owners and Managers
Contact: ADCOM
650 S. Eastern Ave.
Los Angeles, CA 90022
(714) 549-9345

Association for Computing Machinery — Golden Gate Chapter
Contact: Golden Gate — ACM
P.O. Box 26044
San Francisco, CA 94126
(415) 428-5257

Association of C.A.R. Software Users
Contact: Association of C.A.R. Software Users
525 S. Virgil St.
Los Angeles, CA 90020
(213) 739-8262

Association of Calma Users
Open to: Individuals who use computer systems for scheduling or planning
Contact: Association of Schedulers and Planners
P.O. Box 1178
Reseda, CA 91335
(213) 996-3984

Automation Technology Institute
Contact: Automation Technology Institute
Box 242
Pebble Beach, CA 93953
(408) 624-5892

BAKUP — Bay Area Kaypro Users & Programmers
Contact: Treasurer
BAKUP
Box 20181
Oakland, CA 94620

CP/M & Kaypro Users Group
Open to: Users of Digital Research, Inc. CP/M-based computer systems
Contact: Gerald Neir
22554 Tiara St.
Woodland Hills, CA 91367
(213) 361-8204

COMPATIBILITIES
Open to: Prime Computer, Inc. users or vendors
Contact: Mitch Modeleski, President
Princo, Inc.
30 Roundtree
San Rafael, CA 94903
(415) 428-8774

Coordinators of DP Education
Open to:Users, vendors or trainers involved in DP Education
Contact: Coordinators of DP Education
Suite 605
109 Minna St.
San Francisco, CA 94105-3796
(415) 477-1022

Electric Law Users Group
Open to: Attorneys who are computer users
Contact: Electric Law
36 Malaga Cove Plaza
Palo Alto, CA 94304
(213) 375-9775

HP 3000 International Users Group, Inc.
Contact: William M. Crow
289 S. San Antonio Road
Los Altos, CA 94022
(415) 941-9960

IBM Personal Computer Users Group
Contact: STD Computing Firm
1931 Avenue of the Stars, No. 1774
Los Angeles, CA 90067
(213) 553-8489

Independent Computer Consultants Association
Contact: Marie Petretto
P.O. Box 85152 MB 252
San Diego, CA 92138
(619) 268-4818

Independent Computer Consultants Association of Orange County
Contact: ICCA-OC
P.O. Box 3067
Santa Ana, CA 92703
(714) 953-8359

Northern California Pick Users
Open to: Users of Pick and Associates, Inc. products
Contact: NCPU
P.O. Box 879
Oakland, CA 94603
(415) 632-0977

Northern California Prime User’s Group
Open to: Users of Prime systems
Contact: Charles Verboom
P.O. Box 2315
Vallejo, CA 94592
(707) 646-2444

OSI Personal Users Group
Contact: Jim Buttnick
5501 Lewis Ave.
Los Angeles, CA 90012
(213) 428-0426

Osborne Professional & Educators Network
Open to: Users of Osborne computers
Contact: Frank L. Christ
Learning Assistance Center
CSU Long Beach
Long Beach, CA 90840
(213) 498-4186

Associations
Associations

Perfect Software Users Group
Open to: Perfect Software, Inc. users
Contact: Perfect Software Users Group
702 Harrison
Berkeley, CA 94710
(415) 527-2526

Daniel Users Group of Southern California
Contact: Michael S. Geller
c/o Remy Leather Fashions
1200 South Los Angeles St.
Los Angeles, CA 90015
(213) 537-7700

San Diego Computer Society
Contact: San Diego Computer Society
P.O. Box 81537
San Diego, CA 92138
(619) 442-7967

Usenix Association
Open to: Licensees of Bell Laboratories, Inc.'s Unix
Contact: Usenix Association
P.O. Box 7
El Cerrito, CA 94530
(415) 528-UNIX

COLORADO

Association of Computer Users
Contact: Hillel Segal, President
P.O. Box 8003
Boulder, CO 80301
(203) 755-1771

Computer Programmers & US-NS
Open to: Any individual who has a personal interest in minicomputers
Contact: Jim Dudley
Box 74200
Steamboat Springs
CO 80477
(303) 879-0203

Group 34/38
Open to: Those individuals who are actively working on or are involved with IBM's System/34 or System/38
Contact: Group 34/38
P.O. Box 424
Golden, CO 80402
(303) 737-1065

Independent Computer Consultants Association
Open to: Self-employed businessmen or Chief Executive Officers of their own businesses

CONNECTICUT

Analyzer International Users Group
Open to: Users of Data Devices International, Inc.'s Analyzer System
Contact: TSI International
50 Washington Street
Norwalk, CT 06854
(203) 853-2884

Connecticut CP/M Users Group for Businesspeople and Professionals
Contact: Malcolm Roth
62 Bunnwood Dr.
Bloomfield, CT 06002
(203) 243-3063

D.P. Directions
Open to: Alani, Inc. computer owners or users
Contact: D.P. Directions
Box 562
Bloomfield, CT 06002
(203) 859-0492

Data Processing Management Association, Stamford Chapter
Open to: Any person who has at least one year of DP experience
Contact: DPMA — Stamford Chapter
P.O. Box 4120
Stamford, CT 06907

DISTRICT OF COLUMBIA

Washington DC-IDMS Users Group
Contact: John A. Ambler
DBMS, Inc.
Suite 1200
8150 Leesburg Pike
Vienna, VA 22180
(703) 827-0078

Women in Information Processing
Contact: Judy Beckman
Lock Box 39173
Washington, DC 20016
(202) 328-6161

FLORIDA

PRO/34
Open to: All individuals with interest in IBM's small systems
Contact: Joe Britt, Chairman
PRO/34
P.O. Box 8006
Maitland, FL 32751
(800) 432-8315

ILLINOIS

Association of the Institute for Certification of Computer Professionals [ICCP]
Open to: Any individual who holds an ICCP certificate
Contact: AICCP
33 E. Wacker Drive
Chicago, IL 60601
(312) 782-9437

Association of Information Managers [AIM] for Financial Institutions
Open to: MIS executives in financial institutions
Contact: M.J. Hoogenrijk
AIM Executive Director
Suite 2221

National Association of Computer Stores
Contact: National Association of Computer Stores
198 North St.
P.O. Box 1333
Stamford, CT 06904
(203) 323-3143

VS News & World Report
Open to: Any Wang Laboratories, Inc. VS system user
Contact: VS News and World Report
99 River Road
Cos Cob, CT 06607
(203) 629-2880

PRO/34
Open to: All individuals with interest in IBM’s small systems
Contact: Joe Britt, Chairman
PRO/34
P.O. Box 8006
Maitland, FL 32751
(800) 432-8315

DISTRICT OF COLUMBIA

Washington DC-IDMS Users Group
Contact: John A. Ambler
DBMS, Inc.
Suite 1200
8150 Leesburg Pike
Vienna, VA 22180
(703) 827-0078

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Contact: Judy Beckman
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Washington, DC 20016
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Contact: Joe Britt, Chairman
PRO/34
P.O. Box 8006
Maitland, FL 32751
(800) 432-8315

ILLINOIS

Association of the Institute for Certification of Computer Professionals [ICCP]
Open to: Any individual who holds an ICCP certificate
Contact: AICCP
33 E. Wacker Drive
Chicago, IL 60601
(312) 782-9437

Association of Information Managers [AIM] for Financial Institutions
Open to: MIS executives in financial institutions
Contact: M.J. Hoogenrijk
AIM Executive Director
Suite 2221
INDIANA
ASCUE
Open to: Individuals interested in computer educational needs in colleges and schools
Contact: R. Waldo Roth, Chairman Information Science Dept.
Taylor University
Upland, IN 46989
(317) 898-2791, Ext. 269
Northern Indiana IBM-PC Users Group
Open to: Anyone interested in personal computers
Contact: Northern Indiana IBM-PC Users Group
316 N. Ironwood Drive
South Bend, IN 46615
(219) 289-3506
The Unix Project
Open to: Anyone who is interested in Unix, C and so forth
Contact: Unix
Suite 106
5987 E. 71st St.
Indianapolis, IN 46220
(317) 842-7014

KENTUCKY
Kentucky Regional Users Group
Open to: Hewlett-Packard HP 3000 users
Contact: Cheri Vetter Wilson
c/o NTS Development Co.
10172 Linn Station Road
Louisville, KY 40223
(502) 426-4800

LOUISIANA
Artistic Digital Dexterity
Open to: Individuals with an artistic interest in digital technology
Contact: Bernard J. Rauch Jr.
P.O. Box 15199
New Orleans, LA 70175
(514) 897-3372

MAINE
MAINEON
Open to: Individuals with an interest in online searching
Contact: Deb Warner
Newsletter Editor, MAINEON
Central Maine Medical Center Library
Lewiston, ME 04240
(207) 795-2376

MARYLAND
Atari Olney A.C.E.
Open to: Individuals with an interest in Atari systems
Contact: Dean Sarff
3701 Mt. Olney Lane
Olney, MD 20832
(301) 774-9405

Construction Computer Application Newsletter
Open to: Construction contractors
Contact: Construction Industry Press
1105-F Spring St.
Silver Spring, MD 20910
(301) 589-4894

Massachusetts
Association of Data Processing Trainers
Open to: Individuals responsible for the development of DP personnel
Contact: Chris Rappel
Conifer Computer Services
370 Main St.
Worcester, MA 01608
(617) 879-0511 x4712

The Boston Computer Society
Contact: Rosemary O’Neil
3 Center Plaza
Boston, MA 02108
(617) 367-8080

Computer Security Institute
Open to: Individuals interested in computer security
Contact: Carol Smith
Computer Security Institute
43 Boston Post Road
Northborough, MA 01532
(617) 845-5050

Greater Boston Datapoint Users Group
Open to: Users of Datapoint Corp. systems
Contact: Thomas J. Laliberte
50 Pond Park Road
Hingham, MA 02043
(617) 748-8681

NEAR/ACF
Open to: Users of IBM’s advanced communications function and
Associations

communication software
Contact: Barry Nusbaum
Avco Computer Services
201 Lowell St. MS 3123
Wilmington, MA 01887
(617) 729-7700

North American Honeywell Users
Contact: George D. Thompson
Secretary
310 Franklin St.
Wrentham, MA 02093
(617) 449-3000 x220

Small Business Service Bureau
Contact: Al Roch
Director
Management Assistance
544 Main St.
Worcester, MA 01601
(800) 262-2981, MA

System 1022/1032 Users Group
Contact: System 1022/1032 Users Group
1105 Massachusetts Ave.
Cambridge, MA 02138
(617) 661-9440

MISSISSIPPI
BLISS/COBOL Users Group
Contact: Marshal O'Neil
P.O. Box 12424
Jackson, MS 39211
(601) 649-3400

MISSOURI
Independent Computer Consultants
Association
Open to: Firms offering independent computer consulting
Contact: ICCA
P.O. Box 27412
St. Louis, MO 63141
(314) 567-9708

Key/500 Users Group
Contact: Sauer Computer Systems, Inc.
1750 South Brentwood
St. Louis, MO 63144
(314) 962-0382

St. Louis Computer Group
Contact: St. Louis Computer Group
5600 Clayton Road
St. Louis, MO 63110
(314) 535-0100

St. Louis Health Users Group
Contact: SLHUG
c/o 3794 McKelvey Rd.
St. Louis, MO 63144
(314) 592-0382

St. Louis Regional Hewlett-Packard
Users Group
Contact: CCSC, Inc.
2001 Hanley Center
St. Louis, MO 63144
(314) 674-8891

St. Louis S/38 Users Group
Open to: Users with installed IBM System/38s
Contact: Charles Rickenberg
St. Louis Football Cardinals
200 Stadium Plaza
St. Louis, MO 63102
(314) 421-0777

MONTANA
Institute for Professional Management
Contact: Lance S. Staub
Secretary/Treasurer
800 S. Main St.
Kirtland, MT 59901
(406) 255-5300 x265

NORTH CAROLINA
Charlotte Apple Computer Club
Contact: Dr. Stephen Canipe
President
2301 E. Providence Drive
Matthews, NC 28105
(704) 373-4530

Triangle 34/38
Open to: Users who have an installed IBM System/34 or 38
Contact: Triangle 34/38
P.O. Box 58783
Raleigh, NC 27658

NEBRASKA
Computers in Business
Open to: Microcomputer owners
Contact: Bob Weber
3510 Ave. M
 Kearney, NE 68847
(308) 237-3190 or (308) 236-6665

NEW JERSEY
Northeast Central Regional User Group, Inc.
Open to: Individuals interested in Hewlett-Packard products
Contact: Pete Somers
c/o Cape Data Corp.
Cape May, NJ 08204
(215) 564-4133

Management Recruiters of Sussex
Contact: Management Recruiters
276 Route 206
Andover, NJ 07821
(201) 691-2000

Morris County Timex Users Group
Contact: Larry Spencer
6 Forest Court
Morris Plains, NJ 07950
(201) 267-5569

Metropolitan Honeywell Users Association
Contact: Honeywell Users
C/o Goodall Rubber Co.
P.O. Box 8237
Trenton, NJ 08650
(609) 587-4000

NEW YORK
Association of Upstate NY Information Centers
Contact: Sandra Maceyska
User Services Manager
Associations

First Federal Savings and Loan
1 First Federal Plaza
Rochester, NY 14614
(716) 454-4010

Buffalo Area On-line Users Group
Open to: Search analysts
Contact: Maryruth Glogowski
SUC/Buffalo
1300 Elmwood Ave.
Buffalo, NY 14222
(716) 878-6320

DC/2 Users Group
Contact: Richard Nauer
Mobil Oil Corp.
150 42nd St.
New York, NY 10017
(212) 883-5950

DYROS
Open to: Individuals interested in developing a commitment to world workability methods through automation.
Contact: Mr. Jack A. Schulman
1160 Midland Ave.
Bronxville, NY 10708
(615) 793-6228

FUSE
Open to: Licensees of Information Builders, Inc.'s Focus software
Contact: Information Builders FUSE Secretary
1250 Broadway
New York, NY 10001
(212) 736-4433

Foot Hills Apple Users Club
Contact: Brian Clements
Foot Hills Computer
Quaker Road
Glens Falls, NY 12801
(518) 792-0598

HP 3000 Upstate New York Regional Users Group
Contact: Richard J. Cooman
President
c/o Norwich-Eaton Pharmaceuticals
P.O. Box 191
Norwich, NY 13815
(716) 334-8080

Long Island Wang Users Group
Open to: Wang 2200 VS users
Contact: Wang Users Group
6800 Jericho Turnpike
Syosset, NY 11572
(516) 364-8700

MDS Library 21
Open to: People who have developed software for use on MDS Series Systems.
Contact: Walter J. Sexton
R.D. 2
Frankfort, NY 13340
(315) 866-5300 x5320

New York IBM Personal Computer Users Group
Contact: Eric A. Jaffe, M.D.
Cornell University Medical College
1300 York Ave.
New York, NY 10021
(212) 440-3401

OS Eastern Region Group
Open to: Systems programmers running MVS or VSI systems
Contact: Lucy Adelson
Home Life Insurance Co.
253 Broadway
New York, NY 10007
(212) 306-2185

Starflex Systems and Services, Inc.
Open to: Contract programmers
Contact: Starflex Systems and Services, Inc.
275 Madison Ave.
New York, NY 10002
(212) 684-6540

TelTech CICS Users Group
Contact: TelTech
548 5th Ave.
New York, NY 10038
(212) 921-0250

Tri-State Information Management Educators
Contact: Kathryn Marsala
1285 Ave. of the Americas
New York, NY 10019
(212) 554-4089

OHIO

Cleveland Sinclair-Timex Users
Contact: R.F. Sieg
19502 Thorrnidge
Cleveland, OH 44135
(216) 281-2211

Mapics Users Group
Open to: All Mapics users
Contact: Woody Herford
1018 Proprietor's Road
Worthington, OH 43085
(614) 846-1839

Northern Ohio Data General Users Association
Contact: John Ferry
15300 Industrial Parkway
Cleveland, OH 44135

Qantal Users Association of Northern Ohio
Contact: Katherine A. Strickland
382 W. Jackson St.
P.O. Box 110
Painesville, Ohio 44077
(216) 587-3400

Rubber Apple Users Group
Contact: Rubber Apple Users Group
1870 Brookfield Drive
Akron, Ohio
(216) 922-2990

Sierra Data Sciences Users Group
Contact: Sierra Data Sciences
Product Support Division
25700 First St.
Westlake, Ohio 44145
(216) 892-1800

The Data Processing Association of Lima, OH
Contact: Charles E. Black
Dresser Industries
Leroi Division
P.O. Box 90
Sidney, OH 45365
(519) 490-1171 x230

4300 Users Group
Open to: Users of IBM 4300 or compatible systems
Contact: Ken Beraduce
RMI Co.
1000 Warren Ave.
Niles, OH 44466
(216) 652-9851

OKLAHOMA

Peachtree Enhancement Group
Open to: Users of Peachtree Software, Inc. financial software
Contact: Mini/Micro Software Group
6181 N. May Ave., Suite 23
Oklahoma City, OK 73112
(405) 840-1175

OREGON

Corvalis PC Computer Club
Contact: Barry Shain
P.O. Box 1016
Corvallis, OR 97339
(503) 753-1143

Eugene Kaypro Users Group
Contact: Fred Beisse
721 Footclub Drive
Eugene, OR 97405
(503) 344-7202

Pennsylvania

Delaware Valley Computer Users Group
Open to: All computer users and vendors
Contact: Delaware Valley Computer Users Group
Associations

P.O. Box 30159
Philadelphia, PA 19103
(215) 698-4000

Delaware Valley IAS LUG
Open to: People interested in Digital Equipment Corp. PDP-11s or IAS equipment
Contact: Robert F. Curley
University of Pennsylvania
P.O. Box 322
Flourtown, PA 19031
(215) 662-3083

Project Management Institute
Contact: Project Management Institute
P.O. Box 43
Drexel Hill, PA 19026
(617) 927-7101

Susquehanna Valley IBM Users Group
Contact: Dennis Archenerfelder
3185 Lackawanna
Bloomsburg, PA 17815
(717) 784-2121

TEMPO
Open to: Individuals with DP educational responsibilities
Contact: Ms. Katherine Huston
c/o Smithline Beckman Corp.
Mail Code N39
P.O. Box 7929
Philadelphia, PA 19101
(215) 521-5000 x2059

Valley Apple Medical Group
Open to: Any Apple Computer, Inc. Apple III or Ile owners.
Contact: Dr. Robert England
3237 Paper Mill Road
Huntington Valley, PA 19006
(215) 581-6372

PUERTO RICO
Asociacion de Ususarios
Open to: Any microcomputer, minicomputer or portable computer end users
Contact: Alfredo M. Torey
P.O. Box 11486
San Juan, PR 00910
(809) 728-8694

RHODE ISLAND
Independent RSTS Users
Contact: Joyce Leonard
IRUS Office Manager
Suite 4
3657 Post Road

Warwick, RI 02886
(401) 738-4430

TEENIESSE
East Tennessee HP 1000 Users Group
Contact: Randy Bowling
TVA, 278 401B
Chattanooga, TN 37401
(615) 751-3757

TEXAS
Houston Area Datapoint Users Group
Contact: Virginia Schwartz
HADUG
4990 S.W. Freeway, No. 103
Houston, TX 77027
(713) 759-0059

Midland Microcomputer Association
Contact: Midland Microcomputer Association
P.O. Box 50246
Midland, TX 79710
(915) 697-7012

NEC Users Group
Contact: PC Place, Inc.
11020 Audelle, Suite B101
Dallas, TX 75243
(214) 340-0825

Prime Gulf Coast Users Group
Contact: Bob Rasp
6400 Westpark, Suite 180
Houston, TX 77057
(713) 781-5310

SNA Product Users Group
Open to: Users of IBM's Systems Network Architecture
Contact: SNA Products Users Group
P.O. Box 472832
Garland, TX 75047
(214) 840-2992

Women in Computing
Contact: Sharon Baker
Women in Computing
Suite 185
7501 C West 15th
Plano, TX 75075
(214) 257-0722 — Days
(214) 484-4053 — Evenings

VIRGINIA
Computer Mailing Association
Contact: Computer Mailing and Information Services

P.O. Box 1172
McLean, VA 22101
(703) 827-5949

Systems Planning Corp. Users Group
Contact: Nancy Jenkins
SPC, 1500 Wilson Blvd.
Arlington, VA 22209
(703) 841-2975

WISCONSIN
Mapics Users Group — Milwaukee
Contact: Bennet A. Rucka, President
5223 So 49th St.
Greenfield, WI 53220
(414) 423-0680
CALENDAR OF EVENTS
WITH ADVERTISER'S INDEX
Microcomputers in Small Business
September 1, October 1, November 1, December 1
Portland, Ore.
Sponsor: Daniel Moore & Associates
Exhibit contact: S. J. Kent
Suite 201C
10157 S.W. Barbur
Portland, OR 97219
(503) 245-2102

“Local Networks: Promise into Practice” Seminar
Seminar focusing on criteria for designing and choosing local networks
August 31-September 1 — Phoenix, Ariz.
September 13-14 — San Francisco, Calif.
Registration contact: Architecture Technology Corporation
P.O. Box 24344
Minneapolis, MN 55424
(612) 935-2035

National Conference on Artificial Intelligence
Conference to promote research in the field of artificial intelligence
August 22-26 — Washington, D.C.
Washington Hilton
Sponsoring companies: AAAI, University of Maryland and George Washington University
Registration contact: AAAI
445 Burgess Drive
Menlo Park, CA 94025
(415) 328-3123

Satellite Communications Users Conference
Trade show in satellite communications industry
August 22-24 — St. Louis, Mo.
Stouffer’s Riverfront Towers
Sponsor: Satellite Communications Magazine
Exhibit contact: Cheryl R. Carpinello
Stouffer’s Riverfront Towers
15565 Northland Drive
Southfield, Mi 48075
(313) 569-8280

Technical Career Job Fair
A recruiting trade show for technical corporations
August 22-23 — Phoenix, Ariz.
September 1-2 — San Jose, Calif.
September 19-20 — Dallas, Texas
September 26-27 — Denver, Colo.
October 17-18 — Minneapolis, Minn.
November 14-15 — San Jose, Calif.
November 21-22 — Boston, Mass.
December 5-6 — Los Angeles, Calif.
Sponsor: Business People, Inc.
Exhibit contact: Mike Hall
(303) 328-4032

Worcester Polytechnic Institute’s “Executives-Only” Technology Briefing
One day briefing on “The Revolution in Telecommunications Technologies”
August 23 — New York, N.Y.
Sponsor: WPI
Exhibit contact: S. J. Kent
Suite 201C
10157 S.W. Barbur
Portland, OR 97219
(503) 245-2102

Business Expo
Business-to-business products and services show
August 24-25 — Anaheim, Calif.
September 22-23 — Boston, Mass.
October 5-6 — Oakland, Calif.
November 1-3 — Detroit, Mich.
December 6-8 — Dallas, Texas
Sponsor: International Business Expositions, Inc.
Registration contact: Janice Dettweiler
(513) 569-8280
Exhibit contact: Tim Cleary
Suite 702 E.
15565 Northland Drive
Southfield, MI 48075
(313) 569-8280

IBM PC Faire
Conference, exposition, and group meetings focusing on hardware, software and applications for the IBM Personal Computer
August 26-28 — San Francisco, Calif.
Civic Auditorium and Brooks Hall
Exhibit contact: Jim Warren
IBM PC Faire
345 Sweett Road
Woodside, CA 94062
(415) 851-7077

Expo Computers 2000
For micro-, mini- and hand-held computers
August 29-September 3 — San Juan, P.R.
Sponsor: Expo 2000 Promotion Agency
Exhibit contact: Alfredo M. Tomy
Exhibit contact: Mrs. Auret Imbert
P.O. Box 11486
San Juan, PR 00910
(809) 728-8694

Society for Information Management Conference
Various seminars focusing on the human dimension of information management
September 12-15 — San Diego, Calif.
Sponsor: Society for Information Management
Exhibit contact: Lynn Valastyan
111 East Wacker Drive
Chicago, IL 60601
(312) 644-6610

IEEE Seminar on Software QA
September 12-14 — Atlanta, Ga.
Omi Hotel
October 26-28 — San Francisco, Calif.
IEEE
Suite 201C
10157 S.W. Barbur
Portland, OR 97219
(503) 245-2102

Holiday Inn, Fisherman’s Wharf
November 30-December 2 — Las Vegas, Nev.
Sponsor: Institute of Electrical & Electronics Engineers, Inc.
Registration contact: Susan M. Havranek, Standards Seminar Manager
IEEE
345 East 47th St.
New York NY 10017
(212) 706-7907

MID CON
Minicomputer/Microcomputer Trade Show
September 13 — Chicago, Ill.
Sponsor: Topaz
Exhibit contact: Ruxton Tucker
3855 Ruffin Road
San Diego, CA 92123
(619) 571-5622

Computer-Assisted Manual Writing
Documentation development seminar
September 13 — Boston, Mass.
September 15 — Washington, D.C.
Sponsor: EUROMICRO
P.O. Box 217
Dept. INF
Room AM21
7500 AE Einschede, The Nederlands
(31) (53) 338799

EUROMICRO 1983 Symposium
Special emphasis on software
September 14-16 — Madrid, Spain
Sponsor: EUROMICRO
P.O. Box 217
Dept. INF
Room AM21
7500 AE Eisenhede, The Netherlands
(31) (53) 338799

Micro Database Software
Data base software demonstration for microcomputers
September 15 — Dayton, Ohio
Sponsor: Data Base Software and Logic
Registration contact: Dave Lu
P.O. Box 53
Dayton, Ohio 45420
(513) 229-8626

Great Southern Computer and Electronics Shows '83
Comprehensive computer and electronics show
September 16-18 — Jacksonville, Fla.
Sponsor: Great Southern Computer and Electronics Shows
Registration contact: Great Southern Computer and Electronics Shows '83
P.O. Box 655
Jacksonville, FL 32201
(904) 353-0418

Information and Technology: At the Crossroads
Conference covering areas of information technology with emphasis on library applications
September 18-21 — Baltimore, Md.
Calendar

IEEE Seminar on Software Testing
November 28-29 — Las Vegas, Nev.

Strategy for Success in Data Processing: Project Management
Course which emphasizes management planning issues concentrating on the development center.
September 29-31 — Washington, D.C.

HP 3000 International Conference
Technical Conference on the Hewlett-Packard 3000 System/Applications
October 2-7 — Edinburgh, Scotland

COMPUSOURCE '83
Exhibits plus technical sessions reflecting latest advances in computer industry
October 5-6 — San Jose, Calif.

GREAT SOUTHERN COMPUTER AND ELECTRONICS SHOW '83
Comprehensive computer and electronics show
October 7-9 — Jacksonville, Fla.

Computer-aided Design Conference
October 10-14 — Washington, D.C.

CADCAM East '83
Engineering conference devoted exclusively to computer-aided design
October 11-12 — Boston, Mass.
Calendar

Registration contact: CADCON East 83
Coordinator
Morgan Grampian Expositions Group
Two Park Ave
New York, NY 10017
(212) 340-9781

System 1022/1032 Users
Conference
Seminars, workshops for our users
October 16-19 — Boston, Mass.
Hotel Marriott/Long Wharf
1105 Massachusetts Ave.
Cambridge, MA 02138
(617) 661-9440

Texas Association for Educational Data Systems 1983 Convention
Conference with theme of computer literacy
October 16-18 — Dallas, Texas
Austin Hilton Hotel
Sponsor: Texas Association for Educational Data Systems
Registration contact: Tom Hopper
P.O. Box 90020, Dept. 350
Houston, TX 77290
(713) 251-9726

Strategy for Success in Data Processing Resource Management
Seminar which emphasizes management planning issues concentrating on the new current applications and information centers.
October 17-20 — Los Angeles, Calif.
Sponsor: Febish Associates, Inc.
Registration contact: George J. Febish
P.O. Box 90020, Dept. 350
Houston, TX 77290
(713) 251-9726

HP 1000 IUG Conference
Technical Conference on the Hewlett-Packard 1000 System
October 18-21 — Fort Worth, Texas
Fort Worth Hyatt Regency
Sponsor: HP 1000 International Users Group
Registration contact: Ted Varga
P.O. Box 1447
Provo, UT 84601
(801) 373-8150

Exhibit contact: Conference Manager
HP 1000 International User’s Group
289 S. San Antonio Road
Los Altos, CA 94022
(415) 841-1843

Facts ’83
Automation for financial institutions
October 23-26 — Hilton Head, S.C.
Registration contact: Elizabeth Toronto
50 Washington St.
Norwalk, CT 06854
(203) 853-2884

Televend ’83
Conference promoting understanding among leaders of telecommunications industry
October 23-25 — Montreux, Switzerland
Maison des Congres
Sponsor: Televend USA
Registration contact: U.S. - Marianne Berrigan
Suite 1128
1120 Connecticut Ave., N.W.
Washington, DC 20036
(202) 857-4612

DEXPO/West ’83
National DEC Compatible Industry Exposition
October 23-26 — Las Vegas, Nev.
Las Vegas Convention Center
Sponsor: Expoconsal International, Inc.
Registration contact: Steven Barth
Exhibit contact: Natalie Kaye
55 Princeton Hightstown Road
Princeton Junction, NJ 08550
(609) 749-1661

SIZZLE/West
Seminar/Exposition for Info Industry Marketers
October 26-27 — San Jose, Calif.
San Jose Convention Center
Sponsor: The Sizzle Sheet
Registration contact: Doreen Goldberg
Exhibit contact: Doreen Goldberg
San Jose Convention Center
(408) 654-5892

INTECH ’83
Conference addressing integration of information technologies and applications
November 1-3 — Chicago, Ill.
McCormick Place
Sponsor: National Trade Productions, Inc.
Registration contact: Mary Beth Gouled
National Trade Productions
9418 Annapolis Road
Lanham, MD 20706
(301) 459-8383

Automation Technology in Engineering Data Handling and CAD/CAM
November 2-4 — Monterey, Calif.
Sponsor: Automation Technology Institute
Registration contact: Juliann McPadden
Exhibit contact: Donna Davidson
P.O. Box 242
Pebble Beach, CA 93953
(408) 654-5892

IFMA ’83 - The Electronic Connection
Annual tradeshow and convention of the IFMA
November 2-4 — Denver, Colo.
Inn at Market Place
Sponsor: National Facility Management Association
Registration contact: IFMA 5900 Evers Road
San Antonio, TX 78238
(512) 618-8330

4th Annual San Diego Computer Fair
Exhibits and seminars for microcomputer users
November 5-6 — San Diego, Calif.
Sponsor: San Diego Computer Society
Registration contact: C.B. Ahlberg
(619) 278-4284

Central Prime Users Meeting
Annual meeting and seminars for central region Prime Computer users
November 6-8 — Arlington Heights, Ill.
Arlington Park Hilton
Sponsor: Central Prime Users
Registration contact: Meg Lovell
Exhibit contact: Meg Lovell
720 S. Elgin Ave.
Elgin, IL 60120
(708) 265-3000

Information Exchange
Annual users conference
November 7-10 — Nashville, Tenn.
Sponsor: TSI International
Registration contact: Elizabeth Toronto
TSI International
50 Washington Street
Newark, NJ 07105
(201) 853-2884

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**CHICAGO SALES OFFICE:** Art Kossack, H. Newton Barrett, III. District Managers. Jean F. Broderick, Sales Assistant. COMPUTERWORLD, 2600 South River Road, Suite 304, Des Plaines, Ill. 60018, Phone: (312) 827-4433.

**LOS ANGELES SALES OFFICE:** Bob Hubbard, Bernie Hockswender, District Managers. Beverly Raus, Account Coordinator. COMPUTERWORLD, 18088 Skypark Circle, Suite 260, Irvine, Calif. 92714, Phone: (714) 556-6480.


**ATLANTA SALES OFFICE:** Jeffrey Melnick, District Manager. Michael J. Masters, Eastern Regional Manager. COMPUTERWORLD, 1853 Peeler Road, Suite D, Atlanta, GA 30338, Phone: (404) 394-0758.
The word processor for the times when mere words are not enough.

The SPERRYLINK Office System.

It's a word processor with the numbers capability and image capability of a data processor. A data processor with the stand-alone flexibility of a personal computer. A personal computer that reaches the mainframe, for mainframe information with mainframe support.

More: a telecommunications terminal with electronic mail and digitized voice capabilities; and a link to the world outside.

Any station can be any and all of these things. So the whole system adapts immediately to your corporate structure and management philosophy.

When new needs arise, SPERRYLINK rises to the challenge, re-adapting as your company grows.

The SPERRYLINK System. In concept, it goes beyond conventional ideas of office automation. It is far more than words and numbers, voice and image.

Because it's a tool designed not simply to help people work better.

But to help people work together.

Information. Not automation.

We understand how important it is to listen.
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Because it's a tool designed not simply to help people work better.
But to help people work together.

Information. Not automation.
History will record as a profound irony that the most powerful word processing package ever created for the IBM® Personal Computer wasn't created by IBM.