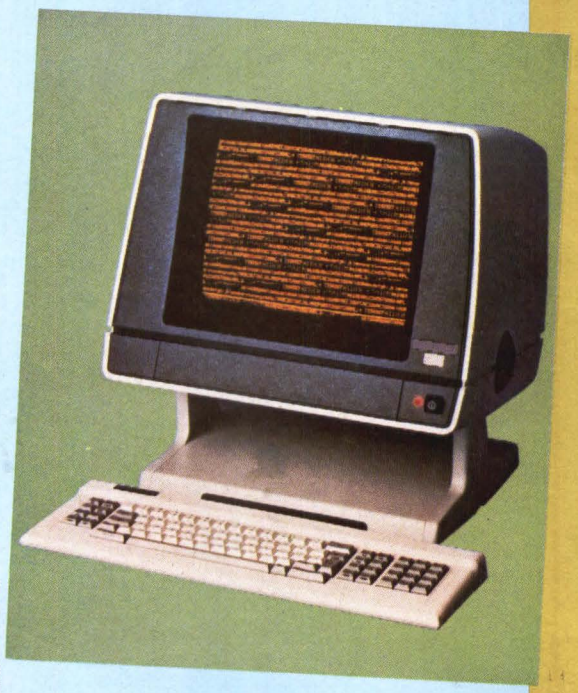
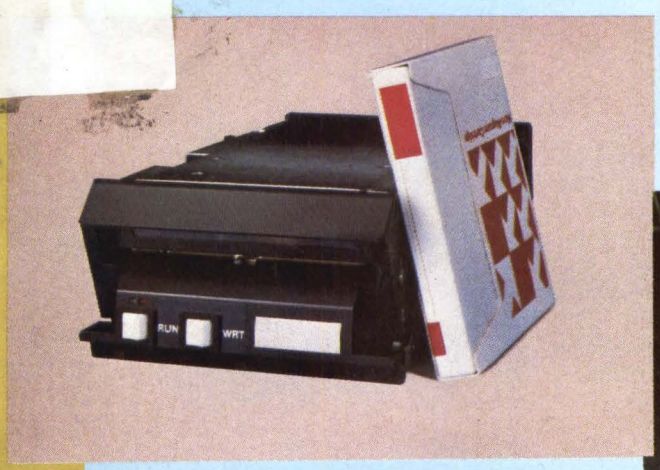
Mini-Micro Systems

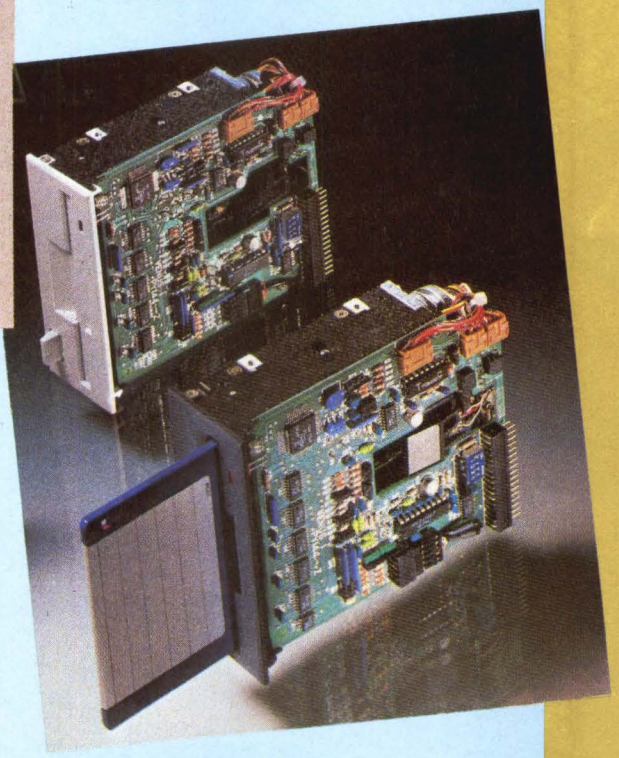
A CAHNERS PUBLICATION

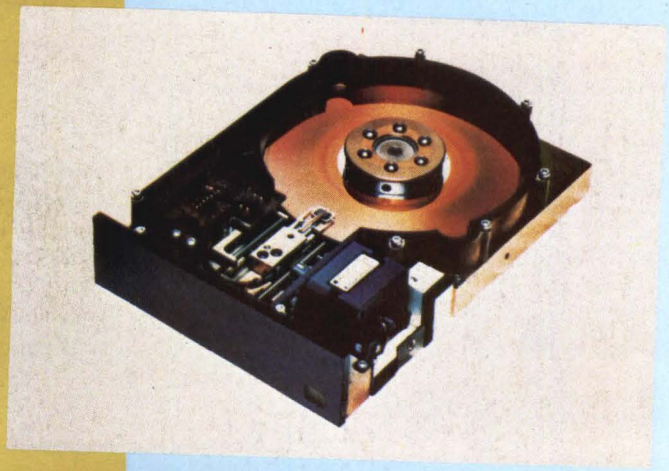
NOVEMBER 19, 1984/$15.00

Fall Peripherals Digest

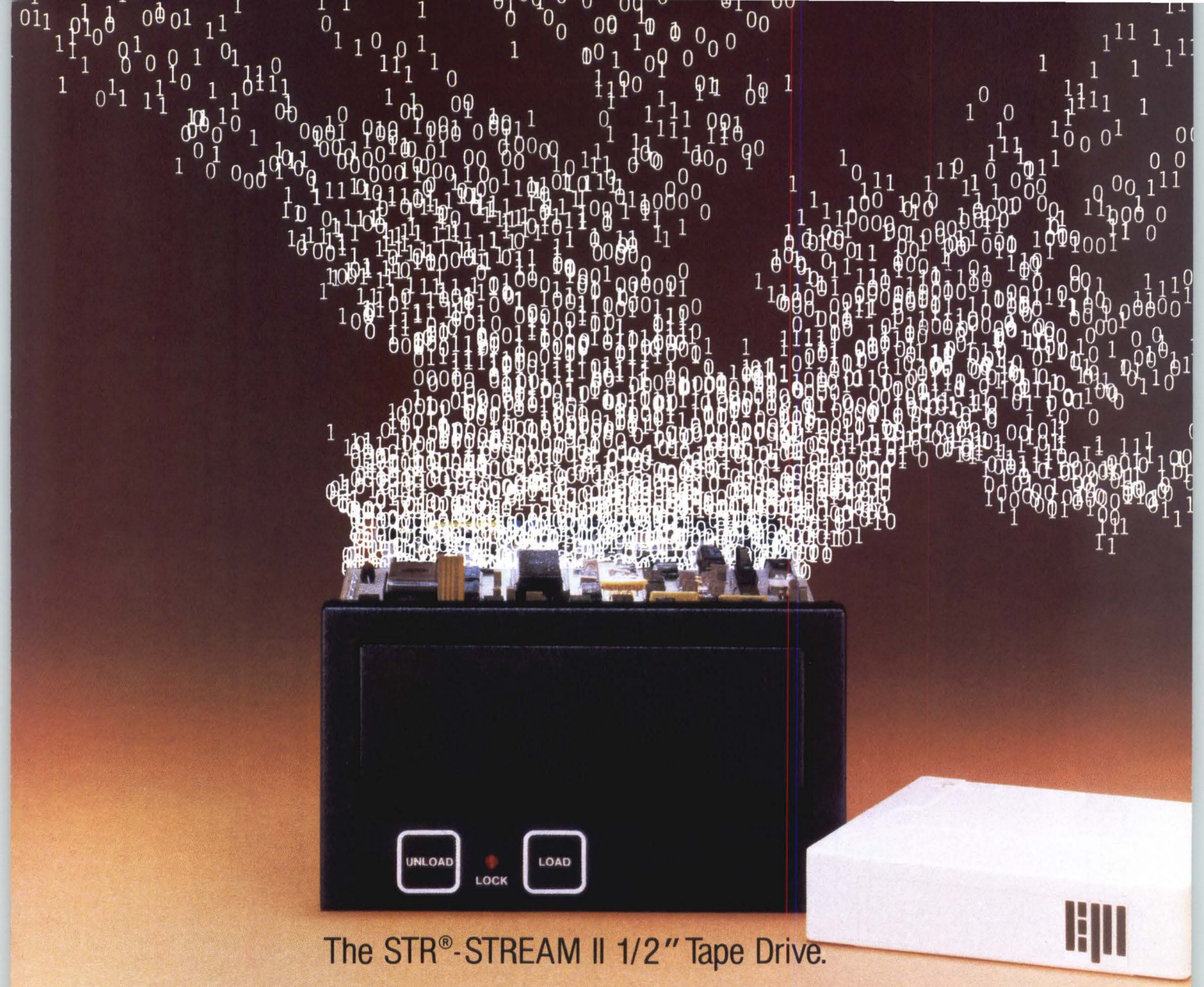








The source book for system integrators



The STR®-STREAM II 1/2" Tape Drive.

130 million bytes can't be wrong.

If you've got a lot of data to backup off your system hard disk (up to 130 Mbytes) and can't afford a lot of time to make sure it's done accurately, then you should take note of the new EPI STR-STREAM II 1/2" cartridge tape drive. It features 130 Mbyte capacity in a single 1/2" tape cartridge, one of the lowest cost-per-megabyte figures of any competing mass storage device, and the proven accuracy of reel-to-reel technology.

The screamin' streamer.

You get an almost unbelievable 225 kbytes/sec transfer rate. That coupled with an EPI controller means it can operate continuously in streaming mode to backup a full 130 Mbytes in under 12 minutes. And deliver a guaranteed bit error rate of less than one hard error in 10^{11} bits.

Compatibility, innovation, and reliability complete the story.

Tape guide accuracy of ±.001 inch means that tapes can be freely interchanged between any STR-STREAM II drives. And our proprietary multi-bump, constant-curvature head assures accurate and repeatable head-to-tape contact. The drive fits in the same space as a standard 5 1/4" disk drive, operates off the same supply voltages, and features a superior MTBF of 15,000 power-on hours.

For more information on the STR-STREAM II 1/2" cartridge tape drive, call us today at (303) 761-8540, or write Electronic Processors, Inc., 1265 W. Dartmouth Ave., Englewood, CO 80110.

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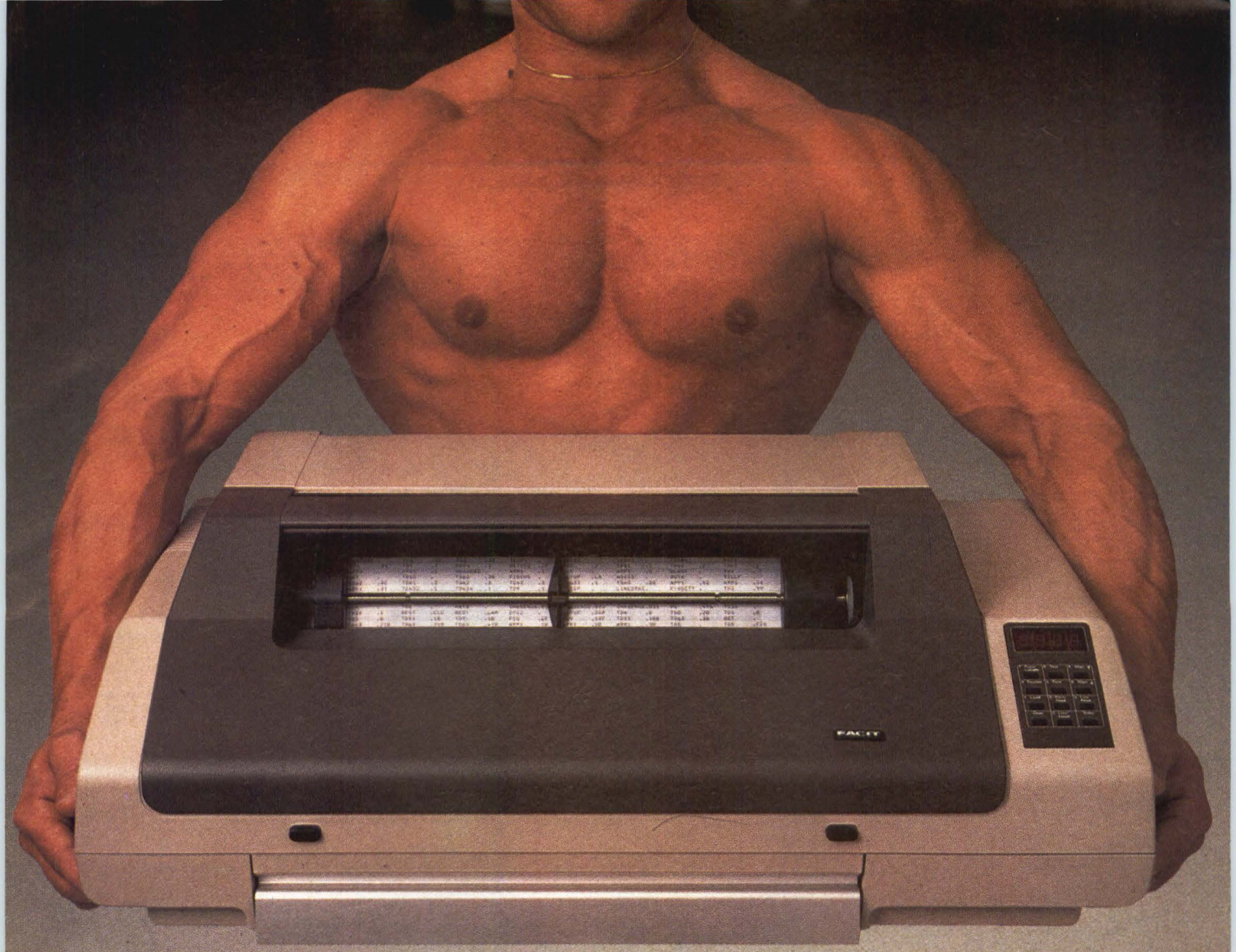
"Let EPI remember for you."

841

CIRCLE NO. 1 ON INQUIRY CARD



ADD THE HEAVYWEIGHT TO YOUR SYSTEM POWER

You'll immediately notice the difference with the Facit 4570 Matrix Printer.

Just try to lift it! And its 92 lbs (42 kg) speak for its ruggedness. Built for professional heavy-duty operations round the clock. Featuring Facit's unique Stored Force Flexhammer Printhead with all-perfect, non-deteriorating printouts throughout its average 1,000,000,000 character service life!

Facit 4570 has all the essential qualities that defines it as your central printer for large-volume printouts. As well as the handling of printouts from several wordprocessing workstations. At a speed of 250 CPS draft or 80 CPS NLQ printing.

Integrated in your word- and dataprocessing systems, its software intelligence and printing capability will convince you of its competitive edge.

Italic, bold and elongated characters with 16 different fonts, monospaced or proportional, are easily selected from the keypad or host computer. Equipped with Facit's Cut Sheet Feeder, the Facit 4570 can be manually or automatically fed from two magazines.

So when performance and reliability are vital parts of your system building, Facit 4570 Matrix Printer will add more punch to your own product.

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CIRCLE NO. 2 ON INQUIRY CARD

NO GUTS, NO GLORY.

Parallel port included. Standard interface for popular printers.

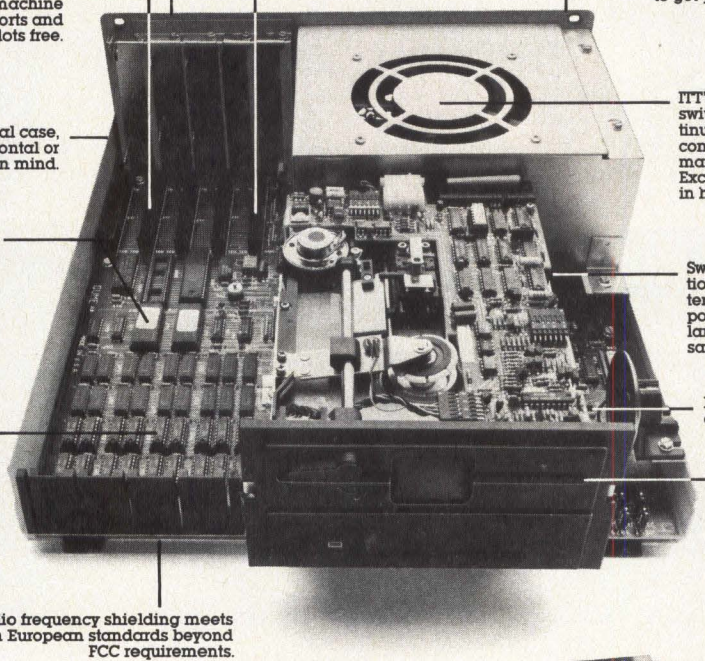
Watch this space for exciting new options coming soon.

Serial (RS-232) communications port built in. Console I/O may be redirected to this port by switch setting. Menu-driven DOS utility (set up) to configure this port or redirect printer I/O to it. Communications program included to get you started.

Five full-length expansion slots for IBM PC/XT compatible option cards. Hard disk machine with 640K, real time clock, three I/O ports and display has two slots free.

ITT's own heavy duty, high efficiency, switching power supply (115 watts continuous service) saves weight without compromising support for fully-equipped machines. 95 to 132 volts or 180 to 240 volts. Excellent air flow for greater reliability in harsh environments.

Small overall dimensions, sturdy metal case, designed inside and out with horizontal or vertical operation in mind.



ROM BIOS AND MONITOR by ITT: Interrupt compatible with IBM PC/XT and more. Ever-ready, menu-driven, diagnostic monitor debugger. Test hardware device by device and channel by channel. Examine registers, alter or dump memory, read or write tracks and sectors. Even set drive timing.

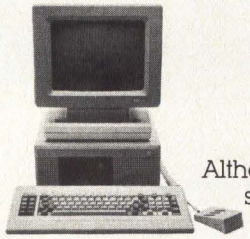
Switch controls allow console I/O redirection to serial port—use whatever ASCII terminal you want. Enable/disable power-on memory test for faster starts on large machines. Enable/disable screen-saving blanking when left idle.

Floppy disk controller on planar. Saves a slot.

256K byte, parity-checked RAM on planar board. Combo board with one, two and three banks of 128K bytes each. Real time clock and parallel port also available to give 640K RAM total with only one slot used.

Space-saving half-height disk drives. Solid and positive door mechanism with interlock to avoid closing empty and extend head life.

Radio frequency shielding meets tough European standards beyond FCC requirements.

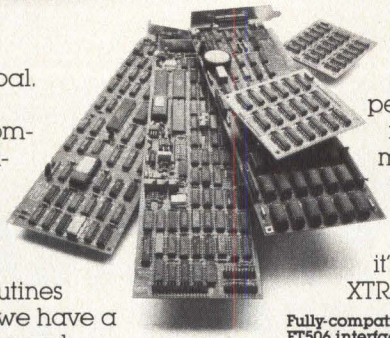


Monitor conveniently tilts and swivels. Pedestal height is proper. Green, amber or color non-glare monitors all meet toughest ergonomic standards. Three position keyboard is smooth as silk. Meets European ergonomic standards. Smart alpha and numeric shift lamps don't get fooled when software changes keyboard state. Dimpled F and J keys indicate home keys.

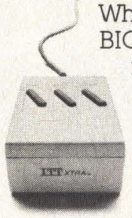
Although the outside of the ITT XTRA™ Personal Computer is small and beautiful, we're most proud of the beauty inside.

of design was our goal. We achieved it.

The ITT XTRA is compatible both in hardware and software with the IBM PC/XT with one exception.



Where IBM has BIOS support routines for its BASIC, we have a ROM monitor and diagnostics utility that's always available, provides direct disk access, and isolates problems down to the chip level.



Our very own mouse. Fully supported with shell software to integrate with existing or new applications. The ITT Mouse does not require a board. It connects to the keyboard through the interface box.

We offer a mouse that is made just for us. The BIOS, the keyboard services and the mouse itself are tailored to work smoothly together and remain transparent to ITT application programs.

We expect users to appreciate fine engineering. And, we plan to serve them for a long time. That's why we spent so much effort on the little things that make a machine predictable, reliable, and a pleasure to use.

Just working with a personal computer isn't enough anymore. It's time to work smart with style, quality, and reliability. That's why it's time for the ITT XTRA Personal Computer.

Fully-compatible color graphics board. FT506 interface hard disk controller with on-board diagnostics. "Combo" board with 1, 2 or 3 banks of 128K RAM, real time clock and parallel port.

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This is a machine you should know about, because it is the finest PC compatible.

It was conceived and built to be an application of proven technology in the most refined and careful way. It is a machine devoid of rough edges. It not only works right, it's tough, it's neat, and the insides make sense. Simple elegance

Fully "moused" versions of popular ITT application packages. Enhanced DOS with menu-driven setup (including port initialization), disk parking, true hard disk format with bad sector information. Excellent documentation.

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CIRCLE NO. 3 ON INQUIRY CARD

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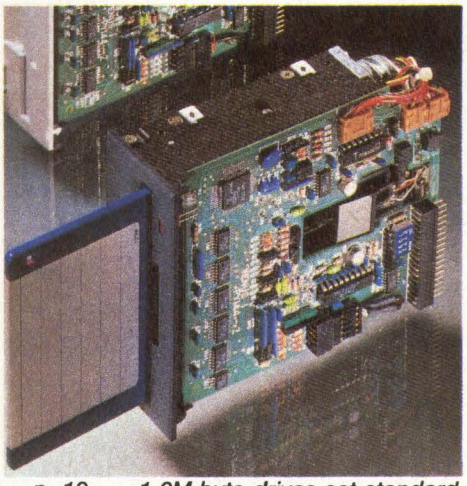
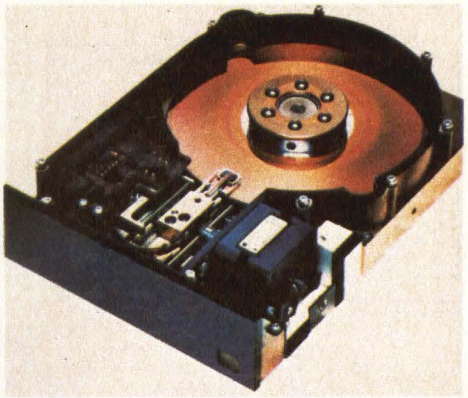
Mini-Micro Systems Fall Peripherals Digest

A Cahners Publication

Vol. XVII No. 14 November 19, 1984



p. 19 . . . 1.6M-byte drives set standard



p. 39 . . . Sub 4 inchers make the grade

p. 83 . . . Portable printers stake a claim

Save millions of dollars with Six-Shooters™

Last year 430 million business slides were made at a cost of $3.2 billion. Most of these slides were manually generated.*

These slides could have been made on Sweet-P® Six-Shooter Personal Plotters™. Faster and better. With savings of millions of $!

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Use your office computer and Six-Shooter Personal Plotter to create and plot finished charts in 6 colors in 5 to 15 minutes. Save $5.00 to $100.00 per chart.

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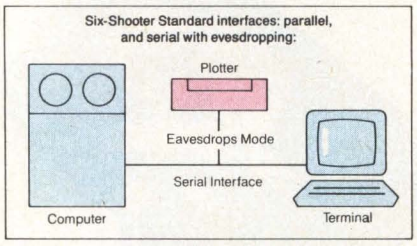
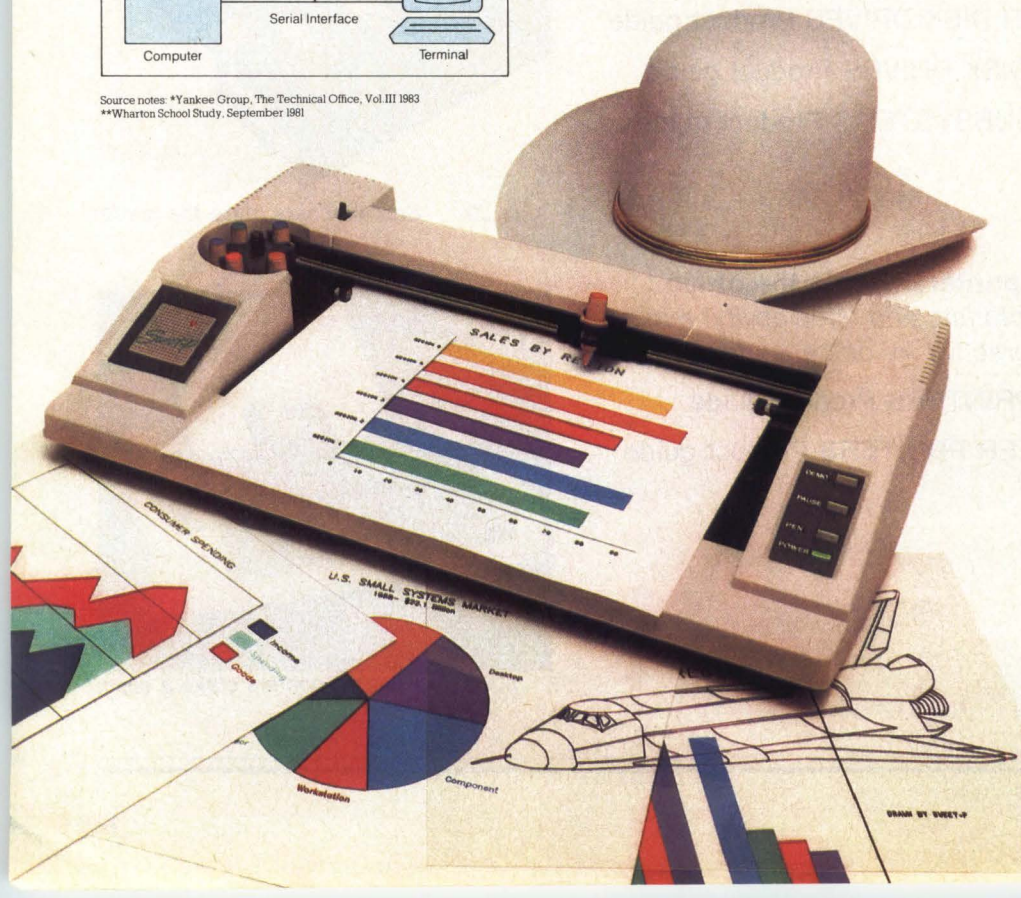
The Six-Shooter easily connects to almost any computer. It has RS-232 serial and Centronics parallel connectors. And it has two standard graphics languages—Sweet-P Graphics Language (SPGL™) and Hewlett-Packard Graphics Language (HPGL™).

The Six-Shooter plots on almost any media. Make brilliant overhead transparencies. Plot on film, and on plain and coated papers.

Save on wiring costs too. The Six-Shooter will "eavesdrop" on the RS-232 cables that connect your terminals now. (This makes it easy for Six-Shooters to join local and long distance networks.)



Source notes: *Yankee Group, The Technical Office, Vol.III 1983
**Wharton School Study, September 1981



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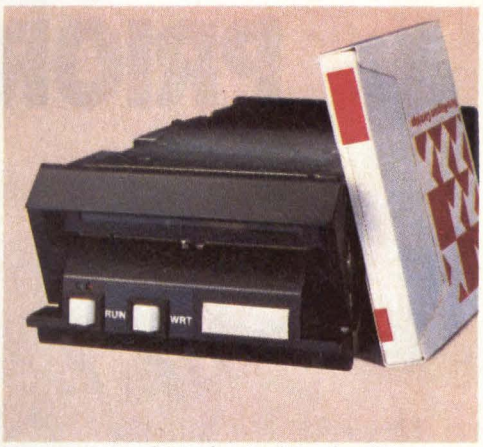
CIRCLE NO. 4 ON INQUIRY CARD



p. 117 . . Quarter inchers lead the pack

p. 133. . . Desktops offer high performance

DEPARTMENTS

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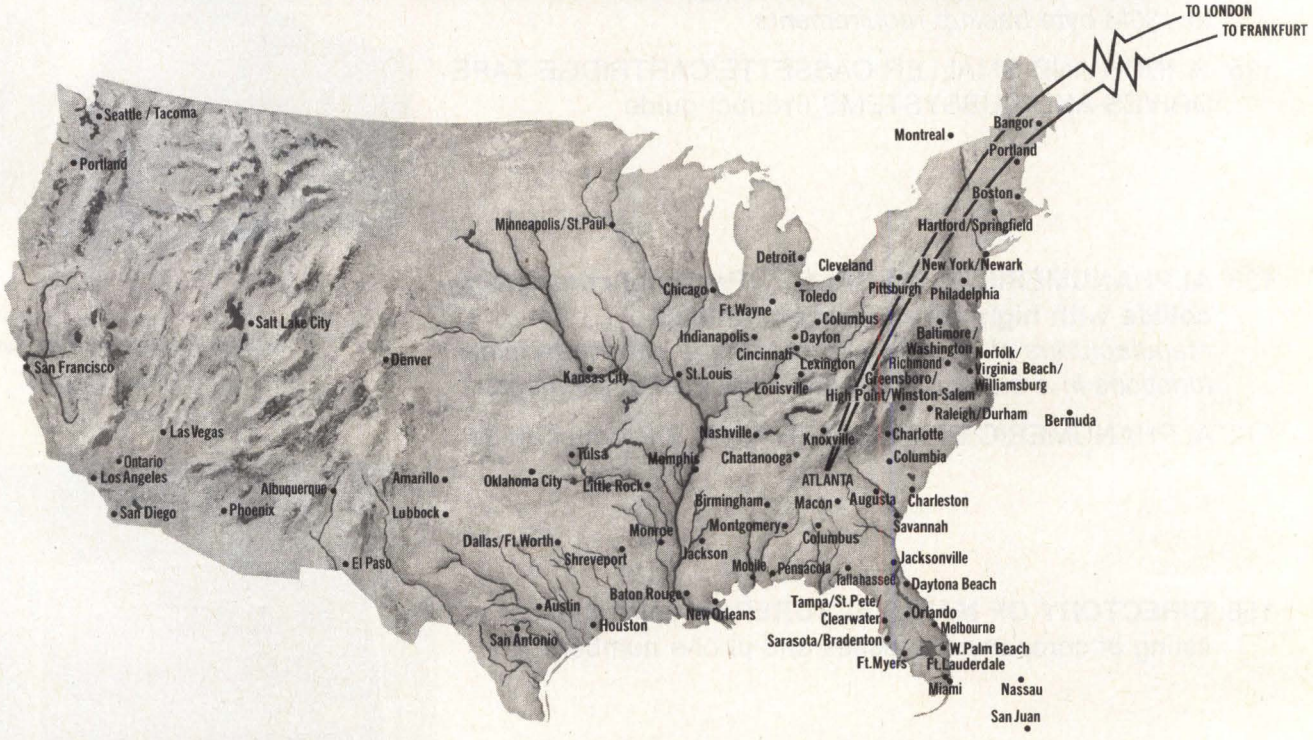

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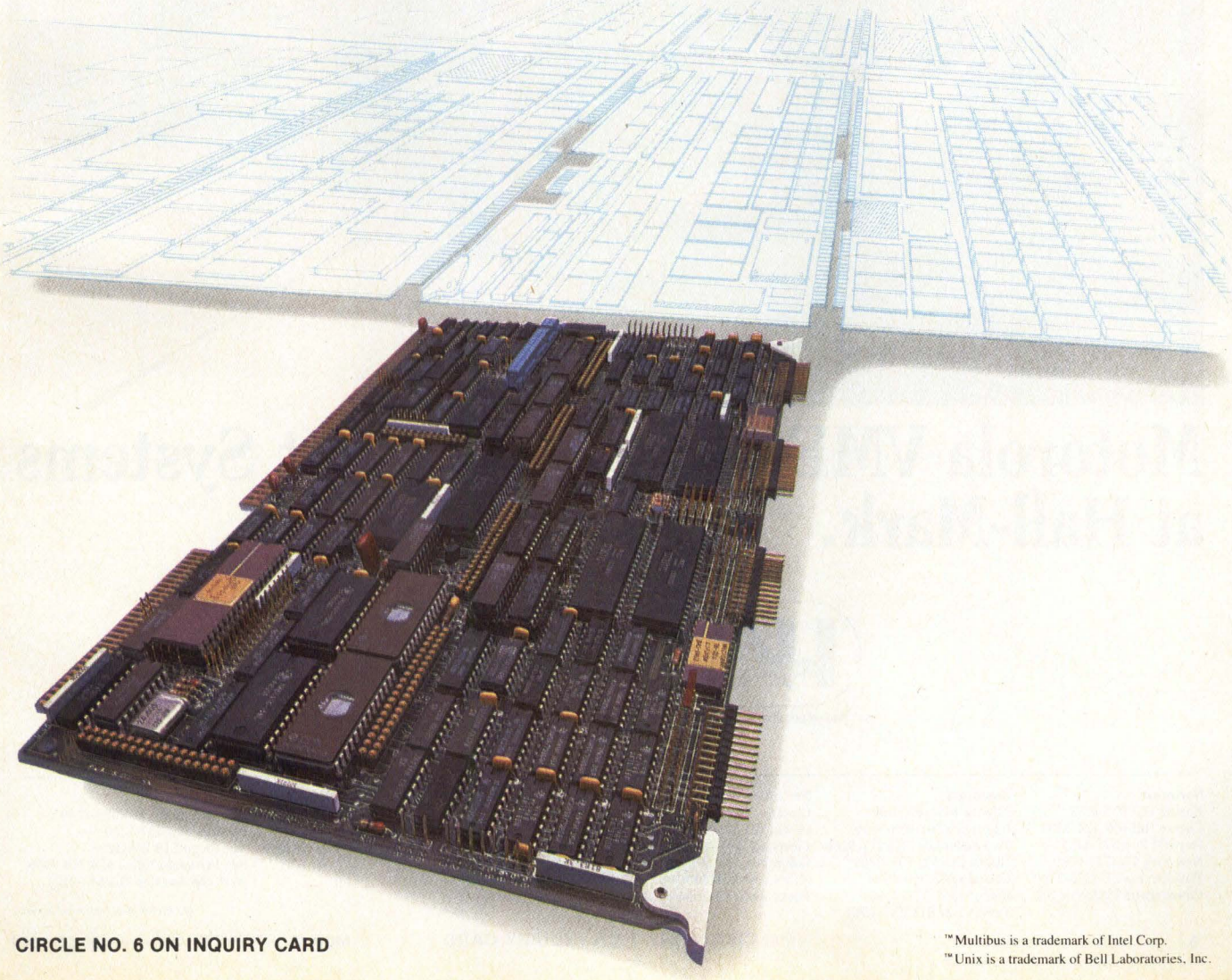

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™ Unix is a trademark of Bell Laboratories, Inc.

Motorola VME/10 Development Systems at Hall-Mark.

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CIRCLE NO. 7 ON INQUIRY CARD

How to use the Peripherals Digest

The Peripherals Digest is divided into six categories —five for products and the sixth for the directory of product manufacturers. Each of the five sections contains two subsections:

- one or more product overviews compiled by *Mini-Micro Systems*
- one or more product pricing and specification tables arranged alphabetically by company name, compiled by computer and based on mail- and telephone-survey information.

The directory of manufacturers, the last section of the digest, is a consolidated alphabetical listing of all the vendors tabulated in the five product categories. Each directory entry provides a vendor's mailing address and telephone number, as well as a circle number for the reader service card.

To use the Peripherals Digest effectively, use the tabs to find the right product category. To find addresses or phone numbers, use the directory of manufacturers. To check product prices or specifications:

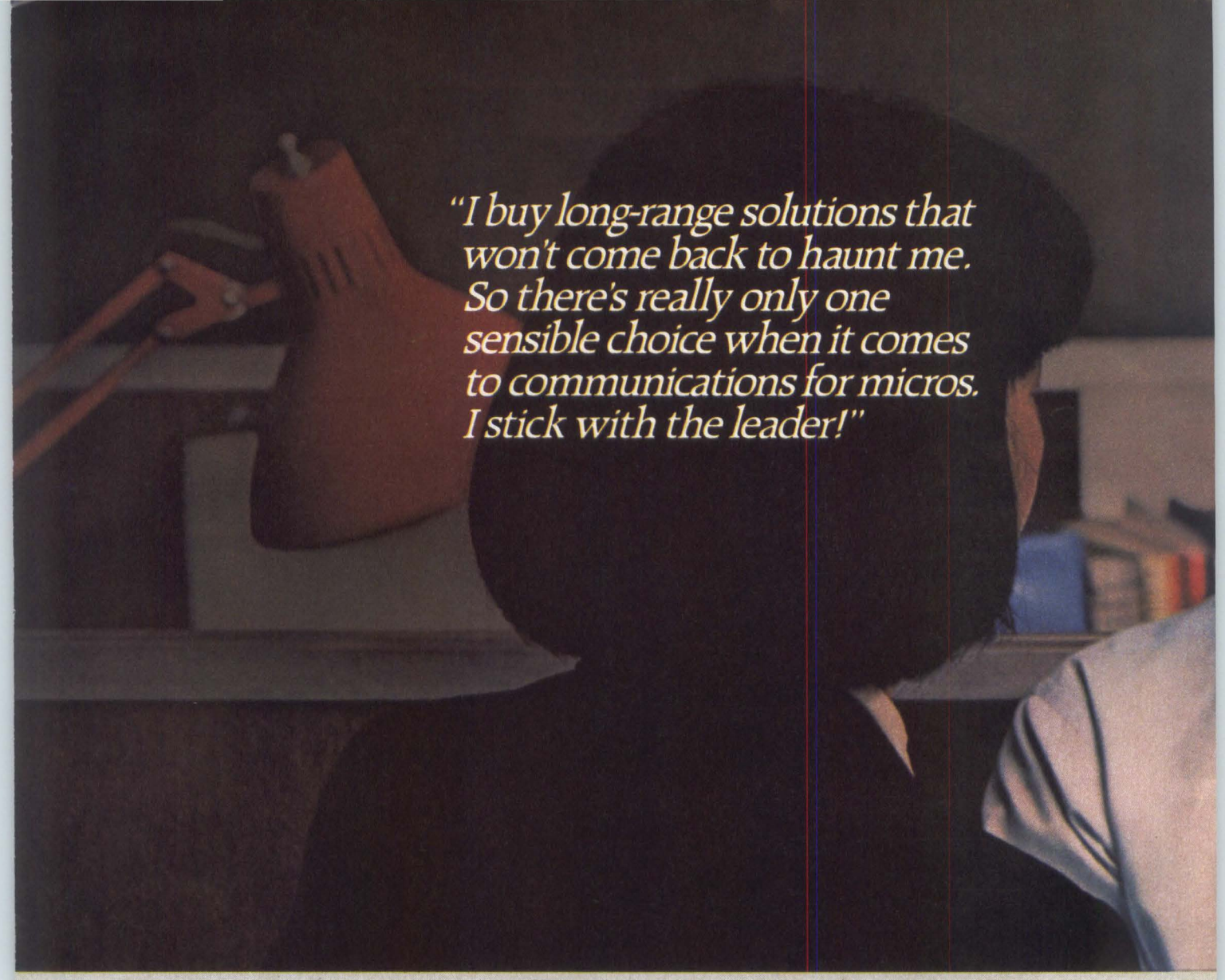
- turn to the appropriate product category,
- find the product table,
- find the alphabetically listed vendor.

To select a peripheral:

- turn to the appropriate product category,
- refer to the product tables,
- refer to the directory of manufacturers to find suppliers' addresses.

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

The Peripherals Digest data research and editing staff includes Adrienne DeLeonardo, associate editor; Frances Michalski, associate editor; Megan Nields, assistant editor; and Pamela Gorski, assistant editor. Production assistant Carole Smith provides editorial support.



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Smartcom II is flexible. Use it as is or customize it for particular applications. Smartcom II makes telecomputing simple for beginners, with sophisticated programming options for you.

Now Smartcom II does even more to streamline business communications.

More connection capabilities. Our new Smartcom II is available for more than 16 personal computers (with more to come). Now the DEC Rainbow in purchasing can swap data with the HP 150 in accounting. While the IBM PC in sales gets updates from the TI in the southeastern office. Quickly and easily. Smartcom to Smartcom. And with no handholding from you.

XMODEM protocol. In addition to the Hayes Verification protocol, Smartcom II includes the XMODEM protocol, for error-free transmission to even more micros, as well as to mainframes at the information services.

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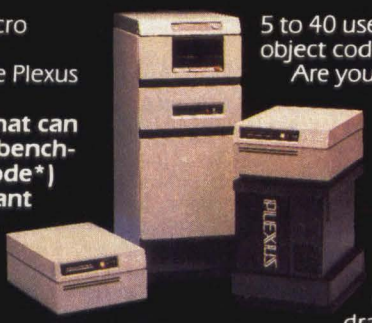

Are you thinking "Fine, but I really don't need all that performance"? Well, some of our customers tried other hardware first. They used to think the same thing.

Challenge details: This offer is extended to bona fide OEM's, value-added resellers, and volume end-users in the multiuser commercial UNIX systems market. Limit one award per company. Offer expires Jan. 31, 1985 unless withdrawn earlier. For complete rules and participation information, call (800) 556-1234 Ext. 560 (in Calif. (800) 441-2345 Ext. 560)

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Digest schedule expands to four issues

This November's Fall Peripherals Digest is the third of three special *Mini-Micro Systems*' issues published during 1984. That compares to two Digests issued in 1983. As we enter 1985, our third year of publishing special product issues, *Mini-Micro Systems* is expanding the digest schedule to four special product issues: Communications Digest (new), two Peripherals Digests—Spring and Fall— and the Computer Digest.

Your new Communications Digest will arrive in late February, 1985. Survey categories will include modems, multiplexers/concentrators, local area networks, network and communications software, plus network terminals and computers. Like our other digests, each of the product information tables will be complemented by staff-written market-overview articles. Following the Communications Digest, you will receive the Spring Peripherals Digest in April, the Computer Digest in June and the Fall Peripherals Digest in November. All Digests will contain a directory of manufacturers and reader-service cards valid for an entire year.

As you look at the table of contents in this issue, you will notice that we have modified the product categories. This issue (and the Fall Peripherals Digest in 1985) includes flexible and rigid disk drives and subsystems up to 5¼ inches; matrix and solid-font character printers; ¼-inch and smaller cassette/cartridge tape drives and alphanumeric display terminals. The 1985 Spring Peripherals Digest will not repeat the Fall Digest's product coverage. Instead, it will cover flexible, optical and rigid disk drives and subsystems of 8 to 14 inches; teleprinters and ink-jet, laser and line printers; ½-inch cartridge tape dirves and graphics terminals.

Although the digests primarily contain information on computer hardware, we increased our editorial coverage of software this year. In 1985, we will continue to include software survey articles in each regular issue. Also, in our regular issues, we are continuing our practice of taking a more focused look at exciting product groups. For example, in January, 1985, we will survey multifunction printers and February's hardware survey will focus on intelligent disk- and tape-drive controllers. The wide or all-inclusive product group coverage is reserved for the Digests.

Since we are introducing the new Communications Digest in February, our data communications emphasis issue (traditionally scheduled in March) now moves to September. Continuing unchanged in our 1985 editorial calendar are two special-emphasis issues—June's State of the Market Report and December's State of the Technology Report.

Our job is to provide timely and complete coverage of product developments in the value-added market. If you have suggestions for improving our product coverage, please send them to the Editor in Chief, *Mini-Micro Systems*, 221 Columbus Ave., Boston, Mass. 02116.

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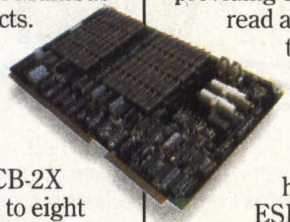

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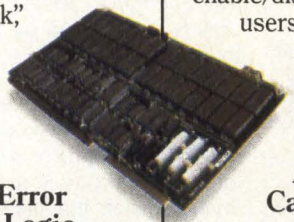

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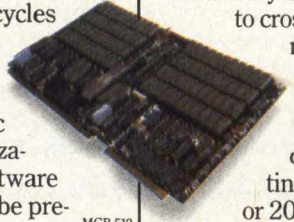

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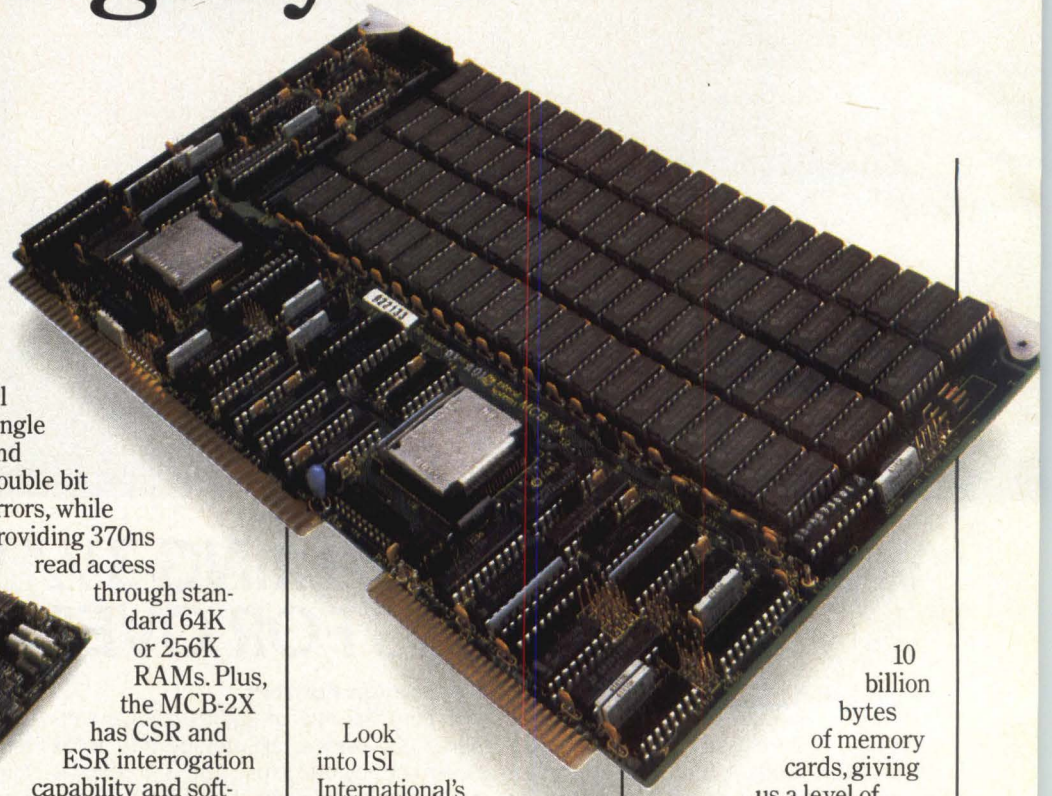

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IBM sets storage standard with 1.6M-byte flexible drive

The PC-AT computer system's flexible drive forces other manufacturers to upgrade storage capacity

Carl Warren, Western Editor

IBM Corp's Advanced Technology (AT) personal computer system has established an expanded capacity standard in 5¼-inch flexible disk storage. The system incorporates a half-height 5¼-inch, 96-tracks-per-inch (tpi) drive that offers 1.6M bytes of unformatted storage—more than double that available in the IBM PC's 48-tpi technology.

Because it is IBM that has made the advance, industry speculation is running high that virtually every maker of desktop systems will be forced to follow suit. According to James Porter, author of the 1983 *Disk/Trend Report* on flexible drives, 1.6M-byte drives should garner as much as 26 percent of the worldwide market.

There are a few caveats, however, says Porter: "The PC-compatible manufacturers are stuck with adhering to the 48-tpi half-megabyte standard established by IBM. And it doesn't appear that IBM has any plans of upgrading existing PCs with the 1.6M-byte drive. Consequently, other manufacturers may have to make some bold moves."

IBM is acutely aware of the market pressures it exerts. But IBM spokesman Richard Scott won't predict what moves other companies will make. "We can't speculate on what other people will do. We, however, have addressed the compatibility issue from two directions that allow both forward and backward migration." The company has addressed compatibility with 48-tpi formats by providing the AT system with the ability to read (not write) disks formatted at the lower densities. Moreover, the AT's disk controller is designed to handle not only the high-capacity drive, but also a 320K-byte or 360K-byte floppy and rigid disk drive as well. Therefore, users have the opportunity of adding 48-tpi drives to the AT system.

Clearly, IBM's use of the 96-tpi drive is causing various microcomputer manufacturers to consider it. Industry watchers suggest that Houston-based Compaq Computer Corp., is reviewing 1.6M-byte drive manufacturers. Compaq, however, would not comment.

Higher capacity disk drives prove slow to mature

The need for higher capacity flexible disk drives is clear. Some manufacturers such as Drivetec Inc., and Amlyn Corp., both based in San Jose, Calif., have been building 3.3M-byte, 5¼-inch drives for more than a year.

In addition, other technologies such as vertical recording are competing for high-capacity favor as well. For example, Vertimag Systems Corp., Roseville, Minn., in concert with Shugart Corp., Sunnyvale, Calif., and 3M Co., is developing a perpendicular recording method with sputtered flexible media. The goal is capacity in the 5M-byte range. Also boosting capacity, to 10M bytes, is Iomega Corp., Ogden, Utah. Their drive uses the Bernoulli principle—a technique that floats the media.

Although each firm is shipping products, stumbling blocks remain to inhibit growth. Specifically, standards have not been established for the interchange of media in the 3.3M-byte range, thus leaving Drivetec and Amlyn without interchange capability. Iomega, in addition to the single-source disadvantage, also suffers from buyers' impression that their technology is perhaps too advanced for a relatively conservative industry. As for perpendicular recording, it may require another three to five years to mature.

So until these problems are resolved, system integrators using drives in the 3.3M-byte range will have to use single-source designs. Most are not willing to risk the technology leap and will settle for 1.6M-byte flexible drives.

1.6M-BYTE FLEXIBLE DRIVES

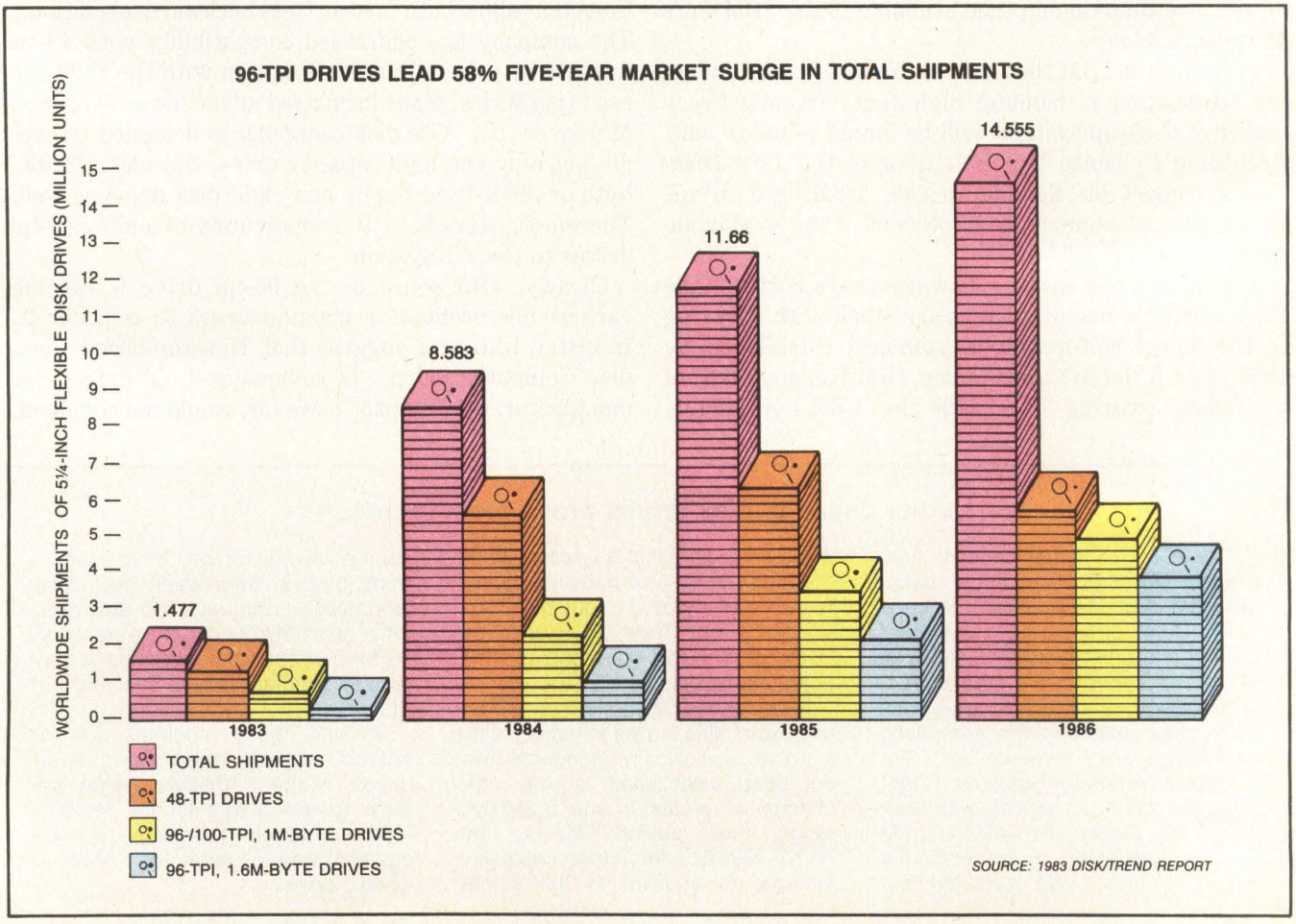
Because the Japanese have refined 96-tpi technology, it wasn't surprising that IBM employed the design from Tokyo-based YE-Data Inc. Other companies are doing the same. For example, Shugart Corp., Sunnyvale, Calif., has licensed the technology used in its Model 475 from Matsushita Communication Industrial Co. Ltd., Yokohama, Japan. The Model 475 provides an unformatted capacity of 1.6M bytes and, like the YE-Data model, is capable of reading both 48- and 96-tpi disks. However, the Shugart product uses a variable speed spindle motor that switches from 300 rpm to 360 rpm depending on the track density. In contrast, the IBM implementation uses a single-speed motor that operates at 360 rpm. As a result, transfer rates range from 300K bits per second (bps) for 48 tpi to 500K bps for 96 tpi. Because a 250K-bps transfer rate is the standard for 48 tpi, IBM has found it necessary to develop a complex data separator to handle the transfer differences. Another company that may soon be offering a 475-like drive is Sanyo America Corp., who also has been licensed for the Matsushita design.

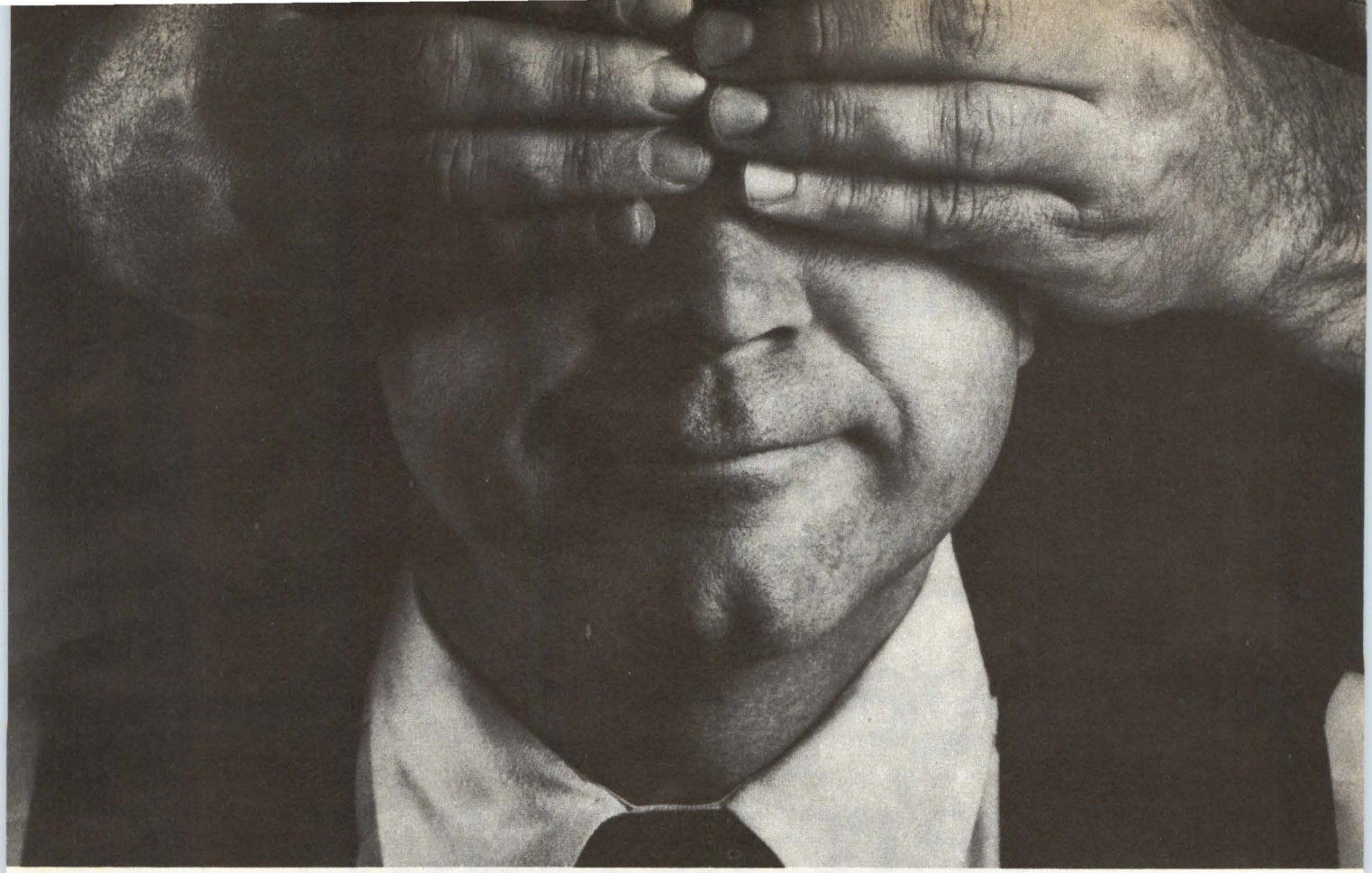
More than a dozen Japanese manufacturers have been shipping 1.6M-byte products to the Japanese domestic market for more than a year. Emerging U.S. manufacturers besides Shugart include Hi-Tech Peripheral Corp., Huntington Beach, Calif.; Tandon Corp., Chatsworth, Calif.; and Philips Peripherals Inc., South San Francisco, Calif. Jim Porter, president of Disk/Trend Inc., Los Altos, Calif., suggests that virtually all flexible disk drive makers will need to address the higher-capacity technology.

Quality and performance may differ

Philips Peripherals' U.S. manager of flexible disk products, Chet Mackenzie, insists that Philips also has an edge on technology. "Building 96-tpi drives, such as the 1.6M-byte Model X3138, isn't new to us. We've been doing it for a number of years and identified all the problem areas. Just about anyone can build 48-tpi workable drives; 96-tpi isn't that easy."

Mackenzie is convinced that with IBM putting the stamp of approval on 96-tpi drives, there will be a mass migration to the newer drives. "The size of this market is going to be larger than anyone expects," says Mackenzie. "System integrators will be able to tell quality a lot quicker than with 48-tpi drives, simply because





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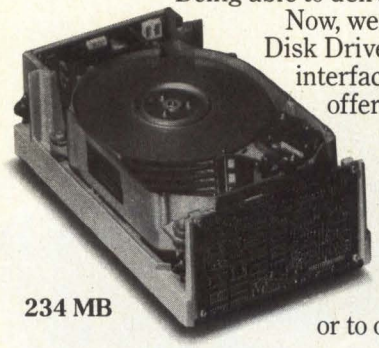

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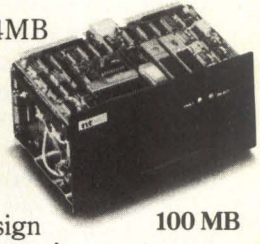

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CIRCLE NO. 14 ON INQUIRY CARD

there are so many variables that have to be tuned in this type of drive."

Part of the problem with 96-tpi drives is that most U.S. manufacturers haven't had a reliable product. In the past, media interchangeability was a major problem, partly due to lack of industry standards for acceptable azimuth. Azimuth is a measurement of the relationship of a disk drive's read/write gap to a radial drawn horizontally from the center of the spindle. The smaller the angle between the gap and the radial, the better the drive's read/write accuracy. Moreover, available media could not withstand a wide range of temperature and humidity. It was prone to warping, thereby producing an unacceptable azimuth measurement. The Japanese, however, have addressed these problems and so has Philips.

Because it is IBM...speculation is running high that virtually every microcomputer manufacturer will be forced to follow suit.

Because higher-capacity 5¼-inch drives aren't easy to manufacture, quality will more than likely vary, making it more difficult to make wise buying decisions. Consequently, buyers must turn to testing data to make an informed choice.

Perhaps the most critical test is a four-corner measurement made under various temperature and humidity ranges, all of which can effect the read/write accuracy. Be aware that poor media can give a misrepresentation of drive performance. These measurements provide the data necessary to judge a drive's track-positioning accuracy.

Mackenzie explains that most failures in flexible disk drives are mechanical rather than electrical. He points out that because the media is aligned and rotated by the clamping mechanism, "misregistration due to poor clamping can cause off-track errors. The clamp should be vertical and have a positive grip." Because the disk ejector and door mechanism are directly related to the proper operation of the clamp mechanism, these items should also be thoroughly tested.

Standard 8-inch format used

To achieve high capacity and speedy transfer rates, 96-tpi drives typically emulate the standard IBM 3740 8-inch recording format. Shugart insists that this is a plus, because direct mapping from the 8-inch to 5¼-inch format is possible. Plus, users get the capacity of an 8-inch flexible drive in a new package that is not only half the size, but also half the price of 8-inch drives.

Interestingly, all the problems associated with 96-tpi, 1.6M-byte drives are magnified for flexible drives in the 3M-byte range and above, (see "Higher capacities slow in maturing," Page 19). Thus, industry watchers such as Dennis Waid, president of Peripheral Research Corp., Santa Barbara, Calif., see 1.6M-byte drives as the mainstay for at least five years.

Price erosion expected

The impetus behind the 1.6M-byte, 5¼-inch drive may further erode 48-tpi prices. Already facing disk drive manufacturers is rapid price erosion of flexible disk drive products. For example, in OEM quantities, 48-tpi drives are priced below the $85 mark and expected to dip even further by mid 1985.

The new 96-tpi drives are not immune to price erosion either. Typically, pricing is in the above-$250 range in small quantities, but in the $100 range for larger quantities. This may lead some manufacturers into a price squeeze even before they begin volume production. □

Interest Quotient (Circle One)
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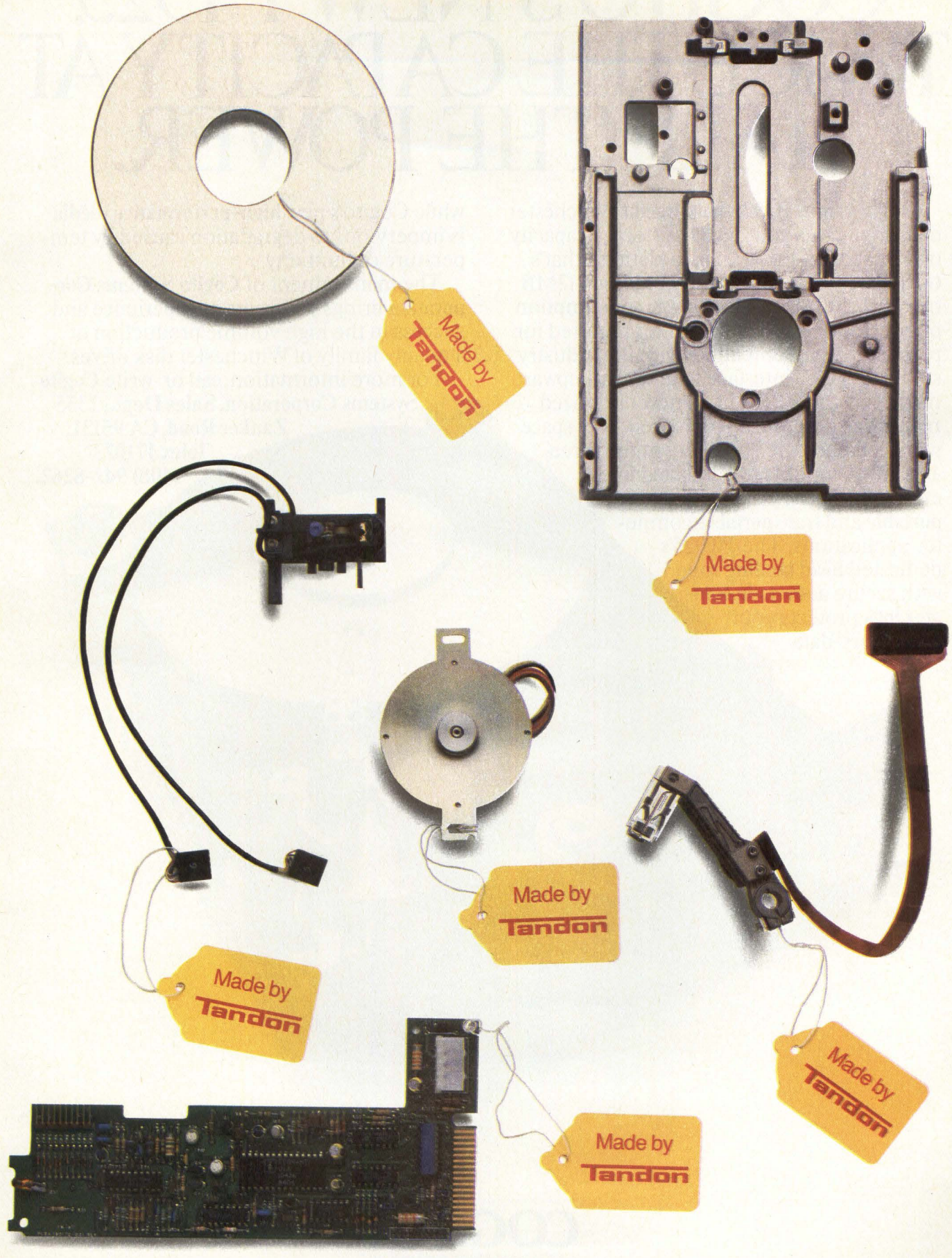


COGITO'S NEW PT925. TWICE THE CAPACITY AT HALF THE POWER.

Cogito's **new PT925 half-height** Winchester disk drive gives you **25MB** of storage capacity on two state-of-the-art media platters – that's **twice** the capacity of Cogito's previous 12MB model CG912. Yet its **low power** consumption of only **12 watts** is **half** the power required for regular drives. Compatible with the industry standard ST412 interface to allow you upward migration, the **PT925** has a new optimized **ruggedized** design with increased sway space which extends the effectivity of the three-axis shock mounts to withstand forces exceeding **40 Gs**, making it ideal for **portable** and **transportable** computer applications. The PT925's dedicated **head landing zone** with secure **automatic actuator lock** protects your customers' data while Cogito's new **high-performance media** is impervious to degradation caused by temperature or humidity.

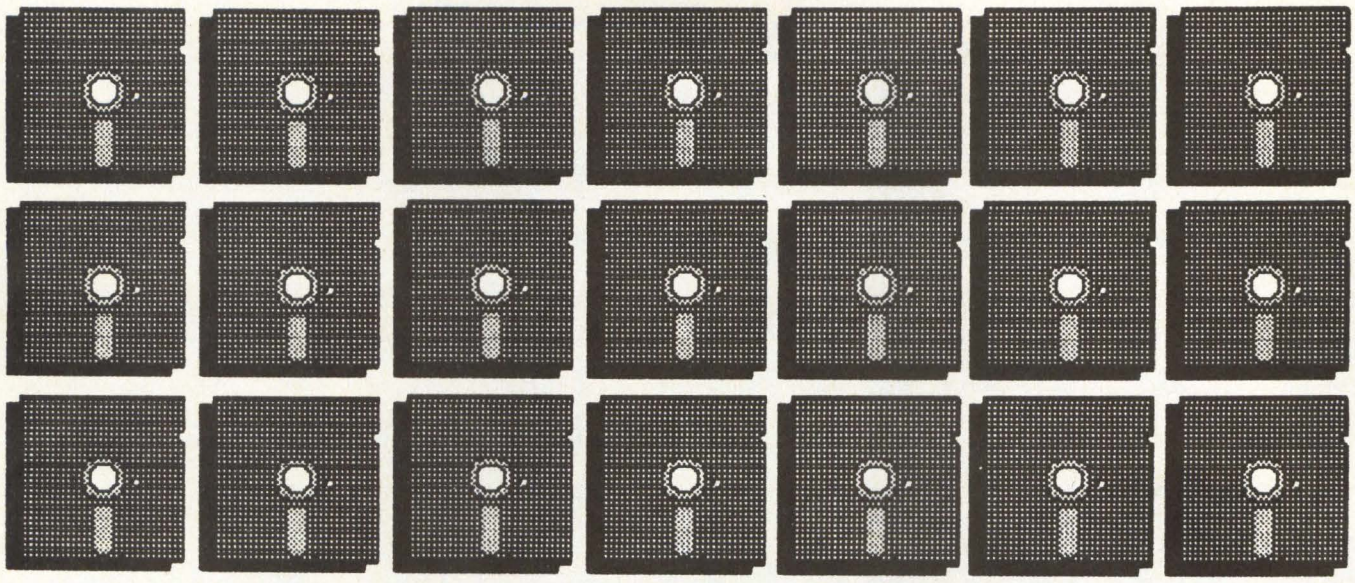
The management of **Cogito Systems Corporation** brings you years of experience and success in the high volume production of a quality family of Winchester disk drives.

For more information, call or write **Cogito Systems Corporation, Sales Dept., 2355 Zanker Road, CA 95131, Telex 171023 (408) 942-8262.**

COGITO
SYSTEMS

CIRCLE NO. 17 ON INQUIRY CARD

FLEXIBLE DISK DRIVES

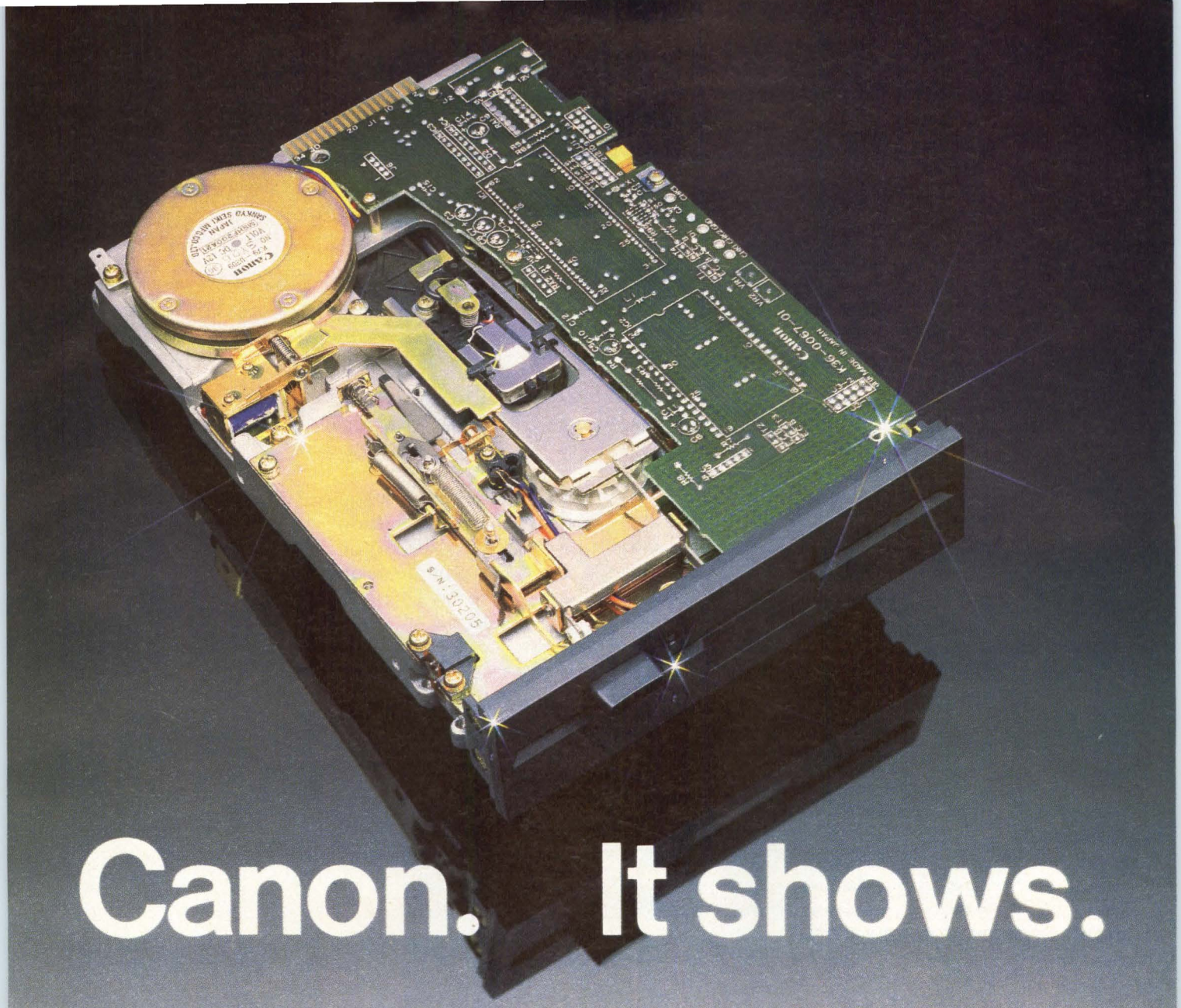


Illustrations by Anne Tregay

Company Model	Capacity (K bytes)	Single- or double-sided	Avg. access time (msec.)	Transfer rate (K bits/sec.)	Tracks/ surface	Tracks/ inch	Dimensions (HxWxD inches)	Price ($)	Notes, features, options
ALPS ELECTRIC CO. LTD.									
FDL 212B	500	double-sided	6	250	40	48	1.61x5.75x7.99		
FDL 222B	1000	double-sided	3	250	80	96	1.61x5.75x7.99		
FDD 2124/2524	250	single-sided	12/6	250	40	48	1.61x5.75x7.99		
AMLYN CORP.									
1865	3200	double-sided	88	500	154	170	1.625x5.75x8	595(Q1); 330(Q1000)	closed loop servo system, SA850 interface
ANALOG AND DIGITAL PERIPHERALS INC.									
ADPI Easi-Disk	250–2000	double-sided		110–200	40, 80	96	6.5x5x9.5	910(Q100)	
APPLE COMPUTER INC.									
Disk II/III	143 (unformatted)/140 (formatted)	single-sided	463	125	35	48	3.25x5.75x8(II)/ 4.12x6.35x8.8(III)	429(Q1) Disk II with controller/435(Q1) Disk III with controller	interfaces to Apple II, II+, IIe; Disk II without controller is $329(Q1).
ATARI INC.									
1053	520	double-sided	105	250	40	48	3.5x7.5x12		downwardly compatible with Atari 810 and 1050
1450	520 per drive	double-sided	105	250	40	48			minimum system consists of one DS/DD drive
BASF AG									
6106	250	single-sided	156	125, 250	40	48	2.27x5.91x7.74		
6108	500	double-sided	156	125, 250	40	48	2.27x5.91x7.74		
6116/6118	250, 500/.5, 1	single-sided (6116); double-sided(6118)	158	125, 250	80	96	2.27x5.91x7.74		
6128	500	double-sided	158	250	40	48	1.32x5.4x8.7		
6138	1000	double-sided	79	250	80	96	1.32x5.4x8.7		
6148	1600	double-sided	91	500	77	96	1.32x5.4x8.7		

FLEXIBLE DISK DRIVES

Company Model	Capacity (K bytes)	Single- or double-sided	Avg. access time (msec.)	Transfer rate (K bits/sec.)	Tracks/ surface	Tracks/ inch	Dimensions (HxWxD inches)	Price ($)	Notes, features, options
C. ITOH ELECTRONICS INC.									
YD-380	1604	double-sided	91	500	154	96	1.61x5.75x8	238(Q1000)	compatible with 8-inch, double density formats
YD-380-1714	1604	double-sided	91	500	154	96	1.61x5.75x8		
DRIVETEC INC.									
D320	3330	double-sided	160	500	160	192	1.62x5.75x8.48	345(Q500)	uses imbedded vector track following system
ELCOMATIC LTD.									
ACP 548-50	500	double-sided	97	250	40	48	1.66x5.75x8	175(Q1); 149(Q500)	custom bezels
ACP 596-10	1000	double-sided	96	250	80	96	1.66x5.75x8	206(Q1); 178(Q500)	custom bezels
ACP 596-16	1600	double-sided	93	500	77	96	1.66x5.75x8	239(Q1); 199(Q500)	custom bezels
HEWLETT-PACKARD CO. — GREELEY DIV.									
82901M/82902M	500 per drive	double-sided	187	250	33	48	4.31x16.75x14.74	2,230(Q1)/ 1,520(Q1)	82901 is a dual drive, 82902 is a single drive
HONEYWELL INFORMATION SYSTEMS INC.									
DTV-9801/2	655 (formatted)	double-sided	160	31	80	96	3.5x6x8.5	800(Q1); 680(Q500)	
MICROPOLIS CORP.									
1115-II-V	500	single-sided	152	250	77	100	3.25x5.75x8	299(Q1); 185(Q500)	
1115-IV-VI	1000	double-sided	158	250	80	96	3.25x5.75x8	349(Q1); 220(Q500)	
1117-VI	1700	double-sided	158	250	80	96		461(Q1); 314(Q500)	
MICROSCI CORP.									
A2	143	single-sided	18	256	35		3.75x6x8.75	345(Q1)	Apple II and IIe compatible
A3	143	single-sided	18	256	35		3.75x6x8.75	379(Q1)	Apple III compatible, may be daisy chained
A20	164	single-sided	18	256	40		3.75x7x8.75	199(Q1)	Apple II and IIe compatible
A80	328	double-sided	18	256	80		3.75x7x8.75	469(Q1)	Apple II and IIe compatible
A143	572	double-sided	5	256	140		3.75x6x8.75	659(Q1)	Apple III compatible, may be daisy chained
NEC INFORMATION SYSTEMS									
FD1053	500	double-sided	94	250	40	48	1.625x5.75x8	150(Q500)	head-loaded solenoid
FD1055	1000	double-sided	95	250	80	96	1.625x5.75x8	187(Q500)	head-loaded solenoid
OKIDATA									
GM3315B/3305H	500	double-sided	95	250	40	48	1.12x5.75x7.95/ 1.68x5.75x7.95	255(Q1); 149(Q500)/ 245(Q1); 143(Q500)	3315 is ⅓-height, both are microprocessor-controlled
BM3415B/3405H	1000	double-sided	95	250	80	96	1.12x5.75x7.95/ 1.68x5.75x7.95	305(Q1); 179(Q500)/ 295(Q1); 173(Q500)	3415 is ⅓-height drive, both have spindle motors and are microprocessor-controlled
PHILIPS PERIPHERALS INC.									
X3131	250	single-sided	80	250	40	48	1.61x5.75x7.9		
X3132	500	double-sided	80	250	40	48	1.61x5.75x7.9		
X3133	500	single-sided	80	250	80	96	1.61x5.75x7.9		
X3134	1000	double-sided	80	250	80	96	1.61x5.75x7.9		
X3138			80	500			1.61x5.75x7.9		
QUME CORP.									
QumeTrak 242	0.8	double-sided	91	250	48	154			half-height
QumeTrak 142	500	double-sided	160	250	40	48	1.59x5.75x8		half-height



Canon. It shows.

One look at a Canon floppy disk drive — and hearing its silence while seeking — tells you it's made by masters in the art of designing and manufacturing ultraprecise miniature mechanisms.

A second look would reveal some unique features: Pushbutton clamping...disk is clamped — and ejected 10 to 20 mm — by pushing the same button, which is locked while the heads are loaded. Steel belt head positioning, for outstanding accuracy. Soft landing mechanism in the head loading system, and thin R/W heads (tested beyond 10 million taps), to minimize head and media wear.

Canon drives were designed originally for 96 TPI; the 48 TPI versions therefore have that added reliability.

Single Drives:	MDD 221: 96 TPI, double sided/density, 1 Mbyte.* MDD 211: 48 TPI, double sided/density, .5 Mbyte.*
Dual Drives:	MDD 423: 96 TPI, double sided/density, 2 Mbyte. MDD 413: 48 TPI, double sided/density, 1 Mbyte.

Let Lee Heller tell you more. Call him at (516) 488-6700, Ext. 4958. Or write to him at Canon U.S.A., Inc., Disk Drive Division, One Canon Plaza, Lake Success, NY 11042.

Canon drives. More flexible up front.

Our drives are available with the bezels shown — or with no bezel at all, so that you can determine your own packaging design.

33.5 mm bezel

Standard half-height bezel

Dual drive:
Standard 2/3 height (57.5 mm) bezel

Dual drive:
Standard full height bezel

* *Recognized under the Component Program of Underwriters Laboratories Inc.*

Canon

CIRCLE NO. 18 ON INQUIRY CARD

FLEXIBLE DISK DRIVES

Company Model	Capacity (K bytes)	Single- or double-sided	Avg. access time (msec.)	Transfer rate (K bits/sec.)	Tracks/ surface	Tracks/ inch	Dimensions (HxWxD inches)	Price ($)	Notes, features, options
SANYO BUSINESS SYSTEMS CORP.									
FDD1655		single-sided	93			48		349(Q1)	second drive for the MBC 550-1, 160K
FDD3200	320	double-sided	93			96		495(Q1)	second drive for the MBC 1100 320K
FDD6400	640	double-sided	93			96		595(Q1)	second drive for the MBC 1200 & MBC 4000
SHUGART CORP.									
455	500	double-sided	100	250	40	48	1.63x5.75x8	132(QOEM)	
465	1000	double-sided	100	250	80	96	1.63x5.75x8	164(QOEM)	
475	1600	double-sided	83	500	80	96	1.63x5.75x8	180(QOEM)	
TANDON CORP.									
TM100-1	250	single-sided	75	250	40	48	3.38x5.87x8.29	127(Q1)	
TM100-2	500	double-sided	75	250	40	48	3.38x5.87x8.29	160(Q1)	
TM65-2L	500	double-sided	90	250	80	48	1.68x5.87x8.07	115(Q1)	
TM65-4	1000	double-sided	90	250	80	96	1.68x5.87x8.07	149(Q1)	
TM50-1	250	single-sided	287	250	40	48	1.625x5.75x8	110(Q1)	
TM50-2S	500	double-sided	98	250	40	48	1.625x5.75x8	132(Q1)	
TECHTRAN INDUSTRIES INC.									
980X	200	single-sided	200		35	48	4.83x10x11.75		random file access, univ. batch mode, binary mode, auto file directory, front panel control
980X-1	200	single-sided	200		35	48	4.83x10x11.75		univ. batch mode, binary mode, front panel control
981X	200	single-sided	200		35	48	4.83x10x11.75		link mode, disk repack, univ. batch mode
980XX	397	double-sided	200		35	48	4.83x10x11.75		resident microprocessor software
TOSHIBA CORP.									
ND-04D	500	double-sided	80	250	40	48	5.75x1.61x8.28		
ND-06D	1000	double-sided	94	250	80	96	5.75x1.61x8.28		
ND-08D	1604	double-sided	91	500	77	96	5.75x1.61x8.28		
WELTEC DIGITAL INC. (FORMERLY REMEX)									
M48	250/500	single- or double-sided	75	125/ 250	80	48	1.61x5.75x8		interchangeable front bezel
M96	500/1000	single- or double-sided	88	125/ 250	160	96	1.61x5.75x8		interchangeable front bezel
Y-E DATA INC.									
YD-274	500	double-sided	248	250	40	48	3.25x5.75x8		
YD-280	1000	double-sided	95	250	80	96	3.25x5.75x8		
YD-380	1600	double-sided	95	500	77	96	1.61x5.75x8		opt. dual speed
YD-480	1000	double-sided	95	250	80	96	1.61x5.75x8		
YD-580	500	double-sided	81	250	40	48	1.61x5.75x8		

Brown Floppy Discs at Hall-Mark.

HALL-MARK

Hall-Mark Electronic Corp. • Dallas, Texas • Subsidiary of Tyler Corp.

Northeast
Boston 617/935-9777
Cherry Hill 609/424-7300
Fairfield 201/575-4415
New York 516/737-0600
Philadelphia 215/355-7300
Connecticut 203/269-0100

Southeast
Atlanta 404/447-8000
Baltimore 301/988-9800
Ft. Lauderdale 305/971-9280
Huntsville 205/837-8700
Orlando 305/855-4020
Raleigh 919/872-0712
Tampa Bay 813/530-4543

North Central
Chicago 312/860-3800
Cincinnati 513/563-5980
Cleveland 216/349-4632
Columbus 614/891-4555
Milwaukee 414/761-3000
Minneapolis 612/854-3223

South Central
Austin 512/258-8848
Dallas 214/553-4300
Houston 713/781-6100
Kansas City 913/888-4747
St. Louis 314/291-5350
Tulsa 918/665-3200

Northwest
Bay Area 408/946-0900
Denver 303/790-1662
Sacramento 916/722-8600

Southwest
Orange County 714/669-4700
Phoenix 602/437-1200
San Diego 619/268-1201
San Fernando Valley 818/716-7300
West Los Angeles 213/643-9101

CIRCLE NO. 19 ON INQUIRY CARD

We'v
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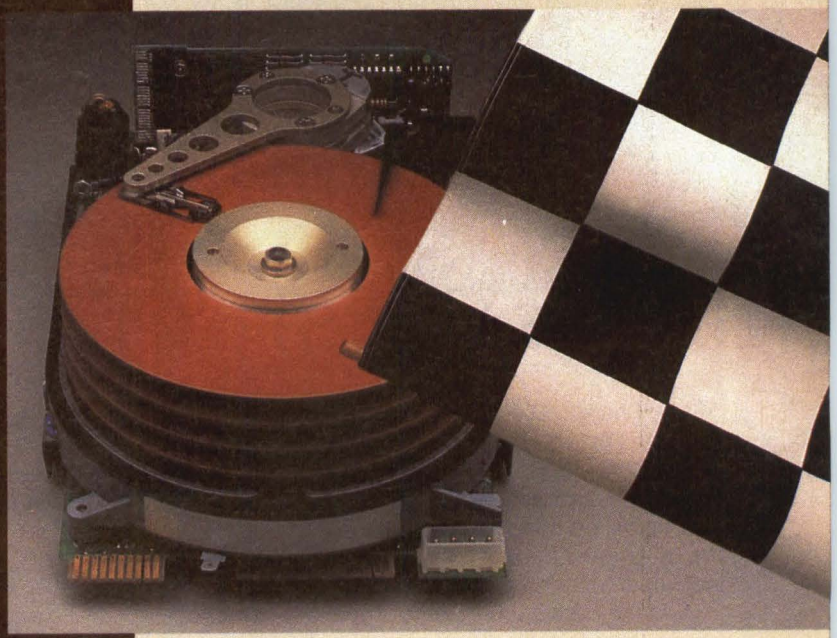
e sed ad.

The clear lead we established with our 8" medium-capacity Winchesters has now been extended. Our 5¼" drives are out front now, too. With both 8" and 5¼" drives leading the field, we now make more medium-capacity disk drives than anybody.

If there's a lot riding on your disk drive decision, you may want to consider our record as a consistent winner.

5¼" drives, from 20 to 40 megabytes. 8" drives, from 10 to 85 megabytes.

Quantum Corporation, 1804 McCarthy Boulevard, Milpitas, CA 95035, (408) 262-1100, TWX 910-338-2203. Eastern Regional Sales Office: Salem, NH (603) 893-2672. Western Regional Sales Office: Santa Clara, CA (408) 980-8555. European Sales Office: Frankfurt, West Germany 069-666-6167.



QUANTUM

Quantum products are distributed in the United States by Arrow Electronics, Inc.

CIRCLE NO. 20 ON INQUIRY CARD

OKIDATA'S NEW ⅓ HIGH FLOPPY DISK DRIVES GIVE YOU THREE TIMES THE POTENTIAL.

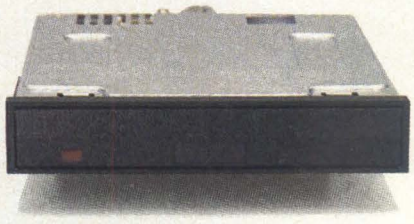
Take Charge. Okidata's new ⅓ High Floppy Disk Drives give you the potential to do more. With less.

Okidata's precision engineering cuts down on space. So you can get the thinnest, lightest compact 5¼ inch around.

Okidata's advanced design means fewer moving parts. So you get greater reliability. A superior disk drive that delivers an MTBF of 11K Power on Hours. At 100% Duty Cycle. Four times the duty cycle of most other floppy disk drives.

Okidata's state of the art power utilization reduces energy consumption. So you get disk drives that run on only 7W of power. About one-half the energy required by most others. With unformatted capacity of up to 1000K Bytes, so you're sure to have enough memory to handle any application.

Get the new Floppy Disk Drives that give you more. And take less. Less space. Less weight. Less power. For systems that can be lighter. More compact. And more portable. Okidata potential is all yours.

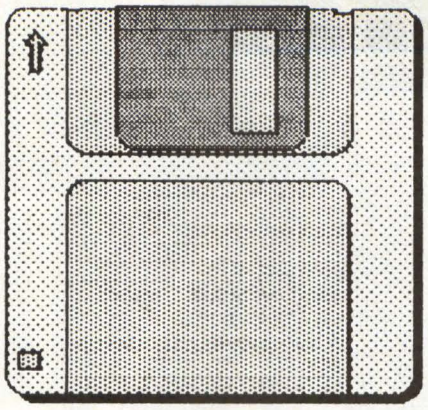


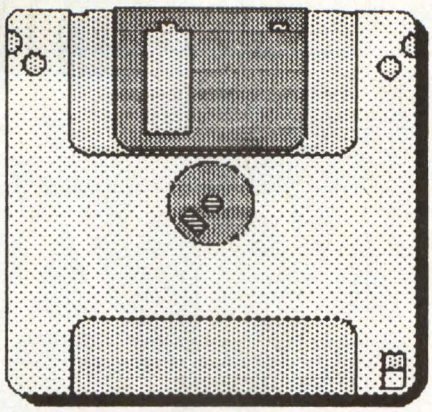
OKIDATA
an OKI AMERICA company

For more information call 609-235-2600. Okidata, Mt. Laurel, NJ 08054.

CIRCLE NO. 21 ON INQUIRY CARD

MICRO FLEXIBLE DRIVES





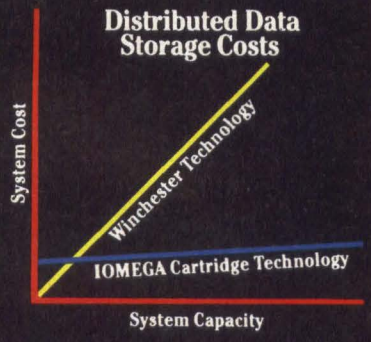
Company Model	Size (inches)	Capacity (K bytes)	Single- or double-sided	Avg. access time (msec.)	Transfer rate (K bits/sec.)	Tracks/ surface	Tracks/ inch	Dimensions (H x W x D inches)	Price ($)	Notes, features, options
ALPS ELECTRIC CO. LTD.										
FDV 113A	3.5	250	single-sided	6	250	40	67.5	1.46x4.02x5.12		low power consumption, direct drive spindle
FDV 123A	3.5	250	double-sided	6	250	40	67.5	1.46x4.02x5.12		direct drive spindle
FDV 213/253A	3.5	500	single-sided	6	250/500	80	135	1.46x4.02x5.12		direct drive spindle
FDV 223A/263A	3.5	1000	double-sided	6	250/500	80	135	1.46x4.02x5.12		direct drive spindle
C. ITOH ELECTRONICS INC.										
YD-600	3.5	1000	double-sided	95	250	160	135	1.63x4x6		modular design
HEWLETT-PACKARD CO. — GREELEY DIV.										
9114A	3.5	1000		497	500	80	135	3x12.8x8	795(Q1)	battery powered, includes controller, power supply, interface
9122D/9122S	3.5	1000	double-sided	485	500	80	135	2.99x12.8x11.2	1,270(Q1)/ 965(Q1)	9122D is a dual drive, 9122S is a single drive; both include controller, power supply, interface
MITSUBUSHI ELECTRONICS AMERICA INC.										
MF351L	3.5	500	single-sided	94	250	80	135	1.62x4x5.87	350(Q1); 200(Q500)	low power
JF353L	3.5	1000	double-sided	94	250	80	135	1.62x4x5.87	400(Q1); 230(Q500)	low power
NEC INFORMATION SYSTEMS										
FD1034/1035	3.5	500/1000	single-sided (1034)/ double-sided (1035)		250	80/160	135	1.73x4.1x5.2		head-loaded solenoid, 3.9 watts operating power
SANKYO SEIKI AMERICA INC.										
FDU-300	3	250(SS); 500(DS)	single- or double-sided	3	125/250	40	100	1.58x3.54x5.9	250(Q1); 145(Q500)	opt. customized bezel
FDU-355	3.5	500; 1000	single- or double-sided	3	125/250	80	135	1.58x4x6.05	275(Q1); 135(Q500)	opt. customized bezel
SHUGART CORP.										
300/350	3.5	500/1000	single- or double-sided	100	250	80	135	1.62x3.96x6	126(QOEM)/ 115(QOEM)	operates with industry standard microfloppy cartridge
TABOR CORP.										
TC500	3.25	500	single-sided	175	250	80	140	1.625x4x5.5	225(Q1); 185(Q500)	IBM PC compatible
TC1000	3.25	1000	double-sided	175	250	80	140	1.625x4x5.5	295(Q1); 240(Q500)	IBM PC compatible
Y-E DATA INC.										
YD-620	3.5	500	double-sided	96	250	40	67.5	1.63x4x6		
YD-640	3.5	1000	double-sided	95	250	80	135	1.63x4x6		

A DECLAR
DATA INDE

When In The Course Of Business Events . . .

OEMs designing systems for today's businesses face two realities. One, data processing is rapidly becoming more decentralized. It is pushing outwards into individualized work units, defined more by job function and applications, performed by more people in more places, demanding more data flexibility—more data independence.

Which brings OEMs face to face with a second reality. Winchesters. Because the prevailing mass storage technology—in the form of large storage units used for access or downloading, or smaller, high capacity desk-top mechanisms—continues to head in the opposite direction. Rather than freeing users to operate effectively in the new environments of distributed data processing, Winchesters keep them device-dependent, keep them tied to a shared system of storage.

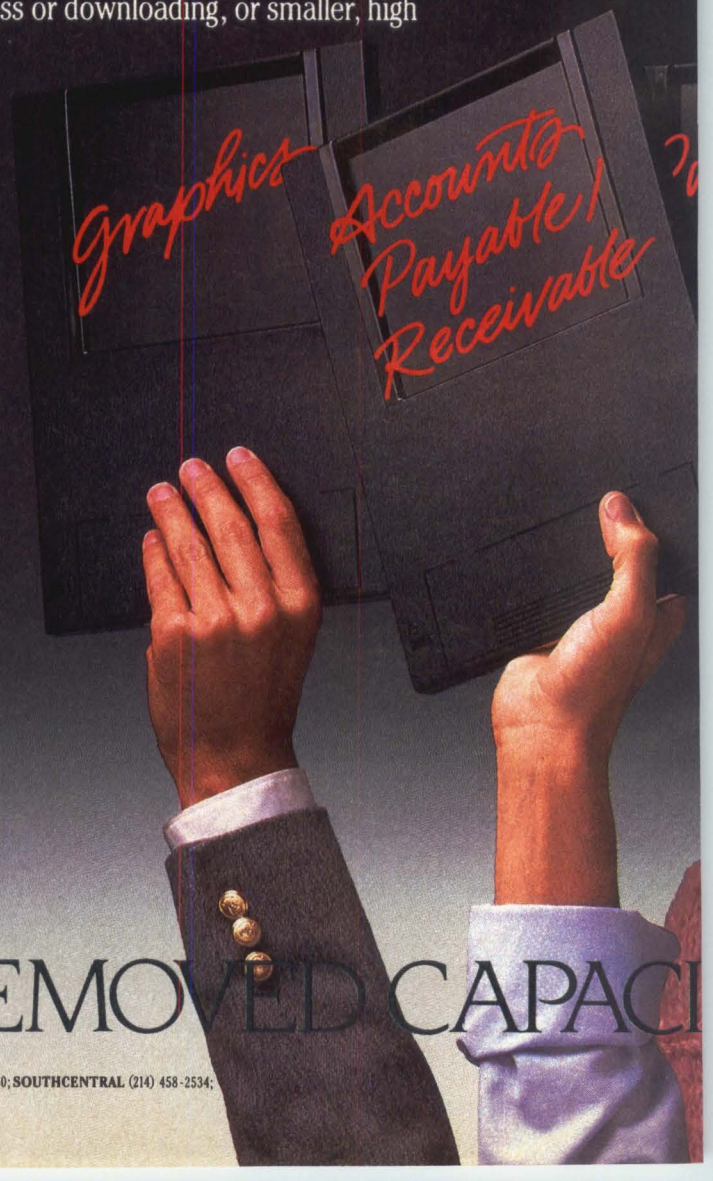


Slavery By Any Name . . .

There are lessons here. That the central issue isn't more data, but more data dynamics. And that Winchesters are hardly data dynamic at all.

Consider the aggravations of "wait your turn" access, or the need for lots of "system savvy" on the user's part. Consider the time consumed in backing up and restoring data. And consider the ever-present risk of a system going down or files lost to expensive head crashes.

Now consider the alternative.



IOMEGA HAS REMOVED CAPACI

REGIONAL AND DISTRICT SALES OFFICES: SOUTHEAST (305) 755-1060; SOUTHCENTRAL (214) 458-2534;

ATION OF PENDENCE.

IOMEGA's Distributed Data Storage: Freedom Of Information.

The IOMEGA family of data management/storage systems effectively matches today's distributed data processing reality with a new reality: *distributed data storage.* Because IOMEGA's reliability and performance specs often exceed Winchesters, particularly in access times and transfer rates. And they deliver cost-per-megabyte figures that Winchesters cannot figure at all.

	IOMEGA BETA 5	IOMEGA ALPHA 10/10H	TYPICAL WINCHESTER
Formatted Capacity	5.0 Mbytes per cartridge	10.0 Mbytes per cartridge	10.0 Mbytes fixed
Data Transfer Rate	5.0 Mbits/Sec	9.0 Mbits/Sec	5.0 Mbits/Sec
Average Access Time	39 msec includes settling	35 msec includes settling	85 msec
Form Factor	5.25"	8"/8" Half Height	5.25"

The key is "in/out" simple—the IOMEGA cartridge. Think about downloading data and software to a single 5- or 10-megabyte cartridge, then manipulating, updating, and uploading with maximum convenience and cost efficiency. And think about a total enterprise solution, about storing individual applications, complex software programs, or data sets—all of which can be passed along to others without expensive networking resources. And when you need more storage, you use more cartridges, not more hardware.

Accept No Other Alternatives.

IOMEGA's distributed data storage solutions—in full- and half-height 8-inch 10-megabyte solutions, and a 5-megabyte, 5¼-inch version as well—give OEMs Winchester performance and reliability, and floppy convenience and cost efficiency. They are proven, risk-free solutions. And of the few cartridge opportunities on the market today, IOMEGA's—besides being available—are the only ones that are rugged, absolutely interchangeable, and inexpensive. As such, they give OEMs the most precious commodity of all: *the freedom of designed-in freedom.* The freedom your customers require.

Take The Liberty.

Get in touch with an IOMEGA representative today. One is conveniently located in an area near you.

IOMEGA *THE FUTURE IN DISTRIBUTED DATA STORAGE*

IOMEGA CORPORATION
1821 West 4000 South
Roy, Utah 84067
(801) 776-7330

CIRCLE NO. 22 ON INQUIRY CARD

YAS THE MASS STORAGE ISSUE.

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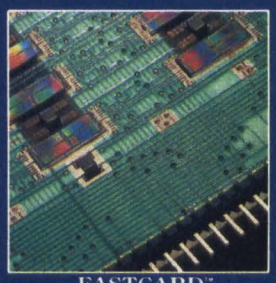

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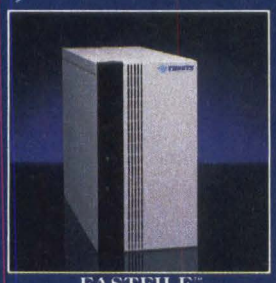

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CIRCLE NO. 23 ON INQUIRY CARD

Sub 4-inch Winchesters offer 5 ¼-inch drive performance

Using less space than most 5¼-inch Winchesters, sub 4-inch drives are meeting storage needs of desktop microcomputers

Microcomputer Memories Inc.'s *3½-inch Winchester fits in the palm of a hand.*

Carl Warren, Western Editor

As the need for desktop microcomputer disk storage increases, Winchester disk drive manufacturers are offering substantial storage capacity in sub 4-inch disks —and without sacrificing compatibility with, or the performance of, the industry-standard ST506/412 interface.

Though half-height, 5¼-inch Winchesters offer system integrators substantial space savings and capacities as high as 200M bytes, they may be outsold in the under-30M-byte arena by sub 4-inch designs. But many observers maintain that box cost in the under-30M-byte area will be more important than cost-per-megabyte, which characterizes the high-capacity, 5¼-inch drives.

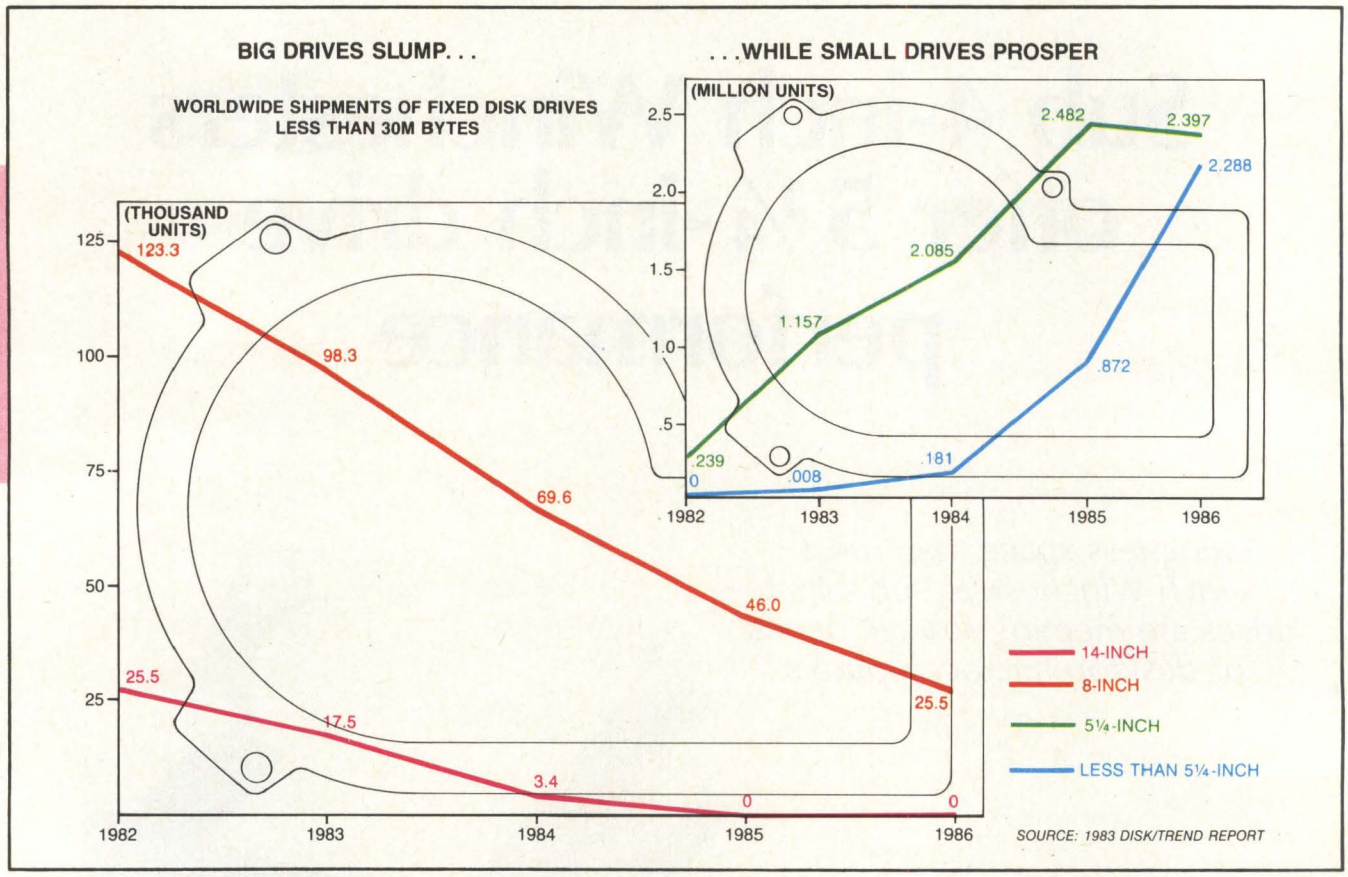
The small drives have a de facto industry-standard disk diameter of 3½-inches, except those of SyQuest Technology Inc., Fremont, Calif., (which are 3.9 inches). The drives offer capacities ranging from 12¾M bytes to 38M bytes of unformatted capacity, and their small size requires less power.

But, observes James Porter, industry consultant and president of Disk/Trend Inc., Los Altos, Calif., "The development of a sub 4-inch market isn't technology-dependent. Rather, it is one of packaging, and the ability to manufacture in large volumes."

Shock isolation important

Innovative packaging is one of the reasons that Rodime Ltd., Glenrothes, Scotland, currently leads manufacturers in the production of sub 4-inch drives. Its Model RO-352 provides 12¾M bytes of unformatted storage. Compaq Computer Corp., Houston, Texas, uses the drive in the Compaq Plus portable system. The drive was chosen, according to a Compaq spokesman, because sufficient shock mounting could be incorporated into the system to prevent drive damage.

Daniel T. Lilley, senior acoustical engineer for the E-A-R Division of Cabot Corp., Indianapolis, Ind., affirms the importance of shock mounting of Winchester drives: "Drive designers have to carefully evaluate



the frame and isolation-mount design to prevent damage to the data surfaces . . .It[involves]more than just adding a bumper guard. It's more like a resting spring that can absorb shock from several angles."

All manufacturers of small drives are paying attention to shock isolation. Lapine Technology Inc., Santa Clara, Calif., for example, offers the Ranger series Model 3521 and 3522, with 6.23M- and 12¾M-bytes unformatted capacity and an overall size of 1.625 inches by 4 inches by 5¾ inches—about half the total size of similar 5¼-inch drives. "We take a standard approach to the drive design," says vice president of marketing Richard E. Brechtlein. "We excel in the ruggedness of the design. Since we see a strong market for small desktop computers and portables, it is imperative that we provide four-corner shock absorption." Lapine also developed an automatic head-lifter and arm-lock mechanism that moves the head assembly off the data surface, then lifts and locks the head over the outer guard bands of the data platters during power-down.

Price may determine growth

The sub 4-inch market is still new and expanding. R.D. Eirich, vice president of marketing for Microcomputer Memories Inc., Van Nuys, Calif., contends that price is the most important variable pertaining to growth; 10M-byte drives may be priced too high. Eirich doesn't think the market reaction will be the same as it was for 5¼-inch drives. "The market for the 20M-byte won't supplant the 10M-byte in the same way the 10 supplanted the 5 in 5¼-inch drives. Software is expanding the need for hard disks," Eirich explains. "and offices with multiuser local area networks . . .will want 25M bytes and above. The high-capacity needs, however, represent only a small percentage of the PC market. The higher the capacity, the smaller the market."

Although the market picture looks bright, shipment volume is not increasing as fast as the industry expected a year ago. Though Johnson thinks that 4.6 million sub 4-inch drives can be shipped by 1986, Disk/Trends' Jim Porter, is more pessimistic: "In 1983, I predicted world-wide shipments to be about 181,000 and a little over two million in 1986. This was based on announcements in 1983. [But,] the manufacturers announced later than expected and the market buildup is just beginning. This year will probably [see shipments of] around 70,000 to 100,000, and in 1985, over half a million. The two million mark still looks good for 1986."

Another company climbing into the sub 4-inch ring is Xebec Inc., Sunnyvale, Calif., with the Micro-Owl. According to company chairman, president and chief executive officer James Toreson, there is a need for a

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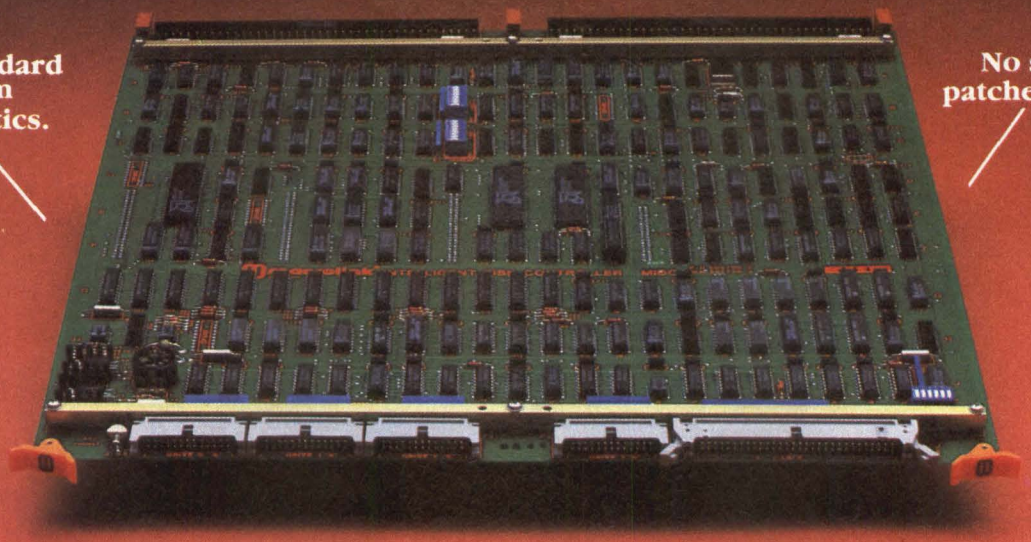

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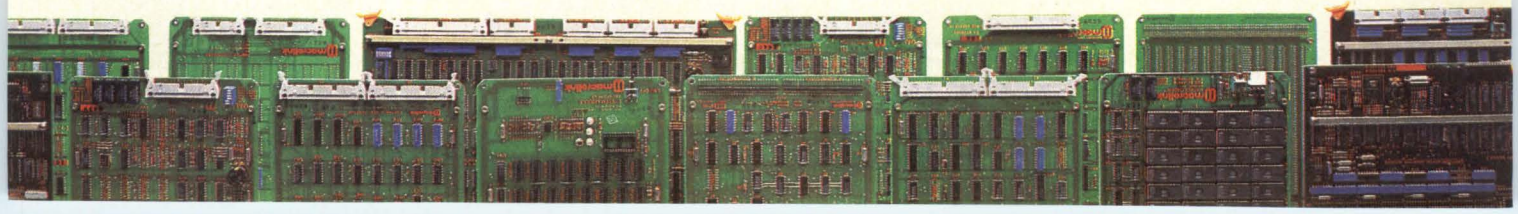

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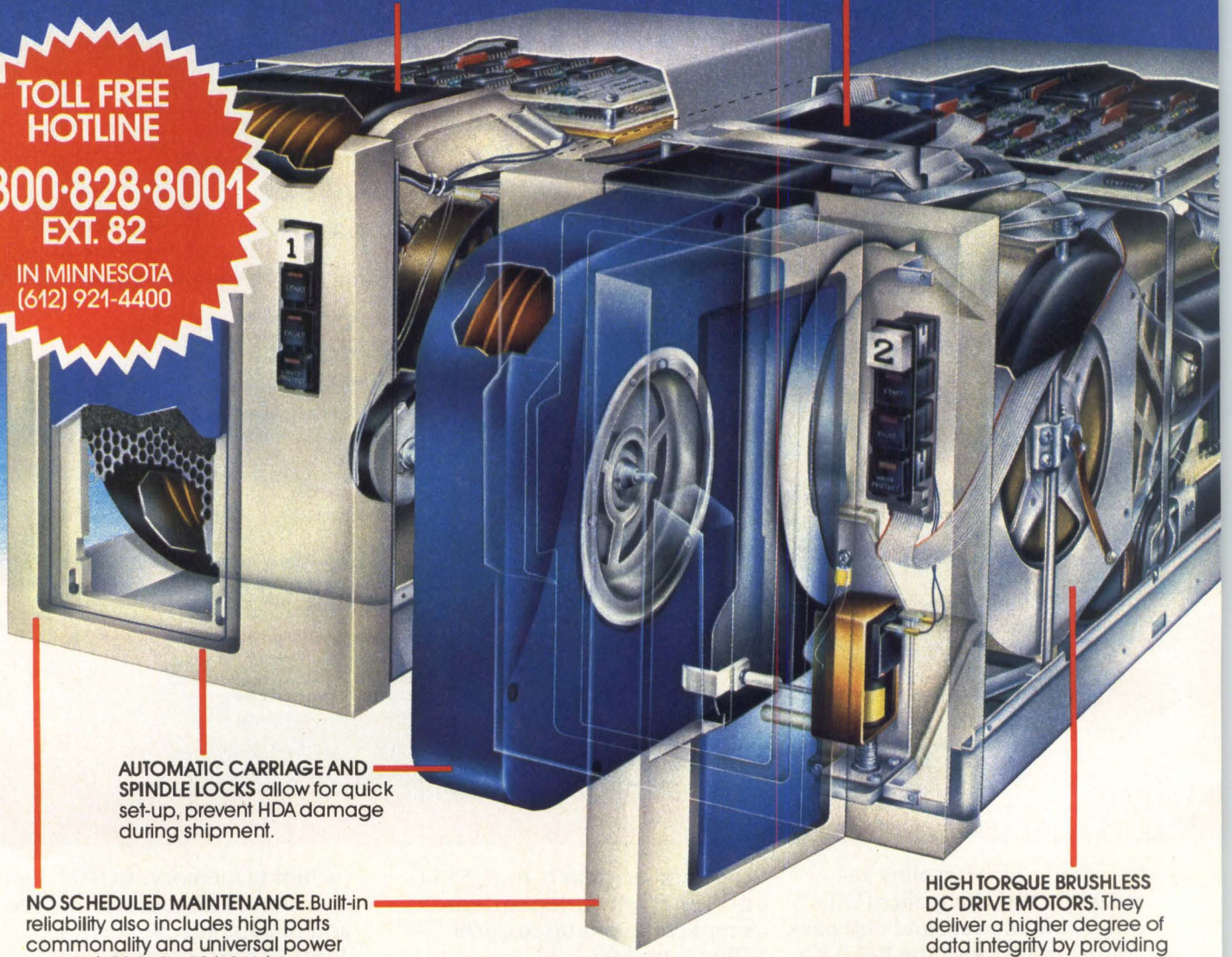

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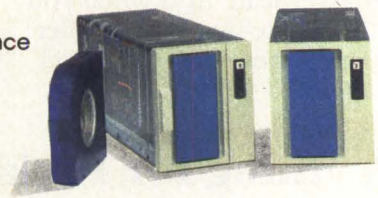

CONTROL DATA

low-power and compact 3½-inch drive. Xebec expects to be producing both a 10M- and 20M-byte version of the drive in the near future, and plans to add an on-board intelligent controller.

Toreson believes that to maintain price performance, drives will have to include embedded intelligence. "Essentially the idea is to make the integration easier, and not burden the system integrator with a lot of excess electronics," says Toreson.

Setting up for capacity upgrades

For 3½-inch Winchesters to be viable, says Porter, it is essential that they are plug-to-plug compatible with existing controllers. Therefore, virtually all the designs that are being announced provide a ready plug-in market.

Reportedly, not all the companies with 3½-inch drives are taking this approach. For example, Miniscribe Corp., Longmont, Colo., has been showing their 10M- and 20M-byte drives to customers such as IBM Corp., Wang Laboratories Inc. and Tallgrass Technologies Corp. Although ST506/412 compatibility has been considered a must, speculation is that since the Miniscribe drives have a higher transfer rate than the expected 5 MHz, they will require a more sophisticated, non-standard interface and controller. Miniscribe officials declined comment. The Miniscribe drives employ one and two platters, and achieve their capacities by using a wider data area, and by increasing the bit density of the inner tracks. In addition, the new drives employ a rack-and-pinion positioner and a fast stepper motor that, according to some observers, will permit an average access time as low as 45 msec.

'The development of the sub 4-inch market isn't technology-dependent, but one of packing and ability to manufacture in volume.'

Qew Inc., Milpitas, Calif., a wholly owned subsidiary of Quantum Corp., is expected to raise the veil from their 12.7M-byte, unformatted, 3½-inch drive sometime later this year. Although a Quantum spokesman did confirm Qew's charter to be one of developing a consumer storage system, they were unwilling to provide any details on the forthcoming drive. There may be two models on the horizon: the aforementioned 10M-byte model and a 20M-byte model. These Qew drives, too, are expected to have transfer rates above 5 MHz thus making it unlikely they will be ST506/412-compatible.

A company taking the traditional path, but with some twists, is SyQuest Technology Inc. They are still the only company to offer sub 4-inch Winchesters with a removable cartridge, which they contend affords users the ability to exchange data. The cartridge concept hasn't caught on all that well, though. So, to ensure themselves a share of the growing sub 4-inch market, SyQuest has developed fixed drives ranging in capacity from 25M bytes to 38M bytes, unformatted, using two and three platters, respectively.

According to former SyQuest vice president of marketing Lawrence Sarisky, ST412-compatibility was maintained to ensure plug-to-plug flexibility. Because SyQuest drives—like the SQ306R—use 3.9-inch diameter platters, the drives' dimensions are wider (5¾ inches versus 4 inches), and longer (8 inches versus 5¾ inches] than most 3½-inch designs. This has led many observers to believe the SyQuest drives are built to compete more with half-height 5¼-inch models. Regardless of the size differences, however, SyQuest claims to have shipped more than 25,000 of the SQ306R removable drives, with the Q-Pak cartridge.

Beyond 10M bytes not easy

Since IBM has settled on 20M-byte Winchester drives for the IBM-AT, industry observers are speculating that IBM is only interested in 20M-byte, 3½-inch models for use in their portable system, and drive manufacturers are developing products that offer capacities in this range and above.

Disk/Trend's Porter says there are several ways to boost sub 4-inch drive capacity: "Typically, 10M-byte drives use two platters with four heads, and 10,416 bytes per track, the same as an ST412. The 20M-byte models present more of a problem. It can be difficult to stack a fourth platter in, or to take one out. A two-platter drive means that something has to be done with the track density or bit density, or both. The best approach may be to use three platters and relax both the bit density and track density." But Porter warns that tradeoffs in the track and bit density may result in a different file organization, thus preventing plug-to-plug compatibility.

Because plug-to-plug compatibility is said to be so important, Ron Schlitzkus, director of marketing support for Microscience International Corp., Mountain View, Calif., emphasizes that the Model HH-312, 10M-byte, 3½-inch drive they offer provides the necessary compatibility to existing systems. "We essentially down-sized a 5¼-inch drive, but at the same time made provisions for a capacity upgrade with little difficulty." The HH-312, although a stepper drive, uses a special closed-loop servo system to ensure the accuracy of the head positions, and a microprocessor to monitor the drive's functions. To reach 20M bytes, either the track density can be increased or an extra platter added. But

Virtually all the designs that are being announced provide a ready plug-in market.

Schlitzkus isn't convinced that drive customers are ready for a 20M-byte sub 4-inch drive. "We could have introduced a higher-capacity model. But right now the market wants 10M bytes that look like a ST412."

What the market needs...wants

Andrew M. Seybold, a small-systems consultant who is a contributing editor of *Seybold Report on Professional Computing*, Torrance, Calif., thinks the industry is ripe for small form-factor, high-capacity Winchesters. "Future microcomputers will have smaller footprints...the idea is to eliminate desk clutter. A limiting factor in achieving a smaller footprint has been the size of the storage system."

Seybold, while conceding that the half-height, 5¼-inch Winchesters have gone a long way in helping to reduce the size of desktop microcomputers, was "disappointed" with IBM's choice of technology: "It's too big. There is really no reason why [the PC-AT] has to be that large."

Numerous manufacturers are planning sub 4-inch drives: Hewlett-Packard Co., Tandon Corp., Seagate Technology, Shugart Corp., Miniscribe, Microscience, Lapine, Qew and Microcomputer Memories. In addition, Control Data Corp. is expected to reintroduce the Cricket drive, but with 10M bytes capacity, and an access time of under 80 msec.

Japanese companies—NEC Information Systems Inc., Tokyo Electric Co., Epson Co. Ltd., Hitachi Ltd., Mitsubishi Electric Corp. and others—are following suit with new products expected in the next two fiscal quarters. In addition to these firms, Porter speculates that a number of Japanese companies which are relatively unknown, will also introduce devices to the United States. And, both Seybold and Porter agree, IBM has provided the signal that the computer industry is ready for 3½-inch Winchesters. □

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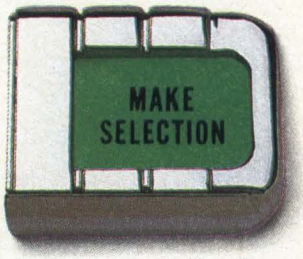

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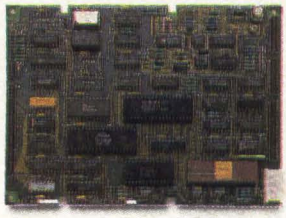

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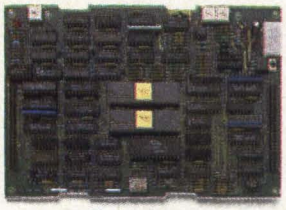

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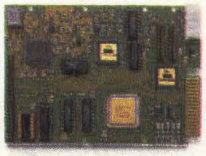

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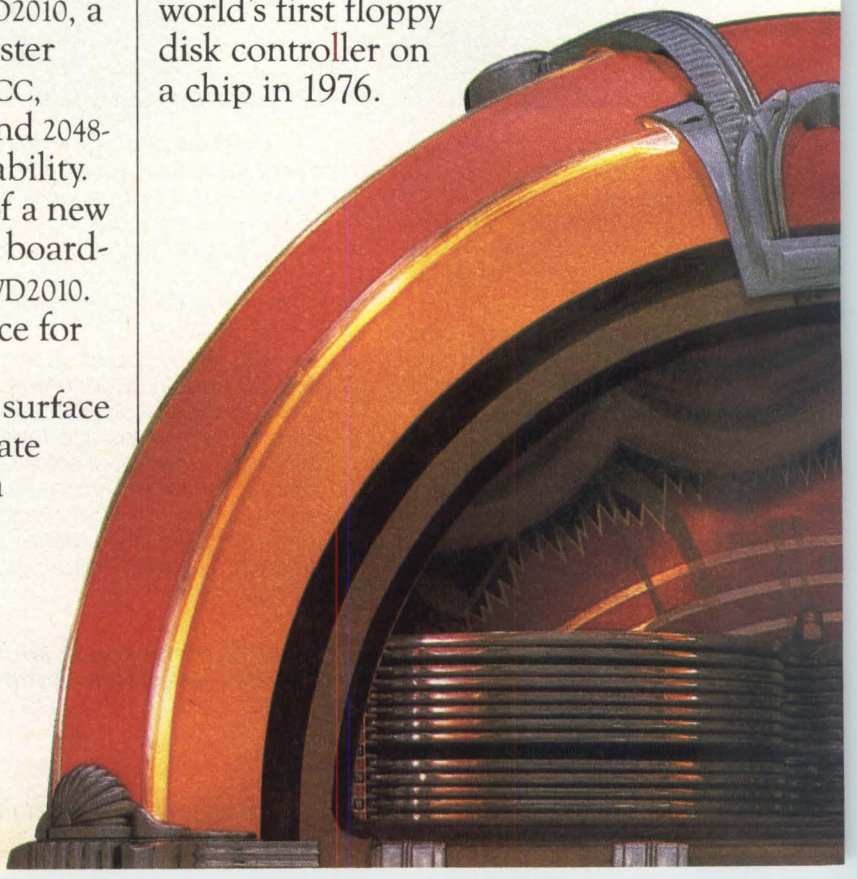

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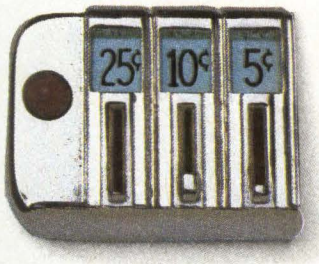

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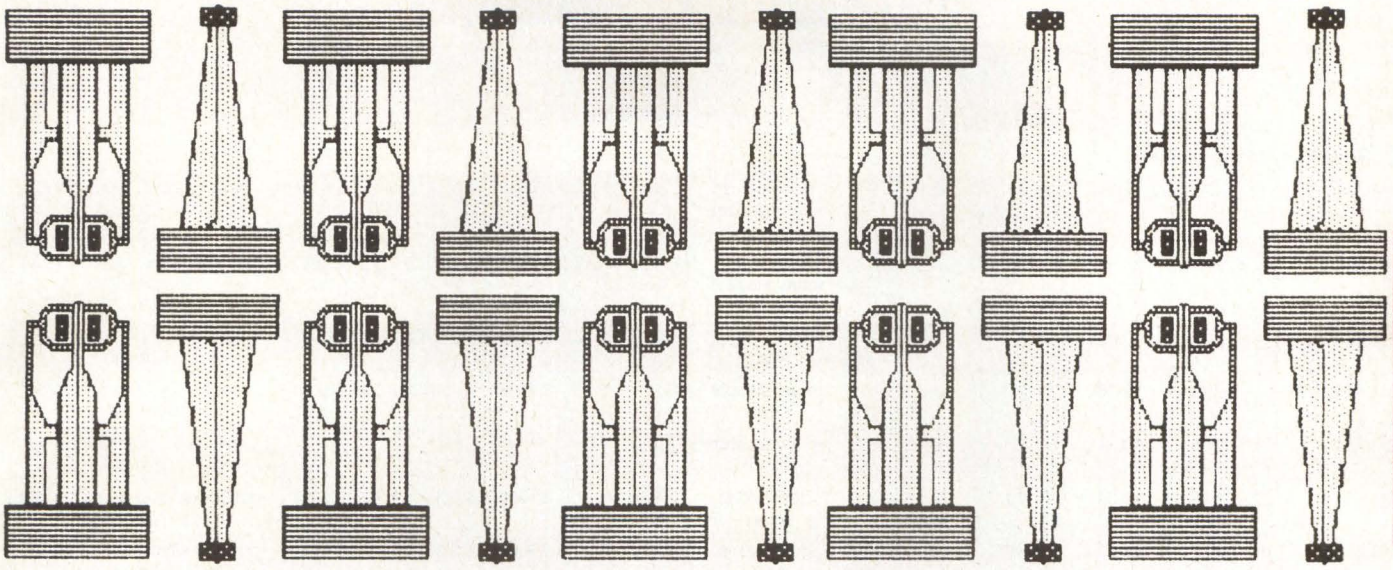


Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
ATASI CORP.										
3033	5.25	33.1	30	5	5	closed-loop linear voice coil	3.25x5.75x8	ST506, ST412	1,970(Q1); 1,570(Q500)	dedicated head landing zone, automatic carriage return and lock
3046	5.25	46.3	30	7	7	closed-loop linear voice coil	3.25x5.75x8	ST506, ST412	2,100(Q1); 1,670(Q500)	dedicated head landing zone, automatic carriage return and lock
3065	5.25	65.6	24	7	7	closed-loop linear voice coil	3.25x5.75x8	ST506, ST412	1,940(Q1); 2,430(Q500)	dedicated head landing zone, automatic carriage return and lock
3075	5.25	75	24	8	8	closed-loop linear voice coil	3.25x5.75x8	ST506, ST412	2,040(Q1); 2,560(Q500)	dedicated head landing zone, automatic carriage return and lock
BASF AG										
6185	5.25	27.5	108	6	6	stepper motor	3.25x5.75x8.23	ST506, ST412		spindle motor brake
6186	5.25	18.3	108	4	4	stepper motor	3.25x5.75x8.23	ST506, ST412		spindle motor brake
6187	5.25	9.1	108	2	2	stepper motor	3.25x5.75x8.23	ST506, ST412		spindle motor brake
6188 Slim-line	5.25	15.0	88	6	6	stepper motor	1.6x5.75x8	ST506, ST412		half-height drive, automatic return and lock of head carriage
6193	5.25	52.0	30	5	5	closed-loop rotary voice coil	3.25x5.75x8	ST412		thin-film metal disks, balanced rotary actuator, adaptive buffered mode positioning
6194	5.25	72.9	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ST412		thin-film metal disks, balanced rotary actuator, dedicated servo, adaptive buffered mode positioning
6195	5.25	93.7	30	9	9	closed-loop rotary voice coil	3.25x5.75x8	ST412		thin-film metal disks, balanced rotary actuator, dedicated servo, adaptive buffered mode positioning
COGITO SYSTEMS CORP.										
CG912	5.25	12.76	85	4	4	linear stepper motor	5.75x1.625x8	ST412		half-height
PT925	5.25	25.5	135	4	4	linear stepper motor	5.75x1.625x8	ST412		10 watts

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
COMPUTER MEMORIES INC.										
CM-3212	5.25	12.76	85	2	2	closed-loop rotary stepper motor	5.75x1.625x8	ST506	1,000(Q1); 450(Q500)	parking zone, head locking mechanism
CM-3426	5.25	25.52	85	4	4	closed-loop rotary stepper motor	1.625x5.75x8	ST506	1,100(Q1); 550(Q500)	parking zone, head locking mechanism
CM-5206	5.25	6.38	77	2	2	rotary stepper motor	3.25x5.75x8	ST506	1,000(Q1); 450(Q500)	electronics, motor outside clean area
CM-5412	5.25	12.76	77	4	4	rotary stepper motor	3.25x5.75x8	ST506	1,050(Q1); 500(Q500)	electronics, motors outside clean area
CM-5619	5.25	19.14	77	6	6	rotary stepper motor	3.25x5.75x8			electronics, motors outside clean area
CM-6213	5.25	13.34	40	2	2	closed-loop rotary	3.25x5.75x8	ST506	1,580(Q1); 805(Q500)	positioner locking mechanism, head parking zone
CM-6426	5.25	26.67	40	4	4	closed-loop rotary	3.25x5.75x8	ST506	1,680(Q1); 905(Q500)	positioner locking mechanism, head parking zone
CM-6640	5.25	40	40	6	6	closed-loop, rotary	3.25x5.75x8	ST506	1,800(Q1); 1,025(Q500)	positioner locking mechanism, head parking zone
CM-7660	5.25	60	30	6	6	closed-loop rotary	3.25x5.75x8	ST506	2,200(Q1); 1,395(Q500)	parking zone, head-locking mechanism, 3370 technology
CM-7880	5.25	80	30	8	8	closed-loop rotary	3.25x5.75x8	ST506	2,500(Q1); 1,595(Q500)	parking zone, head-locking mechanism, 3370 technology
COMREX INTERNATIONAL INC.										
ComFiler CR-1510	5.25	12.76	85	4	4	stepper motor	7.8x5.7x14.8	Epson QX-10	2,295(Q1)	

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
CONTROL DATA CORP.										
Wren I 9415	5.25	21, 36	40	3, 5	3, 5	closed-loop rotary voice coil	3.25x5.75x8	ST506, FDI		dedicated head landing zone
Wren II 9415	5.25	48, 67, 86	30	5, 7, 9	5, 7, 9	closed-loop rotary voice coil	3.25x5.75x8	ST506, EDSI		
FUJITSU AMERICA INC.										
M2233	5.25	13.33	83	4	4	stepper motor	3.3x5.7x8	ST506, SA4000	1,350(Q1); 650(Q499)	
M2234	5.25	20	83	6	6	stepper motor	3.3x5.7x8	ST506, SA4000	1,625(Q1); 750(Q499)	
M2235	5.25	26.66	83	8	8	stepper motor	3.3x5.7x8	ST506, SA4000	1,745(Q1); 845(Q499)	
M2241	5.25	31.4	35	4	4	voice coil	3.3x5.7x8	ST506, SA4000	2,950(Q1); 1,525(Q499)	
M2242	5.25	54.9	35	7	7	voice coil	3.3x5.7x8	ST506, SA4000	3,250(Q1); 1,700(Q499)	
M2243	5.25	86.3	35	11	11	voice coil	3.3x5.7x8	ST506, SA4000	3,700(Q1); 1,925(Q499)	
M2230AT	5.25	6.7	95	2	2	stepper motor	1.6x5.7x8	ST506, SA4000	1,275(Q1); 630(Q499)	
M2233AT	5.25	13.3	95	4	4	stepper motor	1.6x5.7x8	ST506, SA4000	1,375(Q1); 685(Q499)	
HITACHI AMERICA LTD.										
DK511-3	5.25	36.4	30	5	5	rotary voice coil	3.25x5.75x8	ST506, ST412; SASI		

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
DK511-5	5.25	51.0	30	7	7	rotary voice coil	3.25x5.75x8	ST506, ST412		
DK511-8	5.25	85.7	25	10	10	rotary voice coil	3.25x5.75x8	ST506, ST412; SASI		
DK512-8	5.25	85.7	25	5	5	rotary voice coil	3.25x5.75x8	ESDI, SASI, ST412, Hewlett-Packard		
DK512-17	5.25	171.4	25	10	10	rotary voice coil	3.25x5.75x8	ESDI, SASI, ST412, Hewlett-Packard		
INTERNATIONAL MEMORIES INC.										
5006H	5.25	6.38	68	2	2	stepper motor	3.25x5.75x8	ST506	800(Q1); 460(Q500)	thin-film plated media, dedicated shipping zone
5012H	5.25	12.75	68	4	4	stepper motor	3.25x5.75x8	ST506	900(Q1); 560(Q500)	thin-film plated media, dedicated shipping zone
5018H	5.25	19.13	68	6	6	stepper motor	3.25x5.75x8	ST506	1000(Q1); 650(Q500)	thin-film plated media, dedicated shipping zone
5612H	5.25	12.76	49	2	2	stepper motor	3.25x5.75x8	ST506		
5624H	5.25	25.52	49	4	4	stepper motor	3.25x5.75x8	ST506		
5636H	5.25	38.28	49	6	6	stepper motor	3.25x5.75x8	ST506		
5650H	5.25	51	49	8	8	stepper motor	3.25x5.75x8	ST506		

5¼-INCH AND SMALLER RIGID DISK DRIVES

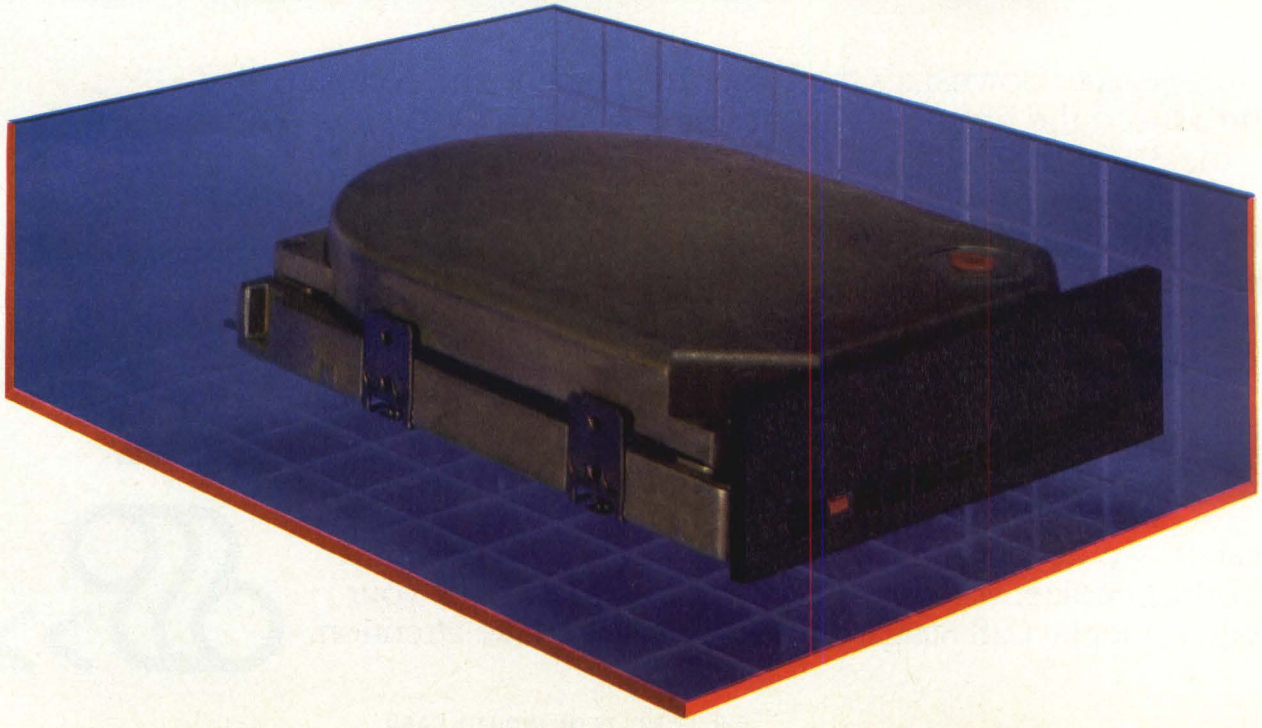
Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
MAXTOR CORP.										
XT-1065	5.25	66.93	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ST506	2,390(Q1)	microprocessor controlled spindle motor, plated media
XT-1105	5.25	105.18	30	11	11	closed-loop rotary voice coil	3.25x5.75x8	ST506	3,340(Q1)	microprocessor controlled spindle motor, plated media
XT-1140	5.25	143.43	30	15	15	closed-loop rotary voice coil	3.25x5.75x8	ST506	4,290(Q1)	microprocessor controlled spindle motor, plated media
XT-2085	5.25	89.24	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ST506	2,630(Q1)	microprocessor controlled spindle motor, plated media
XT-2140	5.25	140.24	30	11	11	closed-loop rotary voice coil	3.25x5.75x8	ST506	3,675(Q1)	microprocessor controlled spindle motor, plated media
XT-2190	5.25	191.24	30	15	15	closed-loop rotary voice coil	3.25x5.75x8	ST506	4,720(Q1)	microprocessor controlled spindle motor, plated media
EXT-4075	5.25	76.40	30	3	3	closed-loop rotary voice coil	3.25x5.75x8	ESDI	2,500(Q1)	microprocessor controlled spindle motor, plated media
EXT-4175	5.25	178.28	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ESDI	4,440(Q1)	microprocessor controlled spindle motor, plated media
EXT-4280	5.25	280.16	30	11	11	closed-loop rotary voice coil	3.25x5.25x8	ESDI	6,205(Q1)	microprocessor controlled spindle motor, plated media
EXT-4380	5.25	382.03	30	15	15	closed-loop rotary voice coil	3.25x5.75x8	ESDI	7,710(Q1)	microprocessor controlled spindle motor, plated media
MEMOREX CORP.										
321	5.25	6.7	80	2	2	rotary stepper motor	3.25x5.75x8	ST412, ST506	990(Q1); 545(Q500)	
322	5.25	13.3	80	4	4	rotary stepper motor	3.25x5.75x8	ST412, ST506	1,190(Q1); 655(Q500)	

5¼-inch and smaller rigid disk drives

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
323	5.25	20	80	6	6	rotary stepper motor	3.25x5.75x8	ST412, ST506	1,390(Q1); 765(Q500)	
324	5.25	26.7	80	8	8	rotary stepper motor	3.25x5.75x8	ST412, ST506	1,590(Q1); 875(Q500)	
512	5.25	30	21	3	3	closed-loop linear voice coil	3.25x5.75x10.5	ST412, ST506; opt. SECA	2,200(Q1); 1,210(Q500)	
513	5.25	50	21	5	5	closed-loop linear voice coil	3.25x5.75x10.5	ST412, ST506; opt. SECA	2,800(Q1); 1,540(Q500)	
514	5.25	70	21	7	7	closed-loop linear voice coil	3.25x5.75x10.5	ST412, ST506; opt. SECA	3,400(Q1); 1,870(Q500)	
MICROCOMPUTER MEMORIES INC.										
M-106	3.5	6.38	85	2	2	linear stepper motor rack and pinion	1.625x4x5.75	ST506, ST412	1,350(Q1); 550(Q500)	
M-112	3.5	12.75	85	4	4	linear stepper motor rack and pinion	1.625x4x5.75	ST506, ST412	1,400(Q1); 625(Q500)	
M-212	3.5	12.75	85	4	4	linear stepper motor rack and pinion	1.625x5.75x8	ST506, ST412	1,400(Q1); 625(Q500)	mounted in 5.25-inch half-height package

25MB HAL



5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
MICROPOLIS CORP.										
1302	5.25	25.9	30	3	3	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	1,890(Q1); 1,115(Q500)	dual chassis
1303	5.25	43.2	30	5	5	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	2,040(Q1); 1,240(Q500)	dual chassis
1304	5.25	51.9	30	6	6	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	2,150(Q1); 1,360(Q500)	dual chassis
1323	5.25	42.7	28	4	4	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	2,110(Q1); 1,325(Q500)	dual chassis
1324	5.25	64	28	6	6	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	2,325(Q1); 1,495(Q500)	dual chassis
1325	5.25	85.3	28	8	8	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412	2,580(Q1); 1,680(Q500)	dual chassis
1353	5.25	85.3	28	4	4	closed-loop rotary voice coil	3.25x5.75x8	ESDI	1,469(Q1000)	dual chassis, thin-film media
1354	5.25	128	28	6	6	closed-loop rotary voice coil	3.25x5.75x8	ESDI	1,669(Q1000)	dual chassis, thin-film media
1355	5.25	170.6	28	8	8	closed-loop rotary voice coil	3.25x5.75x8	ESDI	1,837(Q1000)	dual chassis, thin-film media
MILTOPE CORP.										
RD 5/15	5.25	19	40	4	4		8x8.62x13.63	ST506		cartridge loaded Winchester drive, ruggedized for military environments
MITSUBISHI ELECTRONICS AMERICA INC.										
MR521	5.25	12.75	85	2	2	closed-loop rotary stepper motor	1.62x5.75x8	ST506		thin-film media

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
MR522	5.25	25.5	85	4	4	closed-loop rotary stepper motor	1.62x5.75x8	ST506		thin-film media
MR532	5.25	25.5	65	4	8	closed-loop rotary stepper motor	1.62x5.75x8	ST506		thin-film media
NEC INFORMATION SYSTEMS INC.										
D5124	5.25	12.91	85	4	4	stepper motor	1.6x5.75x8	ST412	650(Q1); 500(Q500)	carriage lock, landing zone, half-height
D5224	5.25	12.91	85	4	4	stepper motor	3.2x5.7x8	ST406	725(Q1); 590(Q500)	carriage lock, landing zone
D5244	5.25	25.83	85	8	8	stepper motor	3.2x5.7x8	ST406	875(Q1); 760(Q500)	carriage lock, landing zone
MYARC INC.										
WDS/100	5.25	7.13	85	2, 4	2, 4	stepper motor	6x6.5x14	ST412, ST506	2,099(Q1); 1,799(Q500)	floppy backup
NEWBURY DATA RECORDING LTD.										
NDR 505	5.25	6.4		4	4	closed-loop linear voice coil	3.25x5.75x10.6	ST506		
NDR 1065	5.25	66.93	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ST506		plated disks, Whitney heads
NDR 1105	5.25	105.18	30	11	11	closed-loop rotary voice coil	3.25x5.75x8	ST506		plated disks, Whitney heads
NDR 1140	5.25	143.43	30	15	15	closed-loop rotary voice coil	3.25x5.75x8	ST506		plated disks, Whitney heads

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5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
PRIAM CORP.										
504	5.25	86	35	11	11	closed-loop linear voice coil	5.75x3.25x8	ST506, ST412	2,750(Q1); 1,650(Q500)	dedicated landing / shipping zone, automatic spindle brakes and carriage lock, integral shock mounting
QUANTUM CORP.										
Q520	5.25	21.33	45	4	4	closed-loop rotary	3.25x5.75x8.05	ST506, ST412	1,615(Q1); 1,030(Q500)	head landing zone and lock
Q530	5.25	31.99	45	6	6	closed-loop rotary	3.25x5.75x8.05	ST506, ST412	1,755(Q1); 1,140(Q500)	head landing zone and lock
Q540	5.25	42.66	45	8	8	closed-loop rotary	3.25x5.75x8.05	ST506, ST412	1,895(Q1); 1,250(Q500)	head landing zone and lock
QUME CORP.										
QumeTrak R100	5.25	13.34	75	2	2	rotary	1.625x5.75x8	ST506, ST412		half-height, dedicated head landing/shipping zone, spindle brake, actuator lock
QumeTrak R200	5.25	26.7	75	4	4	rotary	1.625x5.75x8	ST506, ST412		half-height, dedicated head landing/shipping zone, spindle brake, actuator lock
QumeTrak R300	5.25	40	75	6	6	rotary	1.635x5.75x8	ST506, ST412		half-height, dedicated head landing/shipping zone, spindle brake, actuator lock
RODIME PLC.										
RO201	5.25	6.67	90	1	2	stepper motor	8x5.75x3.25	ST506		
RO202	5.25	13.33	90	2	4	stepper motor	8x5.75x3.25	ST506		
RO203	5.25	20	90	3	6	stepper motor	8x5.75x3.25	ST506		

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
RO204	5.25	26.67	90	4	8	stepper motor	8x5.75x3.25	ST506		
RO202E	5.25	26.66	60	2	4	stepper motor	8x5.75x3.25	ST506		
RO203E	5.25	40	60	3	6	stepper motor	8x5.75x3.25	ST506		
RO204E	5.25	53.54	60	4	8	stepper motor	8x5.75x3.25	ST506		
RO351	3.50	6.38	85	1	2	stepper motor	5.75x5.4x1.625	ST506		
RO352	3.50	12.75	85	2	4	stepper motor	5.75x5.4x1.625	ST506		
SEAGATE TECHNOLOGY										
ST212	5.25		65	2	4	stepper motor	1.63x5.75x8			
ST406	5.25	6.38	85	2	2	stepper motor	3.25x5.75x8	ST506		
ST412	5.25	12.76	85	4	4	stepper motor	3.25x5.75x8	ST506		
ST419	5.25	19.14	85	6	6	stepper motor	3.25x5.75x8	ST506		
ST425	5.25	25.52	65	4	8	stepper motor	3.25x5.75x8	ST506		
SHUGART CORP.										
706	5.25	6.6	85	2	2	stepper motor	1.63x5.75x8	ST506, SCSI	374(OEM)	half-height drive, dedicated head landing/shipping zone
712	5.25	13.3	85	4	4	stepper motor	1.63x5.75x8	ST506, SCSI	421(OEM)	half-height drive, dedicated head landing/shipping zone
706S	5.25	6.6	85	2	2	stepper motor	2.86x5.75x8	ST506, SCSI	558(OEM)	intelligence incorporated within form factor of drive
712S	5.25	13.3	85	4	4	stepper motor	2.86x5.75x8	ST506, SCSI	604(OEM)	intelligence incorporated within form factor of drive
SYQUEST TECHNOLOGY										
SQ325F	3.9	25.5	95	4	4	stepper motor	1.625x4.8x8	ST506	900(Q1); 750(Q500)	thin-film plated media with graphite overcoat

5¼-INCH AND SMALLER RIGID DISK DRIVES

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
SQ338F	3.9	38.2	95	6	6	stepper motor	1.625x4.8x8	ST506	1,100(Q1); 900(Q500)	thin-film plated media with graphite overcoat
SYSTEM INDUSTRIES										
9722	5.25	160	28.3	6	6	rotary	9.84x16.38x 25.59	SMD		
TANDON CORP.										
TM252	5.25	12.8	85	4	4	rotary	1.625x5.75x8	ST412		hard-coated plated media
TM502	5.25	12.8	85	4	4	rotary	3.25x5.75x8	ST412		hard-coated plated media
TM503	5.25	19.1	85	6	6	rotary	3.25x5.75x8	ST412		hard-coated plated media
TM703	5.25	36.2	45	5	5	closed-loop	3.25x5.75x8	ST412		hard-coated plated media
TECHMAR INC.										
40200	5.25		72	17	4		19.5x16.5x5.25	ST506	2,795(Q1)	
40300	5.25	19	72	17	6		19.5x16x5.25	ST506	3,195(Q1)	
40400	5.25	40	72	17	8		19.5x16x5.25	ST506	4,295(Q1)	
TULIN CORP.										
TL213	5.25	13.34	85	2	2	closed-loop stepper motor	1.625x5.75x8	ST506	1,100(Q1); 740(Q500)	half-height drive, dedicated head landing/shipping zone
TL226	5.25	26.7	85	4	4	closed-loop stepper motor	1.625x5.75x8	ST506	1,300(Q1); 940(Q500)	half-height drive, dedicated head landing/shipping zone
TL240	5.25	40	85	6	6	closed-loop stepper motor	1.625x5.75x8	ST506	1,500(Q1); 1,140(Q500)	half-height drive, dedicated head landing/shipping zone

5¼-INCH AND SMALLER RIGID DISK DRIVES

5¼-inch and smaller rigid disk drives

Company Model	Disk size (inches)	Unformatted capacity	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
VERTEX PERIPHERALS										
V130	5.25	30.8	30	3	3	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412		plated media, automatic actuator lock, power sequencing
V150	5.25	51.4	30	5	5	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412		plated media, automatic lock, power sequencing
V170	5.25	72.0	30	7	7	closed-loop rotary voice coil	3.25x5.75x8	ST506, ST412		plated media, automatic actuator lock, power sequencing
V185	5.25	85	30	7	7	closed-loop rotary voice coil	3.25x5,75x8	ST506, ST412		plated media, automatic actuator lock, power sequencing
WANG LABORATORIES INC.										
PC-PM021	5.25	10	85		4		3.25x5.75x8	ST506	2,385(Q1)	
2275-20	5.25	20	85		4		14.9x6.5x16	ST506	4,000(Q1)	
XEBEC										
Owl	5.25	14.1	99	4	4	stepper motor	1.62x5.88x8	SASI	500(Q1)	half-height drive, includes controller

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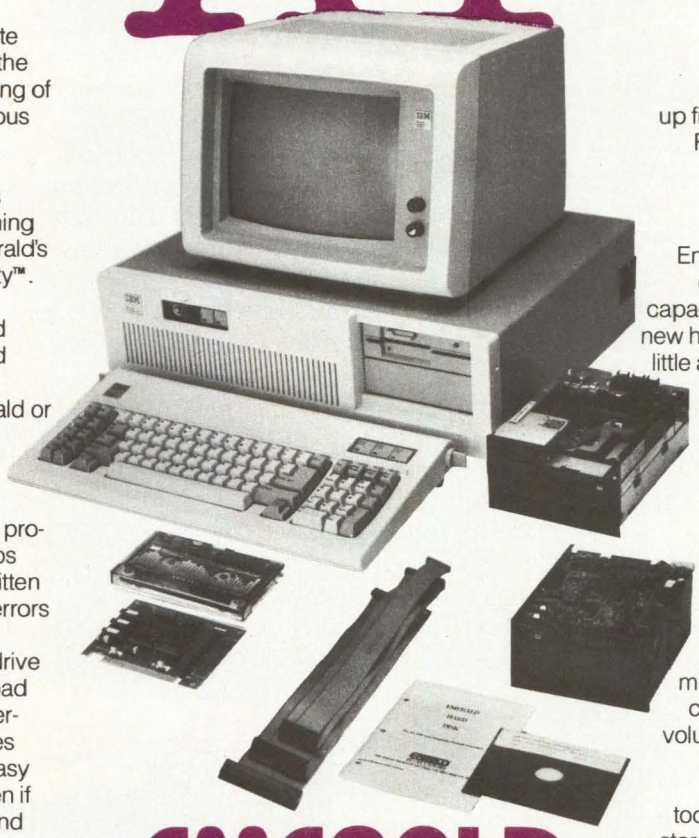
■ Emerald System's new 60MByte ¼" cartridge tape subsystem is the perfect answer to faster processing of your PC AT's larger, more numerous data files.

Forget about keeping track of expensive floppies. Because this internal upgraded kit has everything you need, including BRU™, Emerald's unique Backup and Restore Utility™.

BRU works as your personal librarian, helping you to retire and track files for archival storage and enabling you to safely and easily transfer files between your Emerald or IBM hard disk and floppies and Emerald's ¼" tape cartridge.



MORE RELIABLE

Our BRU-equipped tape drive protects your valuable data and helps assure timely access. All data written to tape is checked, and all write errors are corrected automatically.

Even if your AT floppy or disk drive is non-operational, you can still load files directly from tape. Media interchangeability with other machines also running BRU assures you easy access to your valuable data even if your machine is not operating. And our cartridges also allow you to distribute data files that don't fit on floppies.

MORE CONVENIENT

Do multiple volume backup from your IBM or Emerald hard disk or floppies on one data cartridge. And with a utility such as ProKey™, your backup procedure can be fully automated. BRU options invoked from the DOS command line or from a convenient menu gives you these choices:

- Backup an entire physical disk.
- Backup a logical volume.
- Backup entire DOS directories.
- Backup files by name (wild card allowed).
- Backup files by DOS date and time stamp.

■ And you can forget about file sizes. Emerald's BRU automatically breaks up files that are longer than the tape. Restoring files from tape involves options essentially the reverse of backup.

MORE ECONOMICAL

Emerald's 60 MByte tape cartridge gives you 50 times more storage capacity, yet costs less than 1/5 that of new high-capacity floppies. And for as little as $65 per MBYte you can install our hard disk kit in your PC/AT chassis. Emerald Systems' internal 40, 65, 140, 280 MByte hard disk AT upgrade kit is also 30% faster than IBM's. And our hard disk cache feature makes retrieval speed of selective files 100 times faster. This hard disk caching feature keeps often-used files available in memory at microspeed access time. And you can partition our disks into 1 to 24 volumes, with up to 240 MBytes per volume.

You may not need 280 MBytes today. But if you need to share disk storage in your LAN or expand your database without being limited by DOS to 32 MBytes, you need Emerald Systems' technology today.

SUPPORTS ALL MAJOR OPERATING SYSTEMS & LANS

Emerald's subsystems support DOS 2.0/2.1./3.0, QNX, PC/IX, UCSDp System, and XENIX (when available). Also, all fully compatible LAN's including 3 COM, PC-NET, X-NET, NOVELL, and IBM's version of SYTEK's LAN (when available).

EMERALD
SYSTEMS CORPORATION
Mainframe Storage for Micros

A COMPREHENSIVE SOLUTION —AVAILABLE NOW!

Emerald Systems Corporation. The complete hard disk and tape backup solution for builders of desktop computer systems.

So up your AT, your XT, your PC, or your PC compatible system . . . with Emerald Systems' mainframe storage for micros. **Call (619) 270-1994 for more information and the name of the dealer nearest you.**

4901 Morena Blvd.
San Diego, CA 92117
(619) 270-1994

CIRCLE NO. 33 ON INQUIRY CARD

QUIETLY BUILDING THE BEST

Some people prefer performance to promises. To those we quietly offer our family of 30MB, 51MB, 72MB and 85MB 5¼" Winchesters.

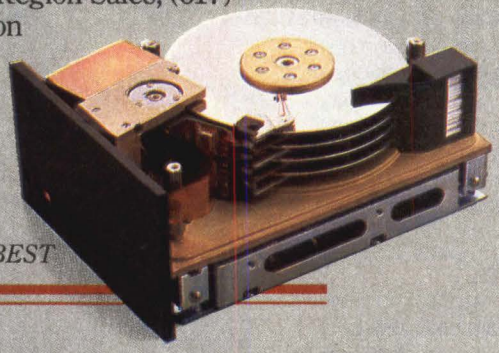
You see, we have an old fashioned attitude. Performance ought to speak for itself. That's why we're quietly becoming a leader in high performance 5¼" Winchesters. With volume deliveries of very reliable drives. To a diverse customer base which includes some of the most successful OEM's in the business.

We could brag more about specs and design integrity. We could holler about our great manufacturing capability.

Yeah, we could shout with the best of 'em.

But we'd rather *build* the best of 'em.

Call us for a quiet conversation. Vertex Peripherals, 800 Tasman Drive, Milpitas, CA 95035, (408) 943-9530. Eastern Region Sales, (617) 435-5348. Midwest Region Sales, (612) 784-0347. Western Region Sales, (714) 937-0384.



VERTEX

QUIETLY BUILDING THE BEST

CIRCLE NO. 34 ON INQUIRY CARD

The best way to choose the best drive is to test it yourself.

When you're designing your systems to handle more work faster and more reliably, you'll want to use half-height, high-capacity floppy disk drives so your system will run longer and more efficiently hour after hour.

We designed our family of drives to keep up with your hard-driving technology.

Drives that incorporate our field-proven technology, Philips patents, and manufacturing experience.

Drives with up to 1.6 MB capacities and data transfer rates that are compatible with 8-inch drives.

96 tpi drives with access times less than 3 msec and 48 tpi drives with access times of 2.5-6 msec.

Philips has a full family of drives for today. And an aggressive development program that is keeping pace with the worldwide requirements of people such as you who are planning tomorrow's systems.

We're so confident in our Philips half-height floppy drives, we'll give you a comprehensive testing guide to help you prove Philips drives are unsurpassed in performance.

And unequaled in reliability.

SPECIFICATIONS	X3131	X3132	X3133	X3134	X3138
Capacity (unformatted)	250 KB	500 KB	500 KB	1 MB	1.6 MB
Track density	48 tpi	48 tpi	96 tpi	96 tpi	96 tpi
Positioning time (track to track)	2.5-6 msec.		<3 msec.	<3 msec.	<3 msec.
Interface	ANSI/INDUSTRY STANDARD				
Media	ECMA 66	ECMA 66/70	ECMA 78	ECMA 78	ECMA 78
Recording density	5876 (MFM)	5876	5876	5876	9870
RPM	300	300	300	300	360

Warranty: 1 year on all parts and labor (seldom used).

But what will really impress you are the low part count and exceptional simplicity of design.

Our precision split band actuator, stepping motor, and performance-proven clamping cone assure highly reliable data interchange... even under extreme conditions.

FREE Call or write today for your copy of Disk Drive Evaluation Techniques and more information on the drives with higher performance and greater payloads.

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Company _____

Address _____

City _____

State/Zip _____

DISK DRIVE EVALUATION TECHNIQUES

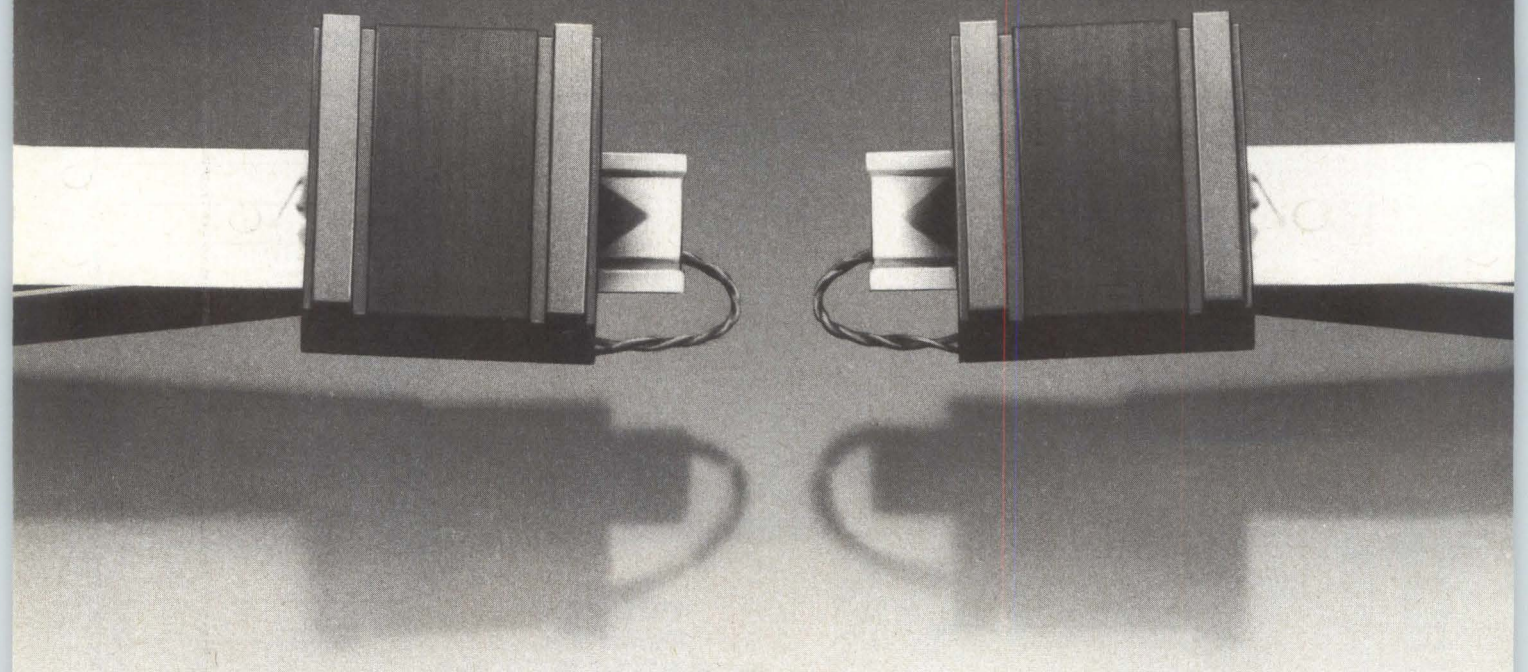
Mail to: Philips Peripherals, Inc. 385 Oyster Point Blvd., Unit 12, South San Francisco, CA 94080, (415) 952-3000

PHILIPS

Unsurpassed in Test After Test After Test...

CIRCLE NO. 35 ON INQUIRY CARD

INTRODUCING MIS 1700 FROM MAGNEX. SYMMETRY WITH SEVENTEEN TURNS.



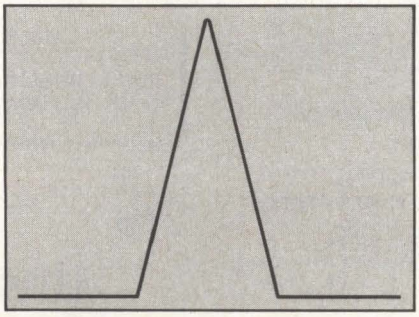
The new MIS-1700 from Magnex. Seventeen turns and Magnex know-how make it the finest performing thin-film head available for today's high density disk drives.

And for disk drives to come.

An MIS-1700 thin-film head is pure symmetry. Perfectly aligned pole tips are manufactured within tight, equal tolerances. And the MIS-1700 achieves a greater signal on closely spaced tracks than conventional thin-film heads. With a lot less noise.

Magnex's proprietary dry sputtering process deposits permalloy with an incredibly uniform composition. Our patented Poletrim™ process trims the poles to virtually identical widths.

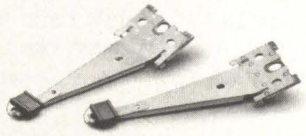
The result is greatly enhanced magnetics for cleaner data, more data. Regardless of your media size.



Typical track profile of an MIS-1700 thin-film head on Dysan 3380-equivalent media.

Magnex offers an MIS-1700 series thin-film head for virtually all disk drive applications. Existing or developing. And in production quantities.

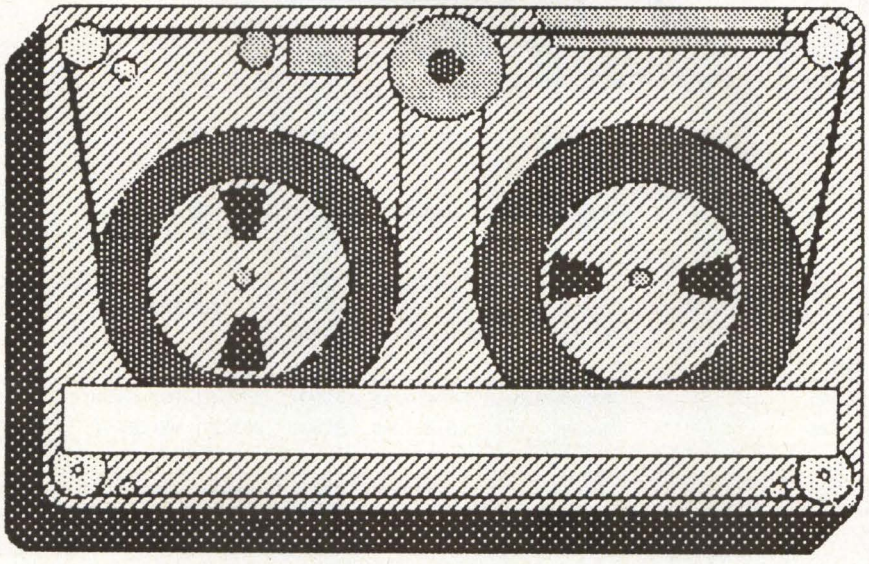
Get in touch for details. Call Director of Marketing, Magnex Corporation, 6850 Santa Teresa Boulevard, San Jose, CA 95119, (408) 281-1000, TELEX 176042.



MAGNEX

CIRCLE NO. 36 ON INQUIRY CARD

5¼-INCH CARTRIDGE DISK DRIVES

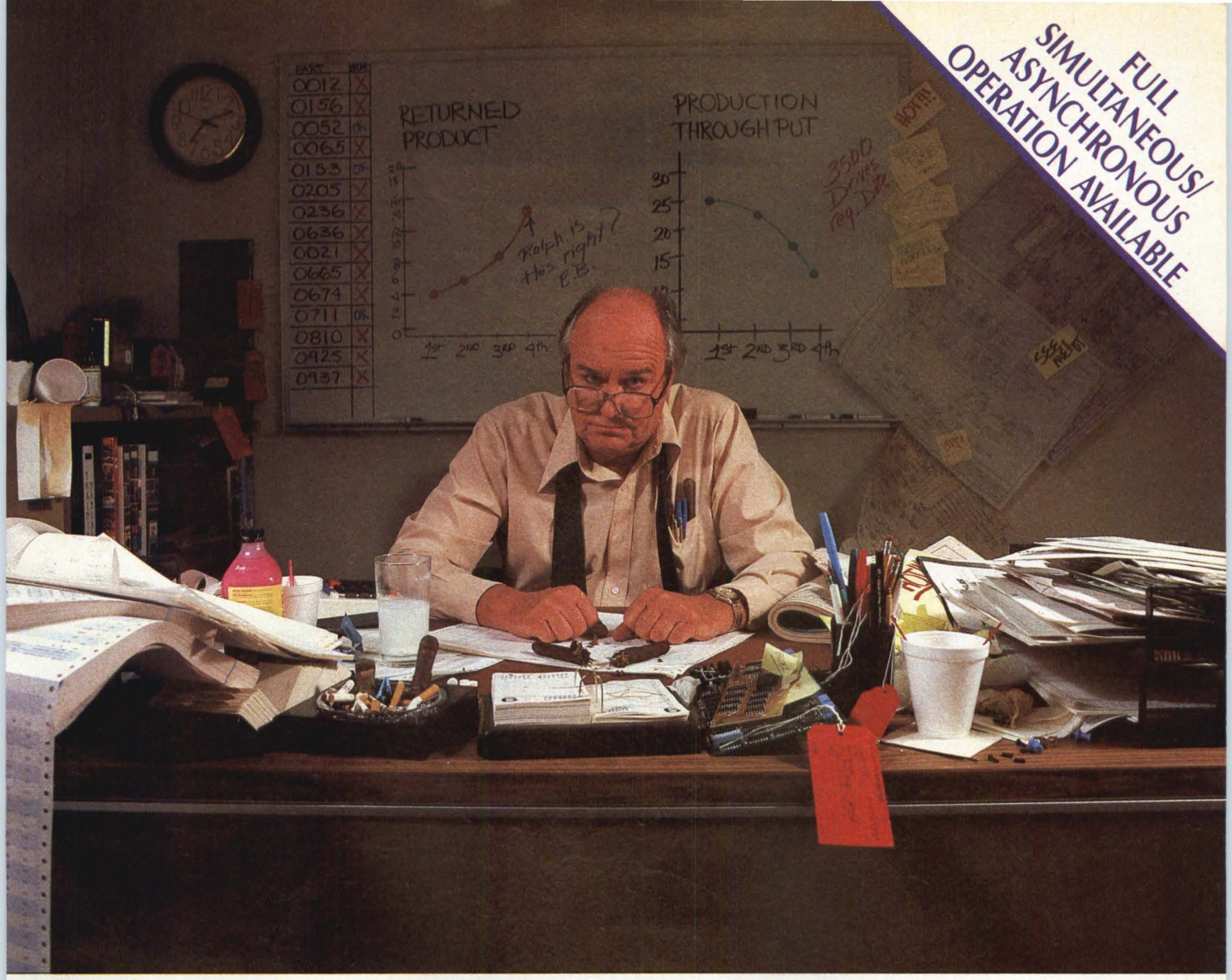


Company Model	Unformatted capacity fixed (removable)	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
ATHENAEUM TECHNOLOGY INC.									
Aegis 50	54.48 (54.48)	40	8	8	closed-loop linear	3.25x5.75x 11.75	ST506	2,500(Q1); 1,500(Q500)	electronics housed in separate module which may be placed anywhere within 7 inches of drive
Aegis 1010	27.24 (13.62)	40	4	4	closed-loop linear	3.25x5.75x 11.75	ST506	2,500(Q1); 1,500(Q500)	electronics housed in separate module which may be placed anywhere within 7 inches of drive
DMA SYSTEMS CORP.									
Micro-Magnum 5/5	6.4 (6.4)	40	4	4	closed-loop linear voice coil	3.25x5.75x10.5	ST506	2,200(Q1); 1,400(Q500)	
Micro-Magnum 5R	(6.4)	40	4	4	closed-loop linear voice coil	3.25x5.75x10.5	ST506	2,000(Q1); 1,135(Q500)	
Micro-Magnum 11/11	13.6 (13.6)	40	4	4	closed-loop linear voice coil	3.25x5.75x10.5	ST506	2,400(Q1); 1,675(Q1)	
GENIE COMPUTER CORP.									
5+5	6.4 (6.4)	40	4	4	closed-loop linear voice coil	5.5x10.5x16	SASI	3,995(Q1)	automatic breaking
11+11	13.62 (13.2)	40	4	4	closed-loop linear voice coil	5.5x10.5x16	SASI	4,995(Q1)	
X5A	(6.4)	40	2	2	closed-loop linear voice coil	5.5x10.5x16	SASI	3,295(Q1)	
GENISCO MEMORY PRODUCTS CORP.									
EDR-100	(12.75, 25.5)	68	2, 4, 6	2, 4, 6	linear	7x17.7x20	opt. ST506		plated media, ruggedized for use in hostile environments
EDR-105	(12.75, 25.5, 38.25)	68	2, 4, 6	2, 4, 6	linear	7x17.7x20	opt. ST506		available 1985
GRECO SYSTEMS									
FDS-200/1	(0.5)	93	2	2	stepper motor	5x10x10	RS232C, RS422, RS423	2,195(Q1); 1,207(Q500)	rackmount, intelligent file and system management functions
FDS-200/2	(1)	94	2	2	stepper motor	5x10x10	RS232C, RS422, RS423	2,495(Q1); 1,372(Q500)	rackmount, intelligent file and systems management functions

5¼-INCH CARTRIDGE DISK DRIVES

5¼-inch cartridge disk drives

Company Model	Unformatted capacity fixed (removable)	Average access time (msec.)	Number of data surfaces	Number of read/write heads	Actuator type	Dimensions (HxWxD inches)	Interface	Price ($)	Notes, features, options
FDS-200/5	(3.3)	160	2	2	stepper motor	5x10x10	RS232C, RS422, RS423	3,500(Q1); 1,925(Q500)	rackmount, intelligent file and system management functions
DU-58/8	(1)	93	2	2	stepper motor	5x19x8.75	RS232C, RS422, RS423	1,695(Q1); 1,185(Q500)	DEC TU-58 software compatible, includes controller and power supply
DU-58/16	(2)	94	2	2	stepper motor	5x19x8.75	RS232C, RS422, RS423	1,995(Q1); 1,395(Q500)	DEC TU-58 software compatible, includes controller and power supply
INTERNATIONAL MEMORIES INC.									
2306H	6.38 (6.38)	85	2	2	stepper motor	1.61x5.75x8	ST506	800(Q1); 460(Q500)	half-height drive
2312H	12.75 (12.75)	85	4	4	stepper motor	1.61x5.75x8	ST506	900(Q1); 560(Q500)	half-height drive
IOMEGA CORP.									
BETA-5	(7.524)	50	1	1	closed-loop stepper motor	3.25x5.75x8	ST605	895(Q1); 595(Q500)	
MEMOREX CORP.									
410	(6.4) 6.4	40	4	4	closed-loop linear voice coil	3.25x5.75x10.6	ST506, ST412	2,550(Q1); 1,405(Q500)	
450	(12.75)	98	2	2	linear stepper motor voice coil digital closed-loop servo	1.625x5.75x8	ST506, ST412	1,480(Q1); 815(Q500)	
NEWBURY DATA RECORDING LTD.									
NDR 505	6.4 (6.4)		4	4	closed-loop linear voice coil	3.25x5.75x10.6	ST506		
SYQUEST TECHNOLOGY									
S0306RD	(6.38)	90	2	2	stepper motor	1.625x4.8x8	ST506	995(Q1); 600(Q500)	thin-film plated media with graphite overcoat
SQ312RD	(12.75)	90	2	2	stepper motor	1.625x4.8x8	ST506	1,095(Q1); 775(Q500)	thin-film plated media with graphite overcoat
TECHMAR INC.									
40010	(6.38)	70		2		19.5x16x5.25		2,695(Q1)	
WESTERN DYNEX CORP.									
WD505	(6.38)	35	2	2	stepper motor	3.25x5.75x8	ST506	975(Q1); 495(Q500)	microprocessor controlled



Why Buy Peripheral Test Equipment?

As Production Test Manager, are you tired of test room bottlenecks? Intermittent test results? Excessive field returns? *Having your Development Engineers building test equipment instead of designing products that* ***produce revenue?***

Applied Circuit Technology can provide you with solutions to these and other testing and manpower problems! Our family of easy-to-operate Floppy and Winchester disk drive test equipment can test from 1 to 50 devices *simultaneously*. And, with our user friendly software, you can be assured of consistent product verification.

If you are ready now to break your testroom bottleneck and improve production throughput, call Applied Circuit Technology today!

WHY WAIT?

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CIRCLE NO. 37 ON INQUIRY CARD

EMULEX IMPROVES AND TAPE BACKUP BY

Emulex sets the pace with three great storage subsystems for the full range of DEC QBus and Unibus systems. Whether you need Winchester disk, cartridge disk, ¼" streaming tape, or a combination unit, you'll be a step ahead with Emulex.

INTRODUCING VAULT.™

Emulex rises above the competition with the Vault.™ This 70-MByte tape subsystem is built around the CDC Sentinel ¼" cartridge tape streamer and uses Emulex's own TC05 (QBus) or TC15 (Unibus) tape coupler to interface with your system. The Vault is totally software transparent to standard TS11 software. So this compact tape unit looks just like a big ½" TS11 subsystem to your operating system and diagnostics.

Vault comes complete with power supply in a single compact cabinet. It's the perfect backup unit for smaller QBus systems such as the MICRO/PDP-11 and MICRO/VAX.

PRESENTING SABRE.™

SABRE™ is a sharp solution for LSI users who need more storage and backup. It packs 31.2 MBytes of main storage onto a 5¼" Winchester and 10.4 MBytes of backup onto a removable 8" cartridge disk.

And since SABRE is an exact RL02 emulation, all existing operating and diagnostic software can be used as is.

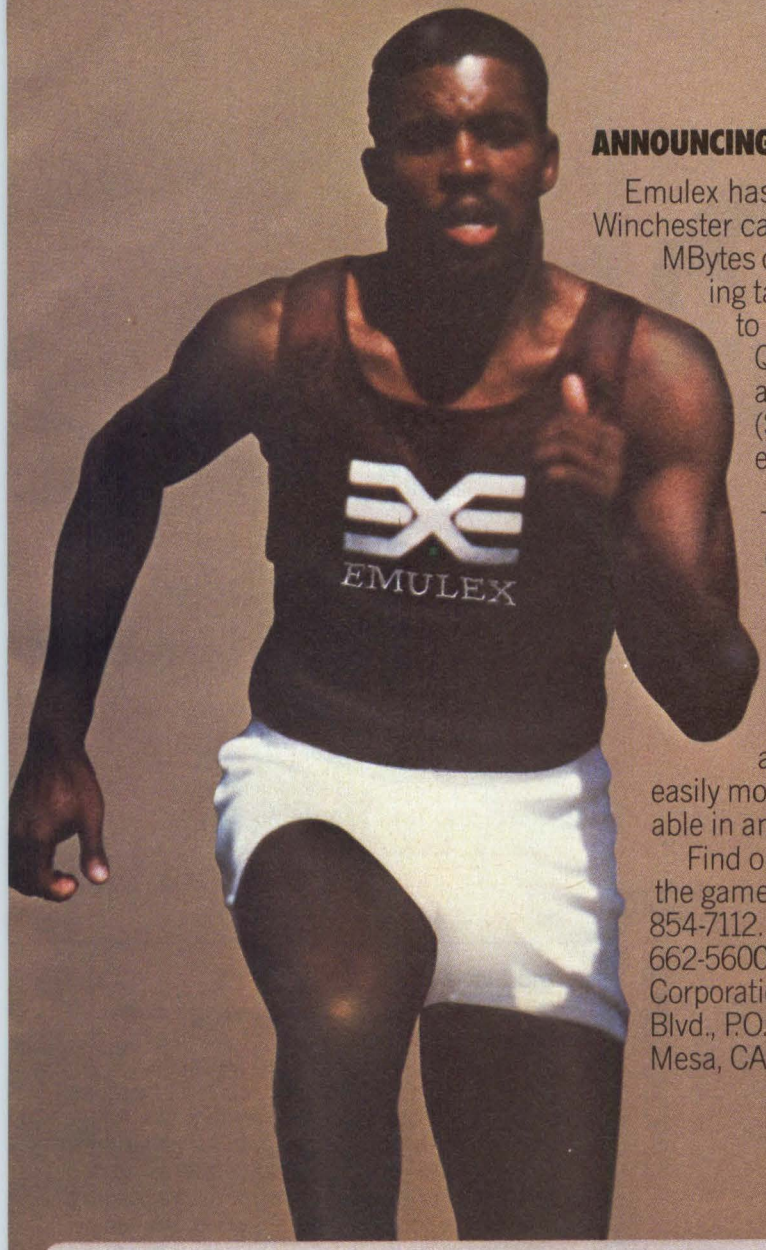
SABRE is 5¼" high and slips into any 19" RETMA enclosure. A desktop version is also available. Both come complete with power supply, host adapter and connecting cables.

SABRE needs only one-eighth the space and one-quarter the power of four RL02s. And it eliminates the need for a separate system bootstrap, bus terminator and clock control board.

*DEC, QBus, Unibus, TS11, MICRO/PDP-11, MICRO/VAX, LSI and RL02 are trademarks of Digital Equipment Corporation
CDC and Sentinel are trademarks of Control Data Corporation

GSA Contract #: GS00K84015S575

DEC DISK STORAGE LEAPS AND BOUNDS.



ANNOUNCING MEDLEY.™

Emulex has another winning combination with the Medley™ Winchester cartridge tape subsystem. It gives you either 35 or 110 MBytes of formatted storage and up to 70 MBytes of streaming tape backup. The Medley is fully software transparent to the operating system and diagnostic software of QBus and Unibus CPUs. And it uses the powerful and versatile Small Computer System Interface (SCSI) which keeps your options open for peripheral expansion.

Medley is interfaced to the system with a TC05/TC15 tape coupler and a UC02 (QBus) or UC12 (Unibus) host adapter. By using the Mass Storage Control Protocol (MSCP), the UC02 and UC12 allow the operating system to utilize the precise characteristics of the Winchester disk drive without patches or modifications to the operating system.

For convenience, Medley's disk drive, tape drive and power supply all fit into an attractive cabinet that easily mounts in a standard 19" rack. The Medley is also available in an attractive desktop version.

Find out how Emulex subsystems can keep you ahead of the game. Call toll-free (800) 854-7112. In California (714) 662-5600. Or write Emulex Corporation, 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626.

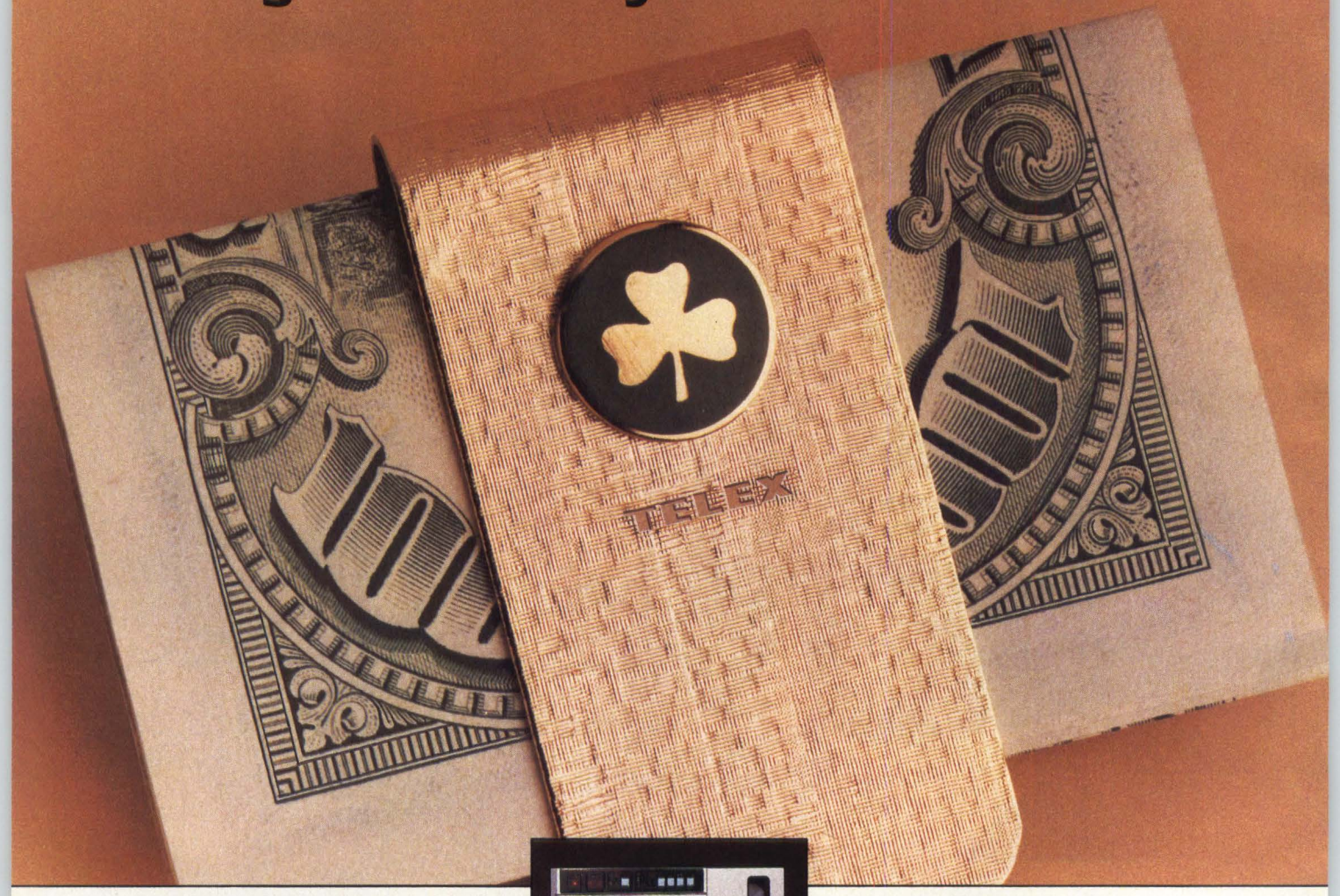
EMULEX

The genuine alternative.

CIRCLE NO. 38 ON INQUIRY CARD

TELEX®

Telex Shamrock 9250 has everything you want in a GCR tape subsystem. Right down to your favorite color.



It's the color of the money you stand to save with the new Telex Shamrock 9250. The most affordable GCR subsystem in its class.

Telex engineers have been making advancements in GCR technology for over a decade. The Shamrock 9250 is the biggest breakthrough yet. It gives you the faster access and throughput, greater storage efficiency and higher data reliability you look for in a full performance GCR subsystem. And it does so with the kind of cost efficiency other tape drives just cannot match.

The savings start right up front. The unit price of the Telex Shamrock 9250 is half that of previous GCR subsystems. Its compact design frees up valuable space. And with the assistance of Telex Engineering experts, your interface development will be fast and efficient.

Down the road, the savings continue to add up. Cost of ownership of the Telex Shamrock is truly attractive. There are no planned service calls because the 9250 requires no preventive maintenance. Self-calibrating capability eliminates the need for scheduled adjustments. When service is required, the resident diagnostics hold costs to a minimum. Lower power consumption (typically 100 milliwatt) of the 9250 gate arrays increases reliability and keeps energy costs in line.

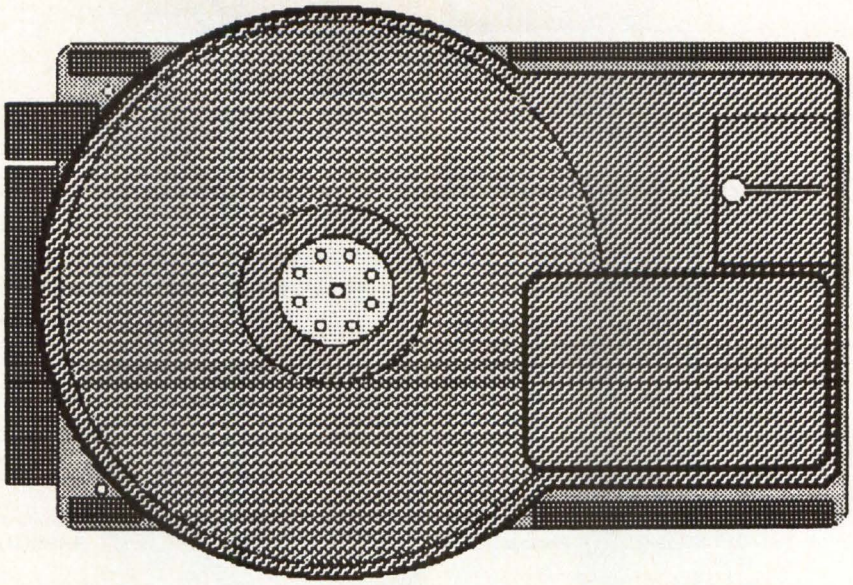
There are more reasons why the Shamrock 9250 is today's best value in full GCR performance. For the rest of the story, call your nearest Telex OEM Sales Office or our OEM Marketing Department at 918-627-1111. And let us show you how good you'll look in Telex Shamrock green.

CIRCLE NO. 39 ON INQUIRY CARD

TELEX® SHAMROCK The innovation continues . . .

Telex Computer Products, Inc., Terminals/Peripherals/OEM Products
6422 East 41st Street, Tulsa, OK 74135 (918) 627-1111 **Regional Offices:** Amherst, NH (603) 673-9272/Garden Grove, CA (714) 898-9833/Houston, TX (713) 497-6770 **International:** (214) 931-8511/telex: 730612 TLXINTL ADDI

5¼-INCH RIGID DISK DRIVE SUBSYSTEMS



Company Subsystem model	Capacity (fixed/ removable)	Disk drive manufacturer Model	Computer/bus compatibility	Price ($)	Notes, features, options
APPLE COMPUTER					
Profile	5(fixed)		Apple II, III, Lisa	1,495(Q1)	
BERING INDUSTRIES INC.					
3000	5–45(fixed)		IEEE-488, Hewlett-Packard	2,540(Q1)	includes controller, power supply; opt. disk, file sharing
3300	5–45(fixed)		IEEE-488, Hewlett-Packard	2,840(Q1)	includes controller, power supply; opt. disk, file sharing
3500	5–45(fixed)		IEEE-488, Hewlett-Packard	3,250(Q1)	includes controller, power supply; opt. disk, file sharing
3800	5–45(fixed)		IEEE-488, HP-IB	4,060(Q1)	8-inch floppy disk backup, includes power supply and controller
COMPUKIT					
10 M	10(fixed)		TRS-80 I, III, IV; IBM PC and compatibles	1,395(Q1)	
15 M	15(fixed)		TRS-80 I, III, IV; IBM PC and compatibles	1,695(Q1)	
32 M	32(fixed)		TRS-80 I, III, IV; IBM PC and compatibles	2,495(Q1)	
DATAPOINT CORP.					
9301	20(fixed)		Datapoint 8600, Microbus	13,850(Q1)	20M-byte cartridge tape backup; includes controller, power supply
9313	5(fixed)		Datapoint 1560, Microbus		1M-byte floppy backup, includes controller, power supply
9315	10(fixed)		Datapoint 8600, Microbus	7,495(Q1)	1M-byte floppy backup, includes controller, power supply
9324	10(fixed)/ 10(removable)	Winchester	Datapoint 8605 processor		
9325	40(fixed)/ 10(removable)	Winchester	Datapoint 8605 processor	17,750(Q1)	
DATARAM CORP.					
D23	31.2(fixed)/ 10.4(removable)	Rodime/DMA	Q-bus, emulates RL02	9,700(Q1)	
D30	67, 134(fixed)	Fujitsu	Q-bus, Unibus, emulates RM02/TS11	14,830(Q1)	includes ¼-inch SMD tape drive
SB1	10.4(fixed)/ 10.4(removable)	DMA	Q-bus, emulates RL02	6,980(Q1)	
S35/EAGLE	41.2(fixed)	Fujitsu Eagle	Unibus, emulates UDA50	20,900(Q1)	replaces RUA81 on VAX, PDP-11

5¼-INCH RIGID DISK DRIVE SUBSYSTEMS

5¼-inch rigid disk drive subsystems

Company Subsystem model	Capacity (fixed/ removable)	Disk drive manufacturer Model	Computer/bus compatibility	Price ($)	Notes, features, options
DAVONG SYSTEMS INC.					
AM014-010	10(fixed)	Rodime RO202	Apple Macintosh, RS422	2,395(Q1)	includes power supply
AM014-021	21(fixed)	Rodime RO204	Apple Macintosh, RS422	3,295(Q1)	includes power supply
AM014-032	32(fixed)	Rodime RO203E	Apple Macintosh, RS422	3,995(Q1)	includes power supply
AM014-040	40(fixed)	Rodime RO204E	Apple Macintosh, RS422	4,495(Q1)	
I0012-010	10(fixed)	Rodime RO202	IBM PC	2,395(Q1)	master hard disk supports up to 3 additional slave drives, password protection, file-lock capabilities
I0012-021	21(fixed)	Rodime RO204		3,295(Q1)	master hard disk supports up to 3 additional slave drives, password protection, file-lock capabilities
I0012-032	32(fixed)	Rodime RO203E			master hard disk supports up to 3 additional slave drives, password protection, file-lock capabilities
I0012-040	40(fixed)	Rodime RO204E	IBM PC	4,495(Q1)	master hard disk supports up to 3 additional slave drives, password protection, file-lock capabilities
DIGITAL ELECTRONIC SYSTEMS INC.					
HDAP, HDPC	5(removable)	SyQuest SQ306R	Apple II+, IIe, Macintosh, IBM PC/XT	1,795(Q1)	any 2 DESI drives may share the same controller
WAP10, WPC10	10(fixed)	Shugart SA712	Apple II+, IIe, Macintosh, IBM PC/XT	1,695(Q1)	tape backup, includes power supply
WAP31, WPC31	31(fixed)	Tulin TL240	Apple II+, IIe, Macintosh, IBM PC/XT	2,695(Q1)	tape backup, includes power supply
WAP70, WPC70	70(fixed)	ST506	Apple II+, IIe, Macintosh, IBM PC/XT	4,995(Q1)	opt. tape backup
WAP150, WPC150	150(fixed)	ST506	Apple II+, IIe, Macintosh	7,995(Q1)	opt. tape backup
DRAGON INDUSTRIES					
SP65	57(fixed)	Vertex	IBM PC/XT and compatibles	4,995(Q1)	opt. floppy, streaming tape backup
SP140	121(fixed)	Maxtor	IBM PC/XT and compatibles	6,995(Q1)	opt. floppy, streaming tape backup
EICON RESEARCH INC.					
DCH 10 MB	10(fixed)		NEC, Apple, IBM PC	3,350(Q1)	256K cache RAM, power supply
DCH 20 MB	20(fixed)		NEC, Apple, IBM PC	4,250(Q1)	256K cache RAM, power supply
DCH 40 MB	40(fixed)		NEC, Apple, IBM PC	5,650(Q1)	256K cache RAM, power supply
GENERAL ROBOTICS CORP.					
Winchester Subsystem	5–40(fixed)		DEC Q-bus	1,750(Q1)	diskette or tape backup
GENIE COMPUTER CORP.					
10+		DMA Systems 360	Apple, IBM PC/XT, TI Professional	2,495(Q1)	
10+10		DMA Systems 360	Apple, IBM PC/XT, TI Professional	3,695(Q1)	
5-10-15-20	6.8, 12.75, 19.13, 25.50(fixed)	Seagate	Apple, IBM PC/XT, TI Professional	1,995(Q1)	
GENISCO MEMORY PRODUCTS					
EDR-100	11, 20, 30(removable)	IMI 5006, 5012, 5018	CSI 11/23 (RS01/02, RS06/07)		ruggedized for use in hostile environments
EDR-105	11, 20, 30(removable)	IMI 5006, 5012, 5018	NTDS, MIL-STD-1553		fully MIL-spec for use in military environments, available mid-1985
HEWLETT-PACKARD CO.					
9133D	19.64(fixed)	Seagate	Hewlett-Packard		710K-byte floppy backup
9134D	19.64(fixed)	Seagate	Hewlett-Packard		includes power supply, controller
9133XV	19.14(fixed)	Seagate	Hewlett-Packard		270K-byte floppy backup
9134XV	19.14(fixed)	Seagate	Hewlett-Packard		includes controller, power supply
9133V	6.38(fixed)	Seagate	Hewlett-Packard		270K-byte floppy backup
I² INTERFACE INC.					
I²BM10P	10.6(fixed)	Tandon TM502	IBM PC/XT, Portable PC, Eagle, Columbia, Corona, Tava, Compaq	995(Q1)	opt. redundant Winchester backup
I²BM15P	15.9(fixed)	Tandon TM503	IBM PC/XT, Portable PC, Eagle, Columbia, Corona, Tava, Compaq	1,150(Q1)	opt. redundant Winchester backup

DIRECTORY TO SELECTING DISK/TAPE/COMM CONTROLLERS

Q-BUS (LSI-11—11/23 PLUS AND MICRO PDP-11)

DISK CONTROLLER, 8" and 14" SMD I/O compatible. **Model DQ202A**
Emulates RP02/RP03. Universal Formatting, RT-11, RSX-11 and RSTS compatible. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O compatible. **Model DQ214**
Emulates RL01/RL02. Universal Formatting. 56-bit ECC. 22-bit addressing. RT-11, RSX-11 and RSTS. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O compatible. **Model DQ215**
Emulates RK06/RK07. Universal Formatting. 56-bit ECC. 22-bit addressing. RT-11, RSX-11 and RSTS. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O compatible. **Model DQ228**
Emulates RM02/RM05/RM80. Universal Formatting. 56-bit ECC. 22-bit addressing. RT-11, RSX-11 and RSTS. Quad board.

DISK CONTROLLER, 8" and 14" Disk Drive Controller. **Model DQ413**
Emulates RP02/RP03. Priam I/O compatible. RT-11, RSX-11 and RSTS compatible. Quad board.

DISK CONTROLLER, 5¼" Disk Drive Controller. **Model DQ614**
Emulates RL01/RL02. Universal Formatting. ST506/412 I/O. 32-bit ECC. 22-bit addressing. RT-11, RSX-11, RSTS. Dual Ht.

DISK CONTROLLER, 5¼" Disk Drive Controller. **Model DQ615**
Emulates RK06/RK07. Universal Formatting. ST506/412 I/O. 32-bit ECC. 22-bit addressing. RT-11, RSX-11, RSTS. Dual Ht.

DISK CONTROLLER, 5¼ Disk Drive Controller. **Model DQ634**
Emulates RL01. DMA Systems Micro Magnum compatible. 32-bit ECC. 22-bit addressing. RT-11, RSX-11 and RSTS. Dual Height.

TAPE CONTROLLER, ½" Tape Drive **Model DQ120**
Emulates TM-11. Industry Standard I/O. Pertec compatible. Quad board.

TAPE COUPLER, ½" Tape Drive **Model DQ130**
Emulates TM-11. Formatted Industry Standard I/O. (Pertec formatted I/O) and ½" streamer tape drive. Quad board.

TAPE COUPLER, ½" Tape Drive **Model DQ132**
Emulates TSV05/TS-11/TU-80 (22-bit). Formatted Industry Standard I/O (Pertec formatted I/O) and ½" streamer and CacheTape drive compatible. Quad board.

TAPE CONTROLLER, ¼" Cartridge **Model DQ330**
Emulates TM-11/TS03. Interfaces Kennedy 6455. Quad board.

TAPE COUPLER, ¼" Cartridge **Model DQ342**
Emulates TS-11/TU80/TSV05. Interfaces CDC Sentinel. 22-bit addressing. Quad board.

FLOPPY DISK DRIVE CONTROLLER 8" **Model DQ419**
Emulates RX02. Interfaces Shugart SA850 Floppy I/O. 22-bit addressing Dual Height.

FLOPPY DISK DRIVE CONTROLLER 5¼" **Model DQ619**
Emulates RX02. Interfaces Industry Standard I/O. 22-bit addressing. Dual Height.

NEW

ASYNCHRONOUS COMMUNICATION CONTROLLER **OPTIMUX/8DZ**
8 lines. DZ11 compatible. Selectable Baud rates and character formats. One bus load. 2 amps @ +5 volts. DEC H3006 plug compatible.

NEW

ASYNCHRONOUS COMMUNICATION CONTROLLER **OPTIMUX/64DH**
16 to 64 lines. DH11 compatible. Selectable Baud rates and character formats. One bus load. 2 amps @ +5 volts. DEC H3006 compatible.

UNIBUS (PDP AND VAX)

DISK CONTROLLER, 14" Cartridge (2315 or 5440). **Model DU100**
Emulates RK05. Interfaces Diablo, Pertec and RK05J compatible I/O. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O Compatible. **Model DU202A**
Emulates RP02/RP03. Universal Formatting. Interfaces SMD I/O. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O Compatible. **Model DU215**
Emulates RK06/RK07. Universal Formatting. 56-bit ECC. Interfaces SMD I/O. VAX. Quad board.

DISK CONTROLLER, 8" and 14" SMD I/O Compatible. **Model DU218**
Emulates RM02/RM05. 56-bit ECC. Interfaces SMD I/O. Hex board.

TAPE CONTROLLER, ½" Tape Drive **Model DU120**
Emulates TM-11. Interfaces Industry Standard I/O (Pertec Compatibility). Quad board.

TAPE COUPLER, ½" Tape Drive **Model DU130**
Emulates TM-11. Formatted Industry Standard I/O (Pertec formatted I/O) and ½" streamer tape drive. Quad board.

TAPE COUPLER, ½" Tape Drive **Model DU132**
Emulates TS-11/TU80. Interfaces Formatted Industry Standard I/O (Pertec formatted. I/O) and ½" streamer and CacheTape drive compatible. VAX. Quad board.

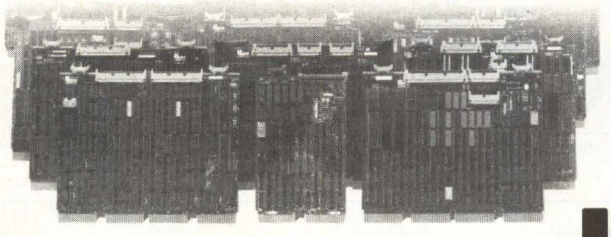
TAPE COUPLER, ¼" Cartridge **Model DU342**
Emulates TS-11/TU80. Interfaces CDC Sentinel. 22-bit addressing. Quad board.

NEW

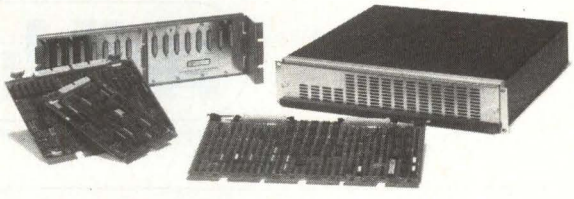
ASYNCHRONOUS COMMUNICATION CONTROLLER **OPTIMUX/16DMF+**
16 lines. Selectable DMF32 or DH11/DM11. Multi word DMA burst mode. Bi-directional flow control. 38.4 K Baud and modem control all lines.

NEW

32 CHANNEL COMMUNICATION CHASSIS **OPTIMUX/DMF 32+**
Incorporates 2 OPTIMUX/16DMF+. Adds 4 slots and 20 amps to host computer. Units may be daisy-chained to 128 lines or more.



DISK & TAPE CONTROLLERS



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5¼-INCH RIGID DISK DRIVE SUBSYSTEMS

Company Subsystem model	Capacity (fixed/removable)	Disk drive manufacturer Model	Computer/bus compatibility	Price ($)	Notes, features, options
I²BM21P	21.1(fixed)		IBM PC/XT, PC Portable, Eagle, Columbia, Corona, Tava, Compaq	1,495(Q1)	opt. redundant Winchester backup
I²BM33P	33.3(fixed)	Rodime 203E	IBM PC/XT, Eagle, Columbia, Compaq, Corona, Tava	1,895(Q1)	
IOMEGA CORP.					
Macintosh Cartridge Disk Subsystem	5.24(removable)	IOMEGA Beta 5	Apple Macintosh		includes power supply
MICRO-DESIGN					
SQ-5	5(removable)	SyQuest	IBM PC/XT; Apple II, IIe, II+; TRS-80, III, IV; Corona Desktop; Portable Compaq; Sperry PC; Leading Edge PC	1,795(Q1); 1,166(Q100)	includes controller
SQ-55	10(removable)	SyQuest	IBM PC/XT; Apple II, IIe, II+; TRS-80, III, IV; Corona Desktop; Portable Compaq; Sperry PC; Leading Edge PC	2,695(Q1); 1,751(Q100)	includes controller
SQ-510	10(fixed)/ 5(removable)	SyQuest, Cogito	Leading Edge; IBM PC/XT; Apple II, IIe, II+; Franklin; TRS-80, III, IV; Compaq Portable; Corona Desktop; Portable Sperry PC	2,995(Q1); 1,946(Q100)	includes controller
SQ-520	20(fixed)/ 5(removable)	SyQuest, Tulin	Leading Edge; IBM PC/XT; Apple II, IIe, II+; Franklin; TRS-80, III, IV; Compaq Portable; Corona Desktop; Portable Sperry PC	3,495(Q1); 2,271(Q100)	includes controller
SQ-530	30(fixed)/ 5(removable)	SyQuest, Tulin	Leading Edge; IBM PC/XT; Apple II, IIe, II+; Franklin; TRS-80, III, IV; Compaq Portable; Corona Desktop; Portable Sperry PC	3,895(Q1); 2,531(Q100)	includes controller
DATA 5	5(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq Portable; Corona Portable, Desktop; Sperry PC; Leading Edge	2,995(Q1); 1,946(Q100)	includes controller
DATA 5+5	5(fixed)/ 5(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq Portable; Corona Portable, Desktop; Sperry PC; Leading Edge	3,495(Q1); 2,271(Q100)	includes controller
DATA 10	10(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona Desktop, Portable; Sperry PC; Leading Edge	2,295(Q1); 1,491(Q100)	includes controller
DATA 10+10	10(fixed)/ 10(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona Desktop, Portable; Sperry PC; Leading Edge	3,495(Q1); 2,271(Q100)	includes controller
DATA 10+20	20(fixed)/ 10(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona Desktop, Portable; Sperry PC; Leading Edge	3,795(Q1); 2,466(Q100)	includes controller
DATA 10+30	30(fixed) 10(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona Desktop, Portable; Sperry PC; Leading Edge	4,195(Q1); 2,726(Q100)	includes controller
DATA 11	11(removable)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona; Sperry; Leading Edge		includes controller
DATA 11+11	11(fixed)	DMA Systems	IBM PC/XT; Apple II, II+, IIe; TRS-80, III, IV; Compaq; Corona; Sperry; Leading Edge		includes controller
PRO-10	10(fixed)	Cogito	IBM PC/XT; Apple II, IIe, II+; TRS-80, III, IV; Corona Portable, Desktop; Compaq; Sperry PC; Leading Edge PC	1,299(Q1); 909(Q100)	includes controller
PRO-20	20(fixed)	Rodime	IBM PC/XT; Apple II, IIe, II+; TRS-80, III, IV; Corona Portable, Desktop; Compaq; Sperry PC; Leading Edge PC	1,499(Q1); 1,124(Q100)	includes controller

5¼-INCH RIGID DISK DRIVE SUBSYSTEMS

5¼-inch rigid disk drive subsystems

Company Subsystem model	Capacity (fixed/removable)	Disk drive manufacturer Model	Computer/bus compatibility	Price ($)	Notes, features, options
PRO-30	30(fixed)	Control Data	IBM PC/XT; Apple II, IIe, II+; TRS-80, III, IV; Corona Portable, Desktop; Compaq; Sperry PC; Leading Edge PC	2,395(Q1); 1,556(Q100)	includes controller
MYARC INC.					
WDS/100	5, 10(fixed)	Tandon 501, 502	TI 99	2,099(Q1); 1,799(Q100)	includes power supply, file management, backup to diskette
NEWBURY DATA RECORDING LTD.					
NDR 5+5	5.4(fixed)/ 5.4(removable)	NDR 505	IBM PC		upgrades IBM PC to XT
PH-ASSOCIATES INC.					
DSS-5	5(fixed)	Seagate ST406	TRS-80, Apple II, IBM PC, S-100, NEC8800	1,995(Q1); 1,505(Q100)	includes software, controller, power supply
DSS-10	10(fixed)	ST412	TRS-80, Apple II, S-100, IBM PC, NEC 8800	2,295(Q1); 1,721(Q50)	includes controller, power supply and software
DSS-15	(15)	ST419	TRS-80, Apple II, S-100, IBM PC, NEC 8800	2,695(Q1); 2,021(Q50)	includes controller, power supply, and software
Mark-20	15.6(fixed)	Atasi 3020	TRS-80, Apple II, IBM PC, S-100, NEC8800	3,213(Q1)	includes controller, power supply, cables, chassis, software
Mark-33	26.7(fixed)	Atasi 3033		3,450(Q1)	
Mark-46	36.4(fixed)	Atasi 3046		3,916(Q1)	
PLESSY PERIPHERAL SYSTEMS					
110	10.4(fixed)	Rodime	DEC RL01/02, Q-bus	4,815(Q1); 3,419(Q100)	includes controller, power supply
112	10.4(fixed)	Rodime	DEC RL01/02, Q-bus	5,985(Q1); 4,249(Q100)	includes one 8-inch floppy drive
113	10.4(fixed)	Rodime	DEC RL01/02, Q-bus	6,730(Q1); 4,778(Q100)	includes two 8-inch floppy drives
114	10.4(fixed)	Rodime	DEC RL01/02, Q-bus	7,065(Q1); 5,016(Q100)	includes ¼-inch tape drive backup
210	20.8(fixed)	Rodime	DEC RL01/02, Q-bus	6,350(Q1); 4,508(Q100)	includes controller
212	20.8(fixed)	Rodime	DEC RL01/02, Q-bus	7,650(Q1); 5,431(Q100)	includes one 8-inch floppy drive
213	20.8(fixed)	Rodime	DEC RL01/02, Q-bus	8,475(Q1); 6,017(Q100)	includes two 8-inch floppy disk drives
214	20.8(fixed)	Rodime	DEC RL01/02, Q-bus	8,850(Q1); 6,283(Q100)	¼-inch cartridge tape drive backup
215	41.6(fixed)	Rodime	DEC RL01/02, Q-bus	8,750(Q1); 6,212(Q100)	includes controller, power supply
216	41.6(fixed)	Rodime	DEC RL01/02, Q-bus	10,050(Q1); 7,135(Q100)	includes one 8-inch floppy backup
217	41.6(fixed)	Rodime	DEC RL01/02, Q-bus	10,875(Q1); 7,721(Q100)	includes two 8-inch floppy drives
218	41.6(fixed)	Rodime	DEC RL01/02, Q-bus	11,250(Q1); 7,987(Q100)	includes one ¼-inch cartridge tape drive backup
POLYMORPHIC SYSTEMS					
HD/18	15(fixed)	Seagate ST519	S-100	2,995(Q1); 1,797(Q100)	includes software, controller, power supply, ROM
HD/18+	15(fixed)/ 5(removable)	Seagate ST519, SyQuest 306R	S-100	4,995(Q1); 2,997(Q100)	includes software, controller, power supply; removable drive is 3.9 inches
HD/40	40(fixed)	Vertex V150	S-100	3,995(Q1); 2,397(Q100)	includes software, controller, power supply
QUALITY COMPUTER SERVICES (QUCES)					
DSK 62	10(fixed)	Miniscribe 2012	IBM, Apple, DEC Rainbow, TI PC, Wang	2,499(Q1)	
DSK 63	16(fixed)	Miniscribe 4020	IBM, Apple, DEC Rainbow, TI PC, Wang	2,799(Q1)	
DSK 65	20(fixed)	Ampex	IBM, Apple, DEC Rainbow, TI PC, Wang	2,999(Q1)	

STRONG STATEMENTS FROM PEOPLE WHO GIVE YOU . . .

STRAIGHTALK

No claims. No boasts. Just straight facts and commitments from Jeffrey Liu, president of Microscience, on our growing family of half-height Winchester disk drives.

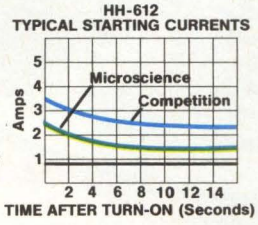
"By introducing the new HH-725 20 MB 5.25" and HH-312 10 MB 3.5" half-height Winchester disk drives to our product line, we now offer the proven quality and performance most OEMs need in volume today.

"Combined with our HH-612 10 MB 5.25" half-height disk drive, Microscience now provides a product family of superior quality and better performance than any other drives available.

"Time after time, we have proven that Microscience has the performance, quality, and price personal and portable computer manufacturers demand.

"The secret is the way we design and manufacture drives for you.

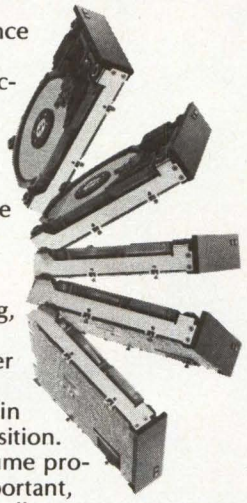
"Microscience disk drives have extremely low voltage requirements because small business and portable computers don't have the luxury of excess power or cooling capacity.



"We've used procedures and components that will be power misers, yet they still provide long-term performance and reliability.

"Our drives feature a thermally isolated stepper motor for precise head alignment and optimum seek performance. A proprietary linear actuator assembly was employed to ensure data reliability and provide greater drive durability.

"A buffered seek mode and highly accurate proprietary microprocessor-controlled closed-loop servo positioning system keeps the head precisely on track. This maintains data integrity through a wide range of operating conditions regardless of thermal expansion, system hysteresis, or long-term wear.



"Microscience drives are not limited to functioning horizontally. Because of the growing use of portable computers and increasingly compact packaging, we designed our Winchester drives so you can use them in almost any position.

"While volume production is important, what you're really concerned about is the quality of product you use in your system or application. We have made a major commitment to manufacturing and quality programs.

"Microscience test equipment and tooling have been carefully selected to meet our exacting standards.

"This ensures Microscience ships only zero defect half-height Winchester product that does not eat away at your profits . . . and your reputation.

"There's a lot more I could say about the Microscience half-height Winchester disk drive family. But what will convince you is using a Microscience drive in your application.

"For more straightalk regarding your half-height Winchester needs, call or write us today."

Jeffrey Z. Liu

President,
Microscience
International
Corporation

Microscience International Corporation

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And when you're ready for your own custom IC's, Silicon Systems has the analog and digital design capability, the Bipolar and CMOS process technology, and the experience to produce the optimum chip design for your system solution. Custom IC's we've produced have included everything from read/write electronics to spindle motor control, analog data processing, digital bus interface, servo control functions, and more.

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5¼-INCH RIGID DISK DRIVE SUBSYSTEMS

Company Subsystem model	Capacity (fixed/removable)	Disk drive manufacturer Model	Computer/bus compatibility	Price ($)	Notes, features, options
DSK 67	42(fixed)	Rodime	IBM, Apple, DEC Rainbow, TI PC, Wang	4,999(Q1)	
DSK 8X	5(fixed)/ 5(removable)	Western Dynex Corp.	IBM, Apple, DEC Rainbow, TI PC, Wang		off-, on-line mass storage
QUALOGY INC. (FORMERLY DATA SYSTEMS DESIGN)					
D904	35.6(fixed)	Quantum Q540	Q-bus	8,995(Q1); 6,117(Q100)	¼-inch tape backup, DSA compatible, rackmount
D910	87.9(fixed)	Maxtor XT1105	Q-bus	11,295(Q1); 7,681(Q100)	¼-inch tape backup, DSA compatible, rackmount
D914	199.9(fixed)	Maxtor XT 1140	Q-bus	12,295(Q1); 8,361(Q100)	¼-inch tape backup, DSA compatible, rackmount
SUNOL SYSTEMS					
SSD-8/16/25	8, 16, 25(fixed)	Miniscribe	Apple II, III, Macintosh, Lisa; IBM PC/XT and compatibles	1,995(Q1)/ 2,495(Q1)/ 2,995(Q1)	streaming or file-by-file tape backup
SSD-40/65/92	40, 65, 92(fixed)	Vertex	Apple II, III, Macintosh, Lisa; IBM PC/XT and compatibles	4,594(Q1)/ 5,295(Q1)/ 6,695(Q1)	streaming or file-by-file tape backup
SYSGEN INC.					
II-G-10	10(fixed)	Fujitsu	IBM PC, PC/XT and compatibles	3,295(Q1)	includes 20M-byte streaming cartridge backup, power supply, host adapter
II-G-20	10(fixed)	Fujitsu	IBM PC, PC/XT and compatibles	3,995(Q1)	includes 20M-byte streaming cartridge backup, power supply, host adapter
II-10	10(fixed)	Fujitsu	IBM PC, PC/XT and compatibles	2,995(Q1)	includes 10M-byte streaming cassette backup, software, controller
II-20	10(fixed)	Fujitsu	IBM PC, PC/XT and compatibles	3,795(Q1)	includes 10M-byte streaming cassette backup, software, controller
SYSTEMS PERIPHERALS CONSULTANTS					
DISKIT jr.	10.6, 22.2, 34.4(fixed)	Miniscribe 3012	IBM PC and compatibles, PC jr.; S-100	1,495(Q1); 995(Q100)	field-upgradable
DISKIT COMBO	10.6, 22.2, 34.4(fixed)/ 5.3(removable)	Miniscribe 3012, SyQuest 306R	IBM PC and compatibles, S-100	2,995(Q1); 1,995(Q100)	
DISKIT 10S	10.6, 22.2, 34.4(fixed)	Miniscribe 3012	Sanyo 1/00 or 550	1,845(Q1); 1,195(Q100)	field-upgradable
DISKIT ULTRASTORE		Miniscribe 3012, Maxtor 1140	IBM PC and compatibles	6,995(Q1)	field-upgradable
TANDON CORP.					
TM5112	10(fixed)	Tandon TM502	IBM PC	1,995(Q1)	
TM5113	15(fixed)	Tandon TM503	IBM PC	2,295(Q1)	
THOUGHTS WORKS INC.					
DF-110	10(fixed)	Rodime RO202	IBM PC; Sanyo 550/555, 1100/1150, 1200/1250, 1000/3000; Zenith Z-1000	2,295(Q1); 1,560(Q100)	includes software; opt. tape backup
DF-120	20(fixed)	Rodime RO204	IBM PC; Sanyo 550/555, 1100/1150, 1200/1250, 1000/3000; Zenith Z-1000	3,195(Q1); 2,160(Q100)	includes software; opt. tape backup
DF-140	40(fixed)	Rodime RO207E	IBM PC; Sanyo 550/555, 1100/1150, 1200/1250, 1000/3000; Zenith Z-1000	4,395(Q1); 3,060(Q100)	
TRAK MICROCOMPUTER CORP.					
T5-10	10(fixed)	Cogito	IBM PC	995(Q1); 745(Q100)	
T5-20	20(fixed)	Cogito	IBM PC	1,395(Q1); 975(Q100)	
Commander 10	10(fixed)	CMI	IBM PC, Apple	2,195(Q1); 1,537(Q100)	
Commander 15	15(fixed)	CMI	IBM PC, Apple	2,495(Q1); 1,747(Q100)	
Commander 30	30(fixed)	CMI	IBM PC, Apple	3,395(Q1); 2,377(Q100)	

5¼-INCH RIGID DISK DRIVE SUBSYSTEMS

5¼-inch rigid disk drive subsystems

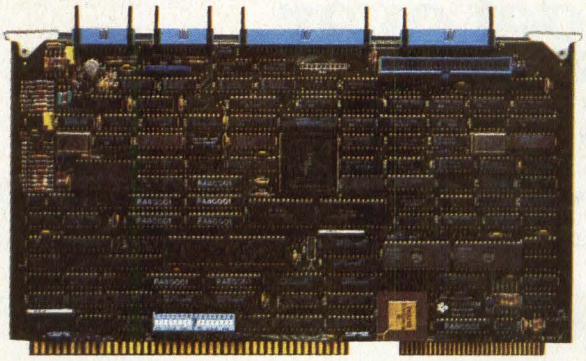
Company Subsystem model	Capacity (fixed/removable)	Disk drive manufacturer Model	Computer bus compatibility	Price ($)	Notes, features, options
U.S. DESIGN CORP.					
VIP	119(fixed)	Maxtor XT2140	DEC Q-bus, Unibus; Multibus, IBM PC, SCSI	12,495(Q1); 8,749(Q500)	100 MB cartridge tape drive for backup or interchange
VIP/X	620(fixed)	Maxtor XT2190	DEC Q-bus, Unibus; Multibus, IBM PC, SCSI	23,995(Q1); 16,799(Q500)	opt. 100 MB cartridge tape drive for backup or interchange
PC800	60(fixed)	Priam 7050	IBM PC	9,995(Q1); 6,999(Q500)	22 MB cartridge tape drive for backup and interchange
CSS-800	60(fixed)	Priam 7050	DEC Q-bus, Unibus	9,995(Q1); 6,995(Q500)	22 MB cartridge tape drive for backup and interchange, emulates DEC RK07 and TU10
WINCHESTER SYSTEMS INC.					
DataSafe-8 + 8R	5.4(fixed)/ 5.4(removable)	DMA Systems	ISIS-II, Intellec series, MDS-800	8,995(Q1)	includes enclosure, controller, power supply, cables, host adapter
DataSafe-8	5(fixed)		ISIS-II, Multibus	4,995(Q1)	includes controller, enclosure, power supply, cables, host adapter
DataSafe-16	10(fixed)		ISIS-II, Multibus	6,500(Q1)	includes enclosure, controller, power supply, cables, host adapter
DataSafe-24	15(fixed)		ISIS-II, Multibus	7,995(Q1)	includes enclosure, controller, power supply, cables, host adapter
DataSafe-17R	10.6(removable)	Lynx DP-100	ISIS-II, Intellec series, MDS-800	9,500(Q1)	includes enclosure, controller, power supply, cables, host adapter
DataSafe-34R	21.2(removable)	Lynx DP-100	ISIS-II, Intellec series, MDS-800	11,995(Q1)	includes enclosure, controller, power supply, cables, host adapter
2xRL01	5.4(fixed)/ 5.4(removable)	DMA Systems	DEC RL01, Q-bus	7,000(Q1)	emulates two DEC RL01s
2xRL02	10.8(fixed)/ 10.8(removable)	DMA	DEC RL02, Q-bus	9,000(Q1)	emulates two RL02s
4xRL01	10.8(fixed)/ 10.8(removable)	DMA	DEC RL01, Q-bus	10,000(Q1)	emulates four RL01s, includes two fixed/removable drives
4xRL02	21.6(fixed)/ 21.6(removable)	DMA	DEC RL02, Q-bus	14,000(Q1)	emulates four RL01s, includes two fixed/removable drives
MB-5/5R	5.4(fixed)/ 5.4(removable)	DMA	Multibus	7,000(Q1)	
MB-5/5Rx2	10.8(fixed)/ 10.8(removable)	DMA	Multibus	10,000(Q1)	includes fixed/removable drives
MB-10/10R	10.8(fixed)/ 10.8(removable)	DMA	Multibus		
MB 10/10	21.6(fixed)/ 21.6(removable)	DMA	Multibus		

"With the Interphase Storager,™ I can make a 5¼" hard disk perform like an 8" disk."

Frank Emser
Manager Hardware Development
Paradyne Corporation

The Interphase Storager Multibus™ controller can give a 5¼" Winchester disk capabilities never before possible. Storager not only gets more performance from existing ST506 drives, but also supports the new ESDI and ST412HP interfaces for more power and capacity than ever before. And since Storager can control two Winchester disks, four ¼" tapes (QIC-02), and two 3½", 5¼" or 8" floppies, the same controller can be used for every storage need.

Storager features 1:1 interleave, with concurrent disk and tape transfers and simultaneous disk and bus transfers for speed and high performance. And Storager's unique "virtual buffer" architecture with UNIX™-optimized intelligent caching can reduce or eliminate disk rotational latency and overcome data overrun/underrun problems of FIFO-based controllers. Plus,



for the very first time on a controller, Storager has an *on-board* 68000 CPU.

The Storager controller is the latest product in Interphase's line of high-performance Multibus controllers. Interphase also offers Multibus controllers for SMD disks, local area networks and video monitors. Plus powerful disk controllers for the IBM® PC. They're all backed by a great customer support team that works full time with Interphase customers to assure that our products work the way they should — in the system.

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CIRCLE NO. 44 ON INQUIRY CARD

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

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

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Or call toll-free 1-800-854-5959.
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CIRCLE NO. 45 ON INQUIRY CARD

Portable printers invade the office

Quiet operation, small footprints and 'stowability' make portable printers more attractive for office workers

Rick Dalrymple, Senior Editor

Office workers never have been interested in adapting their work routines to office machines. But with the introduction of copiers, those workers have been forced to share a printing resource. The frustrations experienced with copying machines are now being repeated with shared computer printers. Although it is unlikely that office workers will get individual copiers, it is now practical for some office workers to have their own designated computer printer. Several analysts see the opportunity to supply office workers with portable printers as a fast-growing market.

Today's portable printer is quieter than a typewriter, smaller than a legal note pad and lighter than an office telephone, and now, one printer manufacturer has put all these features together in a product that will retail for less then $160. The manufacturer is Ergo Systems Inc., Menlo Park, Calif; the printer is the Hush 80. Another recently introduced portable printer combining the same features is the $495 Thinkjet from Hewlett-Packard Co.'s, (HP) Personal Computer Group in Sunnyvale, Calif. While obviously designed for use with portable computers, these two products differ from previous portable printers because of their ability to print on paper 8½ inches wide. Because these printers can produce letter- and legal-size documents, they have become the first portable printers that may seriously be considered for office applications.

According to Peter Steiner, director of the Electronic Printer Industry Service at Dataquest Inc., a market research concern based in San Jose, Calif., several companies will be entering the market with printers that exhibit the aforementioned characteristics. They include Alps Electric Co. Ltd., Tokyo; Brother International Corp., Piscataway, N.J.; Okidata Corp., Mount Laurel, N.J. and Yokogawa Corp. of America, Shenandoah, Ga. Steiner points out that new introductions over the next few years will use a thermal-transfer printing technique as opposed to the thermal matrix used by the Ergo Hush 80 and the ink-jet cartridge employed by the HP Thinkjet.

In an office environment, portable printers offer some desirable features. Foremost is quiet operation, made possible by non-impact printing techniques; another is a small footprint, which conserves desk space, and yet another is low price, diminishing the motive for

Standard interfaces promote add-on portables

Because both the Ergo Systems Inc. Hush 80 and the Hewlett-Packard Co. Thinkjet are available with industry-standard interfaces, system integrators may interface them to existing terminals and computers. The HP Thinkjet is available with either a Centronics parallel port, HP-IB interface or the HP-IL interface. The Hush 80 is available with either a Centronics interface, RS232C serial interface or an interface to Commodore microcomputers.

Obviously, these printers are well-suited to portable applications. The following table compares the Hush 80 and Thinkjet portability specifications:

	Hush 80	Thinkjet
Dimensions (HxWxD,in.)	2.8 by 11.63 by 5.5	3.5 by 11.5 by 8.1
Weight (lbs.)	less than 5	less than 5½
Battery power	rechargeable battery pack	nickel-cadmium battery only on HP-IL version
Battery option price	$30	included in HP-IL price

sharing printers. Office users, however, will not find these portable printers suitable replacements for either their shared multifunction-matrix character printer or daisywheel printer. So, before examining the personal printer concept, system integrators and end users need to know what these printers can and cannot do.

First, notable print-quality differences exist between portable printers and their larger cousins. The Hush 80, a thermal-matrix character printer, uses a 6-dot-by-7-dot matrix, a matrix-character size typically termed "draft" quality by the computer-printer industry. The Thinkjet, an ink-jet character printer, employs a unique process to print an 11-dot-by-12-dot matrix. This matrix character size is denser than "draft" quality but not dense enough to be called "near-letter quality", a term usually applied to printers using a 12-dot-by-18-dot matrix or denser.

Second, besides print quality, these portable printers are less versatile than other matrix printers. For example, paper width is limited to 8½ inches; larger widths cannot be accommodated. Paper-handling accessories, such as double-bin single-sheet and cut-sheet feeders, are not available. Extensive character sets are not offered, and because these printers use non-impact

Daisywheel-printer demand declines

According to Datek Information Services, a Waltham, Mass., printer- market-research concern, daisywheel-printer manufacturers are experiencing a a decline in growth rate. The decline, of course, does not signal a decline in daisywheel-printer shipments per se; what it means is that, relative to matrix-printer shipments, the daisywheel portion of the character-printer market is declining. That is due to performance pressure on the high end coming from both multi-function matrix character printers, and from laser and ink-jet page printers. On the low end, the pressure is a price squeeze from thermal and thermal-transfer printers.

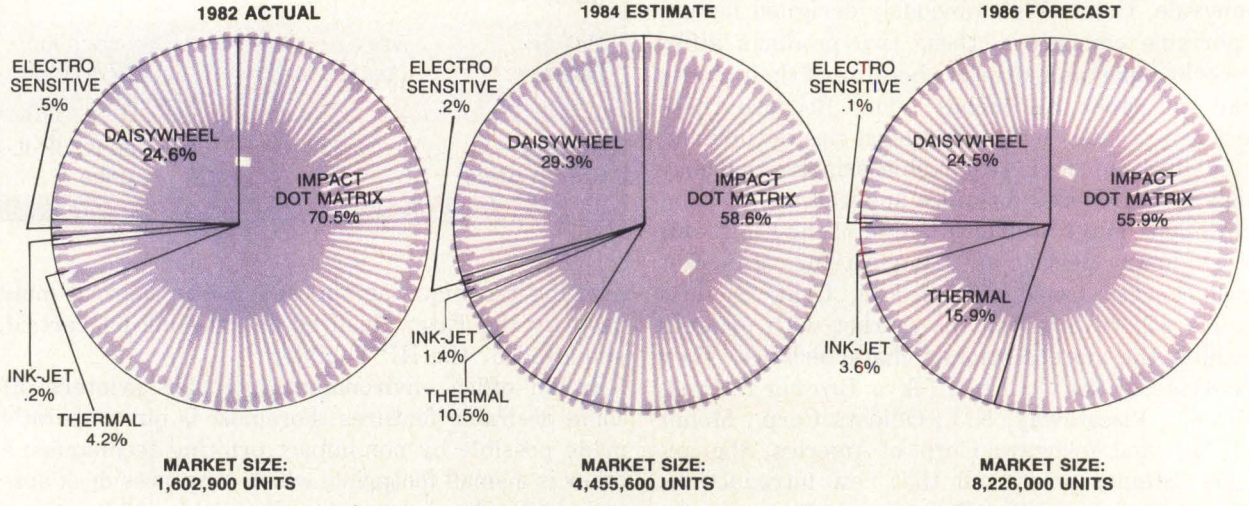
The growth of thermal and thermal-transfer printers along with ink-jet-matrix printers is cutting into the market share of impact dot-matrix printers. Datek's 1986 forecast of character-printer shipments shows that impact dot-matrix printers, which held a 70.5 percent share of the character printer market in 1982, will decline to 55.9 percent. The decline for impact dot-matrix printers is also due to performance pressure on the high end from laser and ink-jet page printers. Datek's forecast also shows that one non-impact technology will decline in market share: Electrosensitive printers, say Datek market analysts, will almost disappear in 1986.

According to Jonathan Dower, a Datek vice president, "The heyday of the daisywheel printer is nearly over." Dower gives the high-end daisywheel-printer market about two more years of healthy growth. "Competitive laser printers have emerged a lot sooner than expected," says Dower, "and we can expect to see more introductions based on the Canon LBP-CX engine."

Datek's *Printout* newsletter named Canon USA Inc.'s LBP-CX print engine as the "Printer of the Year." The Canon print engine's most recent use is in Hewlett-Packard Co.'s 8-page-per-minute LaserJet printer. Priced at $3,495, the HP LaserJet falls in the range of high-end daisywheels.

Printout newsletter editor Edward Webster praises the Canon product. "The LBP-CX is one of those rare great leaps forward in terms of concept and price/performance. It has survived the scrutiny of some of the industry's major OEMs and it has forced the OEMs and most of the printer companies to react."

U.S. CHARACTER PRINTER SHIPMENTS



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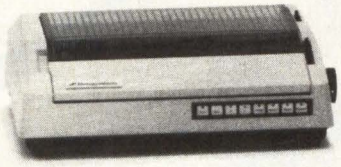
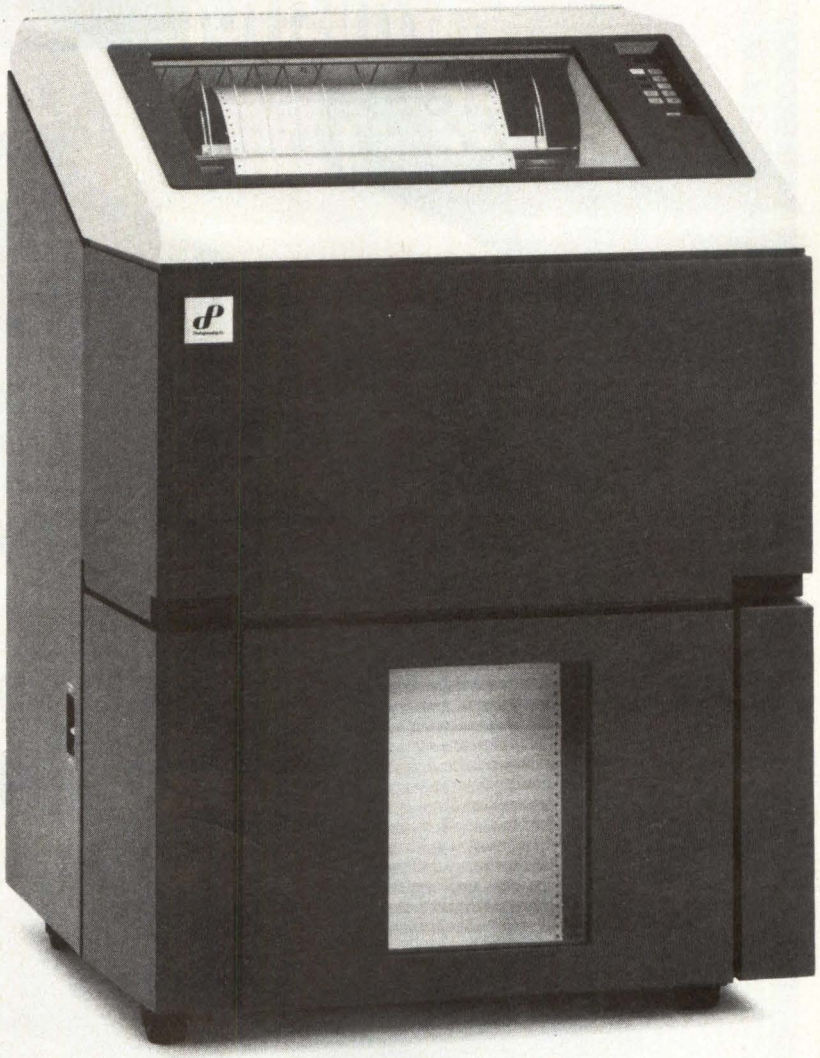
From  , to 

Nobody puts ideas on paper so many ways.

If you're using your printer with a personal computer, you probably need one that can handle a variety of functions.

At the same time, the price should be in line with the computer itself. Low.

The pint-sized Dataproducts printer in the picture costs about as much as one good software package.

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In between these two special-duty Dataproducts printers are whole families of other Dataproducts printers—daisywheel printers, non-impact printers, high-security printers for the government, and more.

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CIRCLE NO. 47 ON INQUIRY CARD

printing techniques, they cannot produce multiple copies in a single printing. Multi-part forms such as invoices and purchase orders must be printed with an impact printer.

Third is the issue of a non-impact printer's special supplies. For example, the Ergo Hush 80 requires coated thermal paper. Although the Thinkjet can print on plain paper, for best results the HP printer needs a short-fiber uncoated paper that absorbs water-based ink rapidly and yet prevents the wicking action characteristic of absorbent papers. The Thinkjet also requires an ink-jet cartridge manufactured exclusively by Hewlett-Packard. The use of these supplies raises questions about cost and availability.

'Ribbon distribution, too, must improve before thermal-transfer printers can effectively compete with thermal printers.'

According to Rhine Meyering, Ergo's vice president of marketing and sales, "Thermal rolls are now available in most office stationery outlets in the United States and the cost works out to about 3 to 6 cents per copy." For the Thinkjet, paper and ink-jet cartridges are available from HP dealers; paper prices are $62.50 for 2,500 8½-by-11-inch fanfold sheets, $41 for 2,000 single sheets, and a single ink-jet cartridge (which HP estimates will print about 500 sheets) costs $7.95.

Portability leads to other benefits

The fact that the Ergo and HP printers are portable is an attractive feature, but other characteristics fuel the imagination of office computer users and office system integrators. Market analyst Neil Kleinman, general manager of International Data Corp.'s (IDC) Pacific Technology Center, Santa Monica, Calif., views these portable units as ideal printers for the office workstation. "There is a segment of the office market that likes the integrated approach," observes Kleinman. "This segment," he adds, "prefers to have all the pieces of hardware and software delivered in an easy-to-use, packaged system." Kleinman sees four benefits: "What portable computers, equipped with portable printers, now allow is a system that doesn't cover a desk top when in use, prints quietly so that it doesn't contribute to office noise or interrupt a phone conversation, isn't difficult to move, and may be stowed away in closet or credenza when not in use."

Such a system, suggests Kleinman, is affordable, and, thanks to the printer, offers its user a quick, hard copy for activities such as reading printed electronic mail, seeing a large spread sheet all at once and reviewing a multipage document. "Notice," Kleinman says, "I haven't yet mentioned the fact that the user can take the system, or maybe just the printer, home."

Ergo's Meyering expects the Hush 80 to be considered as an add-on printer for existing office workstations, terminals and personal computers. "There are office computer users who are frustrated with the logistics of sharing a printer," he says, illustrating his point with a word processing example: "Suppose that I share a daisywheel printer with ten other co-workers who frequently write multipage reports. Like my co-workers, I find it necessary to print three or four draft copies in the process of writing and proofing my documents. This means that our shared printer is engaged in printing draft copy about 75 percent of the time. To me, my draft copy is needed immediately so that I can continue my work. The top priority for the printer, however, is finished documents due today."

Meyering sees his product as a solution to this common bottleneck. By providing each individual with a draft printer, 75 percent of the printing burden is removed from the shared printer. Besides the obvious possibility of allowing more people to share the daisywheel printer, an important organizational benefit is gained by switching to the draft printers with shared printer arrangement. "Now," says Meyering, "instead of scheduling my time around the shared printer, I can get an immediate hard copy from my draft printer. When my document is ready for final printing, I submit it to the shared printer as a batch job for the next day. When it gets printed is a decision made by the shared-printer operator. My only concern is that it's printed by the end of the next day. Thus, I and the shared-printer operator have the freedom to better schedule our time."

Non-impact technologies suit low-priced printers

Dataquest's Steiner also sees these portable printers as part of a trend toward computer printing configurations incorporating draft printers and print servers. "Quiet, compact and inexpensive, are certainly the characteristics of an attractive office printer," says Steiner. He adds that these non-impact portable printers will be joined in the market by other quiet, compact and inexpensive computer printers using a different non-impact technology—thermal-transfer.

Steiner believes that thermal and thermal-transfer will be the printing technologies chosen for low-priced printers. In response to objections raised by the requirement for special supplies, Steiner points out, "In an office setting, I think the benefits of a draft printer more than offset the problems encountered with the supplies. Thermal paper has been improved and has

become more available in the last couple of years, and HP is manufacturing a reliable ink-jet cartridge. In a few years we should be seeing thermal-transfer ribbons that will print on a much wider variety of papers and look toward Japan for developments in dye-based thermal papers that may remove many of the drawbacks in today's carbon-based thermal papers."

One . . . manufacturer has put all these features together . . . for less than $160.

Ergo's Meyering is also a proponent of thermal transfer. "The present situation," explains Meyering, "is that thermal-transfer ribbons are too expensive. The present cost per copy with a thermal-transfer printer is in the range of 20 to 30 cents. Ribbon distribution, too, must improve before thermal-transfer printers can effectively compete with thermal printers. I expect thermal transfer ribbon prices to drop and distribution to improve. When they do, it will be possible to build a thermal-transfer Hush 80 that will offer near-letter-quality printing and perhaps color graphics."

Dataquest's Steiner expects to see more low-cost printer introductions that will follow the pattern set by the Ergo Hush 80 and the HP Thinkjet. Says Steiner, "Quiet non-impact technologies are going to allow computer printers to proliferate in the office." □

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

LOOKING AHEAD IN MMS

Mini-Micro System's December issue is our third annual overview of those leading edge technologies impacting our value-added market readership. A long-lasting sourcebook for technology and market data, the report presents past, present and future perspectives on key areas including:

- local area networks
- natural language translation
- operating systems
- non-impact printing
- relational database systems

The Interpreter section of Mini-Micro Systems' December issue focuses on office-automation systems.

OA systems have the potential to move mountains of paperwork and boost worker productivity. Yet, year after year, the promise is not quite realized. Buyer perceptions of machines as not user-friendly could be one reason. This article examines what's being done to improve OA's image.

A DEFENSE THAT HANGS TOUGH PLAY AFTER PLAY AFTER PLAY.

THAT'S WHAT KEEPS ALL THE POINTS ON YOUR SIDE.

All about defense. And winning. Designing information systems to compete for different business needs is a lot like putting together a winning sports team.

Each component has to offer you the maximum number of offensive and defensive advantages to assure success. Take computer printers.

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How Okidata stacks up for you. Defensively, Okidata keeps piling up the points on your side of the board. Their tank tough bodies can take the most punishing hits.

Their MTBF stats score up to 4,000 hours. Their printheads always go the distance, up to 200,000,000 characters. Their MTTR's are down to an impressive 15 minutes. There are no duty cycle limitations.

And their warranty claim rate record book says 99 1/2 out of every 100 Okidata printers are always in the game for you.

We'll help you win. In OEM system building, just like in Super Bowls, reliability is the name of the game.

If you're putting together a components team where defense counts, call us at 1-800-OKIDATA (609-235-2600 in NJ). Or write OKIDATA, Mt. Laurel, NJ 08054. We'd be more than happy to suit up for you. And help you win.

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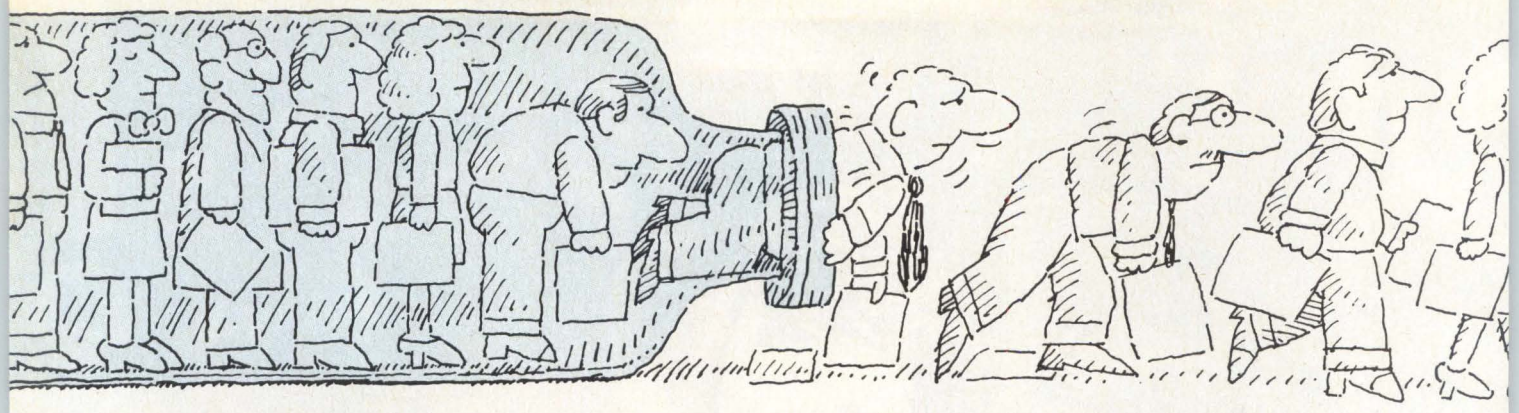


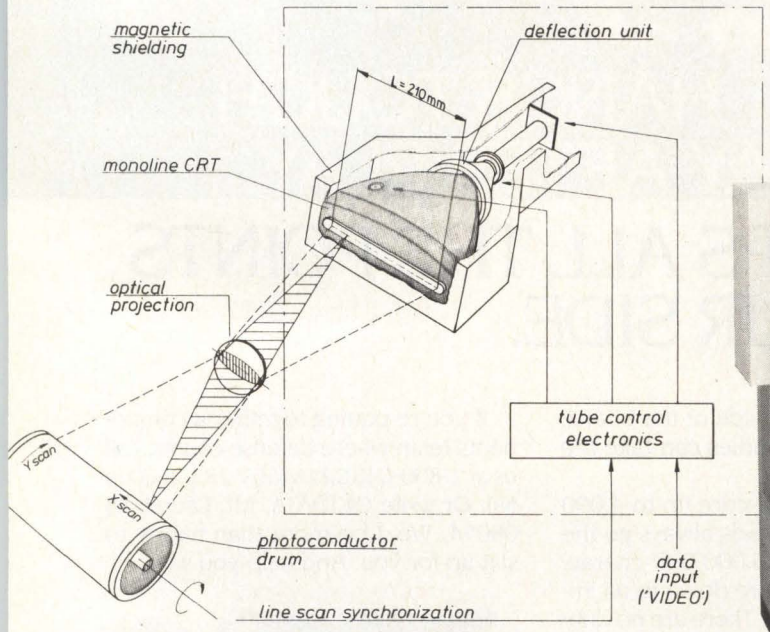
If the printer is the bottleneck in your office...

The Elpho 20 will provide the versatile, reliable solution.

It's ideal for clustered environments where time on a shared printer is at a premium and noise is an important consideration. It can produce 20 pages of letter-quality text and graphics per minute using plain paper.

The Elpho 20 features a specially developed CRT-projection technology for electrophotographic recording.

The input information is converted to optical signals. The light pattern is then projected on the surface to form an electrostatic image.



The entire page of information is quickly and crisply printed on plain paper.

The Philips CRT-projection technique has no moving parts for excellent reliability, extended use life, and variable resolution. And it is quiet—less than 50 dB.

Because we designed it to be used for practically all of your information processing requirements, we designed it with standard interfaces.

Elpho 20 print sample

Elpho 20 print sample

Elpho 20 print sample

Elpho 20 print sample

Elpho 20 print sample

Elpho 20 print sample

You can quickly and easily choose from a library of character sets. And you can change your character pitch, line spacings, and character renditions. The integral print control system even allows you to print multiple character fonts simultaneously.

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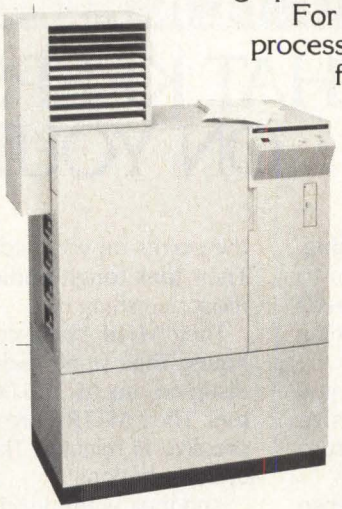
Because of the excellent resolutions, the Elpho 20 produces outstanding portrait and landscape printing as well as full graphics... including mixing text and graphics.

The Elpho 20 is ideal for data, text, and graphics printout.

For high-volume information processing printing functions, find out more about the one printer designed to meet all of your needs... the Elpho 20.



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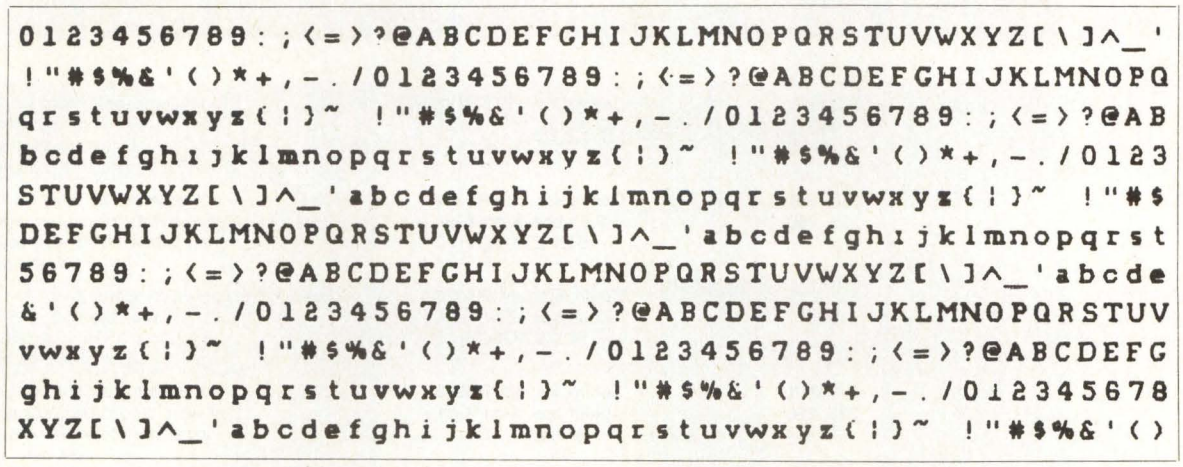

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
ADDMASTER CORP.						
171	impact (5x7)	52	18, 21	Centronics (ETX/ACK)	345(Q1); 249(Q100)	point-of-sale printers, built-in clock calendar, 3-line buffer
172	impact (5x7)	52	18, 21	RS232C (9.6K bps, X-on/X-off)	345(Q1); 249(Q100)	point-of-sale printers, built-in clock calendar, 3-line buffer
ADVANCED COLOR TECHNOLOGY						
ACT II	ink jet	60	132	RS232C, Centronics, Dataproducts (19.2K bps, X-on/X-off)	6,100(Q1)	125 color shades, bit-mapped graphics
ADVANCED COMMUNICATIONS						
MP-2000	thermal	33	20	telephone direct connect with Bell 103 (300 bps)	495(Q1)	
ALPHACOM INC.						
Alphacom 42	thermal (5x7)	80, 40	40	RS232C, Centronics, Atari, Commodore (110-9.6K bps)	120(Q1)	bit-mapped graphics
Alphacom 81	thermal (5x7)	50	80, 40	RS232C, Centronics, Apple, Atari, Commodore (110-9.6K bps)	169(Q1)	bit-mapped graphics
ALPS ELECTRIC CO. LTD.						
ASP1000	impact (9x9)	105	80	RS232C, Centronics (9.6K bps, X-on/X-off, DTR, ETX/ACK)		bit-mapped graphics
ASP1200	impact (9x9)	140	80	RS232C, Centronics (9.6K bps, X-on/X-off, DTR, ETX/ACK)		bit-mapped graphics
ASP1300	impact (9x9)	160	136	RS232C, Centronics (9.6K bps, X-on/X-off, DTR, ETX/ACK)		bit-mapped graphics
AMERICAN COMPUTER HARDWARE CORP.						
AC-9/132	impact	165	136, 163, 225	Centronics, RS232C (X-on/X-off)	1,295(Q1)	

MATRIX CHARACTER PRINTERS

Matrix character printers

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
ANADEX INC.						
DP-9000B	impact	180, 216, 240	80	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,200(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; opt. 2.6K-byte buffer
DP-9001B	impact	150, 188, 225, 250	80	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,200(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; opt. 2.6K-byte buffer
DP-9500B	impact	180, 216, 240	132	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,280(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; opt. 2.6K-byte buffer
DP-9501B	impact	150, 218, 225, 250	132	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,280(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; opt. 2.6K-byte buffer
DP-9620B	impact	120, 144, 180, 197, 240	132	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,380(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; opt. 2.6K-byte buffer
DP-9625B	impact	60-240	132	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,500(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; letter quality
DP-9725B	impact	60-240	132	Centronics; opt. RS232C (9.6K bps, X-on/X-off, STX/ETX/ACK)	1,625(Q1)	4-color ribbon, dot-addressable graphics, compatible with all word processing packages as backspacing printer, noise level less than 55 dBa; letter quality
DP-6500	impact	100-540	132	Centronics, RS232C (19.2K bps, X-on/X-off, STX/ETX/ACK)	2,995(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, letter quality; opt. 20.5K-byte buffer
WP-6000	impact	125-285	132	Centronics, RS232C (19.2K bps, X-on/X-off, STX/ETX/ACK)	2,700(Q1)	dot-addressable graphics, compatible with all word processing packages as backspacing printer, letter quality, Diablo 630 emulation
ANDERSON JACOBSON INC.						
M84	impact (9x9)	200	68, 81, 116, 136, 163, 231	Centronics; opt. current loop, RS232C (9.6K bps, X-on/X-off)	1,245(Q1)	bit-mapped graphics, word processing and graphic software offered, 2K-byte buffer, forms control
M92	impact (9x9)	160	40, 48, 68, 80, 96, 136	RS232C, Centronics, current loop (19.2K bps, X-on/X-off)	699(Q1)	bit-mapped graphics, graphics software offered, 2K-byte buffer, forms control
AJ650	ink jet (7x9)	180	80, 132	RS232C, Centronics (2.4K bps, X-on/X-off, ETX/ACK)	1,495(Q1)	2K-byte buffer, emulates ANSI
APPLE COMPUTER						
Imagewriter	impact	120, 180	38-136, proportional	RS232C (300-9.6K bps, X-on/X-off, DTR)	595(Q1)	bit-mapped graphics, compatible with all Apple computers
Wide Carriage Imagewriter	impact	120, 180	38-136, proportional	RS232C (300-9.6K bps, DTR, X-on/X-off)	749(Q1)	bit-mapped graphics, compatible with Apple II and III
Scribe	thermal	50, 80	38-136 proportional	RS232C (1.2K, 9.6K bps)	299(Q1)	color printing, compatible with Apple IIc, IIe, bit-mapped graphics
BLUE CHIP ELECTRONICS INC.						
M120/10	impact	60, 120	40, 80, 71, 142	Centronics; opt. RS232C, IEEE-488, Commodore 64 (75-9.6K bps, X-on/X-off, DTR, ETX/ACK)	299(Q1); 189(Q100)	bit-mapped graphics, word processing and graphics software, emulates Epson UX80, bidirectional tractor and platen
BROTHER INTERNATIONAL CORP.						
M1009	impact (9x9)	50		Centronics	245(Q1); 155(Q100)	
2024L	impact	80, 96, 160		Centronics		letter quality

Tally Printers at Hall-Mark.

HALL-MARK

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Phoenix 602/437-1200
San Diego 619/268-1201
San Fernando Valley 818/716-7300
West Los Angeles 213/643-9101

CIRCLE NO. 51 ON INQUIRY CARD

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
C. ITOH DIGITAL PRODUCTS INC.						
8600	impact	45, 90, 180		RS232C, Centronics	1,295(Q1); 1,395(Q100)	prints red and black, bit-mapped graphics, tractor feed
C. ITOH ELECTRONICS						
1570	impact	130, 180	136	RS232C, Centronics (X-on/X-off, ETX/ACK)	2,000(Q1)	built-in tractor, 16 languages, bidirectional dot-addressable graphics
1550B	impact (7x9)	120	136	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK)	830(Q1)	dot-addressable graphics, built-in tractor, 5 languages
1550SC	impact	120, 180	136	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK)	1,225(Q1)	dot-addressable graphics, built-in tractor, 13 languages, 7-color printing
1550S	impact (7x9)	120, 180	136	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK)	1,125(Q1)	dot-addressable graphics, built-in tractor, 13 languages
7500E	impact	105	80	RS232C, Centronics (X-on/X-off, ETX/ACK)	450(Q1)	dot-addressable graphics, built-in tractor, 5 languages
85105	impact (9x9)	120, 180	80	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK)	795(Q1)	dot-addressable graphics, built-in tractor, 13 languages
8510B	impact (9x9)	120	80	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK)	495(Q1)	dot-addressable graphics, built-in tractor, 5 languages
8510SC	impact	120, 180	80	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX, ACK)	895(Q1)	7-color printing, dot-addressable graphics, built-in tractor, 13 languages
CENTRONICS DATA COMPUTER CORP.						
250	impact	40, 160	80, 136	RS232C, Centronics, Diablo 630 (X-on/X-off, DTR)	1,295(Q1)	4- or 7-color, bit-mapped graphics, IBM PC, Diablo 630 compatible
351	impact	65, 200	132, 217	RS232C, Centronics, current loop, RS422 (50-9.2K bps, X-on/X-off, DTR)	2,195(Q1); 1,370(Q100)	pin-addressable graphics
352	impact	200	132, 217	RS232C, Centronics, RS422, current loop (50-19.2K bps, X-on/X-off, DTR)	2,295(Q1); 1,470(Q100)	pin-addressable graphics
353	impact	50, 200	132, 217	RS232C, Centronics, RS422, current loop (50-19.2K bps, X-on/X-off, DTR)	2,495(Q1); 1,730(Q100)	pin-addressable graphics; opt. auto sheet feeder
354	impact	220, 50	132, 217	Centronics, Diablo (50-19.2K bps, X-on/X-off, DTR)	2,195(Q1)	pin-addressable graphics, Diablo 630 compatible; opt. auto sheet feeder
357	impact (7x8)	400	132, 217	RS232C, Centronics, current loop (50-19K bps, X-on/X-off, DTR)	2,750(Q1); 1,775(Q100)	pin-addressable graphics
358	impact (7x9)	100, 400	132, 217	RS232C, Centronics, current loop (50-19.2K bps, X-on/X-off, DTR)	3,295(Q1); 2,075(Q100)	pin-addressable graphics; opt. auto sheet feeder
240	impact	80, 160	132	RS232C, Centronics (up to 9.6K bps, X-on/X-off, DTR)	1,495(Q1); 1,200(Q100)	bit-mapped graphics, contains daisywheel and dot matrix control codes
GLP	impact	12, 50	80, 136	RS232C, Centronics (up to 9.6K bps, X-on/X-off, DTR)	279(Q1); 235(Q100)	bit-mapped graphics, compatible with IBM PC software
COMPUTER PRINTERS INT'L INC. (COMPRINT)						
912	electrosensitive (9x12)	225	80	RS232C, IEEE-488, Centronics	595(Q1)	opt. 2K-byte buffer
912GO	electrosensitive (32x1)			RS232C, Centronics, IEEE-488	995(Q1)	opt. 2K-byte buffer

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
COMPUTER TRANSCEIVER SYSTEMS INC.						
1200 Series	thermal	140	41, 73, 80, 136	RS232C, Centronics compatible, IBM compatible (110-9.6K bps, X-on/X-off, DTR)		dot-addressable graphics, Epson-compatible software; opt. integral 212/103 compatible modem
CRADEN PERIPHERALS CORP.						
DP4	impact (7x9, 9x9)	32, 37, 125, 150	40, 48, 80, 96, programmable	RS232C, RS422 (1.2K-9.6K bps, X-on/X-off, DTR)	3,200(Q1); 2,250(Q100)	bit-mapped graphics, prints on passbook
DATAPOINT CORP.						
9621	impact (9x9)	160	132	RS232C (9.6K bps)	2,500(Q1)	Datapoint word processing software offered
9628	impact (9x9)	160	136	RS232C (9.6K bps)	995(Q1)	Datapoint word processing software offered
9629	impact (9x9)	160	136	RS232C (9.6K bps)	1,280(Q1)	Datapoint word processing software offered
DATAPRODUCTS CORP.						
8010	impact (9x9)	30, 90, 180	80, 96, 106, 136	serial, parallel (300-9.6K bps, X-on/X-off, DTR)		raster or bit-mapped graphics, word processing and graphics software, self-test, bidirectional, logic-seeking
8070	impact (18x9)	75, 200, 400	132, 159, 175, 225	parallel		multicolor printing, high resolution graphics, word processing, business graphics, self-test, bidirectional, logic-seeking
M-100L	impact (9x14)	140		8-bit parallel, Centronics compatible		raster graphics, bar code, bidirectional, logic-seeking
M-120	impact (7x7)	180	40, 70, 132	8-bit parallel or Centronics; opt. RS232C, current loop	2,650(Q1)	self-test, status display, bidirectional, logic-seeking
M-200	impact (7x7)	340	40, 70, 132	8-bit parallel, Centronics compatible; opt. RS232C, current loop	2,950(Q1)	self-test, status display, bidirectional, logic-seeking
P Series	impact (24x9)	150, 110, 100, 200		RS232C, Centronics (300-9.6K bps, X-on/X-off, DTR)		int'l character set; opt. 4-color graphics, Greek, math
DATASOUTH COMPUTER CORP.						
DS180	impact (9x7)	180	132	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR)	1,395(Q1)	bit-mapped graphics, programmable key pad, Anadex 9501 graphics compatible
DS220	impact (9x7)	40, 100, 220	132, 217	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR)	1,695(Q1)	bit-mapped graphics, tractor/friction feed stand, Epson MX-80, Anadex 9501 graphics compatible
TX-5180	impact (9x7)	180	132, 217	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR)	2,995(Q1)	bit-mapped graphics, IBM S/34, S/36, S/38 compatible
DATEL						
APP-20	thermal (5x7)	33	20	RS232C, parallel, IEEE-488 (300 bps)	595(Q1)	
APP-48	thermal (5x7)	58	28	RS232C, parallel, IEEE-48 (300 bps)	995(Q1)	
DIGITAL EQUIPMENT CORP.						
LA50	impact	50, 100	80, 132	RS232C, RS423 (110-4.8K bps, X-on/X-off)	695(Q1)	Regis bit-mapped graphics
LA100	impact	30, 80, 240	132, 217	RS232C (50-9.6K bps, X-on/X-off)	1,595(Q1)	Regis bit-mapped graphics
LA120	impact	180	132, 217	RS232C, RS423 (50-9.6K bps, X-on/X-off)	2,420(Q1)	
DIGITAL MATRIX CORP.						
9/80 Durawriter	impact	75, 150	80, 96, 132	RS232C, current loop, Centronics (up to 9.6K bps)	1,050(Q1); 840(Q100)	alternate character set

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
9/80 Formwriter	impact (9x9)	75, 150	80, 96, 132	RS232C, Centronics, current loop	1,295(Q1); 1,035(Q100)	demand document printer
9/132 Durawriter	impact (9x9)	165	136, 163, 225	RS232C, Centronics, current loop	1,295(Q1); 1,035(Q100)	alternate character sets
9/132 Durawriter Plus	impact (9x9)	45, 90, 180	136, 163, 225	RS232C, current loop, Centronics (300-9.6K bps, X-on/X-off, DTR)	1,395(Q1); 1,090(Q100)	bidirectional printing, NLQ
9/132 Formwriter	impact (9x9)	165	136, 163, 225	RS232C, current loop, Centronics (300-9.6K bps, X-on/X-off, DTR)	1,495(Q1); 1,195(Q100)	downloadable and alternate character sets
DURANGO SYSTEMS INC.						
Poppy Writer	impact (9x9, 36x18)	40, 165	132-218	RS232C, Centronics (9.6K bps, X-on/X-off)	2,495(Q1)	bit-mapped graphics, 15 downloadable fonts, tractor, sheet feeder
DYNAX INC.						
Fortis DM5	impact	50	40, 80, 96, 132	RS232C, Centronics (110-9.6K bps)	245(Q1)	emulates Epson
Fortis DM20	impact	30, 60, 180		parallel, serial (110-9.6K bps)	775(Q1)	emulates Epson
Fortis DM40	impact	80, 96, 160	136, 163, 272	(110-9.6K bps)		emulates Epson, Diablo 630
EPSON AMERICA INC.						
RX-80 F/T	impact (9x9, 18x18)	100	40-137	RS232C, Centronics, IEEE-488 (X-on/X-off)	300(Q1)	
RX-80	impact (9x9, 18x18)	100	40-137	RS232C, Centronics, IEEE-488 (X-on/X-off)	220(Q1)	
RX-100	impact	100	68-233	RS232C, Centronics, IEEE-488	400(Q1)	
FX 80	impact (9x9, 18x18)	160	40-80	RS232C, Centronics, IEEE-488 (X-on/X-off)	370(Q1)	
FX 100	impact (9x9, 18x18)	160	40-80	RS232C, Centronics, IEEE-488 (X-on/X-off)	500(Q1)	
LQ-1500	impact (9x17, 37x17)	200	136, 163	RS232C, Centronics, IEEE-488 (X-on/X-off)	780(Q1)	
CTM Series Printer	impact (9x9)	160	40-137	RS232C, Centronics, IEEE-488		bit-mapped graphics, bidirectional printing, graphics software available, noise level less than 58 dBa
ERGO SYSTEMS INC.						
Hush 80	thermal (6x7)	80	80	Commodore, RS232C, Centronics	160(Q1)	
FACIT INC.						
4510	impact (9x15)	120	80	RS232C, Centronics; opt. current loop (110-9.6K bps, X-on/X-off, DTR)	495(Q1)	block and pin graphics, 3-way paper handling, 2K-byte buffer
4511	impact	158	80	RS232C, Centronics; opt. current loop (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)		block and pin graphics, compatible with word processors and graphic software, IBM PC, Epson printer emulation, 3-way paper handling, tractors, 2K-byte buffer
4512	impact	140	132	RS232C, Centronics; opt. current loop (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	995(Q1)	block and pin graphics, compatible with word processors and graphic software, IBM PC, Epson printer emulation, 3-way paper handling, tractors, 2K-byte buffer
4528T	impact	165	136	RS232C, Centronics (110-9.6K bps, ready/busy, X-on/X-off)	1,395(Q1)	
4528V	impact	82.5, 165	136	RS232C, Centronics (100-9.6K bps, DTR, X-on/X-off, custom)	1,595(Q1)	bit-mapped graphics

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
4542	impact (9x9)	250	150	RS232C, Centronics, IEEE-488 (110-19.2K bps, DTR, X-on/X-off, custom)	3,995(Q1)	red/black color printing, bit-mapped graphics, plotter emulation, block graphics
4544	impact (9x9)	225	150	RS232C, Centronics, IEEE-488 (110-19.2K bps, DTR, X-on/X-off, custom)	4,695(Q1)	multi-color printing, bit-mapped graphics, plotter emulation, block graphics
5000A	impact	150	136	RS232C, Centronics (110-9.6K bps, ready/busy, X-on/X-off)	1,495(Q1)	
5000C	impact (9x9)	165	136	RS232C, Centronics (110-9.6K bps, ready/busy, X-on/X-off)	1,695(Q1)	bit-mapped graphics
FLORIDA DATA CORP.						
OSP 130D	impact (9.5x21.3)	100, 150, 600	132, 256	(up to 19.2K bps, Epson, IBM PC Printer)	3,995(Q1)	60 dBa, compatible with Wordstar, built-in cut sheet feeder, built-in tractor
FUJITSU AMERICA INC.						
DPL24	impact (24x180)	80, 160, 240	136, 163, 244	RS232C, Centronics, current loop (150-9.6K bps, X-on/X-off, DTR, ETX/ACK)	1,995(Q1); 1,400(Q100)	dot-addressable graphics, Diablo 630 protocol, operator changeable font cartridges, imbedded rear feed tractor, dual port interface
DPMG9	impact	25, 180	80, 96, 132	Centronics; opt. RS232C (110-9.6K bps, X-on/X-off, DTR)	695-795(Q1)	dot-addressable graphics, IBM PC, EPSON FX80 compatible software, downloadable fonts
GENERAL BUSINESS TECHNOLOGY INC.						
5203DP	impact (7x9)	50, 200	up to 198	IBM S/34, S/36, S/38	3,995(Q1)	
5203MP	impact (7x9)	200	up to 198	IBM S/34, S/36, S/38	3,695(Q1)	
5205WP		up to 55	up to 98	IBM S/34, S/36, S/38	4,295(Q1)	
5206WP		35	up to 198	IBM S/34, S/36, S/38	3,695(Q1)	letter quality
5207FA	impact (9x9)	120	up to 132	IBM S/34, S/36, S/38	2,795(Q1)	
5207MP	impact (9x9)	120	up to 198	IBM S/34, S/36, S/38	2,995(Q1)	
5210BL	impact (9x7)	150	up to 198	IBM S/34, S/36, S/38	4,995(Q1)	
5220DP	impact (9x18)	100, 400	up to 198	IBM S/34, S/36, S/38	2,795(Q1)	
5220MP	impact (9x9)	400	up to 198	IBM S/34, S/36, S/38	4,750(Q1)	
6600XP		12	up to 185	IBM S/34, S/36, S/38	22,500(Q1)	
GENICOM CORP.						
200-Series	impact	200	136	Centronics, RS232C (9.6K bps)	2,590(Q1)	red/black color printing varied configurations split-platen
3000-Series	impact	100, 300, 400	136	RS232C, Centronics (9.6K bps, X-on/X-off, ANSI X3.64)	2,490(Q1)	7-color, graphic software
3024	impact (9x9, 9x18)	40, 200	132	RS232C, Centronics (9.6K bps)	1,499(Q1)	graphic software
GULTON INDUSTRIES, GRAPHIC INSTRUMENTS DIVISION						
CP80C	impact (7x11)	45	80	Centronics, RS170	5,700(Q1); 4,550(Q100)	bit-mapped graphics, plotter emulation, 7-color printing on paper or acetate film
Microplot 80	impact	120	12	RS232C, IEEE-488	2,095(Q1)	plotter emulation, word processing and graphics software available
Microplot 80T	impact (5x7)	120	12	RS232C, IEEE-488	3,000(Q1)	plotter emulation, software available, plotter provides hard copy from CRT, CPU or video monitor
HARRIS CORP., COMPUTER SYSTEMS DIVISION						
Harris 4415	impact	165	132	RS232C		self-test, MUSE software offered

NEC Printers at Hall-Mark.

HALL-MARK

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Southwest
Orange County 714/669-4700
Phoenix 602/437-1200
San Diego 619/268-1201
San Fernando Valley 818/716-7300
West Los Angeles 213/643-9101

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
HEWLETT-PACKARD CO.						
HP2225A ThinkJet	ink jet (11x12)	150	96	HP-IB	495(Q1)	bidirectional, dot-addressable graphics, compatible with Epson America dot-matrix printers
HP2225B ThinkJet	ink jet (11x12)	150	96	HP-IL	495(Q1)	bidirectional, dot-addressable graphics, compatible with Epson America dot-matrix printers
HP2225C ThinkJet	ink jet (11x12)	150	96	Centronics, parallel	495(Q1)	bidirectional, dot-addressable graphics, compatible with Epson America dot-matrix printers
HP2932A	impact	200	68, 136, 223	RS232C, RS422, Centronics, IEEE-488 (ENQ/ACK, X-on/X-off)	2,495(Q1)	raster graphics
HP2933A	impact	200	68, 136, 223	RS232C, RS422, Centronics, IEEE-488 (ENQ/ACK, X-on/X-off)	2,795(Q1)	raster graphics, bar codes
HP2934A	impact	40, 67, 200	68, 136, 223	RS232C, RS422, Centronics, IEEE-488 (ENQ/ACK, X-on/X-off)	2,895(Q1)	bar codes
HONEYWELL INFORMATION SYSTEMS INC.						
MODEL 10, PRU7070, 7071, 7072	impact (9x7)	100	80	RS232C, RS422 (up to 9.6K bps, Honeywell ASPI)	1,195(Q1)	line graphics
Model 30, PRU7075, 7076, 7077	impact (9x7)	100	132	RS232C, RS422 (up to 9.6K bps, Honeywell ASPI)	1,495(Q1)	line graphics
Model 32, PRU7170, 7171, 7172	impact (9x11)	150	132	RS232C, RS422 (up to 9.6K bps, Honeywell ASPI)	1,795(Q1)	line, bit and mosaic graphics
Model 34, PRU7175, 7176, 7177	impact	45, 200		RS232C, RS422 (up to 9.6K bps, Honeywell ASPI)	2,450(Q1)	line, dot and mosaic graphics, supported by Honeywell OAS software; opt. dual-bin cut sheet feeder
Model 38, PRU7270, 7271, 7272	impact (7x7)	400		RS232C, RS422 (up to 9.6K bps, Honeywell ASPI)	3,450(Q1)	
INFORUNNER CORP.						
Riteman Plus	impact	60, 120	40, 66, 80, 132, programmable	Centronics; opt. serial, parallel (X-on/X-off, ETX/ACK, ready/busy)		MX-Graftrax compatible
Riteman Blue Plus	impact	70, 140	40, 48, 66, 80, 96, 132	Centronics; opt. serial, parallel (110-9.6K bps, X-on/X-off, ETX/ACK, ready/busy)		MX-80 Graftrax 3, RX-80 and IBM Graphics Printer compatible
Riteman II, Riteman 15	impact	80, 160	400-132, programmable	Centronics; opt. serial, parallel (150-9.6K bps, X-on/X-off, ETX/ACK, ready/busy)		word processing and graphics software offered, FX-80/100 compatible
LEXICON CORP.						
LEX-21	thermal	30	40	(300 bps, TTY)	395(Q1); 357(Q100)	KSR teleprinter, modem included
LEX-21DJ	thermal	30	40	(300 bps, TTY)	395(Q1); 357(Q100)	KSR teleprinter, modem and Dow Jones key
LEX-21RS	thermal	30	40	RS232C (300 bps, TTY)	395(Q1); 357(Q100)	KSR teleprinter
MEMOREX CORP./COMMUNICATIONS GROUP						
2068	impact	(9x7, 18x20)	80, 350			IBM 3270 plug-compatible; opt. sheet feeder
2087	impact (7x8)	180	132	IBM 3287 Model 2		bidirectional
MICRO PERIPHERALS INC.						
Print Mate 99	impact (7x9, 11x9)	63, 100	80, 96, 136, programmable	RS232C, Centronics (up to 1.2K bps, X-on/X-off, DTR)	599(Q1); 420(Q200)	bit-mapped and dot-addressable graphics vertical and horizontal resolution, MPI application software

MATRIX CHARACTER PRINTERS

Matrix character printers

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
Print Mate 150	impact (7x9, 11x9)	100, 150	136, 163, 204, 231, programmable	Centronics, RS232C; opt. IEEE-488 (up to 19.2K bps, X-on/X-off, DTR)	1,045(Q1); 732(Q100)	bit-mapped and dot-addressable graphics, vertical and horizontal resolution, MPI application software
Sprinter	impact (7x9, 11x9)	106, 160	80, 96, 115, 120, 136	Centronics; opt. RS232C, IEEE-488 (up to 19.2K bps, X-on/X-off, DTR)	695(Q1); 487(Q100)	bit-mapped and dot-addressable graphics, vertical and horizontal resolution, MPI application software, portable
NCR CORP.						
2600	thermal (5x8)	30	80	RS232C, current loop, NCR Parallel (300 bps)		
6411	impact	120	80, 136	RS232C, Centronics (9.6K bps, X-on/X-off, DTR, ETX/ACK)		bit-mapped graphics, proportional spacing
6442	impact	325	132	RS232C, Centronics, NCR (9.6K bps, DTR)		business graphics
NEC HOME ELECTRONICS						
PC-8025	impact	120	80, 230	parallel	895(Q1)	bit-mapped graphics, teletype installation
PC-8027	impact	120	80, 136	parallel	499(Q1)	bit-mapped graphics, small footprint (15x5), paper bin, teletype installation
PC-PR103	impact	55, 135	80, 137	parallel	549(Q1)	bit-mapped graphics, teletype installation, tractor feed included
P2	impact	30, 90, 180	80, 136	RS232C, Centronics (9.6K bps, X-on/X-off, ETX/ACK, IBM graphics printer)	875(Q1)	compatible with most word processing and graphics software, cut sheet feeder available, selectable fonts
P3	impact	30, 90, 180	136, 233	RS232C, Centronics (9.6K bps, X-on/X-off, ETX/ACK, IBM graphics printer)	1,250(Q1)	compatible with most word processing and graphics software, cut sheet feeder available, selectable fonts
NEWBURY DATA RECORDING LTD.						
8905	impact (12x8, 12x20)	90, 180	up to 211, programmable	RS232C, Centronics (up to 9.6K bps, X-on/X-off, DTR, ETX/ENQ/ACK, buffer full)	1,130(OEM)	noise level less than 60 dBa; opt. character sets
8910	impact	160, 240	220, programmable	RS232C, Centronics, current loop (up to 9.6K bps, X-on/X-off, ETX/ENQ/ACK, buffer full)	1,550(OEM)	red/black printing
8926	impact	120, 240	211, programmable	RS232C, Centronics, current loop (9.6K bps)	1,930(OEM)	red/black printing, noise level 45 dBa; opt. character sets
OKIDATA						
Microline 82A	impact (9x9)	120	80, 132	RS232C, Centronics; opt. current loop (X-on/X-off, Printer busy)	349(Q1)	block graphics, Okigraph 1 software
Microline 83A	impact (9x9)	120	136, 224	RS232C, Centronics; opt. current loop (X-on/X-off, Printer busy)	749(Q1)	block graphics, Okigraph 1 software
Microline 84 Printer	impact (9x9)	200, 100, 50	231, 163, 50	RS232C, Centronics, current loop (X-on/X-off, Printer busy)	1,395(Q1)	dot-addressable graphics
Microline 92 Printer	impact (9x9)	160, 80, 40	136, 80, 40	RS232C, Centronics; opt. IEEE-488, RS422	599(Q1)	dot-addressable graphics
Microline 93 Printer	impact (9x9)	160, 80, 40	233, 163	RS232C, Centronics	999(Q1)	Okigraph dot-addressable graphics
Pacemark 2350 Printer	impact (9x9)	350	136, 233	Centronics, RS232C (X-on/X-off, Printer busy)	2,695(Q1)	dot-addressable graphics, line printer graphics
Pacemark 2410	impact	350, 175, 85	136, 233	opt. RS422	2,995(Q1)	

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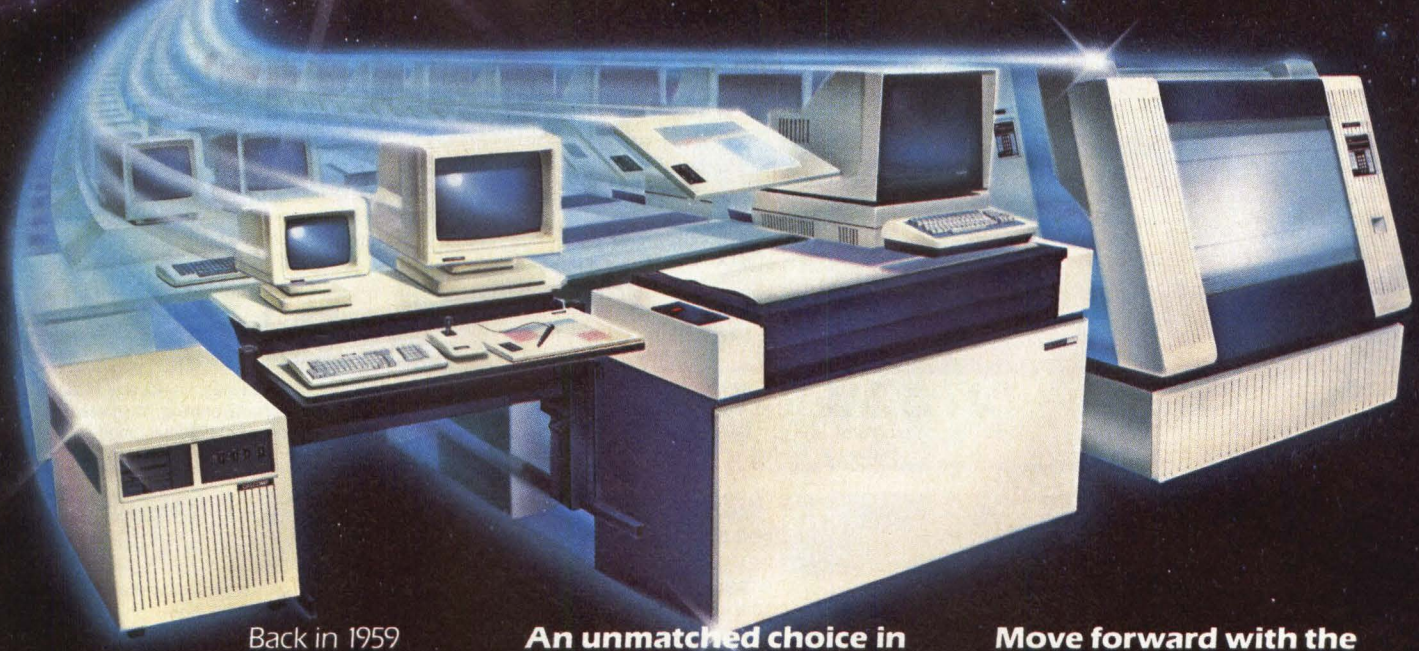

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THE MOMENTUM IS GROWING

CIRCLE NO. 53 ON INQUIRY CARD

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
PANASONIC INDUSTRIAL CO./COMPUTER PRODUCTS						
KXP1090	impact	80, 96	40, 48, 80, 96, 132, 158, programmable	Centronics; opt. RS232C (75-19.2K bps, X-on/X-off, ETX/ACK, DTR)	399(Q1)	graphics capabilities, friction and tractor feed, bidirectional printing, logic seeking
KXP1091	impact	22, 75, 120	40, 48, 66, 80, 96, 132, programmable	Centronics; opt. RS232C (75-19.2K bps, X-on/X-off, ETX/ACK, DTR)	499(Q1)	graphics capabilities, operator switchable print mode, friction and tractor feeds, bidirectional printing, logic seeking
KXP1092	impact	33, 112, 180	40, 48, 66, 80, 96, 132, programmable	Centronics; opt. RS232C (75-19.2K bps, X-on/X-off, ETX/ACK, DTR)	500(Q1)	graphics capabilities, operator switchable print modes, friction and tractor feed, auto reverse paper feed, push tractor feed, bidirectional printing, logic seeking
KXP1093	impact	25, 30, 160	66, 79, 110, 132, 158, 220, programmable	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	899(Q1)	graphics capabilities, tractor and friction feeds, bidirectional printing, logic seeking, operator switchable print modes
PERRY DATA SYSTEMS INC.						
2014	impact	150	40	RS232C, RS422 (110-9.6K bps, X-on/X-off, RTS)	1,175(Q1); 975(Q100)	receipt printer; opt. cash drawer
2042	impact	150	40	RS232C, RS422 (110-9.6K bps, X-on/X-off, RTS)	1,175(Q1); 975(Q100)	slip printer; opt. cash drawer
PERSONAL MICRO COMPUTER INC.						
DMP-85	impact	120	10, 12, 17	Centronics	395(Q1); 315(Q100)	bit-mapped graphics, graphics character set, 1.3K print buffer, tractor and friction feed station
PRINTER PRODUCTS (DIVISION OF CAPITOL CIRCUITS CORP.)						
S100	impact (5x7)	65	27	RS232C, current loop, Centronics	595(Q1); 446(Q100)	
S100T	impact (5x7)	65	27	RS232C, current loop, Centronics	835(Q1); 626(Q100)	
S270	impact	65	27	RS232C, current loop, Centronics	835(Q1); 626(Q100)	
S400G	impact	150	40	RS232C, current loop, Centronics	1,095(Q1); 821(Q100)	
PRINTER SYSTEMS CORP.						
MT1600	impact (7x9)	200		RS232C, Centronics; opt. IEEE-488 (up to 9.6K bps, X-on/X-off, DTR)		word processing and graphics software, automatic front feed inserts, 6 selectable character sets
MT 1800	impact (9x7)	200, 50		RS232C, Centronics; opt. IEEE-488 (up to 9.6K bps, X-on/X-off, DTR)		graphics capability, word processing and graphics software offered, 6 character sets
MT160L, MT180L	impact (9x7)	40, 160		RS232C, Centronics (up to 9.6K bps, X-on/X-off, DTR)		graphics capability, word processing and graphics software, automatic front feed, foreign character sets
M-100	impact	140		RS232C, Centronics (up to 9.6K bps, DTR, X-on/X-off)		bidirectional
M-200	impact	340		RS232C, Centronics (up to 9.6K bps, DTR, X-on/X-off)		
QANTEX/NORTH ATLANTIC INDUSTRIES						
7020	impact (4x5, 9x7, 9x12)	75, 150, 180	up to 256, programmable	RS232C, Centronics, current loop (300-19.2K bps, X-on/X-off, STX/ACK, DTR, busy)	1,495(Q1)	dot-addressable graphics, bar code emulation, Epson, Anadex emulation, letter quality
7030	impact (4x5, 9x12, 24x18)	37.5, 75, 150, 180	up to 256, programmable	RS232C, Centronics, current loop (300-19.2K bps, X-on/X-off, STX/ACK, DTR, busy)	1,695(Q1)	dot-addressable graphics, letter quality, character amplification

MATRIX CHARACTER PRINTERS

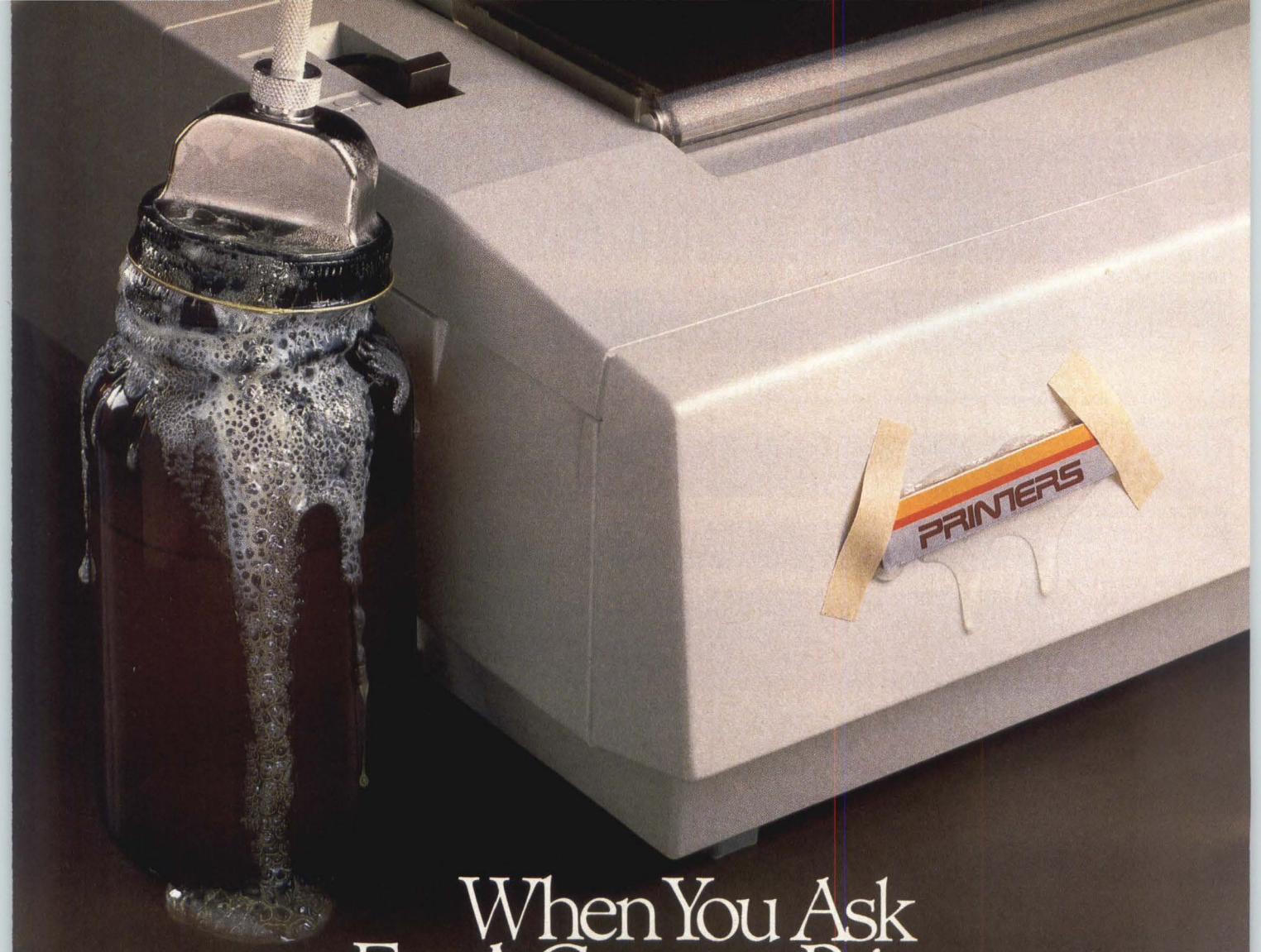
Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
7035	impact	37.5, 75, 150, 180	up to 256, programmable	RS232C, Centronics, current loop (300-19.2K bps, X-on/X-off, STX/ACK, DTR, busy)		dot-addressable graphics, letter quality, character amplification
7040	impact (4x5, 9x7, 24x18)	37.5, 75, 150, 180	256, programmable	RS232C, Centronics, current loop (300-19.2K bps, X-on/X-off, STX/ACK, DTR, busy)	1,795(Q1)	dot-addressable graphics, letter quality, Diablo 630 emulation; opt. bar codes
7065	impact	65, 150, 300	256, programmable	RS232C, Centronics, current loop (300-19.2K bps, X-on/X-off, STX/ACK, DTR, busy)	1,995(Q1)	dot-addressable graphics, letter quality, bar codes
QWINT SYSTEMS INC.						
RO-743	impact	60	80-137, programmable	RS232C, current loop (1.2K bps, X-on/X-off, DC4/DC2)	795(Q1); 675(Q100)	bit-mapped graphics
RO-743-6	impact	60	80-137, programmable	RS232C, current loop (1.2K bps, X-on/X-off, DC4/DC2)	915(Q1); 777(Q100)	bit-mapped graphics, 6K-byte input buffer
RO-744	impact	30	80-137, programmable	RJ-11, telephone subscriber loop (300 bps, DC4/DC2. EOT)	995(Q1); 845(Q100)	built-in auto-answer modem
RACAL-MILGO						
4287	impact (7x7)	200	132			bidirectional, self-test diagnostics
RICOH CORP.						
RD2200Q	impact	22	136, 163, 204	RS232C, IBM PC, Centronics	527(Q100)	
RP1500Q	impact	40.5	136, 163, 204	RS232C, Centronics	1,053(Q100)	
RP1600Q	impact	50.5	136, 163, 204	RS232C, Centronics	1,316(Q100)	
SAMLECO LTD.						
DT 80	thermal	30	80	Centronics, RS232C (75-4.8K bps, X-on/X-off, DTR, ETX/ACK)	198(Q1); 139(Q100)	
DX 80	impact (9x7)	100	40, 80, 96, 132, 136	Centronics, RS232C (150-9.6K bps, X-on/X-off, DTR, ETX/ACK)	275(Q1); 165(Q100)	bit-mapped graphics, Epson graphics software, 8 languages, switch selectable
DX 132	impact (9x7)	100	40, 80, 96, 132, 136	Centronics, RS232C (150-9.6K bps, X-on/X-off, DTR, ETX/ACK)	475(Q1); 285(Q100)	bit-mapped graphics, Epson graphics software, 8 languages, switch selectable
SANTEC CORP.						
S700	impact	up to 390	up to 237	RS232C, Centronics (110-9.6K bps, X-on/X-off, ETX/ACK, DTR, Diablo 630 ECS)	3,600(Q1); 2,412(Q100)	dot-addressable, mosaic, and Epson compatible graphics
SIEMENS COMMUNICATION SYSTEMS INC.						
2712	ink jet	270	132	RS232C, current loop, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	2,250(Q1); 1,800(Q100)	bit-mapped and raster graphics, graphic software offered, noise level less than 50 dBa
PT88	ink jet	150	80	RS232C, current loop, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	895(Q1); 555(Q100)	bit-mapped graphics, graphics software offered, printer compatible, noise level less than 45 dBa
PT89	ink jet	150	132	RS232C, Centronics, current loop (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	1,145(Q1); 710(Q100)	bit-mapped graphics, graphic software offered, noise level less than 45 dBa, adjustable tractor, IBM compatible
SMITH-CORONA						
D100	impact	120	80	Centronics; opt RS232C (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	395(Q1)	bit-mapped graphics
D200	impact	25, 120	80	Centronics, RS232C (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	595(Q1)	bit-mapped graphics

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
D300	impact	30, 140	132	Centronics, RS232C (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	795(Q1)	bit-mapped graphics
Fastext 80	impact	80	80	Centronics; opt. RS232C (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	259(Q1)	bit-mapped graphics
STAR MICRONICS INC.						
Delta 10, 15	impact	160		RS232C, Centronics	649(Q1)/799(Q1)	bit-mapped and block graphics
Gemini 10X, 15X	impact	120		RS232C, Centronics	399(Q1)/549(Q1)	bit-mapped graphics
STX-80	thermal	60		parallel	199(Q1)	bit-mapped and block graphics
Radix 10, 15	impact	200		RS232C, Centronics	849(Q1)/995(Q1)	bit-mapped and block graphics
TELETYPE CORP.						
Model 43	impact (7x9)	30	up to 132	RS232C, current loop, integral modem (300 bps, X-on/X-off)		pin tractor or friction paper feed
5310	impact	200	up to 132, programmable	RS232C (up to 9.6K bps, ANSI X3.64, X-on/X-off, Model 43)		bit-mapped graphics, mosaic graphics for Videotex portable; opt. built-in 212A modem-dialer, friction, pin or tractor paper feed, 15 resident char. sets
5320	impact	200	up to 220, programmable	RS232C (up to 9.6K bps, ANSI X3.64, X-on/X-off, Model 43)		bit-mapped graphics, mosaic graphics for Videotex; opt. built-in 212A modem-dialer, friction or snap-on tractor paper feed, 15 resident character sets
TELEX						
TC281B	impact	120	136		900(Q1)	friction feed, up to 127 lines form feed
TC287D		150	132	RS232C, IBM 3274, 3776	5,000(Q1)	int'l character set
TC387	impact	400		RS232C, IBM 3274, 3276 (IBM 3270)	7,200(Q1)	int'l character set, paper jam sensing
TEXAS INSTRUMENTS INC.						
Silent 700, Model 703	thermal	45	80-132	RS232C, current loop	695(Q1)	silent printing; opt. int'l character set
Silent 700, Model 707	thermal	45	80-132	RS232C	595(Q1)	silent printing; opt. int'l character set
810	impact	20, 150	132	RS232C; opt. current loop (110-9.6K bps; opt. DC1/DC3)	1,645(Q1)	raster graphics, adjustable tractor feed
820 RO	impact	150	132	RS232C, current loop (200-9.6K bps, DC1/DC3)	2,165(Q1)	raster graphics, adjustable tractor feed
850	impact	150	50, 66, 80, 134	RS232C, Centronics, current loop (200-9.6K bps, X-on/X-off)	500(Q1)	raster graphics, mosaic graphics, int'l character set
855	impact (9x9)	35, 150	80, 96, 120, 134, 160	RS232C, current loop (200-9.6K bps, DC1/DC3)	935(Q1)	raster graphics, mosaic graphics
TOSHIBA AMERICA INC.						
P1340	impact	54, 144	80	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	995(Q1); 650(Q100)	bit-mapped graphics
P1351	impact	100, 192	136	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	1,895(Q1); 1,400(Q100)	
TRENDATA CORP.						
350	impact	165	132	RS232C, current loop (150-4.8K bps, X-on/X-off, DTR)		opt. APL character set
TRENDCOM/3M						
1912	thermal (8x10)	40	80, 136	RS232C, TTL (300-9.6K bps, X-on/X-off, DTR)	299(Q1)	bit-image graphics, normal and compressed print
1914	thermal (8x10)	40	80, 136	Centronics (ETX)	289(Q1)	bit-image graphics, normal and compressed print

MATRIX CHARACTER PRINTERS

Company Model	Print method (matrix size)	Printing speed (cps)	Chars./line	Interface (bps/protocols)	Price ($)	Notes, features, options
TRENDCOM/3M						
1902	thermal	40	40, 80	RS232C (300-9.6K bps, DTR, X-on/X-off)	259(Q1)	graphics software offered, normal and compressed printing, noiseless
1904	thermal	40	40, 80	Centronics (TTL, X-on/X-off)	249(Q1)	graphics software offered, normal and compressed printing, bit-image graphics
VIVITAR/TRANSTAR						
315	impact	50	80, 106	Centronics	599(Q1)	raster scan graphics, dot plot graphics, prints 4 colors, up to 30 shades on a single pass of print head
WANG LABORATORIES, INC.						
5577	impact (48x16; 96x32)	40, 192	132		5,975(Q1)	bit-mapped graphics, Wang word processing and graphics software offered
WENGER DATENTECHNIK						
Wenger 4/1	impact	130, 600	136	RS232C, RS422, current loop, Centronics (50-19.2K bps, X-on/X-off, DTR, ETX/ACK, ENQ/ACK, ready/busy)	4,218(Q1); 2,720(Q100)	4-color cartridge, bit-mapped and block graphics, bar code sheet feeder, single document inserter, 40K buffer
Print Swiss Matrix	impact	80, 150	80	RS232C, current loop, Centronics (50-9.6K bps, X-on/X-off, DTR, ETX/ACK, ENQ/ACK)	1,550(Q1); 980(Q100)	bit-mapped, block, raster, and vector graphics, 3K buffer; opt. KSR
WESTREX O.E.M. PRODUCTS						
820 Series	impact	150	46	RS232C, Centronics, current loop (300-9.6K bps, CTS, TTY)	265(Q1); 233(Q100)	
850 Series	impact	150	51	RS232C, Centronics, current loop (300-9.6K bps, CTS, TTY)	260(Q1); 228(Q100)	
8400/8410	impact	150	40	RS232C, Centronics, current loop (300-9.6K bps, CTS, TTY)	230(Q1); 280(Q1); 202(Q100); 246(Q100)	
ZENITH DATA SYSTEMS						
Z-125	impact (9x9)	150	135-222	RS232C, current loop (up to 9.6K bps)	1,499(Q1)	bidirectional, connects to modem



When You Ask For A Custom Printer, We'll Do More Than Change The Logo.

Some people think swapping logos and cabinet colors is customizing.

Not C. Itoh.

Ask us to modify one of our standard printers and we'll not only change the outside: your logo, custom defined colors (two-tone if you like), tinted carriage cover, custom tear bar, serial number & ID tags, etc. But we'll also provide an almost endless array of custom features to the inside, including command sets, buffers, custom character or graphic sets, graphic dot density, superscripts & subscripts, interfacing, downloading wheel and impact sequences . . . the list keeps growing.

And so has our product line, which now includes a full spectrum of Daisy and Dot Matrix printers in a wide variety of speeds, sizes and capabilities. Each loaded with the years-ahead features others charge extra for. Each available in large OEM quantities. And each backed by our full warranty and complete support organization.

It all adds up to a total commitment to the OEM market. Something C. Itoh started more than a decade ago. It's just one reason why our roster of OEM customers includes some of the world's largest companies.

So contact us if you need a printer. And if you want it customized, don't worry, we'll do more than change the logo. Call or write C. Itoh Electronics at 5301 Beethoven Street, Los Angeles, CA 90066, Tel. (213) 306-6700. Telex WU 65-2451 ANS B. CIE LSA, Twx 910-343-7446 ANS B. CI ELEC LSA, Facsimile (213) 390-1188.

C.Itoh *Electronics, Inc.*

CIRCLE NO. 54 ON INQUIRY CARD

OEMS, WE KNOW YOUR WORLD.

SOLID FONT CHARACTER PRINTERS

In addition to its reliability and superb print resolution, the **SPRINT 11 PLUS** family provides compatibility with most business computers through user-interchangeable **Qume Connection Interface Modules** (IBM-PC 8-bit parallel, Centronics 8-bit parallel, 13-bit parallel, and RS-232C serial), allowing for more handshaking connections than the newly hired CEO's son. The inexpensive plug-in module concept was derived with the distribution sales channel and end-user in mind, as the distributor supplants a stock of expensive printers with inexpensive modules, while the end-user has the option to upgrade or expand his/her PC system without having to change printers.

The **SPRINT 11 PLUS** family performs printing features such as **boldfacing**, as seen above, and underlining. Superscripting and subscripting are also easily accomplished.

Company Model	Print method	Print speed (cps)	Chars./line	Interface (bps/protocol)	Price ($)	Notes, features, options
ANDERSON JACOBSON INC.						
AJ831	Qume daisywheels	10, 15, 30	132, 158	RS232C (X-on/X-off)		plotting, noise level less than 70 dBa
AJ833	Qume daisywheels	45	132, 158	RS232C (X-on/X-off)	3,650(Q1)	plotting, noise level less than 70 dBa
APPLE COMPUTER						
Daisywheel Printer	Apple daisywheels	40	198	RS232C (1.2K–9.6K bps, ACK, X-on/X-off)	2,195(Q1)	special graphics mode, compatible with Apple and other software; opt. tractor and single sheet feeders
BROTHER INTERNATIONAL CORP.						
HR-15	daisywheel	13	110, 132	RS232C, Centronics (X-on/X-off)	599(Q1); 320(Q100)	prints red
HR-25	daisywheel	23	132, 158	RS232C, Centronics (X-on/X-off)	895(Q1); 550(Q100)	prints red
HR-35	daisywheel	32	132, 158	RS232C, Centronics (X-on/X-off)	1,245(Q1); 750(Q100)	prints red
BLUE CHIP ELECTRONICS INC.						
BCD-2015	Qume daisywheels	20	10, 12, 15 cpi, programmable	Centronics; opt. RS232C, IEEE-488, CCITT V.24 (4.8K bps, X-on/X-off, DTR, ETX/ACK)	895(Q1)	emulates Commodore, Diablo 630, tractor and friction feed, 16K-byte buffer, noise level 46 dBa
BCD-4015	BCD-4015 daisywheel	40	10, 12, 15 cpi, programmable	Centronics; opt. RS232C, IEEE-488, CCITT V.24 (4.8K bps, X-on/X-off, DTR, ETX/ACK)	1,895(Q1)	emulates Commodore, Diablo 630, tractor and friction feed, 1K-byte buffer, noise level 59 dBa
C. ITOH DIGITAL PRODUCTS INC.						
A-10-20	daisywheel	20	100	RS232C, Centronics	795(Q1)	noise level less than 62 dBa, IBM PC compatible
C. ITOH ELECTRONICS						
A-10/30	100-char. daisywheel	30	115	RS232C, Centronics (300–2.4K bps, X-on/X-off, ETX/ACK)	795(Q1)	noise level 65 dBa
F-10/40	Diablo or any 96-char. daisywheel	40	136, 163, variable	RS232C, Centronics (1.2K bps, X-on/X-off, ETX/ACK)	1,750(Q1)	noise level 65 dBa

SOLID FONT CHARACTER PRINTERS

Company Model	Print method	Print speed (cps)	Chars./ line	Interface (bps/protocol)	Price ($)	Notes, features, options
F-10/55	Diablo or any 96-char. daisywheel	55	136, 163, variable	RS232C, Centronics (9.6K bps, X-on/X-off, ETX/ACK)	1,895(Q1)	noise level 65 dBa
Y-10	Diablo daisywheels	15	115	RS232C, Centronics (X-on/X-off, ETX/ACK)	550(Q1)	
COMPUTERS INTERNATIONAL INC.						
Daisywriter 2000A	Brother-compatible daisywheels	10, 12, 15	132, 158, 198, 264	RS232C, current loop, Centronics, 8-bit parallel, IEEE-488 (50–19.3K bps, ETX/ACK, X-on/X-off)		built-in daisyplot graphics (Diablo-compatible), compatible with most other WP software
COMREX INTERNATIONAL INC.						
ComRiter CR-II	daisywheel	12	110, 132, 165	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	599(Q1)	noise level less than 65 dBa, prints red and black, compatible with WP, bidirectional, logic-seeking, tractor and sheet feeder, keyboard
ComRiter CR-III	daisywheel	23	132, 158, 198	RS232C, Centronics (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	995(Q1)	prints black and red, compatible with WP, bidirectional, logic-seeking, tractor and sheet feeder
DATAPOINT CORP.						
9611	daisywheel	30	132, 158, 198	RS232C (1.2K–9.6K bps)	3,495(Q1)	opt. tractor feed assembly
DATA TERMINALS & COMMUNICATIONS						
3802	daisywheel	32	program-mable	RS232C, Centronics, IEEE-488 (19.2K bps, Diablo 630)	1,495(Q1)	prints colors, 48K buffer, noise level 67 dBa, word processing and graphics software
4502	daisywheel	45	program-mable	RS232C, IEEE-488; opt. Centronics (9.6K bps, Diablo 630)	1,595(Q1)	word processing and graphics software, noise level 57 dBa
DIGITAL EQUIPMENT CORP.						
LQP02	daisywheel	32	132, 158	RS232C (75–9.6K bps, X-on/X-off)	2,800(Q1)	daisy aids, software selectable, foreign language printing
DYNAX INC.						
DX-15	Brother daisywheel	13	110, 132, 165	RS232C, Centronics (110–9.6K bps, Diablo 630)	599(Q1)	noise level less than 65 dBa, prints blue, green, brown, red; opt. keyboard
FACIT INC.						
4565	Diablo/Qume daisywheels	40	136	RS232C; opt. current loop (300–2.4K bps, X-on/X-off, DTR, ETX/ACK)	1,595(Q1)	noise level less than 65 dBa, word processing software, tractor and sheet feeder
4560	daisywheel	22	130	RS232C; opt. current loop (300–9.6K bps, X-on/X-off, DTR, ETX /ACK)	895(Q1)	noise level less than 60 dBa, word processing software, tractor and sheet feeder
FUJITSU AMERICA INC.						
SP320	daisywheel, Diablo/Qume compatible	48	10, 12, 18 cpi	RS232C, current loop, Centronics (150-9.6K bps, X-on/X-off, ETX/ACK, DTR)	1,499(Q1); 945(Q100)	noise level 60 dBa, vector plotting, Diablo 630 compatibility, cut sheet and tractor feed
SP830	daisywheel, Diablo/Qume compatible	80	10, 12, 18 cpi	RS232C, current loop, Centronics (150-9.6K bps, X-on/X-off, ETX/ACK, DTR)	2,950(Q1); 1,840 (Q100)	noise level 60 dBa, vector plotting, unidirectional and bidirectional, cut sheet and tractor feeder, Diablo 630 protocol compatibility
HEWLETT-PACKARD CO.						
2601A	daisywheel	40	132, 158	RS232C (110-9.6K bps, X-on/X-off, DTR, ETX/ACK)	3,520(Q1)	emulates Diablo printers, compatible with most word-processing software
2602A	daisywheel	25	132, 158	RS232C, IEEE-488 (110-1.2K bps, X-on/X-off, DTR, ETX/ACK)	1,545(Q1)	emulates Diablo printers, compatible with most word-processing software
HONEYWELL						
Model 25 PRU 7200/7201/7202	Qume daisywheel	55	136	RS232C, RS422 Honeywell	3,350(Q1)	supported on Honeywell office automation systems
Model 23 PRU 7007/7009/7017	NEC thimble	35	136	RS232C, RS422	2,450/ 2,700(Q1)	supported on Honeywell office automation systems

NO OTHER CUT-SHEET FEEDER GUARANTEES RELIABILITY LIKE WE DO

ELECTRONICS MAKES THE DIFFERENCE

When evaluating a cut-sheet feeder to increase the productivity of your word processing system, compare the Ziyad® Z-300 Intelligent Paper Processor™ to all other cut-sheet feeders. The difference is obvious.

The Z-300 is the only cut-sheet, dual tray and envelope feeder that electronically captures both name and address from a typed letterhead and automatically delivers a typed envelope collated with your letter.

This single feature alone makes all other sheet feeders obsolete.

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Microprocessors, sensors, and three drive motors constantly monitor and drive paper and envelope flow through the Ziyad Z-300. If trays are empty or if a misfeed should occur, the Z-300 immediately stops—eliminating platen printing. It memorizes typing position and automatically alerts the operator with an audible and visual signal.

Electronics Means Reliability
Proven performance has made us the leader in the industry. Ask any of the 22 world's leading manufacturers of word processing equipment who have chosen to sell the Z-300 under their own name. It's reliable...with an MTBF of 6000 hours. That's why more than 100,000 Ziyad products will be sold this year.

Don't compromise your electronic word processing system with any other sheet feeder. Add the electronic cut-sheet feeder that outperforms all others—the Ziyad Z-300 Intelligent Paper Processor.™

Call Sue Turner, 201/627-7600 today.

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CIRCLE NO. 55 ON INQUIRY CARD

Okidata Printers at Hall-Mark.

HALL-MARK

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Baltimore 301/988-9800
Ft. Lauderdale 305/971-9280
Huntsville 205/837-8700
Orlando 305/855-4020
Raleigh 919/872-0712
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CIRCLE NO. 56 ON INQUIRY CARD

SOLID FONT CHARACTER PRINTERS

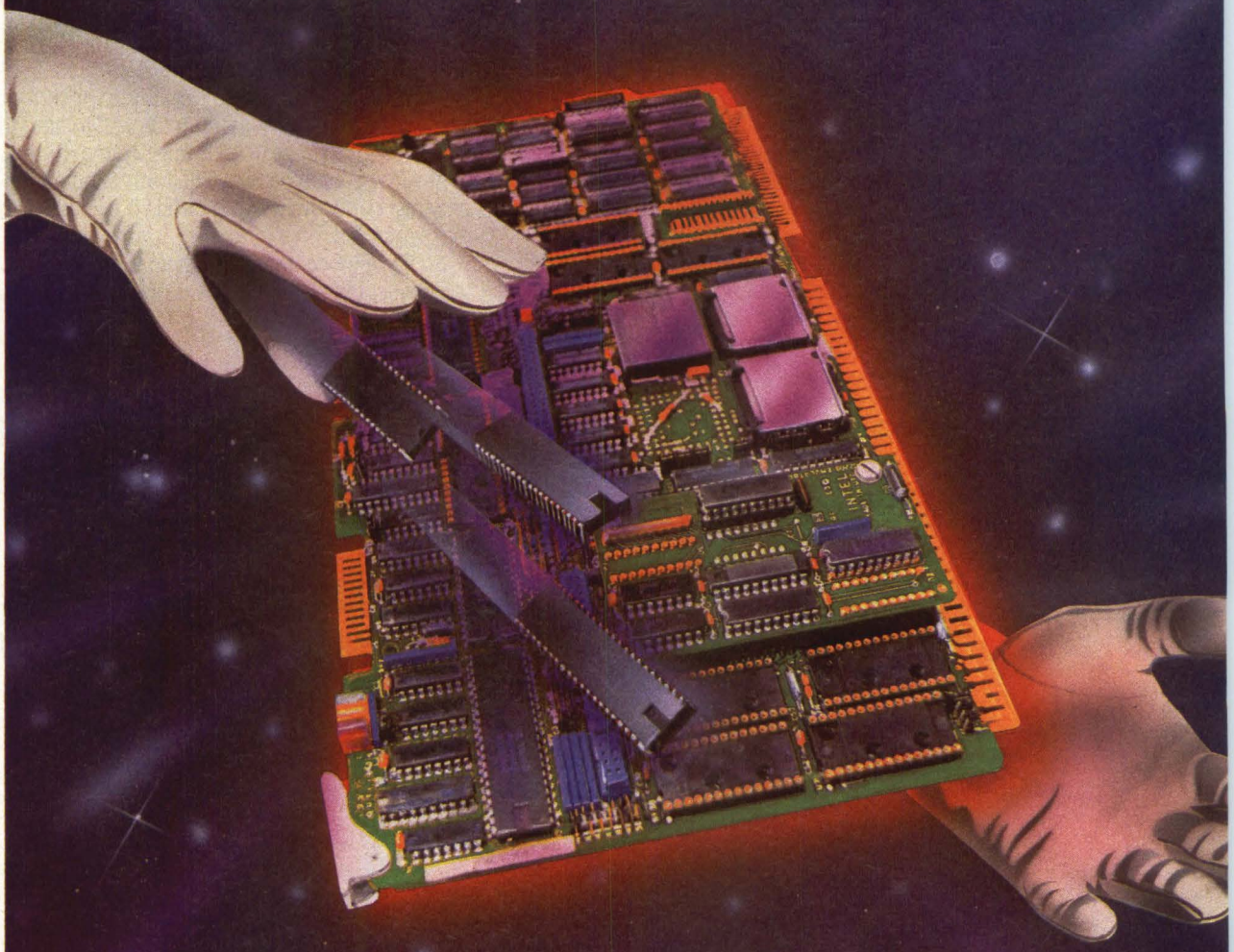
Company Model	Print method	Print speed (cps)	Chars./line	Interface (bps/protocol)	Price ($)	Notes, features, options
JUKI INDUSTRIES OF AMERICA INC.						
6100	daisywheel	18	165	RS232C, current loop, Centronics (300–2.4K bps, DTR, X-on/X-off, DC1/DC3, ETX/ACK)	599(Q1)	noise level less than 62 dBa, emulates Diablo 630; opt. serial interface
6300	daisywheel	40	197	RS232C, Centronics (up to 9.6K bps, X-on/X-off, DTR, DC1/DC3, printer ready, ETX/ACK)	1,000(Q1)	noise level less than 60 dBa; opt. tractor feed
MECHATRON SYSTEMS INC.						
Series 50	Silver Reed or Mechatron printwheels	42, 50	132, 158, 197, proportional	RS232C, current loop, Centronics, Diablo, Qume (110–9.6K bps, X-on/X-off)	1,595(Q1)	noise level less than 60 dBa
Series 70	Silver Reed or Mechatron printwheels	62, 70	132, 158, 197, proportional	RS232C, current loop, Centronics, Diablo, Qume (110–9.6K bps, X-on/X-off)	1,995(Q1)	noise level less than 60 dBa
NEC HOME ELECTRONICS						
Authentic 15 LQ	Diablo daisywheels	14	101, 121, 151, programmable	parallel	695(Q1)	noise level less than 65 dBa, tractor feed
NCR CORP.						
6455	thimble	33	136	RS232C (9.6K bps)		noise level 60 dBa, Wordwise WordStar, 2-color ribbon
PANASONIC INDUSTRIAL CO./COMPUTER PRODUCTS DIV.						
KXP3151	Diablo-compatible daisywheels	21, 22	132, 158, 198, programmable	Centronics; opt. RS232C (110–9.6K bps, X-on/X-off, DTR, ETX/ACK)	699(Q1)	7K-byte buffer, compatible with most software, noise level 63 dBa; opt. tractor and cut sheet feeder
PERSONAL MICRO COMPUTERS INC.						
ETF-80	IBM ball	10, 12	10, 12 cpi	Centronics	395(Q1); 275(Q100)	noise less than 50 dBa, converts IBM selectric/electronic typewriter into letter quality printers
PRIMAGES INC.						
Primage 1	daisywheel	45	135, 162, 202	RS232C, Centronics (110–9.6K bps, X-on/X-off, DTR, ETX/ACK, Diablo 630)	1,875(Q1)	noise level less than 62 dBa, compatible with most word processing packages, sheet feeder, multilingual (without changing printwheels)
PRINTER SYSTEMS CORP.						
DP-35	daisywheel	30	10, 12, 15 cpi	Centronics, Dataproducts, IBM System 34/36/38 (X-on/X-off)		noise level less than 60 dBa, automatic sheet feeder, bidirectional, word processing
DP-55	daisywheel	50	132	IBM Systems S/34, S/36, S/38, 3270 (X-on/X-off)		noise level 60 dBa, IBM compatible, 3K input buffer
SAMLECO						
Director DY-40	Samleco daisywheel	40–55	136	RS232C, Centronics, current loop, IEEE (4.8K bps, X-on/X-off DTR, ETX/ACK, DEC, IBM emulation)	1,000(Q1); 550(Q100)	Diablo 630 compatible, prints red, compatible with most word processing packages, noise level under 60 dBa, auto load of single sheets
SANYO BUSINESS SYSTEMS						
PR5000	daisywheel	14	10, 12, 15 cpi	Centronics (X-on/X-off)	595(Q1)	word processing software
PR5500	daisywheel	15–16	10, 12, 15 cpi	Centronics (X-on/X-off)	995(Q1)	word processing software
SILVER REED AMERICA						
EXP400	daisywheel	10	80	Centronics	399(Q1)	
EXP550	daisywheel	17	132	RS232C; Centronics (300–9.6K bps, X-on/X-off, ETX/ACK, ready/busy)	699(Q1)	
EXP500	daisywheel	14	100	RS232C, Centronics (900–9.6K bps, X-on/X-off, ETX/ACK, ready/busy)	649(Q1)	

SOLID FONT CHARACTER PRINTERS

Solid font character printers

Company Model	Print method	Print speed (cps)	Chars./ line	Interface (bps/protocol)	Price ($)	Notes, features, options
EXP770	daisywheel	31	132	RS232C, Centronics (300–9.6K bps, X-on/X-off, ETX/ACK, ready/busy)	1,295(Q1)	noise level 65 dBa
SMITH-CORONA						
L-1000	SCM daisywheel	12	105, 126, 157	Centronics, RS232C (50–19.2K bps, X-on/X-off, DTR)	545(Q1)	noise level 67 dBa
STAR MICRONICS						
Powertype	daisywheel	18		RS232C, Centronics	199(Q1)	
SWINTEC CORP.						
Compumate 2100	100 char. daisywheel	15, 22	115, 138, 172	RS232C, Centronics (110–9.6K bps, X-on/X-off, DTR)	649(Q1)	less than 65 dBa noise level, color ribbon cassettes, box/chart graphics, letter quality, tractor feed, bidirectional printing
TELEX						
TC286F	daisywheel	60, 80	96, 127	IBM 3274, 3276; Telex 174, 274, 276 (IBM 3270)	5,750(Q1)	friction platen, opt. single sheet feeder
TRENDATA CORP.						
8300	Diablo/Qume daisywheel	30	132, 158	RS232C (300 bps, X-on/X-off, DTR, ETX/ACK)		
8600	Diablo/Qume daisywheel	40	132, 158	RS232C (150–9.6K bps, X-on/X-off, ETX/ACK, DTR)		proportional spacing
VIVITAR TRANSTAR						
120	daisywheel	14	100, 120, 150, programmable	RS232C, Centronics (300–9.6K bps, X-on/X-off, DTR, ETX/ACK)	550(Q1)	uses Diablo 1610/1620 routines, noise level less than 65 dBa
130	daisywheel	18	150, 180, programmable	RS232C, Centronics (300–9.6K bps, X-on/X-off, DTR, ETX/ACK)	699(Q1)	uses Diablo 1610/1620 routines, auto load, proportional spacing, noise level less than 65 dBa
140	Diablo 630-compatible daisywheels	40	150, 180, programmable	RS232C (300–2.4K bps, X-on/X-off, DTR, ETX/ACK)	1,695(Q1)	uses Diablo 1610/1620 routines, proportional spacing, noise level less than 65 dBa
WANG LABS INC.						
DW/0555	daisywheel	55	132–198		5,000(Q1)	Wang word processing software, dual sheet feeder
PC-PM014	daisywheel	50–55			2,995(Q1)	Wang word processing software, diagnostics
RC-PM012	daisywheel	20	132–198	RS232C	1,295(Q1)	Wang word processing software, bidirectional forms tractors

AN 80286 SYSTEM THIS QUICK? ONLY WHEN IT'S...



INTEL from HAMILTON/AVNET

Like magic, the new 80286 microprocessor family from Intel has been transformed into a single board computer: the iSBC* 286/10, already appearing before your eyes at Hamilton/Avnet. It's one of the many ways for you to get the performance of the 80286 into your application, fast.

Just install the iSBC 286/10 in your system, and presto!—you get twice the performance of previous CPUs. The 80286 makes it the most powerful microcomputer board on the market. So that this performance can be unleashed in both real-time and memory-intensive applications, it is supported by iRMX* and Xenix** operating systems.

Add to this Intel's "Open Systems" concept, which helps you customize the system with Intel memory boards, communications boards, peripheral controller boards, graphic boards and iSBX Multimodules.* It's all at Hamilton/Avnet, ready to materialize at your door as soon as you give the word. Call now, and for help getting started, less expensively, be sure to ask us about the "Perfect 10" program.

CIRCLE NO. 57 ON INQUIRY CARD

Hamilton/Avnet ELECTRONICS — AN AVNET COMPANY

A commitment to stock and serve your local market!

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Hitachi disk drives are here. In Hitachi America.

At Hitachi, we've been building disks for 20 years. But we've also been building something more important.

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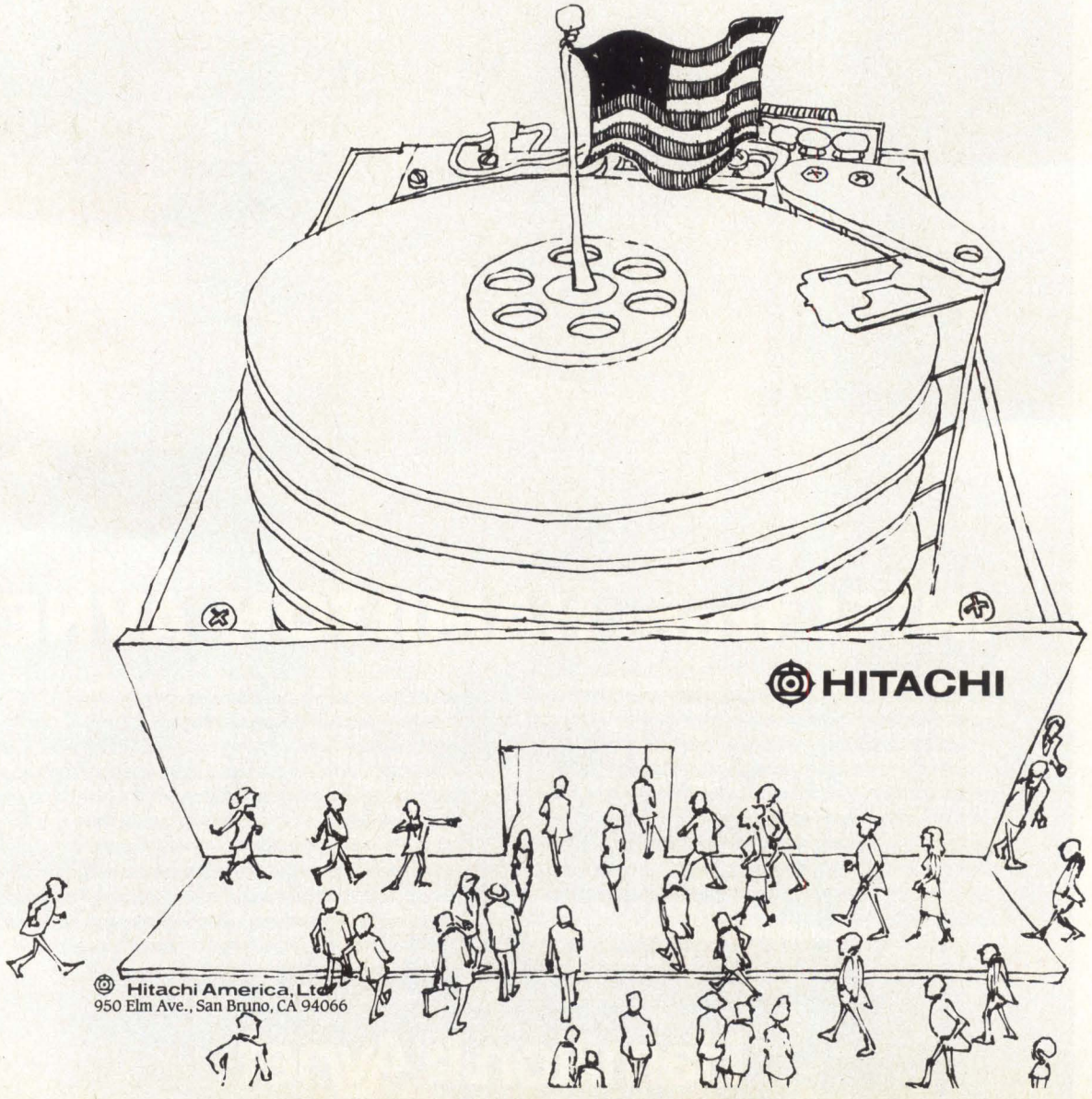
So if you need immediate help with your OEM product, or you're just planning your next one, consider Hitachi. Our disks are here, and so are we.



Hitachi America, Ltd.
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CIRCLE NO. 58 ON INQUIRY CARD

UDS Modems at Hall-Mark.

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CIRCLE NO. 59 ON INQUIRY CARD

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CIRCLE NO. 60 ON INQUIRY CARD

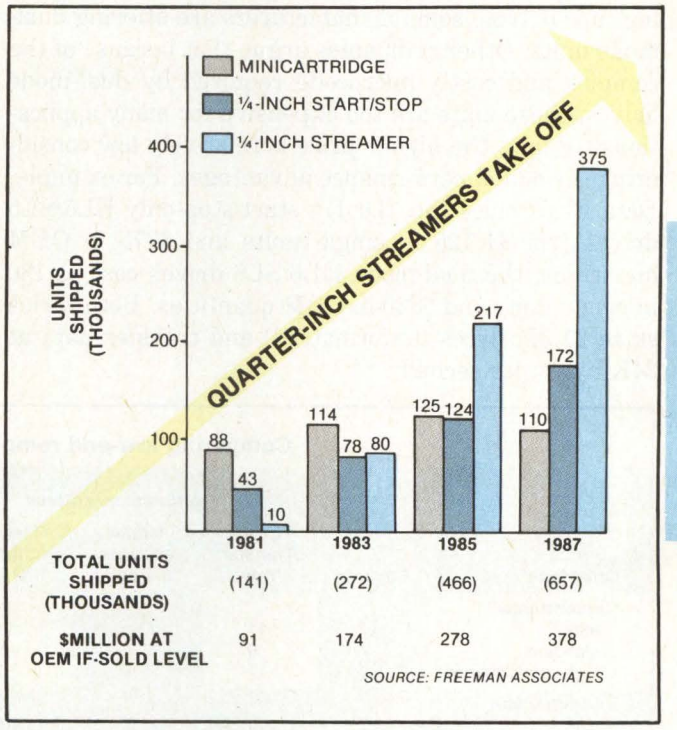
Quarter-inch cartridges command tape drive market

Led by streamers, ¼-inch tape cartridge drives fulfill 10M- to 130M-byte backup requirements

David Simpson, Associate Editor

Driven by sharp demand for inexpensive Winchester disk backup, some segments of the tape drive industry are experiencing unparalleled growth. For example, shipments of ¼-inch streaming-tape cartridge drives are expected to grow at an 84 percent annual rate over the next three years, according to Freeman Associates, a Santa Barbara, Calif., management consulting and research company. Nevertheless, manufacturers of start/stop drives are holding their own, despite the strong competition from their streaming counterparts, and cassette-drive manufacturers are carving niches in the low-end backup market.

However, competition is not entirely confined to the tape drive industry. The system integrator in search of secondary storage must consider alternative technologies, including floppy disk drives and removable disk cartridges. Determining the appropriate trade offs between performance, cost and capacity is the first step in purchasing backup storage devices.



Recent introductions highlight trends

Quarter-inch tape drives address 10M- to 130M-byte backup requirements. A major trend in this market segment is a move away from start/stop drives toward streamers and dual-mode drives. Also, most drive manufacturers are introducing products with higher capacities, faster transfer rates and smaller form factors.

Start/stop drives are preferred for applications such as selective file backup because of their search and record capability. Streamers, on the other hand, are optimized for continous recording and are typically used to record the entire contents of a disk drive in a single session. Streamers write data using a microprocessor-controlled servo system, thus avoiding costly start/stop mechanisms.

Aside from faster throughput, streamers usually offer higher capacities because of better tape utilization. Streamers use as much as 97 percent of a tape whereas start/stop drives typically use a maximum of 70 percent of a tape.

A recently introduced example of the trend toward high-capacity streamers is North Atlantic Industries' Qantex Division's JetStream 16, a ¼-inch streamer that packs 99M bytes (formatted) on a 555-foot 3M DC300XL-type cartridge. It has a burst transfer rate

of 400K bytes per second with an average streaming rate of 72K bytes per second. The drive records at 8,000 bits per inch (bpi).

The JetStream 16 is the first drive to read and write on 9 or 16 tracks, which facilitates conversion from 9- to 16-track systems. According to Heinz Findeisen, director of mass storage at Qantex's Hopkinton, Mass., facility, the JetStream 16 can more than halve the amount of tape usually required by 9-track systems, while retaining complete compatibility. "If the customer has to send tapes out in a 9-track format, he can command the JetStream 16 to write in 9-track mode via a software switch."

Another high-capacity ¼-inch streamer is Northern Telecom Inc.'s 6112, which holds 100M bytes on 12 tracks with 10,000-bpi recording. High throughput enables the 6112 to dump 100M bytes in 19 minutes.

Combining the advantages of start/stop and streaming tape drives, some manufacturers are offering dual-mode units. Other companies argue that because of the complex and costly microcode required by dual-mode drives, these units are too expensive for many applications. In fact, the higher price is relatively low considering the added performance advantages. For example, Data Electronics Inc. (DEI)'s start/stop-only EL5/SL5 drives cost $1,125 in single units and $775 in OEM quantities; the dual-mode EL6/SL6 drives cost $1,180 in single units and $830 in OEM quantities. Both series store 21.3M bytes (unformatted) and transfer data at 24K bytes per second.

The leaders in shipments of ¼-inch start/stop drives are DEI, Kennedy Co. and 3M. Leaders in the ¼-inch streamer market include Archive Corp. with a 50 percent share, 3M with 16 percent, DEI with 13 percent and Cipher Data Products Inc. with 12 percent, according to Freeman Associates' figures for 1983.

Manufacturers switch to smaller form factors

Reacting to similar developments in the Winchester market, manufacturers are moving from 8-inch to 5¼-inch form factors. About 60 percent of all ¼-inch tape cartridge drives are in the 5¼-inch form factor; 30 percent are in the 8-inch form factor. Two years ago, the split was about even.

To enable two drives to fit in the space formerly occupied by one, manufacturers are also turning to half-height versions. Half-height, 5-¼-inch drives include Archive's 20M-byte and 45M-byte Scorpion drives, DEI's 60M-byte Mini-QIC Stream III, Kennedy's 60M-byte 6500, Tandberg Data Inc.'s 20M- to 60M-byte QIC-STOR Mark II and Wangtek Inc.'s 60M-byte PC-36 and SCSI-36.

Smaller form factors are also available via minicartridges, which use 0.15-inch tape. The performance leaders are Irwin Magnetics Inc.'s 110 and 210 drives. Operating at 40 inches per second, the drives hold 10M bytes on 8-track, 6,400-bpi tape. The 210 occupies a 1.625-inch-by-4-inch-by-4.96-inch space, which fits the full-height 3½-inch form factor; the 110 is a half-height, 5¼-inch drive. Both models use 3M's recently devel-

Comparing low-end removable media product classes

	Performance criteria					Price criteria			
Drive type	Capacity	Transfer rate	Media changes 10M bytes	Transfer time 10M bytes	Composite rank	Systems formatted	System $/M byte	Media $/M byte	Composite rank
Cassette tape									
mini	11	11	11	11	11	1	11	11	9
standard	7	9	7	9	8	8	8	5	8
high performance	3	7	1	7	6	4	3	2	1
Cartridge tape									
mini	9	9	9	10	10	4	10	10	9
Irwin mini	4	3	4	3	5	6	4	4	4
¼-inch start/stop	2	4	1	4	4	8	2	3	3
¼-inch streaming	1	4	1	4	1	10	1	1	2
Flexible disk									
5¼-inch	9	8	9	8	9	2	9	7	6
8-inch	8	4	8	4	7	3	7	6	5
Cartridge disk									
3.9-inch	4	1	4	1	1	6	4	8	6
5¼-inch	4	1	4	1	1	11	6	9	11

1 = Highest ranking

Source: Freeman Associates

Quarter-inch cartridges *rank high among low-end removable-media product classes. The table was prepared by taking the most efficient configuration in each product category and analyzing performance and price data. The ranking does not take into account form factors or other specific criteria that might eliminate an otherwise suitable candidate because of unique application requirements.*

oped DC1000 minicartridge, which boasts 550-oersted media in contrast to the 320-oersted tape used in the standard DC100 and DC300 cartridges.

Freeman Associates expects shipments of ¼-inch tape drives to grow from 158,000 units in 1983 to over 547,000 in 1987. If 0.15-inch minicartridges are included, the market share of ¼-inch streamers will jump from 7 percent in 1981 to 57 percent in 1987. Considered separately, the minicartridge share will drop from 62 percent to 29 percent. Quarter-inch start/stop drives are expected to maintain a 26 percent to 30 percent share.

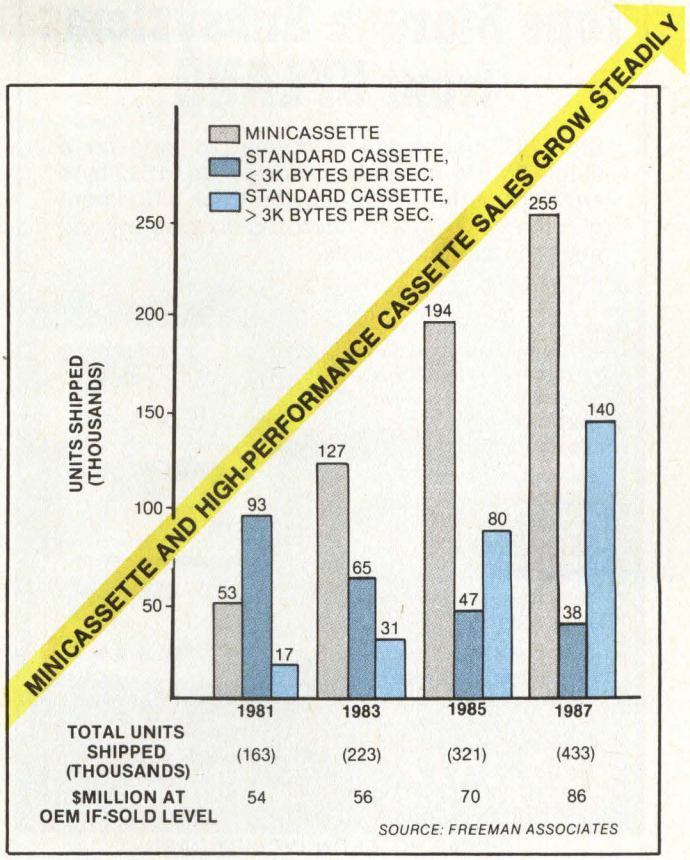
Comparing cost/performance/capacity criteria

Quarter-inch tape cartridge drives command the middle range of the tape drive market, but competition is coming from both the high and low ends. At the high end, ½-inch tape cartridge drives from companies such as IBM Corp., MegaTape Corp., Rosscomp Corp. and Tandon Corp. are targeting the 200M- to 500M-byte range. Scaled-down ½-inch reel-to-reel units such as Cipher's Microstreamer and CacheTape are targeting the 50M- to 100M-byte range.

Although they are comparatively low in capacity, two factors favor ¼-inch drives: they're typically smaller, which facilitates integration into desktop systems, and they're not plagued by a lack of standards, as are ½-inch drives. Half-inch and ¼-inch drives probably won't compete directly until the ¼-inch units reach the capacities of ½-inch units. (*MMS* will cover ½-inch cartridge tape drives in detail in the *Spring Peripherals Digest.*)

Another competitor to ¼-inch tape drives is the removable disk cartridge. These units offer integrators an attractive alternative, should the application call for very high performance at the expense of higher cost. Disk cartridges exhibit higher transfer rates, but fall short in price comparisons. However, manufacturers are reducing disk cartridges from 8-inch to 5¼-inch and smaller packages, and may provide stiff competition for ¼-inch tape units, if they can lower drive and media costs.

At the low end (e.g., under 10M bytes), integrators can choose from ¼-inch cartridges, minicartridges,



Tape drives

Tape industry adopts Small Computer System Interface

Some manufacturers in the ¼-inch tape cartridge market are offering drives with the Small Computer System Interface (SCSI), which is an industry standard for 5¼-inch Winchesters. SCSI is a specification for a peripheral bus and command set. The SCSI interface allows host-independent data distribution among a variety of peripheral devices.

"We consider the SCSI standard for ¼-inch tape drives to be the new direction of the industry," says Larry Hemmerich, vice president and general manager of Cipher Data Products Inc.'s OEM marketing division. Cipher cites the benefits of the SCSI interface as lower system cost because of a shared controller; increased performance because it frees the host computer for other tasks by supporting off-line drive-to-tape or tape-to-drive copying; and reduced bus congestion by queuing simultaneously received commands. These capabilities are a result of built-in intelligence in the SCSI interface. Cipher added the SCSI interface to its line of 540 tape drives in July.

Other manufacturers offering the SCSI interface on ¼-inch-tape cartridge drives include Data Electronics Inc., Moya Corp., North Atlantic Industries' Qantex Division, Wangtek Inc. and 3M.

Qantex's director of mass storage, Heinz Findeisen, says that "the leverage of SCSI is the architectural advantage of having a highly structured and layered protocol to couple a host operating system to a device. The connection is totally transparent and device-independent." With Winchester disks the primary advantage is the ability to hook tape drives and disk drives to the same controller, but SCSI also enables software-transparent connection of virtually any peripheral device. (For a detailed discussion of the SCSI bus/interface, see MMS, May, Page 241.)

cassettes and floppies. The drawback to low-end ¼-inch cartridges is cost. Minicassettes, high-performance standard cassettes and floppies typically offer better cost/performance ratios. As a result, ¼-inch drive manufacturers are forsaking the low end and are concentrating on raising capacities.

Minicartridges provide another low-end alternative, but analysts predict tough times for this product class because of stiff competition from high-performance cassettes and floppies. Minicartridges typically have low transfer rates and capacities. Irwin's 110 and 210 are exceptions, with their 10M bytes and data-transfer rate of 31.2K bytes per second. Freeman Associates sees 1984 as the peak year for minicartridges, with 127,000 units shipped. Shipments are expected to decline to 110,000 units in 1987.

If price and size are the major considerations—even at the expense of some capacity—cassettes provide an attractive low-end solution. Most cassettes hold less than 1M byte, but a notable exception is Memtec Corp.'s line of 12.4M- to 43.9M-byte streaming cassette drives. The high-end model 440 boasts 43.9M bytes using 0.15-inch tape with a data-transfer rate of 112.5K bytes per second. Bolstering market acceptance of high-performance cassettes, Memtec created a second source for its drives in Raymond Engineering Inc.

Analysts expect unit shipments of cassettes that transfer data at less than 3K bytes per second to decrease because of competition from minicassettes, floppies and high-performance (e.g., more than 3K bytes per second) cassettes. For example, Freeman Associates forecasts a 14 percent negative compound annual growth rate, pegging 1984 shipments at 54,000 and 1987 shipments at 38,000.

On the other hand, Freeman Associates expects shipments of over-3K-bytes-per-second cassette drives to go from 53,000 units in 1984 to 140,000 units in 1987, representing a 42 percent annual growth rate. The major application area for these units is 5¼-inch and 3½-inch Winchester disk.

Floppy disk drives are generally considered impractical for applications requiring over 10M bytes because these capacities require so many disks. However, they compete with cartridges and cassettes in the under-10M-byte range because of their low cost, low error rates, and random access capability. In addition, floppies are the most common media for transporting software. □

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High 810 Medium 811 Low 812

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TD-1050

The TD-1050 Series is a 45 ips true start/stop, dual mode, tape drive available with internal formatters and controllers, featuring 800 (NRZI)/1600 (P.E.) bpi operation.

TD-1012

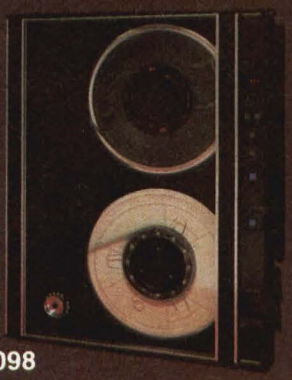
The TD-1012 Series tape drives are available in three mounting configurations (drawer, vertical or desk top) and feature 12.5 ips true start/stop and 100 ips streaming operation.

TD-1099

Offering fully automatic load and tape threading, the TD-1099 Series tape drives operate at 25/100 ips streaming with data formatting for 1600 (P.E.) bpi. The formatter is embedded and intelligent controller options are available.

TD-1089

The TD-1089 Series tape drives offer both 50 ips true start/stop and 100 ips streaming operation at 1600 (P.E.) bpi. The formatter is embedded and intelligent controller options are available.



TD-1098

This compact 7″ reel tape drive offers fully automatic load and tape threading, operation at 25/100 ips streaming with data formatting for 1600 (P.E.) bpi and embedded formatter. Intelligent controller options are also available.

TD-1750

Mechanically rugged and featuring advanced engineering, the TD-1750 Series tape drives offer true start/stop, dual mode, operation at 75 ips. Available with internal formatters and controllers and a unique active compliance arm technique that permits whisper-quiet operation.

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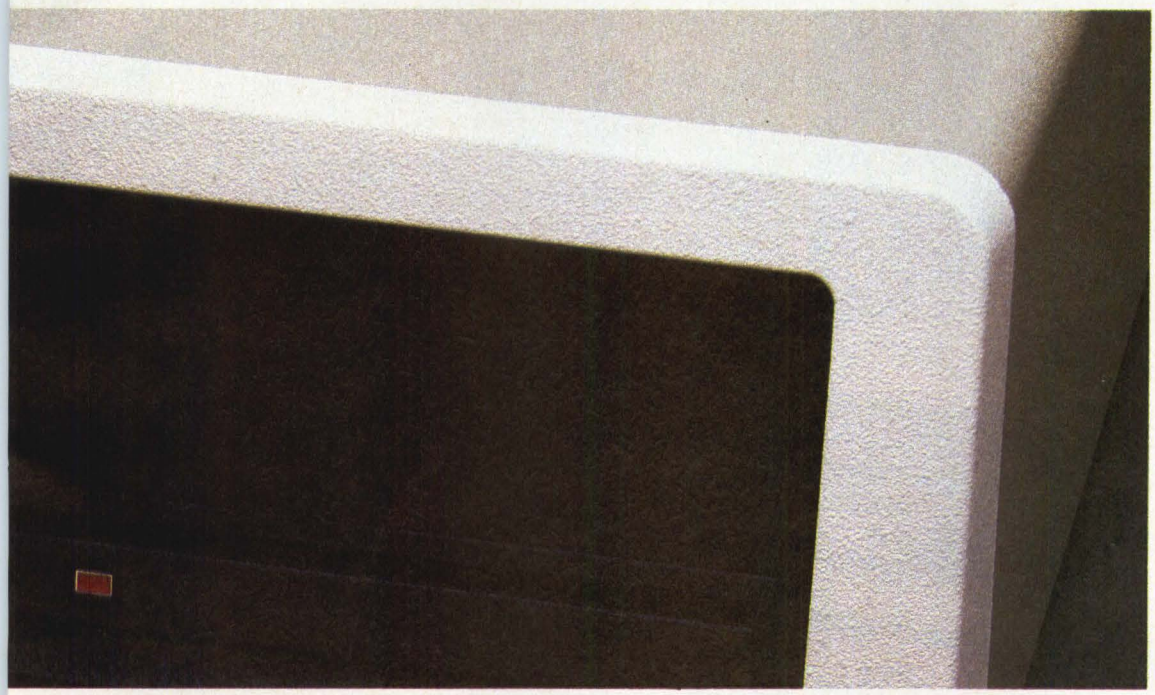

ity. And customers who demand dependability and the simplicity of tape backup.

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The time's right for Archive. We've got the right product for you. At the right price. With the right support.

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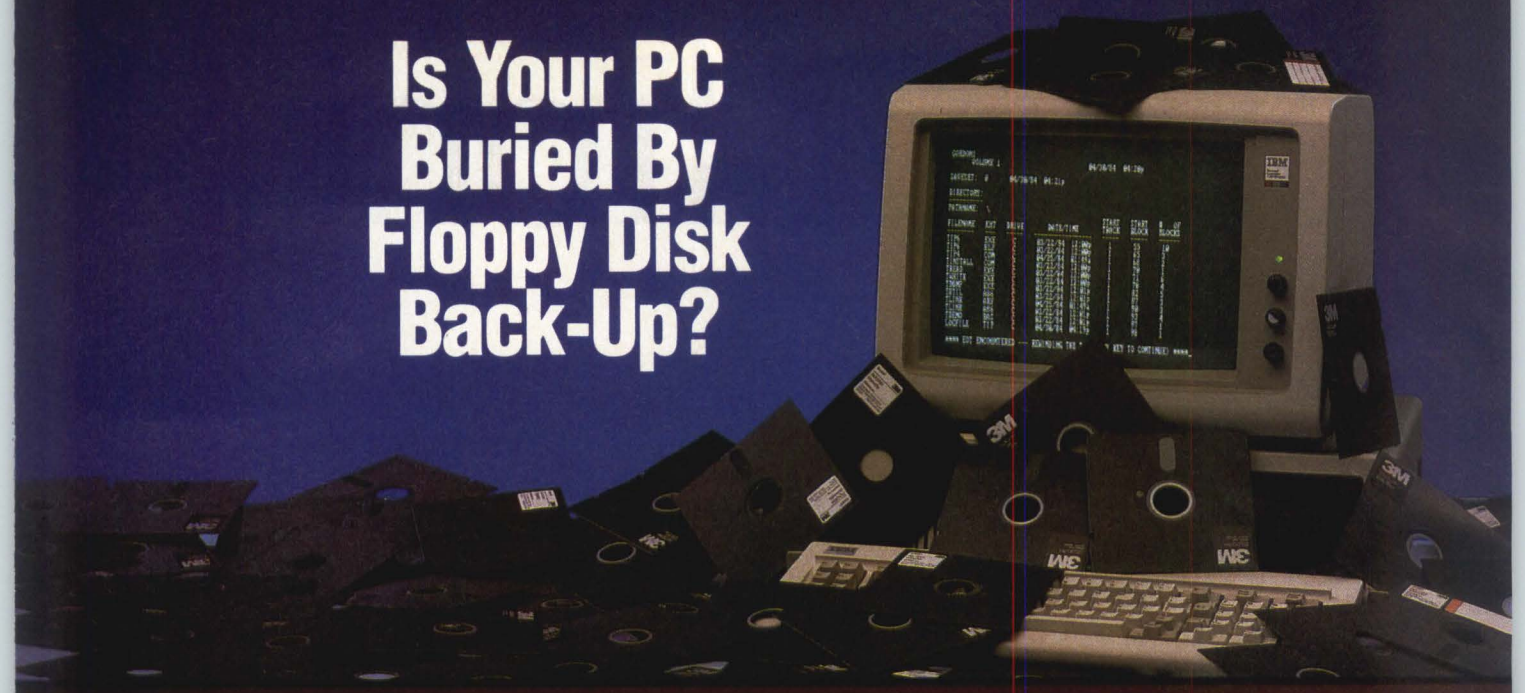

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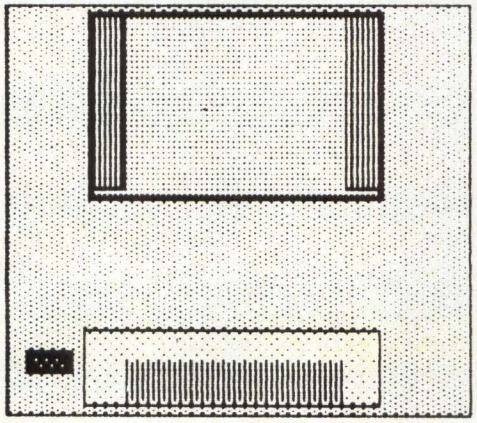
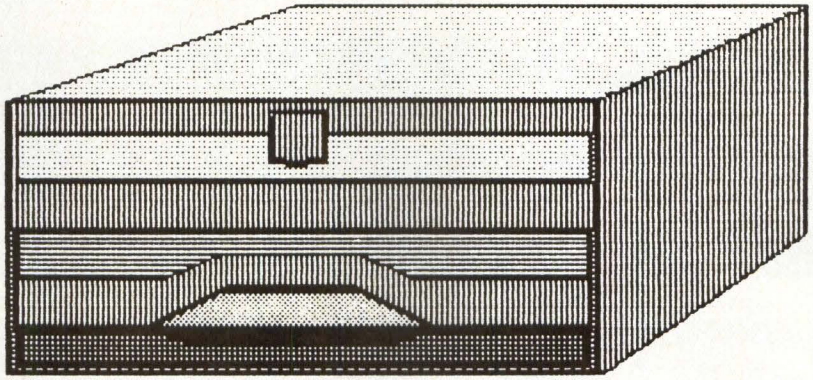
¼-INCH AND SMALLER CASSETTE/CARTRIDGE TAPE DRIVES AND SUBSYSTEMS





Company Model	Drive type	Tape size (inches)	Operating mode	Storage capacity (M bytes)	No. of tracks	Recording density (bpi)	Tape speed (ips)	Data transfer rate (K bytes/sec.)	Interfaces	Dimensions (HxWxD inches)	Price ($) (Quantity)	Notes, features, options
3M DATA RECORDING PRODUCTS DIVISION												
HCD-75/60	cartridge	.25	start/stop, streaming	67 (formatted)	16	10000	60	35	RS232C, SCSI	4.5x6.8x8.6 (internal)	874(Q1)	
ADVANCED DIGITAL INFORMATION												
	cartridge, subsystem	.125	start/stop, streaming	67.1 (formatted)	16	10000	60, 90	35	RS232C, QIC-02, Q-bus, IEEE-488, GPIB, S-100, SASI, SCSI	12x20x6 (rackmount)	3,100(Q1); 1,900(Q500)	
ALGO INC.												
1200S	cartridge	.25	start/stop	5.3 (formatted)	4	1600	30	19.2	RS232C	7.25x5.5x14 (standalone)	2,245(Q1); 1,796(Q500)	power fail restart, serpentine recording, manual or micro control, selectable power supply
1200i	cartridge	.25	start/stop	5.3 (formatted)	4	1600	30	30	IEEE-488, RS232C	7.25x5.5x14 (standalone)	2,345(Q1); 1,796(Q500)	power fail restart, serpentine recording, manual or micro control, selectable power supply
ALLOY COMPUTER PRODUCTS INC.												
PC-BACKUP	cartridge, subsystem	.25	start/stop	16.5 (formatted)	4	6400	30	15	IBM PC, XT; Compaq, Corona, TI Prof., Columbia Data, Eagle	5x8.5x16 (standalone)	2,195(Q1)	operates under PC-DOS and/or CP/M-86
IDXS 100	cartridge, subsystem	.25	start/stop	16.5 (formatted)	4	6400	30	15	S-100	5x8.5x16 (standalone)	2,295(Q1)	software included, operates under PC-DOS and/or CP/M-86
DZ-80	cartridge, subsystem	.25	start/stop	16.5 (formatted)	4	6400	30	11	Intertec, Compustar Model 30 or 40, Kaypro	5x8.5x16 (standalone)	2,295(Q1)	TIP software included, operates under PC-DOS and/or CP/M-86
ANALOG & DIGITAL PERIPHERALS INC.												
Model 1	cartridge	.25	start/stop	158	1	800	30		TTL serial	2.5x4x6	210(Q100)	
Model 2	cartridge	.25	start/stop	.5	2	1600	30		TTL serial	2.5x4x6	305(Q100)	
ADPI Byte Bucket	cassette	.25	start/stop	.5	1	800	15	1.5	RS232C, IEEE-488, NCR	6x4.5x9	780(Q100)	

¼-INCH AND SMALLER CASSETTE/CARTRIDGE TAPE DRIVES AND SUBSYSTEMS

Company Model	Drive type	Tape size (inches)	Operating mode	Storage capacity (M bytes)	No. of tracks	Recording density (bpi)	Tape speed (ips)	Data transfer rate (K bytes/sec.)	Interfaces	Dimensions (HxWxD inches)	Price ($) (Quantity)	Notes, features, options
ADPI Megabyte Bucket	cassette	.25	start/stop	1	2	1600	15	3	RS232C	6x4.5x9	795(Q100)	
Cassette System 1	cassette	.25	start/stop	.5	2	800	5	.5	RS232C, 8-bit parallel	4x8.5x9.5	723(Q100)	
Cassette System II	cassette	.25	start/stop	1	2	1600	5	1	RS232C, 8-bit parallel	4x8.5x9.5	873(Q100)	
DC300	cartridge	.25	start/stop	12	4	6400	30	6	TTL serial, CMOS	8x7x8	985(Q100)	
Feedback 340	cartridge	.25	start/stop	4	4	1600	30	6	RS232C, RS422		2,195	
Feedback 344	cartridge	.25	start/stop	12	4	6400	30	24	RS232C, RS422	8x8x13	2,250(Q100)	
L61	cassette	.25	start/stop	.1	1		18	.75	RS232C, 8-bit parallel	3.5x3x6	388(Q100)	
L62	cassette	.25	start/stop	.2	1		18	1.2	RS232C, 8-bit parallel	3.5x3x6	438(Q100)	
MDCR1	cassette	.25	start/stop	.1	1	330–560	18	.75	TTL serial	3x3.5x3	156(Q100)	
MDCR2	cassette	.25	start/stop	.2	2	330–560	18	1.2	TTL serial	3x3.5x3	175(Q100)	
Mini DC 1	cartridge	.25	start/stop	.25	2	800	30	24	RS232C, 8-bit parallel	6x5.5x7	620(Q100)	
Mini DC 2	cassette	.25	start/stop	.5	2	1600	30	48	RS232C, 8-bit parallel	6x5.5x7	720(Q100)	
Portable Mini L6-P	cassette	.25	start/stop	.1	1		18	.75	RS232C	5x7.75x9.5	640(Q100)	
BERING INDUSTRIES INC.												
T100/ Sponge	cartridge, subsystem	.25	streaming	20 (formatted)	6	6400	78	300	IEEE-488, HP-IB	4.2x15.5x17.5 (standalone)	2,380(Q1); 1,428(Q500)	two digit status LED, backup without CPU, automatic self-test, 64K byte cache, file by file backup
CIPHER DATA PRODUCTS INC.												
420 Quarter-back	cartridge	.25	streaming	20 (formatted)	4	10000	30, 90	87	QIC-02	4.5x8.5x14 (internal)	900(Q1); 800(Q500)	front loading
Series 540	cartridge	.25	streaming	60 (formatted)	9	10000	90	87	QIC-02, QIC-36, SCSI	3.25x5.8x8 (internal)	970(Q1); 800(Q500)	QIC-24 format, front loading
525 Floppy Tape	cartridge	.25	single-track serpentine	32 (unformatted)	6	6400	39, 78	62.5	SA450, SA850	3.25x5.8x8 (internal)	420(Q500)	emulates floppy disk drive, front loading
COMARK CORP.												
MT-85	cartridge, subsystem	.25	start/stop	17 (unformatted)	4	6400	30	192	Multibus-compatible host interface	4.62x8.55x 14.25	2,950(Q1)	8-inch peripheral form factor, AC-DC interface, SA850-compatible
CONTROL DATA CORP.												
92190	cartridge	.25	streaming	59 (unformatted)	11	8000	55	55	BUDI	4.65x8.55x13.5 (internal)	1,500(Q1); 960(Q500)	formatter adapter available for Unibus, Q-bus and SCSI
92192	cartridge	.25	streaming	68 (formatted)	11	8000	55	55	BUDI	4.65x8.55x13.5 (internal)	1,600(Q1); 1,040(Q500)	optional bezel suitable for file and image back-up
DAVONG SYSTEMS INC.												
I0016-020	cartridge, subsystem	.25	streaming	18 (formatted)	4	3200, 8000	90	28.9	ST506, IBM PC	7.5x6.25x16.5 (standalone)	1,795(Q1)	file by file backup capability
DICOM INDUSTRIES												
374	cassette, subsystem		start/stop	.75 (formatted)			10		opt. RS232C, current loop			for DEC PDP Series, DG Nova, HP 2100, Varian Data Machine, rackmount available, self-test
DIGI-DATA CORP.												
6400	cartridge, subsystem	.25	start/stop	15 (formatted)	4	6400	30	24	RS232C, S-100, Multibus, Q-Bus, IBM PC	3.25x6.9x5.75 (internal)	1,190(Q1)	
8300	cartridge, subsystem	.25	start/stop	21 (formatted)	4	8333	37.5	39	RS232C, S-100, Multibus, Q-Bus	3.25x6.9x5.75 (internal)	1,390(Q1)	

¼-INCH AND SMALLER CASSETTE/CARTRIDGE TAPE DRIVES AND SUBSYSTEMS

Company Model	Drive type	Tape size (inches)	Operating mode	Storage capacity (M bytes)	No. of tracks	Recording density (bpi)	Tape speed (ips)	Data transfer rate (K bytes/sec.)	Interfaces	Dimensions (HxWxD inches)	Price ($) (Quantity)	Notes, features, options
ELECTRONIC PROCESSORS INC.												
STR-610A	cartridge	.125	start/stop, streaming	.350 (unformatted)	2	800	18, 60	1.8	8-bit parallel, RS232C	3.2x4.8x3.75 (standalone)	498(Q1); 402(Q500)	
STR-STREAM	cartridge	.25	start/stop	17.3 (unformatted)	4	6400	30, 90	24	SA100, ST506, Priam	4.15x7x13.25 (standalone)	1,452(Q1); 1,090(Q500)	
STR-812	cartridge	.25	start/stop	4.3 (unformatted)	4	1600	30, 90	6	RS422	4x2x12 (standalone)	1,340(Q1); 1,005(Q500)	
FEEDBACK DATA LTD.												
350	cartridge	.25	start/stop	4.31 (unformatted)	4	1600	30, 90	6	RS232C	180x419 x453mm (standalone)		dual drive system, max. 4 drives per formatter, DC or mains versions, remote control, rackmount
351	cartridge	.25	start/stop	4.31 (unformatted)	4	1600	30, 90	6	RS232C	180x219 x453mm (standalone)		DC or mains versions, remote control
340/1	cartridge	.25	start/stop	4.31 (unformatted)	4	1600	30, 90	6	RS232C	180x219 x453mm (standalone)		DC or mains versions, local control
354	cartridge	.25	start/stop	17.25 (unformatted)	4	6400	30, 90	24	RS232C, HDLC	180x419 x453mm (standalone)		DC or mains versions, remote control, rackmount
340/2	cartridge	.25	start/stop	4.31 (unformatted)	4	1600	30, 90	6	RS232C	180x219 x453mm (standalone)		DC or mains versions, remote control
344/1	cartridge	.25	start/stop	17.25 (unformatted)	4	6400	30, 90	24	RS232C	180x219 x453mm (standalone)		DC or mains versions, local control
344/2	cartridge	.25	start/stop	17.25 (unformatted)	4	6400	30, 90	24	RS232C	180x219 x453mm (standalone)		DC or mains versions, remote control
IRWIN MAGNETICS												
110	cartridge	.15	streaming	10.3 (formatted)	8	6400	39	31.2	SA450	1.688x5.75x8 (internal)	500(Q1); 320(Q500)	start/stop and random access modes available with software
210	cartridge	.15	streaming	10.3 (formatted)	8	6400	39	31.2	SA450	4x6.04x2 (internal)	500(Q1); 320(Q500)	start/stop and random access modes available with software
KENNEDY CO.												
6500	cartridge	.25	streaming	60 (formatted)	9	8000						half-height
6455, 6470	cartridge	.25	start/stop	23, 63 (formatted)	4, 10	6400	30, 37.5	24, 30	Pico Bus, Pertec	4.5x8.5x14		emulates .5-inch tape drives without software changes
MILTOPE CORP.												
CR300	cartridge, subsystem	.25	start/stop	8 (unformatted)	4	1600, 3200	30	48	TTL, RS232C, MIL-STD-188/422, Norden PDP 11M Series, Rolm MIL, IBM, NTDS	4.875x7.625 x12.625 (standalone)	9,900(Q1)	MIL-E-16400/ 5400/4158 specs.
CR400	cartridge, subsystem	.25	start/stop	3 (unformatted)	4	1600, 3200	30	12	TTL, RS232C, MIL-STD-188 and 422, Norden PDP 11M series, Rolm, MIL, IBM, NTDS	1x4.2x5.4 (internal)	8,750(Q1)	MIL-E-16400/ 5400/4158 specs.
MOYA CORP.												
120-XXX	cartridge	.15	start/stop	.67 (unformatted)	2	1600	30, 90	48	RS232C, SCSI	3x3.625x2.625 (internal)	327(Q1); 238(Q500)	
121-XXX	cartridge, subsystem	.15	start/stop	.52 (formatted)	2	1600	30, 90	48	RS232C, SCSI, STD bus	3x3.625x2.625 (internal)	434(Q1); 316(Q500)	
NORTH ATLANTIC QANTEX												
Ramtape PC	cartridge, subsystem	.25	start/stop	18.5 (formatted)	4	6400	30	24	IBM PC/XT and compatibles	6.5x11.4x16 (standalone)	1,995(Q1)	software driver included
450	cartridge, subsystem	.25	start/stop	18.5 (formatted)	4	6400	30	24	RS232C, 8-bit parallel, S-100, Multibus	4.25x7x5.75 (internal)	1,450(Q1)	interfaces available with Model 150 tape subsystem

¼-INCH AND SMALLER CASSETTE/CARTRIDGE TAPE DRIVES AND SUBSYSTEMS

Company Model	Drive type	Tape size (inches)	Operating mode	Storage capacity (M bytes)	No. of tracks	Recording density (bpi)	Tape speed (ips)	Data transfer rate (K bytes/sec.)	Interfaces	Dimensions (HxWxD inches)	Price ($) (Quantity)	Notes, features, options
Jetstream 16	cartridge	.25	streaming	99 (formatted)	9, 16	8000	90	90–400	QIC-02, SCSI	4.64x8.6x14.06 (internal)	1,450(Q1); 942(Q500)	QIC-24 tape format
451	cartridge, subsystem	.25	start/stop	18.5 (formatted)	4	6400	30	24	RS232C, 8-bit parallel, S-100, Multibus	4.25x7x5.75 (internal)	1,450(Q1)	interfaces available with Model 150 tape subsystem, serpentine recording
NORTHERN TELECOM INC.												
6109	cartridge	.25	streaming	45, 75 (formatted)	9	8000, 10000	30, 90	30	Archive-compatible, QIC-02	5.75x7.75x3.16	1,167(Q1); 545(Q500)	QIC-24 or QIC-11 recording format, on-board power supply; opt. controller, command set
6112	cartridge	.25	streaming	60, 100 (formatted)	12	8000, 10000	90	90	Archive-compatible, QIC-02	5.75x7.75x3.16	1,345(Q1); 625(Q500)	QIC-11 or QIC-24 recording format, on-board power supply; opt. controller, command set
PEREX LTD.												
Peristream	cartridge	.25	streaming	60 (formatted)	9	8000	90	90	QIC-02	3.25x5.75x8 (internal)	1,285(Q1); 964(Q500)	supports DC 600 foot cartridges, supports parity over the QIC-02 I/F
HD 6400	cartridge, subsystem	.25	start/stop	15 (formatted)	4	6400	30	24	DEI Funnel, S100, Multibus, 8-bit parallel, Apple III, IBM PC	4.25x6.75x5.75 (internal)	1,026(Q1); 770(Q500)	available as OEM drive mechanism, or desktop packaged with 110V PSU, software available for CP/M, MS-DOS, PC-DOS
9000	cartridge	.25	start/stop	40 (unformatted)	4	6400	30	2.4	V24/RS232C	5.75x8.25 x16.50 (standalone)	4,064(Q1); 3,048(Q500)	intelligent 8K buffered unit, local or remote control, cartridge copy facility
PRIME COMPUTER INC.												
4651	cartridge, subsystem	.25		15 (formatted)	4	6400	30	24		(standalone)	4,500(Q1)	backup unit for Prime 2250
4580	cartridge, subsystem	.25		15 (formatted)	4	6400	30	24		(internal)		backup unit for Prime 2250
QUALOGY (FORMERLY DATA SYSTEMS DESIGN)												
DS-201	cartridge	.25	start/stop	17.3 (unformatted)	4	6400	30	192	Q-bus	5.23x14x16.25 (standalone)	3,495(Q1)	emulates TSV05/ TS-11
RAYMOND ENGINEERING INC.												
6449	cartridge	.25	start/stop	4 (unformatted)	4	1600	30, 90	6	RS232C, IEEE-488	4.5x7.25 x10.875 (internal)	995(Q1); 745(Q500)	
6409	cassette	.15	start/stop	.12 (unformatted)	2	800	3, 20	.3		3x3x1.8 (internal)	455(Q1); 365(Q500)	
WR-100	cassette	.15	streaming	13 (unformatted)	4	6400	30, 90	57.6	QIC-02, SCSI	3.375x5.875 x7.625 (internal)	775(Q1); 485(Q500)	
WR-200	cassette	.15	streaming	21.6 (unformatted)	4	10000	30, 90	72	QIC-02, SCSI	3.375x5.875 x7.625 (internal)	875(Q1); 535(Q500)	
6440	cassette	.15	start/stop	2 (unformatted)	2	1600	30, 60, 90	6	RS232C, IEEE-488	4.5x5.5x5 (internal)	575(Q1); 465(Q500)	
SAYLOR ELECTRONICS INTERNATIONAL												
4000	cassette	.15	start/stop	1.0 (formatted)	2	2200	30, 75, 120	8.25	RS232C Centronics, DEC PDP-11, 8-bit parallel	12x12x17	3,685(Q1)	
4000-500	cassette	.15	start/stop	5.0 (formatted)	4	3200	30, 75, 120	1.2	RS232C, 8-bit parallel, DEC PDP-11, Centronics	12x12x17	6,450(Q1)	self contained tape system
4000IIR/V	cassette	.15	streaming	(formatted)	2		30, 120	3.0K	RS232C	17x16x9	6,450(Q1)	self contained tape system

¼-INCH AND SMALLER CASSETTE/CARTRIDGE TAPE DRIVES AND SUBSYSTEMS

Company Model	Drive type	Tape size (inches)	Operating mode	Storage capacity (M bytes)	No. of tracks	Recording density (bpi)	Tape speed (ips)	Data transfer rate (K bytes/sec.)	Interfaces	Dimensions (HxWxD inches)	Price ($) (Quantity)	Notes, features, options
SECONDARY COMPUTER STORAGE												
6110	cartridge, subsystem	.25	start/stop	67 (formatted)	16	10000	30, 60, 90	35	SCSI	5.25x19x20 (standalone)	3,000–4,500(Q1)	random addressable, transparent transfer to and from disk drives
6121	cartridge, subsystem	.25	start/stop	67 (formatted)	16	10000	30, 60, 90	35	16-bit, PDP-11, Q-Bus	5.25x19x20 (standalone)	5,000–6,500(Q1)	RT11 or RSX-11M streaming or directory file access, random addressable
6132	cartridge, subsystem	.25	start/stop	67 (formatted)	16	10000	30, 60, 90	35	PDP-11, VAX; Unibus	5.25x19x20 (standalone)	5,300–6,800(Q1)	RT11 or RSX-11M streaming or directory file access, random addressable
SYSGEN INC.												
Image	cassette, subsystem	.15	start/stop, streaming	10 (formatted)	4	6400	90		IBM bus	(standalone)	995(Q1)	includes controller, software and one 10M byte tape; backs up 10M bytes in 4 minutes, backs up IBM PC-XT and compatibles
QIC*FILE	cartridge, subsystem	.25	start/stop, streaming	20 (formatted)	4	10000	90		IBM bus	(standalone)	1,495(Q1)	includes controller and software, backs up 20M bytes in five minutes, backs up IBM PC-XT and compatibles
TANDBERG DATA INC.												
QIC-STOR Mark II	cartridge	.25		20/27, 45/60 (formatted)	4, 9	8000	45, 90	88, 44	QIC-02	1.67x5.8x8.5	1,750(Q1); 1,525(Q500)	half-height
TECHTRAN INDUSTRIES INC.												
Series 800	cassette	.25	start/stop	.145 (formatted)	2	800	20	.11–9.6	RS232C, CCITT	5x7.25x11 (standalone)		opt. rackmount, battery power, current loop interface, custom designs
9600 PRL	cassette	.25	start/stop	.220 (formatted)	2	800	20	.11–9.6	RS232C, CCITT	6.50x12x8		carry case mount, manual and remote control, auto answer
822	cassette	.25	start/stop	.44 (formatted)	2	800	20	.11–9.6	RS232C, CCITT	6.25x11.25 x12.25		tape editor, partial rewind, parity
TR-4	cassette	.25	start/stop	.145 (formatted)	2	800	20	up to 1.2	RS232C, CCITT	5x7x11		compatible with 103 and 212A modems
U.A.B. PERIPHERAL TECHNOLOGY												
UAB301	cartridge	.25	start/stop	7.5 (formatted)	4	1600	251, 901				1,010(Q1); 895(Q500)	
UPLAND TECHNOLOGIES INC.												
UT-2320	cartridge, subsystem	.25	start/stop	67 (formatted)	16	10000	60, 90	35	RS232C	5x9x15 (standalone)	2,990(Q1)	sequential and block addressable protocols
UT-9000	cartridge, subsystem	.25	start/stop, streaming	67 (formatted)	16	10000	60, 90	35	8-bit parallel, any .5-inch 9 track Pertec host adapter	5x9x15 (standalone)	2,990(Q1)	emulates .5-inch computer tape software, includes Pertec formatter
SILO-PCX	cartridge, subsystem	.25	start/stop, streaming	67 (formatted)	16	10000	60, 90	35	8-bit parallel, IBM PC	5x9x15 (standalone)	2,990(Q1)	software provided to make SILO look like a disk drive using existing PC DOS, back-up or archival storage up to 1M byte per minute
WANGTEK INC.												
5000E	cartridge	.25	streaming	60 (formatted)	4, 9	8000	90	90	QIC-02	3.25x5.75x8.5 (internal)	1,520(Q1); 878(Q500)	
PC-36	cartridge	.25	streaming	60 (formatted)	9	8000	90	90	IBM PC	1.62x5.75x8.5 (internal)	1,540(Q1); 947(Q500)	
SCSI-36	cartridge	.25	streaming	60 (formatted)	9	8000	90	90	SCSI	1.62x5.75x8.5 (internal)	1,625(Q1); 967(Q500)	

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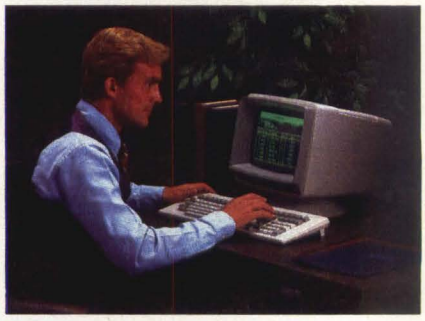

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CIRCLE NO. 67 ON INQUIRY CARD

Personal computers collide with high-performance terminals

Manufacturers of desktop computers are offering terminal functions in a bid to exploit additional market segments

Jerry Borrell, Senior Western Editor

Despite increased functionality in alphanumeric terminals costing less than $1,500, there are still large market segments that these products do not serve. To address this need, manufacturers are offering products at more than $1,500 that are essentially desktop computers but which also function as terminals.

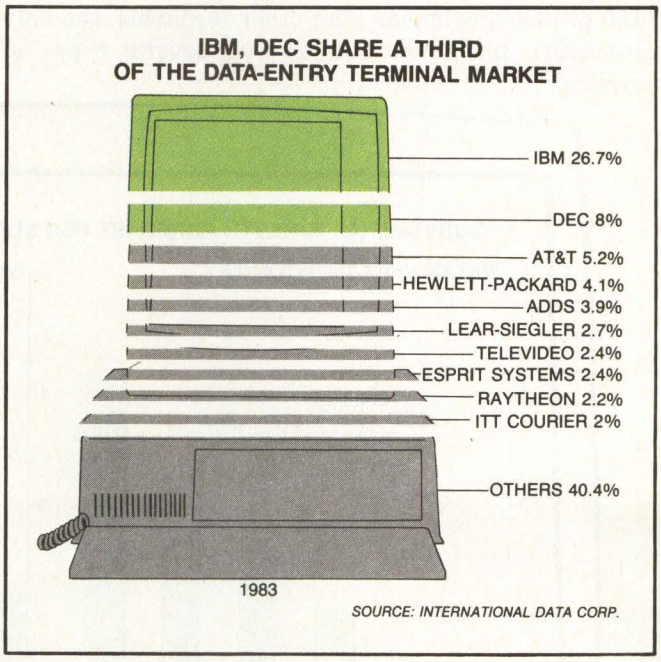
Recent announcements from manufacturers of both desktop computers and terminals indicate growing competition in the field. Nonetheless, there is as yet no clear definition of this market because the products incorporate functions found in a variety of categories, such as alphanumeric terminals, graphics terminals and desktop computers.

IBM sets market trends

IBM spurred the high-end terminal market with the IBM 3270 PC/GX terminal. The PC/GX can be used in an IBM terminal environment, as a graphics workstation and/or as an IBM PC. Analysts point out, however, that the PC/GX's $12,000 price tag will prevent it from affecting sales of low-cost editing terminals. Still, the PC/GX may define the type of functionality expected from manufacturers hoping to compete in the high-end terminal market.

Among the disparate announcements about desktop computers that also function as terminals, one common factor emerges: manufacturers tend to downplay IBM compatibility. The ability to run MS-DOS is usually listed merely as a feature. Despite this approach, it is clear that IBM is helping to shape the type of products that manufacturers are offering.

Since the recent introduction of the IBM PC-AT, system integrators can expect a trend toward increased communications functions among PC-compatible products. Another effect of IBM's recent moves is the effort by new companies in the PC-compatible market to exploit niches that are defined by function rather than by price competition with IBM. These functions include extended emulation and communications capabilities, integral modems or handsets, local area networking and bit-mapped graphics.



Terminal functions provide micro/mainframe link

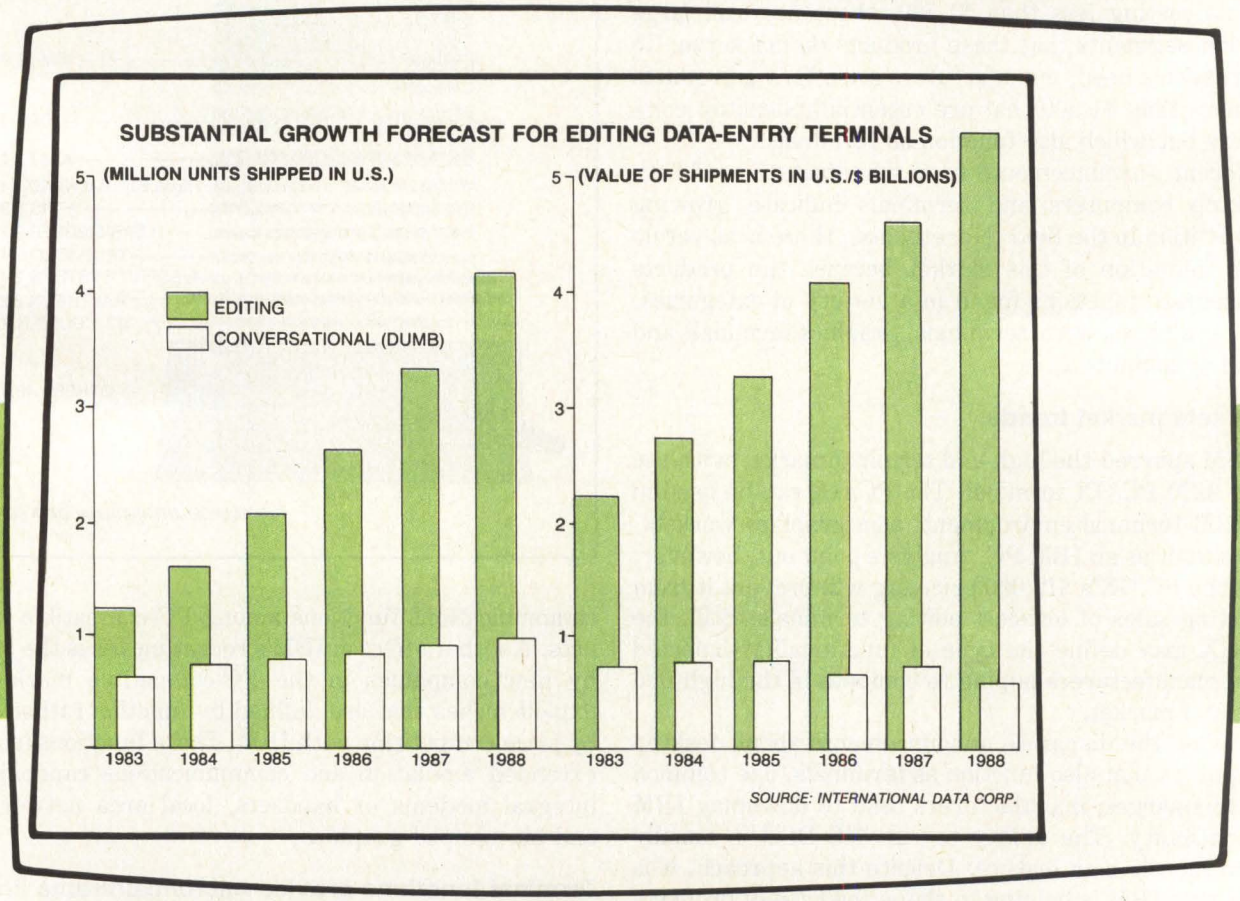
Jim West, product manager for terminals at Ampex Corp., Cupertino, Calif., sees "an explosion of demand for terminal devices, especially where personnel want

access to central databases." At Ampex, the key characteristic of high-performance terminals, which are referred to as workstations, is the function of host-to-terminal file transfers. The result is the company's recent announcement of the 6500 workstation series. Based on 8088 and Z80 processors, the workstations offer seven concurrent protocols including IBM 3270 SNA and bisynchronous, Honeywell 7700, 7801, and 7804, Burroughs TD-830 and 983, and DEC VT100. The protocols are supported on a single card. The workstations start at $3,500 and include dual diskette drives, 1M byte of RAM, MS-DOS and an IBM PC-compatible backplane.

Ampex provides a "V6 control program" that supports seven priority windows (six passive, one active) and allows users to transfer data in a window to a host or to another PC. Ampex's West believes that the product is ideally suited to the business environment because "40 percent of all corporations have more than one type of mainframe. While overall the cost of our 6500 products is higher than other terminals, the only alternative until now was to buy several types of terminals."

Datapoint Corp., San Antonio, Texas, an originator of local area networks, has been developing microprocessor-based terminals on networks since the announcement of ARCNET in 1977. Datapoint's recent introductions demonstrate a continued effort to develop enhanced terminals for ARCNET. Like many other manufacturers, the company provides the user with desktop-computer functions in its terminals.

Datapoint offers the 8220 series terminals to fulfill the requirements of the $500 to $1,400 price range. The high-end 8230 series terminals, priced at $2,295 and based on Intel's 80186 microprocessor, address the needs of users who demand greater performance and functionality than those available in dumb or editing, terminals. Datapoint's director of systems products, Jim Rutledge, observes that "even within the environment addressed by our low-cost terminals—for example, secretarial or clerical workers—there is a demand for programmability to make the terminal more useful and to minimize keystrokes for common operations. At a certain point, user demands take the desktop terminal beyond the range of functionality traditionally defined as terminal functions, and closer to the operations of a



Editing data-entry terminals, *such as TeleVideo's 910, 925 and 950, will set the pace for the market, with an annual growth rate in shipments of 27 percent between 1983 and 1988. Over the same period, the dollar value of shipments will climb only 18 percent, indicating that unit prices will be coming down. Shipments of conversational terminals will climb at a 9 percent annual rate between 1983 and 1988, while the dollar value of shipments drops 0.7 percent.*

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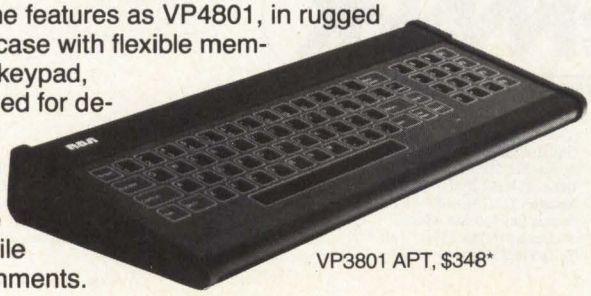

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personal computer."

Recent Datapoint introductions, the 8400 and 8600 series of Applications Processors (APs), aim at more sophisticated applications. Priced between $5,000 and $8,500, the 8400 and 8600 incorporate Intel 80286 microprocessors and can be configured via ARCNET with as many as 250 APs. The APs run their own operating system and applications packages, but have no disk storage. The AP retrieves the operating system and application software from a host computer and goes back to the host only for file serving. "This is a new market," says Rutledge, "and the basic element of systems in it continues to be communications, as it was in terminals. Here, however, the communications are between APs and a central file server, via a local area network."

Takes an all-in-one approach

Burroughs Corp., Detroit, Mich., in recent years has broken from its traditional mainframe orientation to provide minicomputers and supermicrocomputers via OEM products based on Convergent Technologies Inc.'s MegaFrame and N-Gen products. In keeping pace with its large computer systems, the company has developed a group of terminals that incorporate features of many traditionally distinct terminal types. The company has ensured a secure market by incorporating proprietary firmware in the terminals, which forces limited emulation on Burroughs-compatible terminal suppliers.

Burroughs' ET-2000 (Ergonomic Terminal) product line focuses on the micro-to-mainframe link, but interfaces only with the company's computer systems. The ET-2000 is a programmable, MS-DOS-based terminal that emulates any of the company's other terminals. It can be configured with an Intel 8086 processor, 256K bytes of RAM, 720K bytes of additional RAM and as many as three NEC 7220 graphics processors.

The terminals can use a host computer's hard disk for storage, and allow the mainframe to operate on those files. The ET-2000 can also exchange program functions with the host. According to George Sinnott, director for terminals at Burroughs, these abilities are creating a new market. "This personal computer/terminal market will hurt terminal sales, despite continued growth by the latter. In the near term they are distinct, but users will begin to expect greater functionality as the newer products are being introduced." System integrators will benefit by getting graphics, desktop computing and communications functions in products that are competing for a share of the terminal market.

Mike Gold, executive vice-president of Computek Inc., Burlington, Mass., sees the marketplace from the perspective of the OEM. "Terminals, workstations and personal computers are becoming synonymous. A smaller company such as ourselves cannot compete in the terminal market, nor can we compete as just another personal-computer vendor. We see an opportunity in exploiting the vertical niches created by all of the technologies—integrating applications software, personal computers and local area networks—for purchasers in the law and publishing fields."

The PC/GX may define the type of functionality expected from manufacturers hoping to compete in the high-end terminal market.

A recently-introduced professional workstation series from Zaisan Inc., Houston, Texas, is a good example of the importance of desktop workstations for the knowledge-industry worker. The company positions itself in the office automation market with products ranging from the ES.1 integrated voice/data workstation to the ES.3, which adds IBM PC-compatible functions to the ES.1.

The ES.3 professional workstation, selling for $2,595, contains Z80, CMOS 6805 and 8088 microprocessors. The integrated office system approach is evident in the ES.3's telephone handset and several supporting telephonic features, such as auto-redial, calendar, electronic mail, speakerphone, personal phone directory and an integral 1200-baud modem.

Color and graphics become standard

Analysts agree that color in alphanumeric terminals is a growing trend. "Industry experts estimate that the use of color conveys 45 percent more content with the same number of characters," says Ilene Goldman, a research analyst at International Data Corp., Framingham, Mass. "Users have noted a considerable drop in error rate after switching to color terminals. Manufacturers are finding that the market has not taken off like gangbusters, but that it is important to be able to count a color terminal in one's product line." Goldman stresses that over 25 terminal manufacturers presently offer a color model.

While manufacturers can add graphics capabilities to terminals under $1,500, multiple-color capabilities cause prices to rise above $2,000 very quickly. However, cost is not the only impediment. David Deans, president of Intecolor Corp., Norcross, Ga., maintains that "one of the key problems inhibiting the introduction of color to the low-cost terminal marketplace has been the lack of software capable of using it." To solve this problem, Intecolor is introducing the Color Trend series of terminals for the ASCII market. Priced at

about $1,200, the product incorporates firmware that converts monochrome information to color. "Attributes such as lines, texture and reverse video," states Deans, "will be converted by the terminal to color information under the control of the user, or by default in the terminal." Although the series is aimed at the alphanumeric market, it will also provide Tektronix 4010, 4014 and 4027 emulation.

The distinction between alphanumeric and graphics terminals has begun to blur in the eyes of many users. This blurring results from the increasing availability of monochrome graphics in low-cost terminals. The industry traditionally distinguished graphics terminals as those having a "bit map" (e.g., memory locations for each picture element—or pixel—on the display). This distinction has become outdated because price reductions for semiconductor memory have allowed terminal manufacturers to add a bit map as a standard feature.

An example of this trend is Ramtek Corp.'s 6000 series of terminals. Dr. Bob Varga, director of marketing, describes the 6000 series as having multiple uses. "The 6000 has a base functionality of the VT100 with color extensions....it has an eight-color capacity, three pages of memory, and a 160-by-48-character display. It may also be configured with a bit map for the combination of color and graphics, or to overlay color text on graphics displays."

Developments in the terminal market point toward a dominant trend: Manufacturers are incorporating a number of functions that, until recently, accounted for a variety of product classes. Manufacturers are moving toward machines that combine the functions of terminals, desktop computers and graphics workstations.

The changes in the terminal market are perhaps best summed up by Peter Durran, director of research at ARTS Computer Products Inc., Cambridge, Mass. Durran has been working for ARTS in the field of technology for the blind and visually handicapped since 1971. Until recently, the company built its own terminals, starting with a talking terminal in 1976, and the first large-print terminal in 1978. "Our realization that PCs were here to stay meant that there was no need to build our own hardware," says Durran. "We transferred our software to a PC-compatible disk...now it will run on any applications program under MS-DOS in user-selected formats." This illustrates a general trend in the terminal marketplace: Users can now get specialized functionality with the computing power of a general-purpose microcomputer, often at prices that are competitive with those of high-performance alphanumeric terminals. □

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High 813 Medium 814 Low 815

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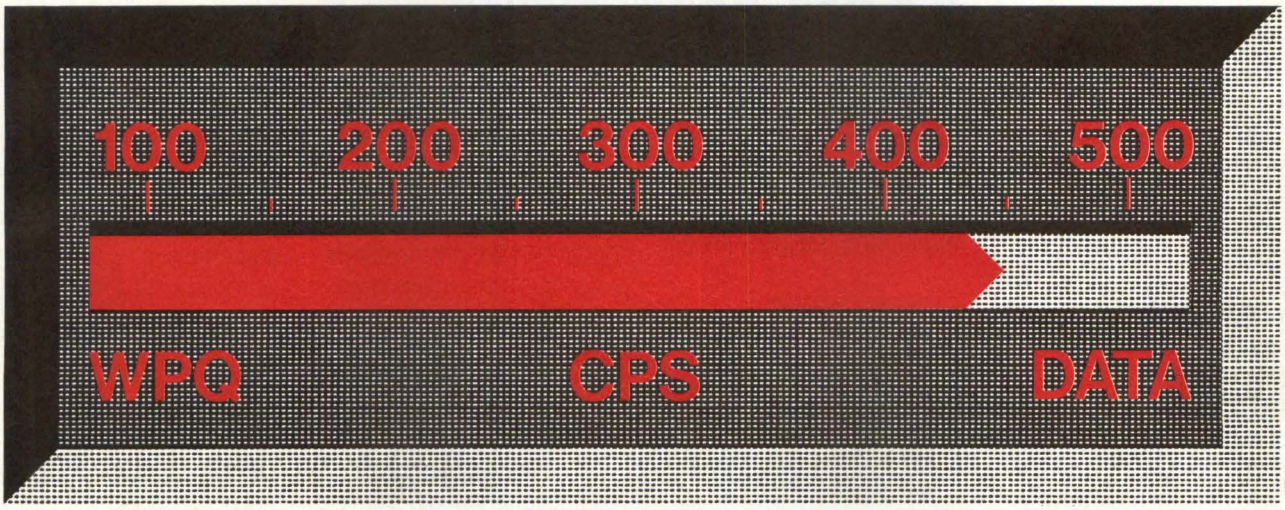

In the Grand Prix of office automation, HERMES multi-mode printers always come in first. Both 400/480 cps data and 100/120 cps single pass near letter quality are possible with the same print-head.

Speed and quality have never been as successfully combined. Professionals who want only the best will also appreciate:

Their versatility. Wide range of attractive characters sets in 16 national versions, as well as math symbols, bar codes and teletex. Dual ports, parallel (CENTRONICS™/ EPSON™ compatible) and serial (RS-232C/RS-422) interfaces. DIABLO™ 630 emulation optional.

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Their quality. Swiss high quality construction. Quality that lasts - thanks to their exclusive «moving-ruby» head.

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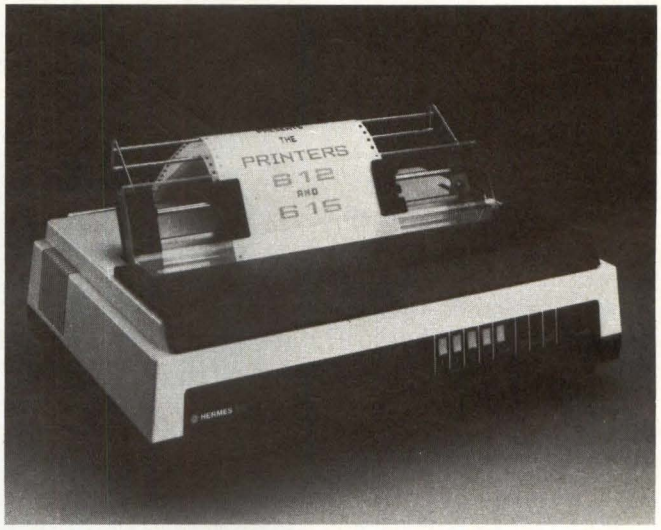

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CIRCLE NO. 71 ON INQUIRY CARD

DIGITAL DISPLAYS THE TERMINALS BEST ENGINEERED FOR BUSINESS.

Before you make any investment in business graphics terminals, it really pays to investigate what you'll be using them for.

If you're like most businesses, your terminals will be used approximately 70% of the time for generating text and numbers. And only around 30% of the time for strictly graphics purposes. The October 1983 *Infosystems* article, "How to Buy Graphics Displays," coauthored by Jim Warner, CEO of Precision Visuals, Inc.,® states, "While it may be true that one picture (chart, graph) is worth a thousand words, there will always be the need for words, thousands of words, in the day-to-day activity of the office. Special graphics-only devices can have limited value in a general office environment."

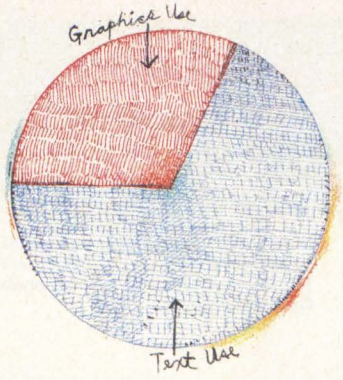
At Digital, the first step in engineering every product we make involves a thorough analysis of who will use it, what it will be used for and which features will help make people more productive in their jobs.

That's been true of every terminal we've designed and helps explain their widespread acceptance and popularity.

And you'll find it's equally true of Digital's latest entries, the VT240™ and VT241™ terminals.

ENGINEERED BEST FOR WHAT YOU NEED MOST.

As the newest members of Digital's family of terminals, the VT240, a conversational



text and graphics terminal, and the VT241, with the added dimension of color, continue the tradition of engineering excellence for performance. They offer full VT100™ compatibility to take advantage of a host of offerings already developed. And to meet the needs of the business environment, you'll find a set of standard text features that are either unavailable on other terminals or may have to be purchased at an additional cost.

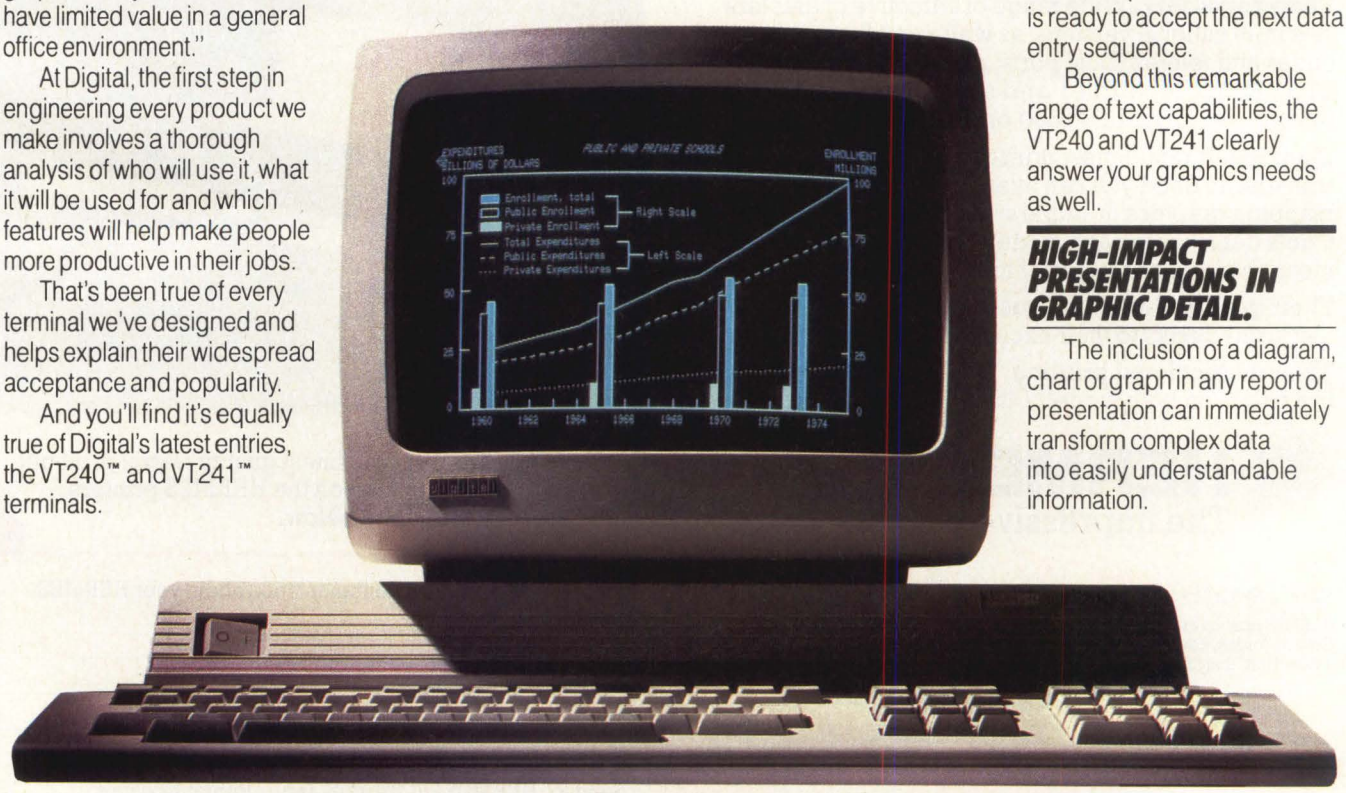
These features include bidirectional smooth scrolling, split screen, a choice of 80 or 132 columns per line and a double width/double height format. A highly legible 8 by 10 dot matrix character font displays true ascenders and descenders for exceptional crispness and legibility. If certain information needs to be highlighted, you can select from a combination of bold print, blinking and underlining in either normal or reverse video. For your added convenience, there's even a built-in printer port for printing hard copy.

Both the VT240 and VT241 terminals give you the option of erasing selected character positions on the screen for more efficient communications and increased productivity. For those applications that require data to be entered by filling in the blanks of a form, once the data has been accepted by the host, the filled-in information – and only that – can be erased by means of a single command. The form itself remains up on the screen and is ready to accept the next data entry sequence.

Beyond this remarkable range of text capabilities, the VT240 and VT241 clearly answer your graphics needs as well.

HIGH-IMPACT PRESENTATIONS IN GRAPHIC DETAIL.

The inclusion of a diagram, chart or graph in any report or presentation can immediately transform complex data into easily understandable information.



touchtype, and an editing keyboard and special function keys that reduce the number of keystrokes to complete an operation. Also, the set-up mode offers a menu in plain language (plain English, plain French and plain German) that leads you through each operation in step-by-step sequence.

All this effort has not gone unnoticed. Digital's video terminals received the International Design Award in 1984. The award is based on ergonomic suitability, safety, design quality, practical useability, technical excellence and practical visualization.

BEST ENGINEERED MEANS ENGINEERED TO A PLAN.

The VT240 and VT241, like every Digital hardware and software product, are engineered to conform to an overall computing strategy. This means our products are engineered to work together easily and expand economically. Only Digital provides you with a single, integrated computing strategy direct from desktop to data center.

For more information and the name of the Authorized Terminals Distributor or Digital Representative near you, call 1-800-DIGITAL, extension 700. Or write Digital Equipment Corporation, 2 Mount Royal Avenue, UP01-5, Marlboro, MA 01752.

Both the VT240 and VT241 terminals generate bit map graphics in a choice of two protocols – Digital's ReGIS™ (Remote Graphics Instruction Set) and Tektronix 4010/4014.™

ReGIS lets you create and store business graphics as simply as producing ASCII text. With VAX-11 DECgraph™ and VAX-11 DECslide™ software, even a novice can prepare graphs and charts and turn them into slides. Self-explanatory icons let you choose a box, circle, line, polygon, triangle or arc.

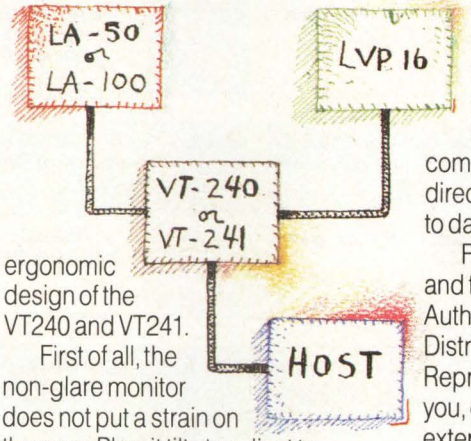
The Tektronix 4010/4014 protocol supports the full array of existing 4010 compatible graphics software. Besides, Tektronix Plot 10,™ TELL-A-GRAF™ and DISSPLA™ from ISSCO® and DI-3000,™ GRAFMAKER™ and GRAFMASTER™ from Precision Visuals are also supported.

When you're using third party software, Digital provides you with the total hardware/software solution: video terminals, hard copy with the LVP16™ Pen Plotter and the VAX™ computer.

THE HIGHEST AWARD FOR ERGONOMIC DESIGN.

Your people have to spend long hours in front of a terminal. It stands to reason the easier they are to use, the more productive the results.

That's why so much time and thought have gone into the ergonomic design of the VT240 and VT241.



First of all, the non-glare monitor does not put a strain on the eyes. Plus, it tilts to adjust to the exact viewing angle that's most comfortable to work with. The detachable keyboard is ruggedly constructed, yet light enough to place on your lap. Even the way the keyboard has been arranged boosts productivity.

There's a standard typewriter keypad so you can

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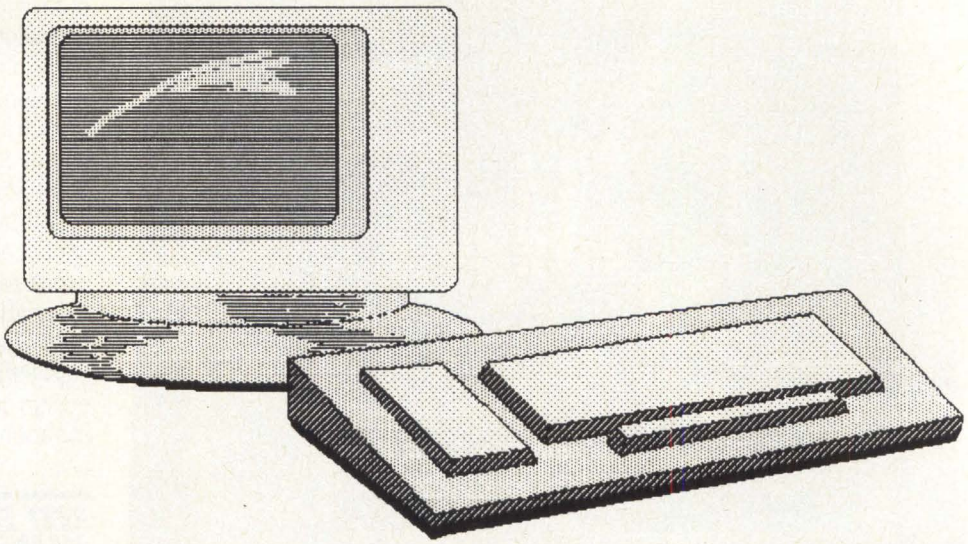
ALPHANUMERIC DISPLAY TERMINALS



Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
ADAC CORP.							
2200CR1X	intelligent	7-inch, green	64 x 24	RS232C, RS422, current loop (X-on/X-off)	DEC VT100	1,545 (Q1); 1,235 (Q100)	vertical and horizontal bar graphs, RS170 video output; opt. sealed keyboard
2200CR2X	graphics	7-inch, green	64 x 24	RS232C, RS422, current loop (X-on/X-off)	DEC VT100	2,245 (Q1); 1,795 (Q100)	vertical and horizontal bar graphs, bit-mapped graphics, text overlay, RS170 video output; opt. sealed keyboard
ADDS/DATATYPE							
X5A	intelligent/ graphics	14-inch; 16-color, 4096-color palette	80 x 25	RS232C (X-on/X-off, DTR)	TeleVideo 925; DEC VT100, VT52	3,745 (Q1); 2,809 (Q100)	24 programmable function keys, 2 pages of memory, non-volatile set-up modes, PLOT 10-compatible, local draw, pan, zoom
XK-1	intelligent/ graphics	14-inch, green	80 x 25	RS232C (X-on/X-off, DTR)	TeleVideo 925; DEC VT52, VT100	3,445 (Q1); 2,584 (Q100)	24 programmable function keys, 2 pages of memory, non-volatile set-up modes, PLOT 10-compatible, local draw, pan, zoom
ANN ARBOR TERMINALS INC.							
GURU XL	editing	15-inch, white	170 x 66	RS232C (X-on/X-off)	opt. DEC mode		programmable keyboard, 15 pages of memory, split screen, non-volatile set-up modes, printer output, zoom; opt. rackmount
AMBASSADOR GXL	editing/ graphics	15-inch, green	80 x 60	RS232C (X-on/X-off)	opt. DEC mode		programmable keyboard, 2 pages of memory, non-volatile set-up modes, bit-mapped and Tektronix 4010, 4014 graphics, opt. rackmount
AMBASSADOR XL	editing	15-inch, green	80 x 60	RS232C (X-on/X-off)	opt. DEC mode		2 pages of memory, split screen, zoom, printer output, rack panel accessory diagnostics
GENIE Plus XL	editing	15-inch, amber	80 x 30	RS232C (X-on/X-off)	opt. DEC mode		2 pages of memory, non-volatile set-up modes, split screen, zoom, printer output, rack panel accessory diagnostics
ARTS COMPUTER PRODUCTS INC.							
PC ORATOR	editing	10-, 13-, 19-inch; 8-color	80 x 25	RS232C (X-on/X-off, bisync)	DEC VT100, IBM 3278	3,995 (Q1)	16 function keys, 16 programmable keys, 1 page of memory, speech
PC LENS	editing	10-, 13-, 19-inch; 8-color	80 x 25	RS232C (X-on/X-off, bisync)	DEC VT100, IBM 3278	3,995 (Q1)	16 function keys, 16 programmable keys, 1 page of memory, 4 sizes of print

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
APPLICON							
4606-B CRT	editing	12-inch, b&w	80 x 24, 132 x 14				self-diagnostics
AUTOMATIC DIGITIZING AND RECOGNITION INC.							
Audre System	intelligent/ graphics	15-inch, 255-color	140 x 78	Ethernet, RS232C, IEEE-488 (GPIB), DMA			up to 4M bytes RAM; opt. fill, zoom, pan, scale; CAD/CAE, UNIX, C software available
AYDIN CONTROLS							
Aycon 15	intelligent/ graphics	13-, 19-inch; 16-color (opt. monitor)	80 x 48	DEC PDP-11, DR11-B(DMA) or DR11-W(DMA); Data General 4040 (bisync)		6,190 (Q1)	90 opt. programmable function keys, dual or triple host CPU interface for simultaneous multiplexing of CPU inputs
Aycon 17	intelligent/ graphics	13-, 19-inch; 16-color (opt. monitor)	80 x 48	RS232C (bisync, TTY)	optional firmware allows emulation of Intecolor 8001G Display system	2,995 (Q1)	45 optional programmable function keys, 4 pages of memory, character graphics, rackmount unit available; opt. floppy disk storage
BRAEGEN CORP.							
8521 Display Station (ELAN System)	editing	15-inch, green	80 x 24	LAN (X-on/X-off, BSC, SNA/SDLC)	IBM 3278 Model 2		24 programmable function keys, multiple host connection via controller, softkey security, removable monitor, self-diagnostics
8522 Display Station (ELAN System)	editing	15-inch, green	80 x 24	(X-on/X-off, BSC, SNA/SDLC)	IBM 3278 Models 2 and 5		multiple screen format, softkey security, removable monitor, self-diagnostics
8523 Display Station (ELAN System)	editing	15-inch, green	80 x 24	LAN (X-on/X-off, SNA/SDLC, BSC)	IBM 3278 Models 2, 4, 8		multiple host connection, diagnostics, removable monitor
CIE SYSTEM'S DISTRIBUTED SYSTEM DIVISION							
CIE-7800	intelligent	14-inch; green, amber	80 x 43	RS232C (SDLC)	DEC VT100, IBM 3101, 3275; Hewlett Packard 2622	1,995 (Q1)	32 function keys, character graphics, split-screen
CIFER PLC.							
Cifer 3834	editing	15-inch; green, amber	132 x 30	(2) RS232C (X-on/X-off, DTR/CTS)			10 programmable function keys, character graphics, 7 pages of memory
Cifer 3842	editing/ graphics	15-inch; green, amber	132 x 25	(2) RS232C (X-on/X-off, DTR/CTS)	DEC VT100, VT52; Tektronix 4010		10 programmable function keys, bit-mapped graphics, 5 pages of display memory, dual-plane alpha/graphics
Cifer T4	editing/ graphics	12-inch; green, amber	132 x 25	(2) RS232C (X-on/X-off, DTR/CTS)	DEC VT100, VT52; Tektronix 4010		10 programmable function keys, 97 software loadable keys, bit-mapped graphics, 5 pages of display memory, dual-plane alpha/graphics
Cifer T5	editing/ graphics	12-inch; green, amber	132 x 25	(2) RS232C (X-on/X-off, DTR/CTS)	DEC VT240, VT100, VT52; Tektronix 4014		10 programmable function keys, 97 software loadable keys, five-page display memory, dual-plane alpha/ graphics, bit-mapped graphics
CODEX CORP.							
268/1	editing	15-inch; green, amber	80 x 25	RS232C, RS422		1,475 (Q1); 1,280 (Q100)	12 function keys, business-graphics characters, 32 foreign-language characters
COLORGRAPHIC COMMUNICATIONS CORP.							
MVI-100	intelligent/ graphics	13-inch, 8-color	80 x 48	RS232C (X-on/X-off)	DEC VT100, VT52; Lear Siegler ADM 3; ADDS Regent 40; Hazeltine 1510	2,750 (Q1); 2,200 (Q100)	24 programmable function keys, 8 pages of memory, split screen, non-volatile set-up modes, mosaic plot software, Plot 10-compatible, arcs, circles, bars
MVI-100, Model 119	intelligent/ graphics	19-inch, 8-color	80 x 48	RS232C (X-on/X-off)	DEC VT100, VT52; Lear Siegler ADM 3; ADDS Regent 40; Hazeltine 1510	3,250 (Q1); 2,600 (Q100)	24 programmable function keys, 8 pages of memory, split screen, non-volatile set-up modes, mosaic plot software, PLOT 10-compatible, arcs, circles, bars, rackmount, video output
CONTROL CONCEPTS CORP.							
EM-3276	editing	12-inch, green	80 x 24	RS232C (bisync)	IBM 3276 Model 2	2,195 (Q1)	opt. integrated 2,400,-4,800 - bps modems

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
CC-3276	editing	12-inch, green	80 x 24	RS232C (SDLC)	IBM 3276 Model 12	2,395 (Q1)	opt. integrated 2,400, 4,800 bps modems
CC-3278	dumb	12-inch, green	80 x 24	RS232C	IBM 3278 Model 2, Model 3178	990 (Q1)	
CYBERNEX LTD.							
XLA-87H	editing	12-, 14-inch; green, amber	80 x 25	RS232C, current loop (CTS/RTS)	Hazeltine 1400/1500 series	1,095 (Q1)	96 fixed function sequences, bidirectional through print
XM3270	editing	12-, 14-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, CTS)	IBM 3274/3278	1,295 (Q1)	24 fixed function sequences, 5 system attention keys; opt. touch screen
SA830	intelligent	14-inch; green, amber	80 x 26	RS232C, TDI (Burroughs poll/select)	Burroughs TD830, TD980, ET1100	1,895 (Q1)	10 programmable function keys, 16 pages of memory, self-test, non-volatile set-up modes, concatenation port with auto-bypass, TTY port
SA7800	intelligent/ graphics	14-inch; green, amber	80 x 26	RS232C, current loop (Honeywell VIP)	Honeywell 7801, 7802, 7804, 7805, 7814	1,995 (Q1)	10 programmable function keys, 15 line-drawing characters, self-test, non-volatile set-up modes, 7804 and 7814 printer buffer support, switch selectable sync. or async. operation
XLA-B4E	editing	14-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, RTS/CTS)	MAI Basic Four	1,095	9 function keys, buffered printer port
XLA-D200	intelligent	14-inch; green, amber	80 x 24	RS232C, current loop (X-on/X-off, RTS/CTS)	Data General Dasher 200	1,095 (Q1)	20 function keys, 10 programmable function keys, buffered printer port
XLA-84	dumb	14-inch; green, amber	80 x 24	RS232C, current loop (X-on/X-off, RTS/CTS)		895 (Q1)	32 graphics characters, custom versions available; opt. 5 function keys
XLA-87d	intelligent	14-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, CTS/RTS)		985 (Q1)	26 function keys, 3 programmable keys, non-volatile set-up modes, 31 block graphics characters, bidirectional auxiliary port
XLA-87	intelligent	14-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, RTS/CTS)		985 (Q1)	16 function keys, 3 programmable function keys, 32 graphics characters
XLA-100	intelligent	14-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, CTS/RTS)		1,095 (Q1)	26 programmable function keys, line drawing characters
DATA GENERAL CORP.							
D211	intelligent	12-inch; green, amber	80 x 24	RS232C, current loop, RS422 (X-on/X-off)		1,195 (Q1); 992 (Q100)	15 programmable function keys
D460	intelligent/ graphics	12-inch; green, amber	132 x 24	RS232C, current loop, RS422 (X-on/X-off)		1,985 (Q1); 1,648 (Q100)	15 programmable function keys, windowing, character graphics
DATAPOINT CORP.							
8220 Workstation	intelligent	12-inch, amber	80 x 24	RS232C	Datapoint, IBM	1,395 (Q1); 1,155 (Q100)	10 function keys, 5 programmable function keys, user-loadable character set
Vista-Station-82	editing	12-inch, amber	80 x 24	RS232C, RS422	Datapoint, IBM	2,295 (Q1); 1,950 (Q100)	21 function keys
DATASTREAM							
178	dumb	12-inch; green, amber	80 x 25	RS232C (X-on/X-off, DTR, BSC or SNA with controller)	DEC VT100, VT52; IBM 3178 and 3278-2 with controller	975 (Q1)	24 programmable function keys (with controller), RS232C printer port, IBM Ideograms, DEC VT100 business graphics
878	intelligent	14-inch; green, amber	132 x 44	RS232C (X-on/X-off, DTR, BSC or SNA with controller)	DEC VT100, VT52; IBM 3178 Models 2, 3, 4 and 5 with controller	1,800 (Q1)	21 programmable function keys in VT100 mode, 24 programmable function keys (with controller), RS232C printer port, IBM Ideograms, VT100 business graphics
DATAVUE CORP.							
DV132C	editing/ graphics	13-inch, green	132 x 24	RS232C, current loop (X-on/X-off)	DEC VT100, SOROC 120	1,795 (Q1); 1,257 (Q100)	5 pages of memory, 1056x240 pixel graphics, rackmount

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
DIGITAL ENGINEERING INC.							
HiSCAN 4205	intelligent/ graphics	12-inch; white, green, amber		RS232C; opt. current loop	DEC VT220, Regis; Tektronix 4010, 4014, 4027, 4105	2,195 (Q1)	15 programmable function keys; bit-mapped graphics; English, German or French menu; lightpen; non-volatile set-up modes
HiSCAN 4205 (color)	intelligent/ graphics	14-inch; 16-color, 64-color palette		RS232C; opt. current loop	DEC VT220, Regis; Tektronix 4010, 4014, 4027, 4105	2,195 (Q1)	15 programmable function keys; non-volatile set-up modes; bit-mapped graphics; English, German or French menu; lightpen
DIGITAL EQUIPMENT CORP.							
VT220	intelligent	12-inch; green, white, amber	132 x 24	RS232C; RS423, current loop (X-on/X-off)	DEC VT100, VT52	1,395 (Q1)	15 programmable function keys, non-volatile set-up modes, split screen, multiple language keyboards, self-test diagnostics, video output for auxiliary monitors
VT240	intelligent/ graphics	12-inch; green, white, amber	132 x 24	RS232C; RS423, current loop (X-on/X-off)	DEC VT100, VT52; Tektronix 4010/4014	2,195 (Q1)	15 programmable function keys, non-volatile set-up modes, split screen, bit-mapped graphics, multiple language keyboards, self-test diagnostics, integral modem
VT241	intelligent/ graphics	13-inch; 64-color palette	132 x 24	RS232C; RS423, current loop (X-on/X-off)	DEC VT100, VT52; Tektronix 4010/4014	3,195 (Q1)	15 programmable function keys, non-volatile set-up modes, split screen, self-test diagnostics; opt. autodial modem
DTI INC.							
302	intelligent	12-inch; b&w, green, amber	80 x 24	RS232C current loop (X-on/X-off)	DEC VT100, VT52; DG200, 6053; Hazeltine 1510; Lear Siegler; Alpha-Micco	995 (Q1); 750 (Q100)	16 programmable function keys, business graphics, portable
ENVISION TECHNOLOGY INC.							
220	intelligent/ graphics	13-inch; 16-color from 4096-color palette	132 x 24	RS232C (X-on/X-off, DTR/CTS)	DEC VT100, Tektronix 9014		70 programmable function keys, bit-mapped graphics, polygon fill, ISSCO, PVI, SAS software support, printer port standard; opt. RS170 output
230	intelligent/ graphics	13-inch; 16-color, 4096-color palette	132 x 24	RS232C (X-on/X-off, DTR/CTS)	DEC VT100, Tektronix 9014		70 programmable function keys, bit-mapped graphics, polygon fill, ISSCO, PVI and SAS software support, printer port standard; opt. RS170 output
ELECTRO MECHANICAL SYSTEMS INC.							
Touch Information Display P/N 10-0001	dumb	12-inch, amber	80 x 24	RS232C	Lear Siegler ADM 3A	1,400 (Q1); 1,265 (Q100)	infrared light beam touch panel, rackmount
ERICSSON INFORMATION SYSTEMS AB							
XXX S11	editing	15-inch, amber	80 x 26	IBM S/34, S/36, S/38	plug-compatible to IBM 5251-11, IBM 5291	2,000 (Q100)	IBM S/3x software-compatible; opt. printer
FALCO DATA PRODUCTS							
Fame II	editing/ graphics	14-inch, green	80 or 132 x 25	RS232C; opt. RS422, current loop (X-on/X-off)	DEC VT100, VT52	795 (Q1)	50 programmable non-volatile function keys, printer port, block and monitor modes, opt. amber display
Fame III	editing	12-inch, green	80 x 25	RS232C (X-on/X-off)	DEC VT52, Lear Siegler ADM 3A	640 (Q1)	12 function keys; printer port, opt. amber display
Fame 100	editing	12-inch, green	132 x 24	RS232C; opt. RS422, current loop (X-on/X-off)	DEC VT100, VT52; opt. Tektronix 4010, 4014	1,195 (Q1)	18 programmable function keys, 16K display memory; opt. 14-inch amber display
GENERAL DIGITAL CORP.							
VuePoint	dumb	10-inch, orange	40 x 12	RS232C (X-on/X-off)		3,500 (Q1); 2,500 (Q100)	3 pages of memory (opt. to 48 pages), touch input, touch scanner enclosed separately from microprocessor, portable, gas plasma
VuePoint II	dumb	10-inch; orange, green	40 x 12	RS232C, RS422, RS423, RS449, RS485, TTL, current loop (X-on/X-off)		2,295 (Q1); 1,767 (Q100)	2 user-selectable character sets, flat panel, gas plasma, 12 x 20 resolution infrared touch scanner

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
GRAPHON CORP.							
GO-100	intelligent	12-inch, green	132 x 24	RS232C (X-on/X-off, DTR)	DEC VT52, VT100, VT102	1,095 (Q1); 895 (Q100)	4 function keys, 8 programmable function keys, non-volatile set-up modes, split screen, character graphics, bidirectional auxiliary port
GO-140	intelligent/ graphics	12-inch, green	132 x 24	RS232C (X-on/X-off, DTR)	DEC VT52, VT100, VT102; Tektronix 4010, 4012, 4013	1,995 (Q1); 1,495 (Q100)	4 function keys, 8 programmable function keys, 4 pages of memory, non-volatile set-up modes, split screen, bit-mapped graphics, PLOT 10-compatible, bidirectional auxiliary port
HMW DATA SYSTEMS							
4001	editing/ graphics	14-, 19-inch; 27-color	80 x 48	RS232C, current loop, Centronics (DTR)	DEC VT100	3,100 (Q1); 2,700 (Q100)	32 function keys, 4 pages of memory, ISSCO and bit-mapped graphics, polygon fill, 19-inch rackmount, built-in diagnostics, RGB and TTL video output
5001	editing/ graphics	20-inch; 16-color, 4096 color palette	80 x 48	RS232C, current loop, Centronics (X-on/X-off, bisync, SDLC, HDLC)	DEC VT100, IBM 3270, Tektronix 40xx	5,100 (Q1); 4,100 (Q100)	32 function keys, split screen, zoom, pan, PLOT 10-compatible, bit-mapped graphics, rackmount, RGB and TTL video outputs, built-in diagnostics, printer buffer
9081	intelligent	19-inch; 8 foreground/ 8 background	80 x 48	RS232C; opt. current loop (X-on/X-off)	IFC 80001F, DEC VT100, ADDS 980	5,000 (Q1)	bar charts, plot and vector modes, RS170 output, 16 programmable function keys; opt. printer ports
9083-S	intelligent	13-inch; 8 foreground/ 8 background	80 x 48	RS232C; opt. current loop (X-on/X-off)	IFC 80001G, DEC VT100, ADDS 980	3,995 (Q1)	bar charts, plot and vector modes, RS170 output, 16 programmable function keys; opt. printer ports
9203	editing	13-inch; 8 foreground/ 8 background	80 x 48	RS232C; opt. current loop (X-on/X-off)	IFC 8001G, DEC VT100, ADDS 980	5,500 (Q1)	bar charts, plot and vector modes, membrane keyboard, ruggedized
HARRIS CORP., COMPUTER SYSTEMS DIV.							
8685	intelligent	12-inch, green	80 x 24	RS232C, RS242 (X-on/X-off)			20 programmable function keys, clock, self-diagnostics, status line
8686	intelligent	12-inch, green	80 x 24	RS232C, RS242 (X-on/X-off)			20 programmable function keys, clock, self-diagnostics, status line
HEWLETT-PACKARD CO.							
2392A	intelligent	12-inch, green	80 x 27	RS232C, RS422, Centronics (X-on/X-off, ENQ/ACK)	DEC VT100	1,295 (Q1)	8 programmable function keys, 4 pages of memory (opt. 8 pages), printer port (RS232C or Centronics), 17 languages
2623A	intelligent/ graphics	12-inch; green, b&w, amber	80 x 26	RS232C, RS422 (X-on/X-off, ENQ/ACK)	Tektronix 4010, DEC VT100	3,250 (Q1)	8 programmable function keys, 2 pages of memory, bit-mapped vector graphics, PLOT 10-compatible, built-in graphics printer, video output, tablet output, 6 languages
2625A	intelligent/ graphics	12-inch; b&w, green, amber	80 x 27	RS232C, RS422, current loop (X-on/X-off, ENQ/ACK, bisync)	Tektronix 4014, IBM 3276	3,495 (Q1)	8 programmable function keys, 6 pages of memory, bit-mapped vector graphics, PLOT 10-compatible, polyfill, built-in printer, 11 languages
2627A	intelligent/ graphics	12-inch, 8-colo	80 x 26	RS232C, RS422, current loop (X-on/X-off, ENQ/ACK)	Tektronix 4010, DEC VT100	5,975 (Q1)	8 programmable function keys, 2 pages of memory, bit-mapped vector graphics, PLOT 10-compatible, polyfill, built-in printer, RGB video output, tablet input, 6 languages
HONEYWELL INFORMATION SYSTEMS INC.							
VIP7201	editing/ graphics	12-inch, green	80 x 24	RS232C, RS422A (TTY compatible)	Honeywell VIP7200	895 (Q1)	7 function keys, mosaic graphics, auxiliary RS232C, RS422A ports
VIP7305	editing	12-inch, green	80 x 25	RS232C, RS422A, current loop, MIL STD 188C (TTY compatible)	Honeywell VIP 7300	1,900 (Q1)	12 function keys, 24 code sequences
HUMAN DESIGNED SYSTEMS INC.							
Concept GVT +	intelligent/ graphics	12-inch; amber, green, b&w	132 x 24	RS232C, current loop (X-on/X-off, CTS/RTS)	DEC VT100, VT52; Tektronix 4010	1,895 (Q1)	46 programmable function keys, up to 8 pages of memory, non-volatile set-up modes, vector graphics, block fill, self-test, printer port, video output; opt. foreign language/math char. sets

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
Concept GVT-APL+	intelligent/ graphics	12-inch; amber, green, b&w	132 x 24	RS232C, current loop (X-on/X-off, CTS/RTS)	DEC VT100, VT52; Tektronix 4010, 4013	2,095 (Q1)	46 programmable function keys, up to 8 pages of memory, non-volatile set-up modes, 4 user-definable windows, vector graphics, block fill, self-test, printer port
Concept AVT+	intelligent	12-inch; amber, green, b&w	132 x 24	RS232C, current loop (X-on/X-off, CTS/RTS)	DEC VT100, VT52	1,295 (Q1)	46 programmable function keys, up to 8 pages of memory, non-volatile set-up modes, 4 user-definable windows, self-test, printer port; opt. foreign language
Concept AVT-APL+	intelligent	12-inch; amber, green, b&w	132 x 24	RS232C, current loop (X-on/X-off, CTS/RTS)	DEC VT100, VT52	1,495 (Q1)	46 programmable function keys, up to 8 pages of memory, non-volatile set-up modes, 4 user-definable windows, self-test, printer port; opt. foreign language and math char. sets
ID SYSTEMS CORP.							
ID-200	intelligent/ graphics	12-inch; b&w, green, amber	132 x 24	RS232C, current loop (X-on/X-off, EIA, DTR, SNA/SDLC)	DEC VT100, VT132		4 pages of memory
ID-200/color	intelligent/ graphics	14-inch, 8-color	132 x 24	RS232C, current loop (X-on/X-off, EIA, DTR, SNA/SDLC)	DEC VT100, VT132	2,750 (Q1)	4 pages of memory
IMS INT'L							
ULTIMA II	intelligent/ graphics	12-inch; green, amber	80 x 25	RS232C, RS422 (X-on/X-off, CTS)	TeleVideo 950, 920, 925; DEC VT52	585 (Q1); 495 (Q100)	72 programmable function keys, bit-mapped graphics, PLOT 10-compatible, keyboard diagnostics, 6 foreign language sets
INTECOLOR CORP.							
2405	intelligent/ graphics	13-inch, 8 foreground/ 8 background	80 x 24	RS232C; opt. current loop (X-on/X-off)	DEC VT100	1,295 (Q1); 995 (Q100)	12 programmable function keys, 2 pages of memory, split screen, non-volatile set-up modes, PLOT 10-compatible, vector graphics, printer port, light pen
F8001	editing	19-inch, 8 foreground/ 8 background	80 x 48	RS232C; opt. current loop (X-on/X-off)		2,395 (Q1); 1,795 (Q100)	12 function keys, printer port; opt. color-graphics package
Color Trend 210	intelligent	14-inch, 8-color	80 x 24	hardware handshaking	DEC VT100, VT52		12 programmable function keys, vector graphics
INTEGRATED AUTOMATION							
VDT-2	editing/ graphics	15-inch, b&w	108 x 70	RS232C, RS449 (X-on/X-off)	DEC VT100		bit-mapped graphics, compatible with Group 3 Facsimile and 200-ppi laser printers
VDT-3	editing/ graphics	15-inch, b&w	104 x 51	RS232C, RS449 (X-on/X-off)	DEC VT100		bit-mapped graphics, compatible with Group 4 Facsimile and 300-ppi laser printers
INTERGRAPH CORP.							
ANT 009	editing	12-inch, b&w	132 x 24	RS232C, current loop (X-on/X-off, RTS/CTS)		1,600 (Q1)	85 function keys, portable, self-diagnostics
ANT 016	editing	12-inch, b&w	132 x 24	RS232C (X-on/X-off)		2,470 (Q1)	83 function keys, portable
KEL INC.							
J1014	intelligent/ graphics	14-inch, green	146 x 64	RS232C, current loop (X-on/X-off, DTR)	Tektronix 4010, 4014; DEC VT100	3,450 (Q1)	non-volatile set-up modes, 8 programmable function keys, PLOT 10-compatible, rectangle fill, circle generator, built-in diagnostics; opt. dual planes, digitizer tablet
J1014C	intelligent/ graphics	14-inch, 8-color	146 x 64	RS232C, current loop (X-on/X-off, DTR)	Tektronix 4010, 4014; DEC VT100	5,950 (Q1)	non-volatile set-up modes, 8 programmable function keys, built-in diagnostics, 4 planes, circle generator, bit-mapped memory, PLOT 10-compatible
J1019	intelligent/ graphics	19-inch, green	146 x 64	RS232C, current loop (X-on/X-off, DTR)	Tektronix 4010, 4014; DEC VT100	4,600 (Q1)	non-volatile set-up modes, 8 programmable function keys, built-in diagnostics; bit-mapped memory, rectangle fill, PLOT 10-compatible; opt. dual plane, digitizer

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
LANPAR TECHNOLOGIES INC.							
Vision	intelligent/ graphics	12-inch; green, amber	132 x 25	RS232C (X-on/X-off)	DEC VT100	995 (Q1)	4 programmable function keys, split screen, non-volatile set-up modes, Tektronix 4010, 4014, PLOT 10-compatible; opt. bit-mapped graphics
Vision 2200+	editing/ graphics	12-inch; green, amber	132 x 25	RS232C (X-on/X-off)	DEC VT220	1,195 (Q1)	non-volatile set-up modes, split screen, Tektronix 4010, 4014, PLOT 10-compatible; opt. bit-mapped graphics
LEAR SIEGLER INC./DATAPRODUCTS DIV.							
ADM 5	dumb	12-inch; green, b&w	80 x 24	RS232C; opt. current loop		745 (Q1)	
ADM 11	intelligent	12, 14-inch; green, amber	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off, DTR)	Lear Siegler ADM 3A, ADM 5; ADDS Viewpoint and Regent 25; Hazeltine 1400, 1420, 1500; DEC VT52	695 (Q1)	8 programmable function keys, non-volatile set-up modes, mosaic graphics
ADM 12	intelligent	12-, 14-inch; green, amber	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off, DTR)	Lear Siegler ADM 3A, ADM 5, ADM 31, ADM 32	805 (Q1)	16 programmable function keys, 2 pages of memory, split screen, non-volatile set-up modes, mosaic graphics; opt. 8 Int'l char. sets
ADM 22	editing	12-inch, green	80 x 25	RS232C, current loop (X-on/X-off)	Lear Siegler ADM 3A, ADM 5, ADM 31; Hazeltine 1500; ADDS Regent 25	695 (Q1)	7 function keys, non-volatile set-up modes, mosaic graphics
ADM 220	intelligent	12-, 14-inch; green, amber	132 x 25	RS232C; opt. RS422, current loop (X-on/X-off)	DEC VT220, VT100, VT52	1,165 (Q1)	30 programmable function keys; 1 page of memory; split screen; non-volatile set-up menus in English, French, German; line graphics
ADM 1178	intelligent	12-, 14-inch; green, amber	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off, DTR)	IBM 3278 with protocol converter	995 (Q1)	24 programmable function keys, non-volatile set-up modes; opt. Int'l char. sets
ADM 3A	dumb	12-inch; green, b&w	80 x 24	RS232C; opt. current loop		695 (Q1)	
LEENSHIRE LTD.							
VCT 6910	intelligent	14-inch, 64-color	132 x 27	RS232C, RS422, current loop (X-on/X-off, RTS)	DEC VT100, VT50; Tektronix 4010, 4105	2,625 (Q1); 1,970 (Q100)	20 programmable function keys, non-volatile set-up modes; opt. graphics
VCT 6928	intelligent/ graphics	14-inch, 64-color	80 x 48	RS232C, RS422, current loop (X-on/X-off, RTS)	DEC VT100, VT52; Tektronix 4010, 4105	4,600 (Q1); 3,450 (Q100)	20 programmable function keys, non-volatile set-up modes, circle, square, polygon fill, zoom, pan, rackmount, RS170 composite output
LIBERTY ELECTRONICS							
Freedom 110	intelligent	12-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off, DTR)	TeleVideo 910, Lear Siegler ADM 3A, ADDS Regent 25, Hazeltine 1420	595 (Q1); 506 (Q100)	10 programmable function keys, non-volatile set-up modes, 15 line-drawing graphics characters, buffered bidirectional printer port, 8 foreign character sets
Freedom 200	intelligent	12-inch; green, amber	80 x 25	RS232C (X-on/X-off, DTR)	TeleVideo 950, Lear Siegler ADM 31	695 (Q1); 591 (Q100)	47 programmable function keys, 10 function keys, non-volatile set-up modes, split screen 86 extended graphics characters, buffered bidirectional printer port, 8 foreign character sets
Freedom 212	intelligent	12-inch; green, amber	80 x 25	RS232C, Bell 212A modem, RJ11/RJ13 (X-on/X-off, DTR)	TeleVideo 950, Lear Siegler ADM 31		10 programmable function keys, non-volatile set-up modes, 86 extended graphics characters, voice/data terminal, integral Bell 212A-compatible modem
Freedom 220	intelligent	12-inch; green, amber	132 x 25	RS232C (X-on/X-off, DTR)	DEC VT220, VT100, VT52	795 (Q1); 676 (Q100)	split screen, 10 programmable function keys, DEC VT220 special graphics character set
Freedom 222	intelligent	12-inch; green, amber	132 x 25	RS232C, Bell 212A modem, RJ11/RJ13 (X-on/X-off, DTR)	DEC VT52, VT100, VT220	1,395 (Q1); 1,186 (Q100)	split screen, 10 programmable function keys, voice/data terminal, integral Bell 212-compatible modem, auto-dial

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
LYNWOOD INT'L INC.							
Alphagraphic-Mono	editing/ graphics	14-inch; green, amber	100 x 30	RS232C, current loop (X-on/X-off, DTR, bisync)	IBM 3274/79; Honeywell 7851/54, 7300, 7700, 7874; DEC VT100	2,000 (Q1)	10 screen windows, 10 interface partitions, non-volatile set-up modes, 10 pages of memory, bit-mapped graphics, PLOT 10-compatible, diagnostics, auxiliary printer
Alphagraphic-Color	editing/ graphics	14-inch, 8-color	100 x 30	RS232C, current loop (X-on/X-off, DTR, bisync)	IBM 3274/79; Honeywell 7851/54, 7300, 7700, 7874; DEC VT100	3,000 (Q1)	10 screen windows, 10 interface partitions, non-volatile set-up modes, 10 pages of memory, bit-mapped graphics, PLOT 10-compatible diagnostics, auxiliary printer
MATROX ELECTRONIC SYSTEMS LTD.							
CTM-300	intelligent/ graphics	12-inch, 8 foreground/ 8 background	132 x 25	RS232C, Centronics (X-on/X-off)	DEC VT100	3,340 (Q1)	18 programmable function keys, split screen, user RAM, mosaic graphics, rackmount, RS170 video output
MEGADATA CORP.							
8188-1	editing	15-inch; b&w, green, amber, red	80 x 25	RS232C, RS422			custom emulations, 100 function keys, 100 pages of memory, split screen, line drawing graphics, custom programming and character sets
8188-2	intelligent	15-inch; b&w, green, amber, red	132 x 29	(2) RS232C			custom emulations, 32 programmable function keys, 32K-byte text memory, line drawing graphics, slave monitor output; opt. touch screen
8188-3	editing	15-inch; b&w, green, amber, red	80 x 25	(3) RS232C, (2) parallel (bisync, SDLC)	UNIVAC UTS40; IBM 3271/77/87; IBM 3275; ADDS Regent 40		90 function keys, 2 pages of memory, line drawing graphics, diagnostics, selectable emulation modes; opt. 1.4M-byte dual floppy disk
8188-4	editing	15-inch; b&w, green, amber, red	132 x 24	RS232C, RS423, parallel (V.21, X.24, X.21, SDLC)			84 function keys, horizontal and vertical split screen, 128K-byte text buffer, line drawing graphics, diagnostics; opt. 1.4M-byte dual floppy disk
8188-5	editing	15-inch; b&w, green, amber, red	80 x 25	RS232C, RS422			100 function keys, 100 pages of memory, split screen, line drawing graphics, diagnostics, battery backup, custom emulations
8188-6	intelligent	15-inch; b&w, green, amber, red	135 x 26	RS232C, RS422	DG410, 460		32 programmable function keys, split screen, line drawing graphics, diagnostics; opt. touch screen
8188-7	intelligent	15-inch; green, amber, red	132 x 29	(3) RS232C, Centronics (bisync, SDLC)	UNIVAC UTS40; IBM 3271/77/87, 3275; ADDS Regent 40		90 function keys, 2 pages of memory, line drawing graphics, 256 user-specified characters, selectable emulation modes; opt. dual floppy disks
MEMOREX CORP./COMMUNICATIONS GROUP							
2051 Model 11		15-inch, monochrome	80 x 25		IBM 5251 Model 11		low power, automatic dimming, alarm
MEMOREX CORP.							
2079 Color Display Stations		14-inch, 7-color	80 x 32	(SNA/SDLC, BSC)	IBM 3279		opt. light pen, graphics
2078 Display Station		15-inch; green, amber	80–132/ 24–43	(SNA/SLDX, bisync)			automatic dimming, alarm
2178 Display Station		12-inch, green	80 x 24	(bisync, SNA/SDLC)	IBM 3178		IBM 3270-compatible, portable, automatic dimming, self-test diagnostics, printer port, Int'l char. sets
MICRO DISPLAY SYSTEMS INC.							
202	editing	15-inch; b&w, green, amber	80 x 57	RS232C		1,695 (Q1)	10 keys
212	dumb	15-inch; b&w, green, amber	80 x 57	RS232C		1,695 (Q1)	
MICRO PRODUCTS CO. (MPC DIV. C3 INC.)							
1100/1200	intelligent	14-inch; b&w, green, amber	132 x 25	RS232C, RS422, current loop, Centronics, RS170 (HDX/FDX, X-on/X-off)	DEC VT52, VT100, VT101, VT131/132, VT220; Perkin Elmer 1251	1,295 (Q1)	13 programmable function keys, 6 pages of memory, soft set-up in NVR, split screen, protected fields, 7 video attributes, line drawing graphics, 5 foreign languages

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
2100/2150	intelligent/ graphics	14-inch; 16-color, 4096-color palette	80 x 48	RS232C, RS423, current loop, Centronics, RS170 (HDX/FDX, X-on/X-off)	Intecolor 8301G/R	2,595 (Q1); 3,995 (Q1)	16 programmable function keys, 6 pages of memory, 7 video attributes, bit-mapped graphics, region/polygon fill, ISSCO, SAS, DVI, PLOT 10-compatible, parallel port
MICRO-TERM INC.							
ACT5A/MIME-2A	editing	12-inch; b&w, green	80 x 24	RS232C, current loop (X-on/X-off, DTR)	DEC VT52, Lear Siegler ADM 3A, SOROC IQ 120	995 (Q1)	8 function keys, split screen
ERGO-201	intelligent/ graphics	12-inch; green, amber	80 x 25	RS232C, current loop (X-on/X-off)	TeleVideo 925, Lear Siegler ADM 3A, ADDS, Hazeltine, DEC VT52, ACT-5A	795 (Q1)	24 programmable function keys, 2 pages of memory, split screen, non-volatile set-up modes, Tektronix 4010-compatible, custom emulations
ERGO-301	intelligent/ graphics	12-inch; green, amber	132 x 25	RS232C, current loop (X-on/X-off)	DEC VT52, VT100	895 (Q1)	4 programmable function keys, 2 pages of memory, split screen, non-volatile set-up modes, Tektronix 4010- and REGIS-compatible graphics, video output
ERGO-301FK	intelligent/ graphics	12-inch; green, amber	132 x 25	RS232C, current loop (X-on/X-off)		995 (Q1)	20 programmable function keys, split screen, non-volatile set-up modes, PLOT 10- and REGIS-compatible graphics, video output, 2 pages of memory
ERGO-4000	intelligent	15-inch, green	80 x 66	RS232C, current loop (X-on/X-off)	DEC VT52, VT100; Lear Siegler ADM 3A	1,195 (Q1)	30 programmable function keys, non-volatile set-up modes, custom emulations
TWIST	intelligent	15-inch; b&w, amber	80 x 72	RS232C, current loop (X-on/X-off)	DEC VT52, VT100; Lear Siegler ADM 3A; TeleVideo; ADDS; Hazeltine	1,595 (Q1)	22 programmable function keys, 3 pages of memory, non-volatile set-up modes, custom modes
MICROMATION INC.							
M/View	editing/ graphics	15-inch, green	132 x 72	(2) RS232C, Centronics (X-on/X-off, DTR, RTS)	DEC VT100, Tektronix 4010/4014	2,990 (Q1); 2,392 (Q100)	non-volatile set-up modes, bit-mapped graphics, PLOT 10-compatible, OEM custom firmware development
MILTOPE CORP.							
MIL-TERM-280	editing/ graphics	4.1 inches high x 8.3 inches wide, orange plasma	80 x 25	RS232C, RS422 (X-on/X-off)	DEC VT100	15,800 (Q1)	militarized, split screen, non-volatile set-up modes, dot-addressable graphics, MIL-STD-188C, parallel printer port
TER-100	editing/ graphics	4.1 inches high x 8.3 inches wide, orange plasma	80 x 25	RS232C, RS422 (X-on/X-off)	DEC VT100	27,000 (Q1)	militarized, non-volatile set-up modes, line-addressable graphics, MIL-STD-188C, parallel printer port, MT-1029 VRC vehicular mount
MOTOROLA SEMICONDUCTOR PRODUCTS							
M68SXD10155A	editing	12-inch, b&w	80 x 24	RS232C	Motorola Exormacs Development System	2,590 (Q1)	12 function keys, audible alarm, switch-selectable modem controls
MSI DATA CORP.							
85	intelligent	5 x 7 dot matrix characters, LCD	2 lines	RS232C, DADM, serial or parallel modem			clock, internal printer, programmable keys
88S	intelligent	5 x 7 dot matrix characters, LCD	2 lines	RS232C, DADM, serial or parallel modem			programmable keys, clock, program-load modules, laser scanner
NCR CORP.							
7900-III	dumb	12-inch, amber	80 x 25	RS232C	ADDS	2,150 (Q1); 1,500 (Q100)	self-test diagnostics, opt. serial or parallel printer
7910	intelligent	15-inch, amber	132 x 25	RS232C, Centronics (X-on/X-off)	NCR, page	1,995 (Q1); 1,395 (Q100)	10 programmable function keys, non-volatile set-up modes, 4 pages of memory, split screen, mosaic line graphics, bar charts, self-test diagnostics
7900-612-1000	dumb	12-inch; amber	80 x 25	RS232C		1,500 (Q1)	local diagnostics, serial printer connect
7910-0102-7107	intelligent	15-inch; amber	132 x 25	RS232C, Centronics (X-on/X-off)	DEC VT100, NCR Models 1 and 4	1,995 (Q1)	10 programmable function keys, 4 pages of memory, non-volatile set-up modes, line and bar graphics, printer buffer
NEWBURY DATA RECORDING							
9509	editing	12-inch; amber, green	80 x 25	RS232C (X-on/X-off)	Newbury Data 8009		12 function keys, non-volatile set-up modes

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
9500	editing	12-inch; green, amber	80 x 25	V24 (RS232C), current loop (X-on/X-off, DTR)	TeleVideo 925, 950		function keys, 4 pages of memory, non-volatile set-up modes, printer buffer; opt. 7 languages
9510	editing/ graphics	12-inch; green, amber	80 x 25	V24 (RS232C), current loop (X-on/X-off, DTR)	TeleVideo 925, 950; Tektronix 4010, 4014		bit-mapped graphics; opt. 7 languages
NORTHERN TELECOM							
DP1000	editing/ graphics	7-inch, white	80 x 24	RS232C, parallel, 2-RJ11C (X-on/X-off; opt. bisync, SDLC)	DEC VT52, VT100; IBM 3101	1,295 (Q1)	5 programmable softkeys, portable, mosaic graphics, integral 103 modem, 2-line telephone with speaker phone, simultaneous voice and data
ONYX SYSTEMS							
OT-80	intelligent	14-inch, green	80 x 25	RS232C (X-on/X-off, bisync)	DEC VT52, VT100	850 (Q1); 810 (Q100)	28 programmable function keys, split screen, mosaic graphics, foreign language versions, diagnostics
PERRY DATA SYSTEMS INC.							
9460 Video Register Terminal	editing	12-inch, green	80 x 24	RS232C, RS422 (RTS)	ADDS Regent 25, Data General D200, Datapoint 8200, IBM 3101	3,500 (Q1); 2,400 (Q100)	10 function keys, is a terminal/cash register (point-of-sale), receipt printer, aux. serial port; opt. bar-code reader
9310 Video Printing Terminal	editing	12-inch, green	80 x 24	RS232C, RS422 (RTS)	ADDS Regent 25	3,500 (Q1); 2,400 (Q100)	5 function keys, (point-of-sale) printing terminal with built-in Okidata 82A printer, cash drawer control, aux. serial port
PDS TECHNOLOGIES INC.							
271	dumb	15-inch; green, amber	132 x 25	RS232C, current loop (X-on/X-off, TTY)	Tektronics 4014, 4010; Lear Siegler ADM 3A	2,200 (Q100)	industrial version only
PINZONE INT'L INC.							
Emulog 200	editing	green	80 x 24	RS232C, current loop (X-on/X-off)	Data General D200, 6053	849 (Q1); 595 (Q100)	20 function keys
PSITECH INC.							
GTC 314	intelligent/ graphics	14-inch; 8-color, 4096-color palette	132 x 48	(2) RS232C (X-on/X-off, RTS/CTS)	DEC VT52, VT100; Lear Siegler ADM 3; Tektronix 4010, 4027	2,895 (Q1)	18 programmable function keys, bit-mapped graphics, graphic primitives, PLOT 10-compatible, ISSCO, SAS, PVI; opt. color ink-jet printer
GTC 329	intelligent/ graphics	19-inch; 16-color, 4096-color palette	132 x 48	(2) RS232C (X-on/X-off, RTS/CTS)	DEC VT52, VT100; Lear Siegler ADM 3; Tektronix 4010, 4027	4,995 (Q1)	18 programmable function keys, bit-mapped graphics, graphic primitives, PLOT 10-compatible, ISSCO, SAS, PVI, rackmount, RGB video outputs; opt. color ink-jet printer
QUME CORP.							
QVT-102	intelligent	12-inch; green, amber	80 x 24	RS232C; opt. current loop (X-on/X-off)	TeleVideo 910, Hazeltine 1500, Lear Siegler ADM 3A, ADM 5A	595 (Q1)	16 graphics symbols; opt. 14-inch display
QVT-103	intelligent	14-inch; green, amber	132 x 24	RS232C; opt. current loop (X-on/X-off)	DEC VT100, VT131	1,095 (Q1)	16 graphics symbols
QVT-108	intelligent	12-inch; green, amber	80 x 24	RS232C; opt. current loop (X-on/X-off)	TeleVideo 912, 920, 925	695 (Q1)	16 graphics symbols; opt. 14-inch display
QVT-109	intelligent	14-inch; green	80 x 24	RS232C; opt. RS423, current loop	ADDS Viewpoint 2A	795 (Q1)	38 programmable functions
RAMTEK							
6221	intelligent/ graphics	13-inch; 8-color, 64-color palette	132 x 24	RS232C, RS170	DEC VT100	5,995 (Q1)	20 programmable function keys, runs ISSCO, SAS, PDA software
RASTER TECHNOLOGIES INC.							
Model One/10	intelligent/ graphics	13-inch, 256-color	128 x 60	RS232C, IEEE-488 (X-on/X-off)	DEC VT100, Tektronix 4014	7,995 (Q1)	12 programmable function keys, 30 function keys, non-volatile set-up modes, polygon fill
SAI TECHNOLOGY CO.							
5000	editing/ graphics	8-x8-inch, orange plasma	80 x 50	opt. serial, parallel	DEC VT100		bit-mapped graphics
7000	editing/ graphics	4-x8-inch, orange plasma	80 x 50	opt. serial, parallel	DEC VT100		bit-mapped graphics, low power

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
SANYO BUSINESS SYSTEMS CORP.							
CRX-1100	intelligent	12-inch, green	80 x 24	RS232C, current loop (X-on/X-off)	TeleVideo 910, Hazeltine 1410, ADDS Regent 25	695 (Q1)	8 programmable function keys, 1 page of memory, non-volatile set-up modes, block graphics, parallel and serial printer ports
SELANAR CORP.							
Hirez 100	intelligent/ graphics	14-inch; green, amber	132 x 48	RS232C (X-on/X-off)	DEC VT100, 101, 102, 52; Tektronix 4010, 4014	2,395 (Q1)	20 programmable function keys; non-volatile set-up modes; arc, circle, polygon generation; user definable printer port, plotter port
SOROC TECHNOLOGY INC.							
Challenger 530	dumb	12-inch, green	80 x 24	RS232C (X-on/X-off)	Lear Siegler ADM 3A	695 (Q1)	limited line graphics; opt. 300-/1200-baud integral modem
Challenger 525	dumb	12-inch, green	80 x 24	RS232C (X-on/X-off)	TeleVideo 925, Lear Siegler ADM 3A	895 (Q1)	limited line graphics; opt. integral modem
Challenger 540	editing	12-inch, green	80 x 24	RS232C (X-on/X-off)	Lear Siegler ADM 3A	895 (Q1)	limited line graphics, function keys; opt. integral modem
Challenger 540AM	editing	12-inch, green	80 x 24	RS232C	Lear Siegler ADM 3A	895 (Q1)	limited line graphics, Alpha-Micro-compatible with driver, function keys; opt. integral modem
Challenger 540 B4	editing	12-inch, green	80 x 24	RS232C (X-on/X-off)	Lear Siegler ADM 3A	895 (Q1)	limited line graphics, MAI/Basic 4 application, function keys, integral modem
Challenger 550	editing	12-inch, green	80 x 24	RS232C (X-on/X-off)	Lear Siegler ADM 2, ADM 3A	1,395 (Q1)	limited line graphics, Tandem-compatible, function keys; opt. integral modem
SPERRY CORP.							
UTS 20	editing	12-inch, green	80 x 25	RS232C, X.21 (UNISCOPE, BSC-3270)	IBM 3270	2,215 (Q1); 1,883 (Q100)	22 function keys, 2 logical screens
UTS 30	editing/ graphics	12-inch, green	80 x 25	RS232C, X.21 (UNISCOPE, TTY)	TTY KSR-35	3,235 (Q1); 2,750 (Q100)	22 function keys, 2 logical screens, CP/M DRI graphics
TAB PRODUCTS CO.							
132/15	intelligent	15-inch, green	132 x 27	RS232C, current loop (X-on/X-off, DTR handshake)	DEC VT52, VT100, VT132; Prime	1,795 (Q1)	22 programmable function keys, 12 function keys, 4 pages of memory, split screen, NVR; opt. printer port, integral modem
132/15G	graphics/ dumb	15-inch, green	132 x 27	RS232C, current loop (X-on/X-off)	DEC VT52, VT100, VT132; Tektronix 4010, 4027	2,795 (Q1)	arcs, circle, pie, polygons; opt. printer port, integral modem
TANDBERG DATA INC.							
TDV 2200 S	intelligent/ graphics	15-inch, green	132 x 25	RS232C, RS422, current loop (X-on/X-off, DTR, bisync)	DEC VT52/100/220, Datapoint 8200/8220, IBM 3101, Data General D 200/220, HP 2622, Honeywell 7802, Computer Automation CRTII, MAI/Basic Four, Univac U200	1,395 (Q1); 950 (Q100)	34 function keys, 16 programmable function keys, 8 pages of memory, non-volatile set-up modes, bit-mapped, PLOT 10-compatible, NOVA GKS, Tektronix 4010/4014 graphics, magnetic-card reader, bar-code reader, foreign languages
TEC INC.							
ET-80 Series	intelligent	15-inch, b&w	132 x 25	RS232C; opt. current loop, RS422 (X-on/X-off)	Lear Siegler ADM 3; TeleVideo 910, 920	1,885 (Q1); 1,505 (Q100)	18 programmable function keys, 5 pages of memory, split screen, line/business graphics, rackmount, 8 foreign character sets, printer buffer
ET-100 Series	intelligent	15-inch, b&w	132 x 25	(X-on/X-off)	DEC VT52, VT100, VT131, VT132	1,885 (Q1); 1,505 (Q100)	16 programmable function keys, 4 pages of memory, split screen, non-volatile set-up modes, line/business graphics, rackmount, printer buffer, 8 foreign character sets
630/630-C	editing	12-inch; b&w, green	80 x 25	RS232C (X-on/X-off)	Lear Siegler ADM 3A	1,310 (Q1); 925 (Q100)	7 function keys, 4 pages of memory, split screen, line graphics, rackmount, printer buffer, card reader, foreign character sets

ALPHANUMERIC DISPLAY TERMINALS

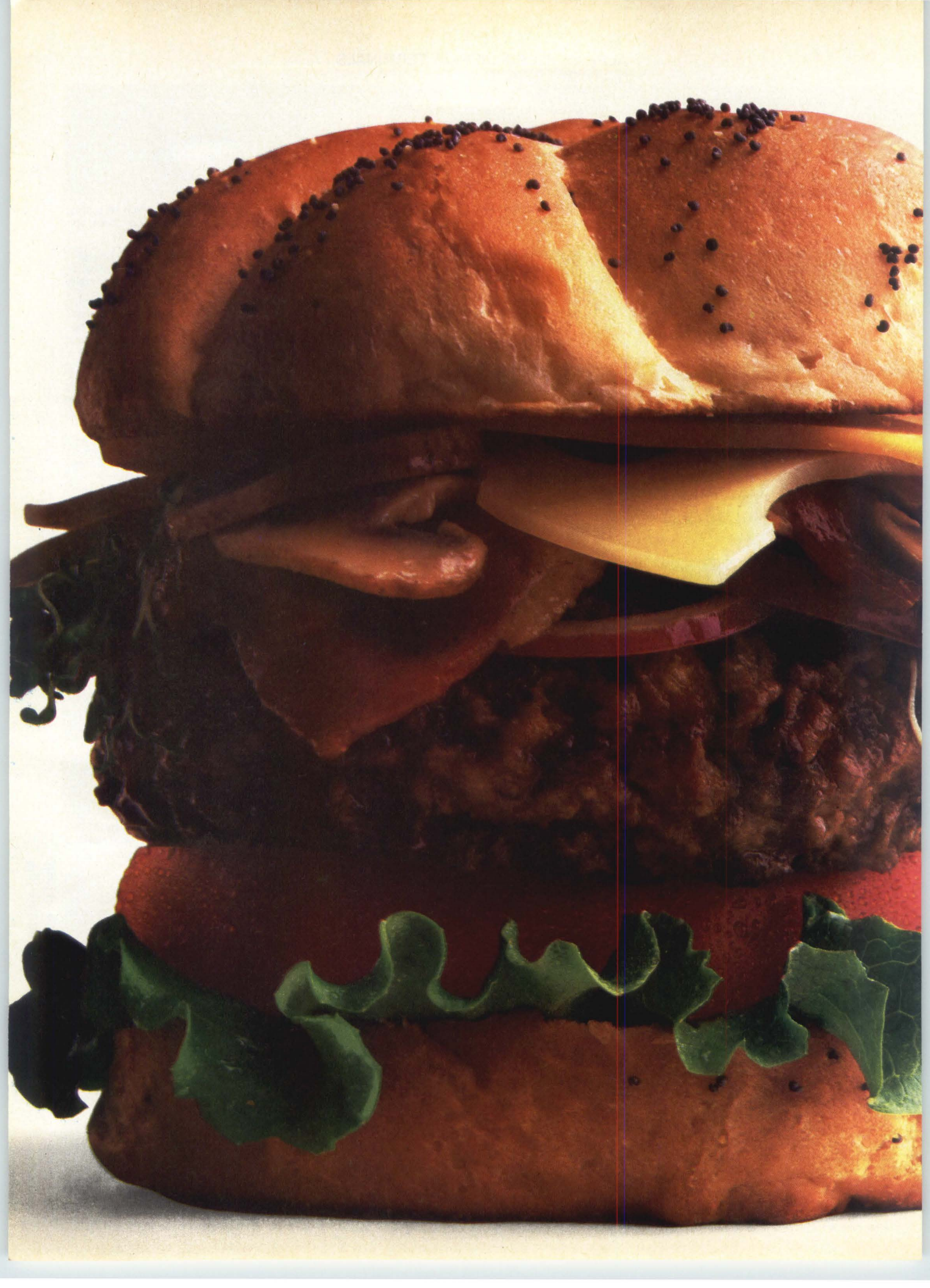
Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
TELERAY							
16-GRF	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)	Tektronix 4010, 4014	2,795 (Q1)	4 pages (opt. 8) of memory, 10 function keys, non-volatile set-up modes, split screen, PLOT 10-compatible, line, mosaic graphics, 2 buffered RS232C ports, rackmount; opt. video output
7-HAZ	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)	Hazeltine 1510	1,335 (Q1)	2 pages (opt. 4) of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, 2 buffered RS232C ports, rackmount; opt. video output
16-HON	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)	Honeywell VIP7801	1,895 (Q1)	2 pages of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, 2 buffered RS232C ports, rackmount; opt. video output
7	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off)	user-defined	1,295 (Q1)	2 pages (opt. 4) of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, rackmount, 2 buffered RS232C ports; opt. video output
7-DDG	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off)	DEC VT100, VT52; Data General D200	1,625 (Q1)	2 pages (opt. 4) of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, rackmount, 2 buffered RS232C ports; opt. video output
16	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)		1,545 (Q1)	4 pages (8 opt.) of memory, 10 function keys, non-volatile set-up modes, mosaic and line drawing graphics, 2 buffered RS232C ports, rackmount; opt. video output
16-APL	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)		1,745 (Q1)	4 pages (8 opt.) of memory, 10 function keys, non-volatile set-up modes, mosaic and line drawing graphics, 2 buffered RS232C ports, rackmount; opt. video output
100	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	132 x 24	RS232C, RS422, current loop (X-on/X-off)	DEC VT100, VT131, VT52	1,395 (Q1)	20 function keys, non-volatile set-up modes, split screen, line graphics, rackmount; opt. video output
100 DHZ	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	132 x 24	RS232C, RS422, current loop (X-on/X-off)	Hazeltine 1510; DEC VT100, VT131, VT52	1,595 (Q1)	20 function keys, non-volatile set-up modes, split screen, line graphics, rackmount; opt. video output
7-DEC	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)	DEC VT102, VT52	1,370 (Q1)	2 pages (opt. 4) of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, two RS232C ports, rackmount; opt. video output, 4 char. sets
7-HNY	editing/ graphics	9-, 12-, 15-inch; b&w, green, amber	80 x 25	RS232C, RS422, current loop (X-on/X-off)	Honeywell VIP 7300, DEC VT100 series	1,720 (Q1)	1 page (opt. 3) of memory, 10 function keys, non-volatile set-up modes, mosaic and line graphics, two RS232C ports, rackmount; opt. video output, 4 char. sets
TELEVIDEO SYSTEMS INC.							
910	dumb	12-inch, green	80 x 24	RS232C; opt. current loop (X-on/X-off, DTR)	ADDS Regent 25, Lear Siegler ADM 5, ADM 3A, Hazeltine 1410	649 (Q1)	1 function key, 1 page of memory, composite video, 4 character sets
910+	editing	12-inch, green	80 x 24	RS232C; opt. current loop (X-on/X-off)		699 (Q1)	1 function key, 1 page of memory, composite video, 4 character sets
925	editing	12-inch, green	80 x 25	RS232C; opt. current loop (X-on/X-off, DTR)	TeleVideo 912, 920	995 (Q1)	11 function keys, composite video; opt. 2 pages of memory
950	intelligent/ graphics	12-inch, green	80 x 25	RS232C, current loop (X-on/X-off, DTR)		1,195 (Q1)	11 programmble function keys, 3 pages of memory, character graphics, composite video, buffered printer port
921	intelligent/ graphics	12-inch, green	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off, DTR)	TeleVideo 910+	699 (Q1)	16 programmable function keys, non-volatile set-up modes, 15 special graphics chars., buffered printer port; opt. Tektronix 4010, 4014 graphics
925E	editing	12-inch, green	80 x 25	RS232C; opt. current loop (X-on/X-off, DTR)	TeleVideo 925	795 (Q1)	16 programmable function keys, composite video, buffered printer port; opt. second page of memory

ALPHANUMERIC DISPLAY TERMINALS

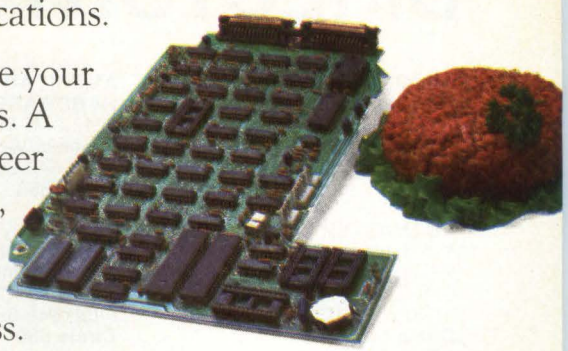
Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
914	intelligent/ graphics	12-inch, green	80 x 25	RS232C; opt. RS422, current loop (X-on/X-off, DTR)	ADDS Viewpoint A2	699 (Q1)	3 programmable function keys, 64 graphics characters, composite video output, buffered printer port; opt. Tektronix 4010, 4014 graphics board
924	intelligent/ graphics	12-inch, green	80 x 25	RS232C; opt. current loop, RS422 (X-on/X-off, DTR)		899 (Q1)	16 programmable function keys, non-volatile set-up modes, 3 pages of memory, 64 graphics characters, composite video output, buffered printer port; opt. Tektronix 4010, 4014 graphics board
PT	intelligent/ graphics	9-inch; yellow, green	80 x 25	RS232C; opt. RJ-11C (telephone) (X-on/X-off, DTR)		499 (Q1)	7 programmable function keys, 1 page of memory, portable, character graphics; opt. modems, telephone
922	intelligent/ graphics	12-inch, green	132 x 25	RS232C (X-on/X-off, DTR)	DEC VT220, TeleVideo 950 (with EPROMS)	995 (Q1)	non-volatile set-up modes, 15 programmable function keys, 1 page of memory, char. graphics, 8 char. sets, buffered printer port
970	intelligent/ graphics	14-inch, green	132 x 25	RS232C, current loop; opt. RS422 (X-on/X-off, DTR)	DEC VT100, VT52	1,495 (Q1)	non-volatile set-up modes, 16 programmable function keys, graphics chars. and block graphics, buffered printer port, 8 char. sets
TELEX							
TC 078	editing	12-inch; amber, green	80 x 24			1,550 (Q1)	light-pen attachment, printer attachment
TC 079		12-inch; 4-, 7-color	80 x 24	RS232C; IBM 3274, 3776 (IBM 3270)		2,195 (Q1)	box-to-box compatibility
TC 178	editing	12-inch, b&w	80 x 24	RS232C, parallel, serial	IBM 3270	1,550 (Q1)	printer attachment
TC1186	intelligent	12-inch; b&w, 4-color	80 x 24	RS232C	IBM 3270		opt. PC keyboard
TERMIFLEX CORP.							
FX/52	intelligent	red, LED	32 x 1	RS232C, RS422, current loop, RS232C		750 (Q1)	8 programmable function keys, portable, block mode transmission, pollable
HT/1000E	intelligent	LCD	16 x 4	RS232C, RS422, current loop, RS232C (X-on/X-off)		1,195 (Q1)	4 programmable function keys, non-volatile set-up modes, portable
THOMAS ENGINEERING COMPANY							
TE-780X	intelligent	14-inch, green	80 x 24	RS232C, current loop (X-on/X-off)	Honeywell VIP7800, DEC VT100	1,695 (Q1)	12 programmable function keys, programmable status line and bar graphics
TRANSIAC CORP.							
TR1024	editing/ graphics	15-inch, green	145 x 52	RS232C (X-on/X-off)	Tektronix 4014, DEC VT100	3,750 (Q1)	16 function keys, 4 pages of memory, non-volatile set-up modes, PLOT 10-compatible, bit-mapped graphics, digitizer tablet
U.S. DATA CORP.							
React 2	intelligent	13-, 19-inch; 8-color	80 x 48	(X-on/X-off)			graphics package available
VERTICOM INC.							
PLP100	intelligent/ graphics	13-, 19-inch; 16-color, 4096-color palette	132 x 80	RS232C, Centronics (X-on/X-off)	DEC VT100, Tektronix 4010	5,650 (Q1)	5 function keys, 10 programmable function keys, 4 pages of memory, polygon fill
PLP200	intelligent/ graphics	13-, 19-inch; 16-color, 4096-color palette	132 x 80	RS232C, Centronics (X-on/X-off)	DEC VT100, Tektronix 4010	6,450 (Q1)	10 programmable function keys, 4 pages of memory, polygon fill
VISUAL TECHNOLOGY INC.							
V55	intelligent	12-, 14-inch; b&w, green	80 x 24	RS232C; opt. current loop (X-on/X-off)	DEC VT52, Lear Siegler ADM 3A, Hazeltine Esprit, 1510, ADDS Viewpoint, Visual 210	895 (Q1)	12 programmable function keys, split screen, non-volatile set-up modes
V50	editing	12-, 14-inch; b&w, green	80 x 24	RS232C; opt. current loop (X-on/X-off)	DEC VT52, Lear Siegler ADM 3A, Hazeltine Esprit, ADDS Viewpoint	695 (Q1)	3 function keys, non-volatile set-up modes
V300	intelligent	12-, 14-inch; b&w, green	80 x 24	RS232C, current loop (X-on/X-off)	DEC VT100, VT52	995 (Q1)	12 programmable function keys, split screen, non-volatile set-up modes; opt. 8 pages of memory

ALPHANUMERIC DISPLAY TERMINALS

Company Model	Terminal type	Display (diag. in., color)	Screen format (col. x lines)	Interfaces (protocols)	Emulations	Price ($)	Notes, features, options
V330	intelligent	12-, 14-inch; b&w, green	80 x 24	RS232C, current loop (X-on/X-off)	DEC VT52, Lear Siegler ADM 3A, Hazeltine 1510, DG D200	995 (Q1)	12 programmable function keys, split screen, non-volatile set-up modes; opt. foreign languages
V500	intelligent/ graphics	14-inch, green	80 x 33	RS232C, current loop (X-on/X-off)	DEC VT52, Lear Siegler ADM 3A, Hazeltine 1510, DG D200, Tektronix 4010, 4014	2,495 (Q1)	12 programmable function keys, split screen, non-volatile set-up modes, bit-mapped graphics, PLOT 10-compatible; opt. foreign language
V550	intelligent/ graphics	14-inch, green	80 x 33	RS232C, current loop (X-on/X-off)	DEC VT100, VT52; Tektronix 4010, 4014	2,695 (Q1)	12 programmable function keys, split screen, non-volatile set-up modes, bit-mapped graphics, PLOT 10-compatible; opt. foreign languages
V102	intelligent/ graphics	14-inch, green	132 x 24	RS232C; opt. current loop (X-on/X-off)	DEC VT102, VT100, VT52; opt. Tektronix 4010, 4014	1,095 (Q1)	8 programmable function keys, split screen, non-volatile set-up modes, bit-mapped graphics, PLOT 10-compatible; opt. foreign languages
WYSE TECHNOLOGY							
WY-1000	intelligent	14-inch, green	132 x 24	RS232C, RS422 (bisync)		2,695 (Q1); 2,021 (Q100)	16 programmable function keys, supports DRI's GSX graphics package; opt. bit-mapped graphics
350	editing	14-inch; 8-color, 64-color palette	132 x 24	RS232C	Wyse WY-100; Lear Siegler ADM 31; Hazeltine 1500; TeleVideo 1500, 910, 924	1,295 (Q1); 971 (Q100)	16 function keys
WY-50	intelligent	14-inch, green	132 x 24	RS232C	Wyse WY-100, Lear Siegler ADM 31, TeleVideo 910, ADDS Viewpoint, Hazeltine 1500	695 (Q100); 521 (Q100)	16 programmable function keys
WY-75	intelligent	14-inch, green	132 x 24	RS232C	DEC VT100	795 (Q1); 596 (Q100)	16 programmable function keys
ZENITH DATA SYSTEMS							
ZTX-10/11	editing	12-inch, monochrome		RS232C, RJ-11C, RS170	DEC VT52	479	battery backup, 4 function keys, portable; ZTX-11 has a built-in Bell 103-compatible modem
ZENTEC CORP.							
1021	editing	12-inch, green	80 x 24	RS232C, current loop (X-on/X-off)	Hazeltine 1500, Lear Siegler ADM 3A, ADDS Viewpoint, DEC VT52	650 (Q1); 395 (Q100)	non-volatile set-up modes, 1 page of memory
1041	intelligent	12-inch; green, amber, white	80 x 25	RS232C, current loop (X-on/X-off, DTR)	Zentec Zephyr	1,095 (Q1); 825 (Q100)	non-volatile set-up modes, 8 programmable function keys, 2 pages of memory (opt. 4 pages)
1051	intelligent	12-, 15-inch; green, amber, white	132 x 25	RS232C/RS422A, RS232C (X-on/X-off, DTR)	DEC VT132	1,295 (Q1); 975 (Q100)	16 programmable function keys, 4 pages of memory, split screen, non-volatile set-up modes, line graphics, horizontal scroll
8031	intelligent	12-inch; green, amber, white	80 x 25	RS232C (X-on/X-off, DTR)	Zentec Zephyr	1,195 (Q1); 900 (Q100)	16 programmable function keys, 1 page of memory



Qume can give your system extra appeal—with terminals made to order to your exact specifications.



We'll work from your specs, or be your partner in the development process. A dedicated Qume applications engineer will be with you from start to finish, to help identify your needs and recommend the right ingredients to make your product plan a success.

Choose a different interface. A unique command set. Even specialized electronics. No modification is too small, no specification too unusual for our experienced team of hardware and software design professionals. On the outside, select custom colors, your own labels and logo, proprietary packaging and owner's manuals. Without paying heavy premiums for these extras.

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- *Type of Organization*
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  - Units acquired
  - Major applications
- *Minicomputers/Microcomputers planned 1984 purchases:*
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  - Sites planning to change major vendor
  - Fail-safe computer operations
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$250,000-499,999	2,218
$500,000 or more	1,403
Sites planning to install integrated electronic office functions in 1984	1,642
HOT PROSPECTS...Sites planning to change major vendors in 1984	1,085
Value-added OEMs and third parties	3,110
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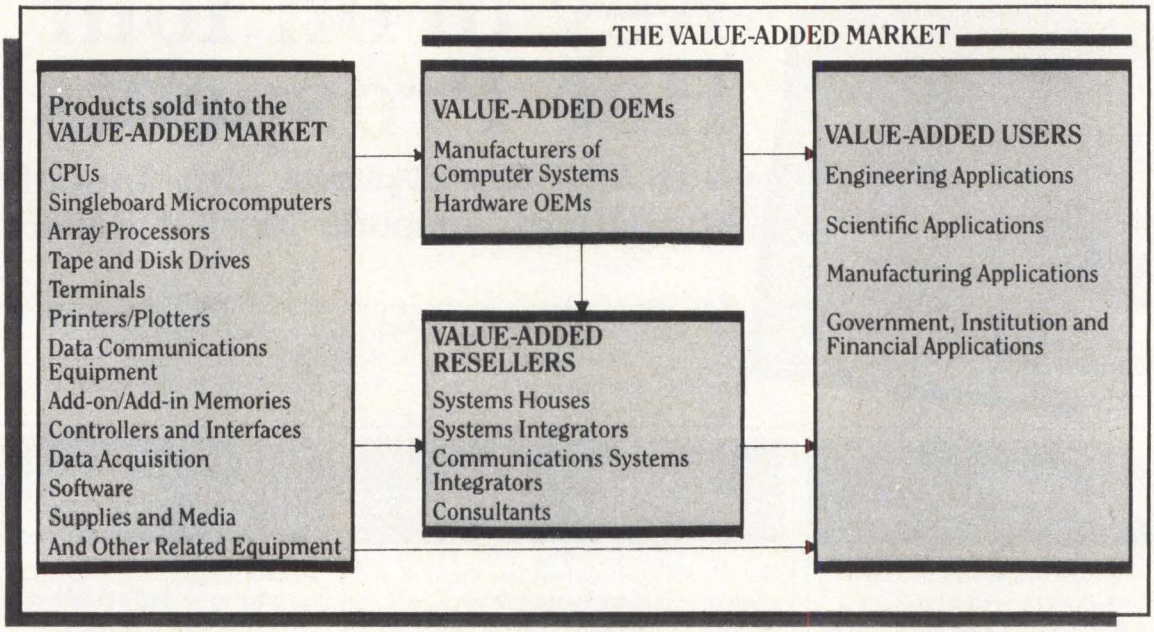

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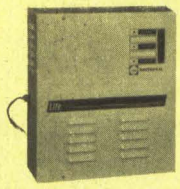

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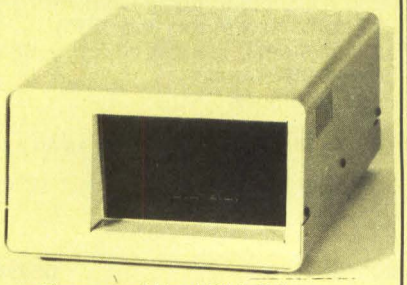

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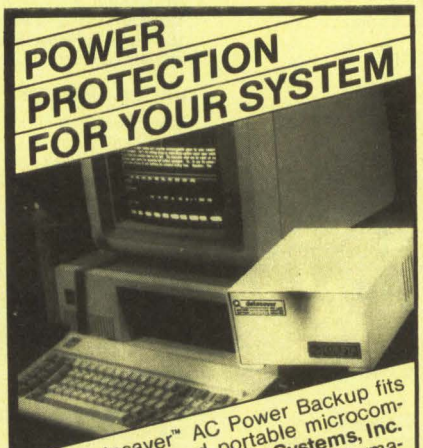

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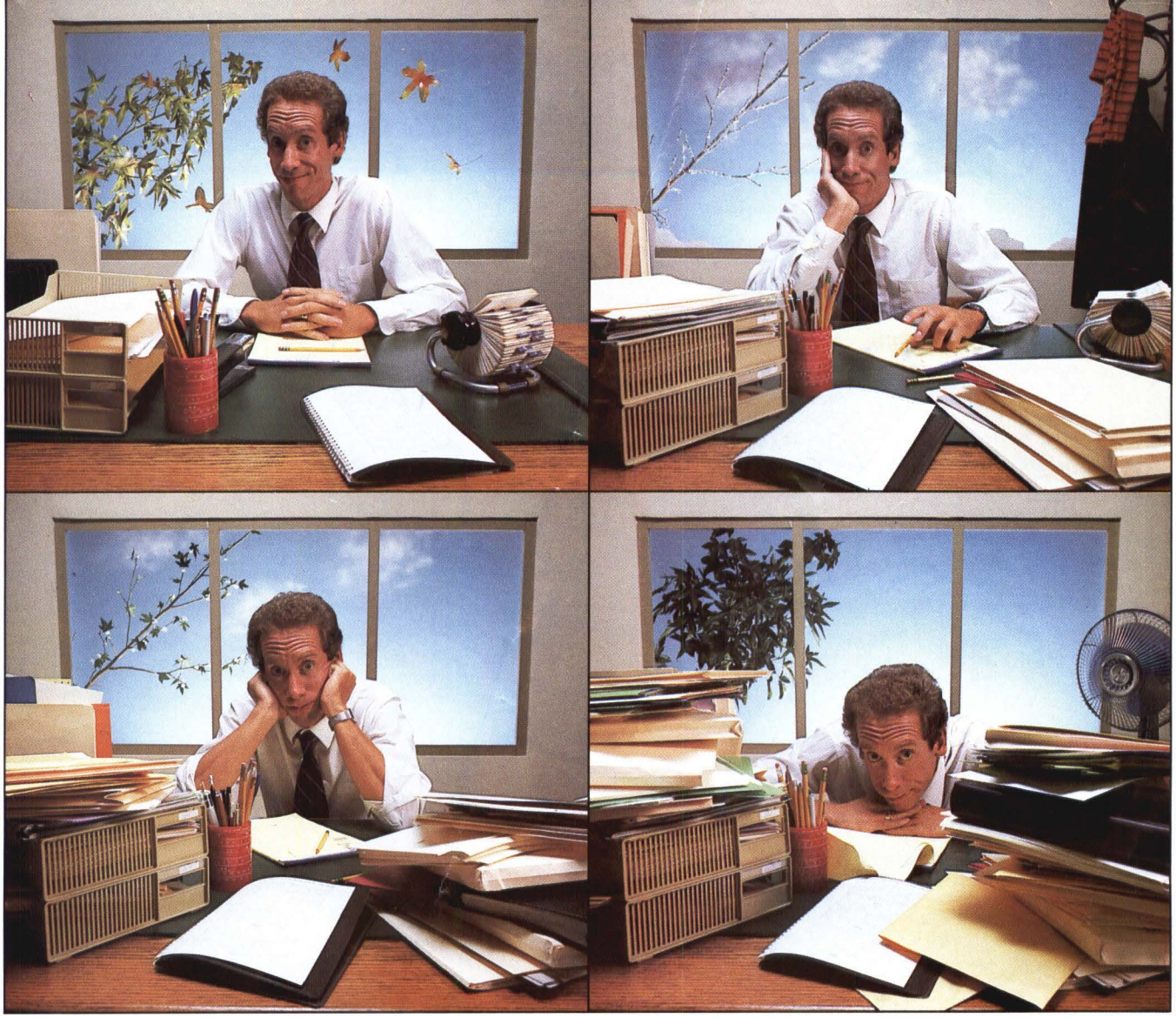

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