A Datapro Feature Report

All About Winchester Disk Drives

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All About Winchester Disk Drives

Winchester disk drives represent the most rapidly growing segment of the hard disk market. This report defines Winchester technology, describes the choices in backup devices, and discusses the current Winchester market. Detailed comparison charts present the basic characteristics of 215 Winchester disk drives from 66 vendors.

IBM's introduction of the innovative 3340 Winchester disk drive launched a revolution in disk technology. Winchester disk drives have proliferated since the 3340's debut in 1973. IBM has used Winchester technology in all of its fixed-disk drives since that date, and independent vendors have followed with plug-compatible versions. All of the earlier Winchester disk drives were high-capacity drives that used 14-inch platters. Then, in 1978, Winchester disk drives with 8-inch platters were announced for users of small computer systems. These smaller drives were followed in 1980 by even smaller drives with 5.25-inch platters. Analysts predict that by 1985 the 5.25-inch and 8-inch Winchester disk drives will dominate the market.

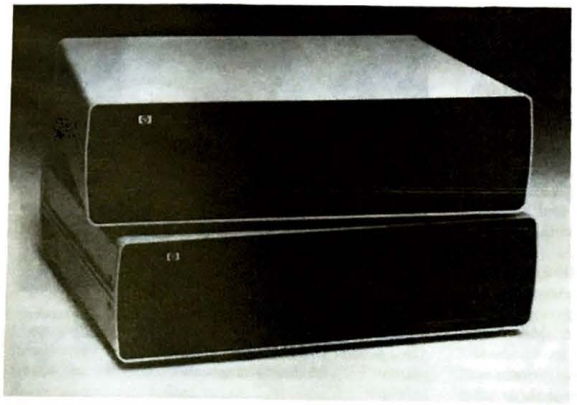
What is a Winchester Disk Drive?

Winchester disk drives are characterized by the following key features:

- The disks, read/write heads, and head actuator are contained in a hermetically sealed head disk assembly (HDA), in which the air is continuously circulated and filtered.
- The read/write heads fly much closer to the disk surface than those on conventional disk drives.
- The head load pressure is only about 10 grams, compared to 350 grams in traditional disk drives.
- Because the light head load does not permit the heads to be mechanically lowered when rotation begins, the heads rest on a landing zone on the surface of the disk when the disk is not rotating.
- The surface of the disk is lubricated to prevent damage to the heads or disks during take-offs and landings.
- The magnetic oxide coating on the surface of the disk is thinner than the coating used on other disk drives.
- Nearly all Winchester disk drives are fixed-disk drives.

Winchester disk drives offer some significant advantages over traditional disk drives. The sealed HDA virtually eliminates the problem of head crashes caused by contamination, and no preventive maintenance, such as changing air filters or cleaning and aligning heads, is required. The Mean Time Between Failures for a Winchester disk drive is from 8000 to 12,000 hours, compared to 4000 to 6000 hours for 3330-type drives.

Greater bit packing densitites and greater track densities have been achieved as a result of the low head flying height, which is typically 19 microinches or less. Because magnetic flux spreads with distance, the greater the separation between the read/write head and the disk surface, the greater the area occupied by a bit of information. The low flying height on a Winchester disk drive is made possible by the light head load pressure and a low head mass. Because of the thinner coating on the disk surface, the magnetic field of the head varies less through the medium, so that the magnetized regions acquire greater definition. Winchester disks can be rotated at faster speeds than other disks because of the ▷



Hewlett-Packard has entered the 5.25-inch Winchester disk drive market with the 9134A (top) and the 9135A (bottom). Both models include the same 6.4-megabyte Winchester disk drive, but the 9135A also includes a 420K-byte 5.25-inch floppy disk drive. A controller, interface, and power supply are included.

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head design and the improved definition between bits. This, coupled with greater packing density, results in an increase in the data transfer rate between the disk drive and the host computer.

Although Winchester disk drives are commonly defined as fixed-disk drives, there are two notable exceptions. The IBM 3340 uses a removable data module, as does its plug-compatible counterpart, the Memorex 3640. The removable module has certain disadvantages. It is much more expensive than a conventional disk pack. Furthermore, whenever a data module is loaded, electrical connections must be established to activate the read/write heads, and positioning mechanisms must be coupled to the head assembly. Since the introduction of the IBM 3344, the successor to the 3340, Winchester disk drives have featured non-removable disks. A few vendors have announced removable "Winchesters," but in this report we have included only fixed disks, with the exception of the IBM 3340 and the Memorex 3640. We felt that the 3340, as the original Winchester disk drive, should be included.

The Backup Issue

While it is generally agreed that a fixed Winchester disk drive requires a removable-media backup device, there is less agreement about the type of backup that should be used. Backup became a major issue when 8-inch Winchesters were introduced. The problem was less critical with 14-inch disk drives, because a number of suitable devices were readily available. Higher capacity removable disk drives are often used with 14-inch Winchesters, and some vendors believe that the best disk backup device is another disk.

Eight-inch and 5.25-inch Winchesters were designed for use with small computer systems, which called for readily available, cost-effective backup devices. Users want a device that is efficient, reliable, and has sufficient capacity, but costs less than the Winchester disk drive.

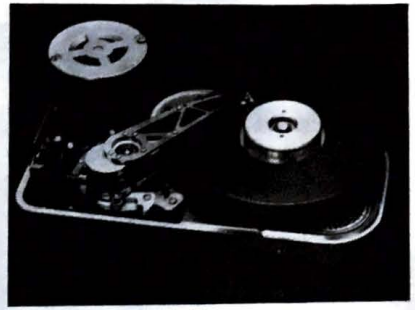
The most commonly used backup devices for 5.25- and 8-inch Winchesters are floppy disk drives, ¼-inch cartridge tape drives, and ¼- and ½-inch streaming tape drives. Some vendors offer a fixed/removable combination disk drive. The Control Data Lark, for example, includes an 8-inch Winchester plus a removable cartridge disk. Recently, a 5.25-inch removable cartridge disk was introduced for 5.25-inch Winchester backup. A 5.25-inch cartridge disk is available from Seagate and is included in DMA's Micro-Magnum 5.5 subsystem and in New World computer's V-4.2 and V-4.4 subsystems.

Eight-inch and 5.25-inch Winchester disk drives are often used to upgrade floppy disk-based systems, so one of the floppies could easily be used as a backup to the Winchester without much extra cost to the user. Most 5.25- and 8-inch Winchesters are the same size as a corresponding floppy disk drive. Some vendors offer Winchester disk subsystems with integrated floppy disk drives. Applied Data Communications, Data Systems Design, Hewlett-Packard, Micro Technology, and Scientific Micro Systems are among the vendors offering Winchester/floppy disk combinations.

Floppy disk drives usually have a maximum capacity of 1.6 megabytes, much less than most Winchester disk drives. It is usually recommended that floppy disks be used to back up Winchester disks with a capacity of 10 to 15 megabytes or less. Copying the entire contents of a 10-megabyte Winchester requires 8 diskettes and takes about 17 minutes. However, one vendor stated that it is seldom necessary to copy the entire contents of a disk. If only the changes to data for a day's transactions need to be copied, a one-megabyte floppy can hold several day's transactions.

For Winchester disk drives with capacities of 15 to 40 megabytes, ¼-inch cartridge tape drives are recommended for backup. The contents of a 20-megabyte disk can be copied to tape in about 70 seconds. The largest supplier of ¼-inch cartridge tape drives is Data Electronics, Inc. (DEI). Kennedy Company offers a formatter that simplifies interfacing Winchester disk drives with cartridge tape drives. An integrated Winchester/cartridge tape subsystem is available from Irwin International.

Streaming tape drives transmit data between the tape system and the Winchester disk in a continuous stream without starting and stopping between data blocks. There are no interblock gaps. Streaming tape drives are designed specifically for loading and copying entire files, not for file access, although they do operate in start/stop mode as well as in streaming mode. The ½-inch streaming tape drives are recommended as backup to Winchesters with a capacity of 40 megabytes or more. Streaming tape drives are available from Ampex, Cipher Data Products, Control Data, DEI, and Kennedy. Streaming tape drives use industry-standard media and are less expensive than start/stop tape drives. Currently, ➢



Quantum's Q2000 Series of 8-inch drives consists of 4 models that offer 10, 20, 30, or 40 megabytes of storage. The Q2000 Series features a rotary moving coil actuator, an optical track position encoder, and a temperature compensation servo technique.

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Table 1. USER RATINGS OF WINCHESTER DISK DRIVES

Disk Drive	Number of User Responses	Number of Drives Represented	Weighted Averages and Response Counts*																	
			Overall Performance					Ease of Operation					Hardware Reliability					Maintenance Service: Promptness				
			WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P
Control Data 33501/33502	8	122	3.0	3	3	1	1	3.8	6	2	0	0	2.9	3	2	2	1	3.0	3	3	1	1
IBM:																						
3340/3344	9	52	3.4	4	5	0	0	3.9	8	1	0	0	3.4	5	3	1	0	3.7	6	3	0	0
3350	7	233	4.0	7	0	0	0	3.9	6	1	0	0	3.7	5	2	0	0	3.7	5	2	0	0
Other models	4	72	3.3	1	3	0	0	3.8	3	1	0	0	3.5	2	2	0	0	3.7	2	1	0	0
Totals	20	357	3.6	12	8	0	0	3.9	17	3	0	0	3.6	12	7	1	0	3.7	13	6	0	0
Memorex 3650/3653/3654	7	130	3.1	1	6	0	0	3.4	3	4	0	0	3.0	0	7	0	0	3.3	2	5	0	0
STC																						
8350	10	166	3.4	5	4	1	0	3.7	7	3	0	0	3.3	5	3	2	0	3.5	6	3	1	0
8360	7	43	3.8	5	1	0	0	4.0	6	0	0	0	3.8	5	1	0	0	3.7	4	2	0	0
8650	10	62	3.8	7	2	0	0	3.9	8	1	0	0	3.7	6	3	0	0	3.7	6	3	0	0
Totals	27	271	3.6	17	7	1	0	3.8	21	4	0	0	3.6	16	7	2	0	3.6	16	8	1	0
All Others	5	147	3.2	1	4	0	0	3.4	2	3	0	0	3.0	1	3	1	0	3.8	4	1	0	0
Grand Totals	67	1027	3.5	34	28	2	1	3.8	49	16	0	0	3.4	32	26	6	1	3.5	38	23	2	1

Disk Drive	Number of User Responses	Number of Drives Represented	Weighted Averages and Response Counts*									
			Maintenance Service: Effectiveness									
			WA	E	G	F	P					
Control Data 33501/33502	8	122	2.8	2	3	2	1					
IBM:												
3340/3344	9	52	3.8	7	2	0	0					
3350	7	233	3.7	5	2	0	0					
Other models	4	72	3.3	1	2	0	0					
Totals	20	357	3.7	13	6	0	0					
Memorex 3650/3653/3654	7	130	3.3	2	5	0	0					
STC												
8350	10	166	3.2	3	6	1	0					
8360	7	43	3.5	3	3	0	0					
8650	10	62	3.4	4	5	0	0					
Totals	27	271	3.4	14	14	1	0					
All Others	5	147	3.2	1	4	0	0					
Grand Totals	67	1027	3.4	28	32	3	1					

*User Ratings show the number of users who responded with each rating. The legend is E for Excellent, G for Good, F for Fair, and P for Poor. The Weighted Averages (WA) are derived by assigning a value of 4 (Excellent), 3 (Good), 2 (Fair), or 1 (Poor) to each response. Cross totals may not sum to the number of responses because not all responses included a rating in every category.

➢ however, many controllers and operating systems do not support streaming tape drives.

Obviously, there is no single solution to the backup issue. Users must consider a number of factors, such as the capacity of the Winchester disk drive, the amount of data to be transferred, the number of backup media changes required, media cost and reliability, and the cost of integrating the backup device into the system.

User Experience

To obtain information about our subscribers' experiences with Winchester disk drives, we included a user survey questionnaire in the December 1981 supplement of DATAPRO 70. By our editorial cutoff date, we had received 67 usable product ratings from 42 subscribers.

Users were asked to rate their Winchester disk drives in five categories: Overall Performance, Ease of Operation, Equipment Reliability, Promptness of Maintenance Service, and Effectiveness of Maintenance Service. To derive the Weighted Averages, a numerical value of 4 was assigned to Excellent, 3 to Good, 2 to Fair, and 1 to poor. Each response was given equal weight regardless of the number of drives represented. The results of the survey are presented in Table 1.

Users were also asked how long the drives had been installed, with what computer system they were used, and what type of backup medium was used. The users' responses are summarized below.

	Number of responses
How long installed—	
Less than one year	23
One to three years	27
More than three years	17
Computer system—	
Amdahl 470	7
IBM 370	11
IBM 303X	21
IBM 3081	1
IBM 4300	25
Magnuson M80	3
NAS Advanced Systems	4
Other	2
Backup medium—	
Magnetic tape	59
Floppy disk	1
Hard disk	2

The Winchester Market

Winchester disk drives are available in a wide array of sizes and configurations. Most are sold to OEMs, but many are sold to end users. The three standard platter sizes are 5.25, 8, and 14 inches, but Cynthia Peripheral Corporation sells a Winchester with 11.5-inch disks and Fujitsu has a 10.5-inch Winchester. Capacities range from 2 to 38 megabytes for 5.25-inch Winchesters, from 2 to 129 megabytes for 8-inch Winchesters, and from 10 megabytes to 2.5 gigabytes for 14-inch Winchesters.

You can buy a basic Winchester disk drive to which you must add your own interface and controller, or a ➢

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complete subsystem consisting of disk drive, interface, controller, power supply, and, in some cases, a backup device. Some vendors make Winchester disk controllers, but not the drives. Winchester controller vendors include Data Technology Corporation, Emulex, and Spectra Logic Corporation.

Fourteen-inch Winchester disk drives have been readily available for several years, and offer a lower cost per megabyte than the newer 8-inch Winchesters. The 14-inch drives are expected to dominate the high-capacity market for a few more years, but lower-capacity 14-inch drives are expected to be edged out by the higher capacity 8-inch drives.

The 8-inch Winchester disk market got off to a rather slow start, partly because many manufacturers underestimated the effort involved in reaching volume production levels. Although 8-inch Winchesters were introduced in 1978, volume shipments did not really begin until mid-1980. According to some industry observers, many manufacturers did not understand the OEM marketplace. It takes time for OEMs to integrate new products into their systems. The backup dilemma and the lack of a standard interface may also have impeded the acceptance of 8-inch Winchesters. However, the American National Standards Institute has proposed a standard interface, which most vendors have said they will support.

Volume shipments of 8-inch Winchester disk drives increased significantly during 1981. Several vendors reported a strong demand for 8-inch drives with capacities of 40 megabytes and up.

Storage Technology Corporation's 8350 is a 14-inch Winchester that is plug-compatible with IBM's 3350. The 8350 provides 635 megabytes of storage. STC also offers a higher performance version, the 8360, and a double-density version, the 8650. All models can be used with STC's new 8890 Sybercache disk/cache control unit.

During the past year, however, the real flurry of activity has been in the 5.25-inch Winchester market, which is expected to impact the sales of lower capacity 8-inch Winchesters. As of January 1981, only five vendors had formally announced 5.25-inch Winchester disk drives. The current edition of this report includes 5.25-inch drives from 24 vendors. These 24 vendors include new companies such as MiniScribe and Rotating Memory Systems, as well as established disk drive manufacturers such as Ampex, BASF, Memorex, and Shugart.

The 5.25-inch Winchester disk drive market is expected to take off faster than the 8-inch Winchester market did. The adoption of the Seagate Technology interface as a de facto standard has hastened acceptance of the 5.25-inch drives and eased the design of controllers for the new drives. User confidence was also increased when Seagate delivered its first model on schedule.

The 5.25-inch Winchesters are expected to be used in word processing applications and in small business systems as upgrades to minifloppy-based systems. The "mini-Winchesters" are more compact, less expensive, and use less power than the 8-inch Winchesters. The 5.25-inch drives are expected to compete in the 5 to 40 megabyte Winchester market.

In general, Winchester disk drives are well suited to on-line storage in data processing and office automation applications where fast access and high throughput are required. Experts predict that capacities of 5.25- and 8-inch Winchesters will continue to increase as small systems users demand more and more storage capacity.

Technology Advances

The first major advance in Winchester disk technology was made by IBM with the introduction of the 3370 disk drive. The 3370 uses thin-film read/write heads. Instead of a coil of wire wrapped around a ferrite core, a thin-film head uses a spiral film of electrical conductor deposited on a silicon substrate. The magnetic core of the head is Permalloy, a mixture of nickel and iron. Use of thin-film heads results in a bit density that is about 10 times greater than the bit density on conventional Winchester disk drives. The bit density can be further increased by using thin-film media. IMI, Irwin International, and Texas Instruments have introduced 5.25-inch drives using thin-film plated disks.

The IBM 3380 disk drive offers a total storage capacity of 2500 megabytes. Some experts predict that future Winchester disk drives will achieve storage capacities of 4000 megabytes.

The emerging field of optical disk technology holds the promise of achieving even greater storage capacities. Optical disks employ a laser beam to burn holes in the

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coating on the disk. A 14-inch disk can hold 10 billion holes a micrometer in diameter. Of course, data recorded in this manner cannot be erased, so optical disks will probably be used primarily for archival storage. In addition, optical disks have relatively high error rates compared to magnetic disks. A number of companies are experimenting with optical disks, and Drexler Technology Corporation has already introduced such a product.

The Comparison Charts

The accompanying comparison charts summarize the characteristics of 215 Winchester disk drives from 66 suppliers and manufacturers. The information in the charts was furnished by the vendors in January and February 1982. Their cooperation is greatly appreciated. *The absence of any specific company from our charts means that the company either failed to respond to our repeated information requests or was unknown to us.*

The chart entries and their significance are explained in the following paragraphs.

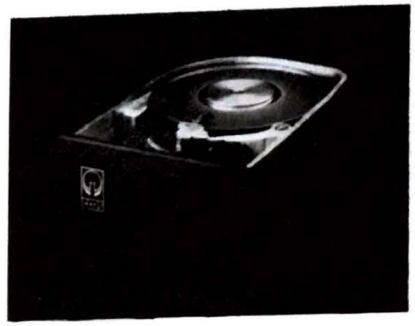
Manufacturer and model identifies the specific device. Products are listed in the charts under the name of the firm that markets them. For your convenience, a list of the vendors, along with their addresses and telephone numbers, immediately precedes the charts.

Primary Market indicates whether the vendor has placed emphasis upon OEM or end-user customers, or upon both. Strictly OEM-oriented units are likely to require that the customer provide his or her own field service, while vendors with end-user products should be able to demonstrate an ability to provide service either through their own personnel or via a third-party source.

Entries under *Type* indicate whether the unit is a Winchester disk drive only or a Winchester plus a backup device such as a floppy disk. The *Disk diameter* is also presented.

Under *Capacity*, the *Recording surfaces per drive* and *Tracks per surface* entries clarify the exact configuration of the unit. The *Unformatted capacity* per drive is presented in millions of bytes. Here, we are using the term "drive" to mean the total drive unit, not just the spindle. Some drive units have two spindles, or two head disk assemblies. For those drives, we have given the total capacity and indicated that the unit has two HDAs.

Several entries describe the *Performance* of the unit. The *Head movement time* is presented, in milliseconds, for *one track*, for an *average* based on the movement across one-third of the tracks, and for the movement *across all tracks*. *Average rotational delay* is based on the time required for one-half of a revolution of the disk. The *Data transfer rate* is indicated in *bytes* per second. A word of caution here is in order. Some vendors' specification sheets give the data transfer rate in millions of *bits* per second, but use the abbreviation "MB," which most people in the computer industry interpret as millions of *bytes*. The fastest data transfer rate yet achieved on any Winchester disk drive is 3,000,000 bytes per second. If you see any figures larger than that in the vendors' literature, those figures must necessarily refer to bits per second, not bytes.



The Rotating Memory Systems RMS 500 Series is a family of 5.25-inch Winchesters available with unformatted capacities of 4.5, 9.0, 13.5, or 18.0 megabytes. The RMS 500 Series features a proprietary head positioning system that is designed to optimize access time and provide more precise alignment. Optional data separators are available.

The *Software support* entry indicates whether the vendor provides drivers, diagnostics, or any other software for the disk unit.

Packaging is just what it says. We have attempted to be as clear and concise as possible in these entries, but they may still require a bit of imagination on the part of the reader. The information is presented for the basic product line styles of the vendors. "PC boards" indicate printed circuit cards that must be housed in some kind of enclosure. Usually, they are placed in the computer housing itself, but there may be provisions in the drive housing for them. We have used the term "chassis" to indicate a mountable arrangement that may or may not be totally enclosed, but is not usually suitable for free-standing use. "Rack-mounted" definitely indicates the need for an equipment cabinet, which may be the computer or peripheral cabinet supplied by the computer vendor.

The *Power source* is an important consideration. An entry of *Internal* indicates the unit includes the circuitry required to convert normally available AC power to the DC voltages required by the drive. An entry of *Separate* indicates that you have to supply the power supply circuitry or take the power from the computer power supply. A power supply can add several hundred dollars to the cost of the unit. Unhappily, the vendors were not as explicit as we had hoped in their replies to these questions, and we urge you to clarify exactly the power supply situation before you buy.

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The entries under *Pricing and Availability* are self-explanatory. Prices stated are for unit quantities unless specified otherwise, and typically do not include options or expanded capacities mentioned in the other comparison chart entries.

Winchester Disk Drive Vendors

Listed below, for your convenience in obtaining additional information, are the full names, addresses, and telephone numbers of the 66 vendors listed in the comparison charts that follow.

Advanced Electronics Design, 440 Potrero Avenue, Sunnyvale, California 94086. Telephone (408) 733-3555.

Advant Corporation, 696 Trimble Road, San Jose, California 95131. Telephone (408) 946-9300.

Amperif Corporation, 21345 Lassen Street, Chatsworth, California 91311. Telephone (213) 998-7666.

Ampex Corporation, Memory Products Division, 200 North Nash Road, El Segundo, California 90245. Telephone (213) 640-0150.

Applied Data Communications, 14272 Chambers Road, Tustin, California 92680. Telephone (714) 731-9000.

BASF Systems, Crosby Drive, Bedford, Massachusetts 01730. Telephone (617) 271-4000.

Century Data Systems, 1270 North Kraemer Blvd., Anaheim, California 92806. Telephone (714) 632-7500.

Charles River Data Systems, Inc., 4 Tech Circle, Natick, Massachusetts 01760. Telephone (617) 655-1800.

Computer Memories, Inc., 9233 Eton Avenue, Chatsworth, California 91311. Telephone (213) 709-6445.

Control Data Corporation, 8100 34th Avenue South, Minneapolis, Minnesota 55440. Telephone (612) 853-8100.

Corona Data Systems, 21541 Nordhoff Street, Unit B, Chatsworth, California 91311. Telephone (213) 998-0505.

Corvus Systems, Inc., 2029 O'Toole Avenue, San Jose, California 95131. Telephone (408) 946-7700.

Cyberchron Corporation, P.O. Box 164, Garrison, New York 10524. Telephone (914) 424-3755.

Cyberdata, 2611 Garden Road, Monterey, California 93940. Telephone (408) 373-2601.

Cynthia Peripheral Corporation (division of Cii Honeywell Bull), 3606 West Bayshore Road, Palo Alto, California 94303. Telephone (415) 856-8181.

Dastek Corporation, 141 Albright Way, Los Gatos, California 95030. Telephone (408) 866-0550.

Data General Corporation, Route 9, Westboro, Massachusetts 01581. Telephone (617) 366-8911.

Data Peripherals, Inc., 965 Stewart Drive, Sunnyvale, California 94086. Telephone (408) 745-6500.

Data Systems Design, Inc., 2241 Lundy Avenue, San Jose, California 95131. Telephone (408) 946-5800.

Digital Equipment Corporation, 146 Main Street, Maynard, Massachusetts 01754. Telephone (617) 897-5111.

DMA Systems, Inc., 325 Chapala Street, Santa Barbara, California 93101. Telephone (805) 965-7059.

Fujitsu America, Inc., 2945 Oakmead Village Court, Santa Clara, California 95051. Telephone (408) 727-4300.

Harris Corporation, Computer Systems Division, 2101 West Cypress Creek Road, Fort Lauderdale, Florida 33309. Telephone (305) 974-1700.

Hewlett-Packard Company, Disk Memory Division, 11413 Chinden Road, P.O. Box 39, Boise, Idaho 83707. Telephone (208) 376-6000.

Hitachi America, Ltd., 100 California Street, San Francisco, California 94111. Telephone (415) 981-7871.

IBM Corporation, National Accounts Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

International Memories, Inc. (IMI), 10381 Bandley Drive, Cupertino, California 95014. Telephone (408) 446-9779.

Irwin International, 2000 Green Road, Ann Arbor, Michigan 48105. Telephone (313) 663-3600.

ISS/Univac, 3333 Scott Blvd., Santa Clara, California 95051. Telephone (408) 496-3333.

Kennedy Company, 1600 South Shamrock, Monrovia, California 91016. Telephone (213) 357-8831.

Memorex Corporation, San Tomas at Central Expressway, Santa Clara, California 95052. Telephone (408) 987-1000.

Micro Peripherals, Inc., 9754 Deering Avenue, Chatsworth, California 91311. Telephone (213) 709-4202.

Micro Technology, Inc., 3605 W. McArthur Blvd., Suite 714, Santa Ana, California 92704. Telephone (714) 545-8477.

Microcomputer Systems Corporation, 432 Lakeside Drive, Sunnyvale, California 94086. Telephone (408) 733-4200.

Micropolis Corporation, 21329 Nordhoff Street, Chatsworth, California 91311. Telephone (213) 709-3300.

Microtech Business Systems, 3180 Pullman Street, Costa Mesa, California 92626. Telephone (714) 557-8640.

MiniScribe Corporation, 410 South Sunset, Longmont, Colorado 80501. Telephone (303) 651-6000.

Mitsubishi Electronics America, Computer Peripherals Division, 2200 W. Artesia Blvd., Compton, California 90220. Telephone (213) 979-6055.

National Advanced Systems, 800 East Middlefield Road, Mountain View, California 94043. Telephone (415) 962-6100.

NEC Information Systems, Inc., 5 Militia Drive, Lexington, Massachusetts 02173. Telephone (617) 862-3120.

New World Computer Company, Inc., 2805 McGaw, Irvine, California 92714. Telephone (714) 556-9320.

Olivetti OPE, 505 White Plains Road, Tarrytown, New York 10591. Telephone (914) 631-3000.

Onyx, Inc., 1487 Chain Bridge Road, Suite 100, McLean, Virginia 22101. Telephone (703) 556-9000.

Pertec Computer Corporation, 9600 Irondale Avenue, Chatsworth, California 91311. Telephone (213) 999-2020.

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Plessey Peripheral Systems, 17466 Daimler Avenue, Irvine, California 92714. Telephone (714) 540-9945.

Priam Corporation, 3096 Orchard Drive, San Jose, California 95134. Telephone (408) 946-4600.

Quantum Corporation, 1804 McCarthy Blvd., Milpitas, California 95035. Telephone (408) 262-1100.

Rodime, Ltd., 23591 El Toro Road, Suite 208, El Toro, California 92630. Telephone (714) 770-3085.

Rotating Memory Systems, Inc., 1031-A East Duane Avenue, Sunnyvale, California 94086. Telephone (408) 730-1346.

Scientific Micro Systems, 777 East Middlefield Road, Mountain View, California 94043. Telephone (415) 964-5700.

Seagate Technology, 340 El Pueblo Road, Scotts Valley, California 95066. Telephone (408) 438-6550.

Shugart Associates, 475 Oakmead Parkway, Sunnyvale, California 94086. Telephone (408) 733-0100.

SLI Industries, 21040 Victory Blvd., Woodland Hills, California 91367. Telephone (213) 884-7300.

Sperry Univac Division, Sperry Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19424. Telephone (215) 542-4011.

Storage Technology Corporation (STC), 2270 South 88th Street, Louisville, Colorado 80027. Telephone (303) 673-5151.

System Industries, Inc., 525 Oakmead Parkway, P.O. Box 425, Sunnyvale, California 94086. Telephone (408) 732-1650.

Tandon Magnetics Corporation, 20320 Prairie Street, Chatsworth, California 91311. Telephone (213) 993-6644.

Tecstor, 16161 Gothard Street, Huntington Beach, California 92647. Telephone (714) 842-0077.

Texas Instruments, Terminals Peripherals Division, P.O. Box 1444, Houston, Texas 77001. Telephone (713) 895-3124.

United Peripherals, 432 Lakeside Drive, Sunnyvale, California 94086. Telephone (408) 730-4440.

United States Design Corporation, 5100 Philadelphia Way, Lanham, Maryland 20706. Telephone (301) 577-2880.

XCOMP, Inc., 7566 Trade Street, San Diego, California 92121. Telephone (714) 271-8730.

Xycom, Inc., 750 N. Maple Road, Saline, Michigan 48176. Telephone (313) 429-4979.

Xylogics, Inc., OEM Component Group, 42 Third Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-8140.

ZZY Systems, Inc., 1900 Lafayette Street, Santa Clara, California 95050. Telephone (408) 496-6988.

3M, Data Recording Division, 3M Center, St. Paul, Minnesota 55144. Telephone (612) 733-1110.

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SUPPLIER AND MODEL	Advanced Electronics Design Winc-08	Advant Microsupport (8-inch)	Advant Microsupport (14-inch)	Amperif 84502	Ampex Capricorn Series
COMPUTERS INTERFACED	DEC LSI-11, PDP-11	Intel Multibus, S-100 bus	Intel Multibus, S-100 bus	Univac Series 90, 1100	DEC PDP-11, DG Nova and Eclipse, SMD
PRIMARY MARKET	OEM	End user, OEM	End user, OEM	End user	OEM
TYPE					
Style	Winchester plus floppy disk	Winchester plus floppy or tape	Winchester plus floppy or tape	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	14	14	14
CAPACITY					
Recording surfaces per drive unit	4 to 8	4	4	—	5 or 8
Tracks per surface	244	256	405	1110	823 or 1024
Unformatted capacity per drive unit, bytes	46.8M	10.7M	29M	635M	165.9M or 330.3M
PERFORMANCE					
Head movement time—					
1 track, msec	30	19	20	6	10
Average (move of 1/3 of tracks), msec	70	70	65	20 to 25	30
Across all tracks, msec	140	150	140	40 to 50	55
Average rotational delay (1/2 rev.), msec	—	9.6	10	8.3	8.3
Data transfer rate, *bytes* per second	593,000	540,000	889,000	1,260,000	1,209,000
SOFTWARE SUPPORT	Emulator, diagnostics	Onboard micro diagnostics	Onboard micro diagnostics	—	Internal diagnostics
PACKAGING					
Controller	Yes	Yes	Yes	Amperif 5046	—
Formatter	—	Yes	Yes	Yes	—
Interface	PC board	Yes	Yes	Yes	—
Drive units per controller	2	4	4	16	—
Drive units per formatter	—	4	4	—	—
Drive mounting	2 drives per cabinet	Separate chassis, 1 or 2 drives	Separate chassis, 1 or 2 drives	Stand-alone cabinet	Rack
Drive dimensions (h x w x d), inches	5.25 x 17.6 x 26.5	—	—	—	10.4 x 17.53 x 28.03
Drive weight, pounds	55	—	—	—	128
Power source for drives	—	Included	Included	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$4,280	$7,000 to $9,000	$7,000 to $9,000	Contact vendor	Contact vendor
Formatter	—	Included	Included	—	—
Interface	$680	Included	Included	—	—
First drive	$2,795	Included	Included	Contact vendor	$10,315 to $12,460
Additional drive	$2,795	Varies	Varies	—	—
Software	—	—	—	—	—
Maintenance—				Contact vendor	—
Controller	—	—	—	—	—
Interface	—	—	—	Contact vendor	—
Drive	—	Yes	Yes	No	Yes
Quantity discounts available	Yes				
First delivery, month/year	1981	December 1980	December 1980	1980	October 1981
Availability, days ARO	30	30	30	—	120
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory	Factory	Factory	Amperif	Ampex
COMMENTS		Choice of floppy disk, standard tape, or streaming tape backup. Features include 2K-byte buffer, variable sector sizes, scan-disk capability, error correction, alternate sector processing		Available with cache memory	SMD-compatible interface

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SUPPLIER AND MODEL	Ampex DFR-932	Ampex DFR-964	Ampex DFR-996	Ampex Pyxis Series	Ampex Scorpio Series
COMPUTERS INTERFACED	SMD/CMD	SMD/CMD	SMD/CMD	—	DEC PDP-11, DG Nova and Eclipse, SMD
PRIMARY MARKET	OEM	OEM	OEM	OEM, end user	OEM
TYPE					
Style	Winchester plus cartridge disk	Winchester plus cartridge disk	Winchester plus cartridge disk	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	14	5.25	8
CAPACITY					
Recording surfaces per drive unit	1 plus 1	3 plus 1	5 plus 1	2, 4, 6, or 8	3 or 5
Tracks per surface	823	823	823	—	823
Unformatted capacity per drive unit, bytes	16M	48M	80M	4M, 8M, 12M or 16M	49.7M or 82.9M
PERFORMANCE					
Head movement time—					
1 track, msec	6	6	6	18	6
Average (move of 1/3 of tracks), msec	30	30	30	85	32
Across all tracks, msec	55	55	55	170	55
Average rotational delay (1/2 rev.), msec	8.33	8.33	8.33	—	8.3
Data transfer rate, *bytes* per second	1,200,000	1,200,000	1,200,000	625,000	1,209,000
SOFTWARE SUPPORT	Available	Available	Available	—	Internal diagnostics
PACKAGING					
Controller	PC board	PC board	PC board	—	—
Formatter	With controller	With controller	With controller	—	—
Interface	With controller	With controller	With controller	—	—
Drive units per controller	—	—	—	—	—
Drive units per formatter	—	—	—	Rack	Rack
Drive mounting	Rack	Rack	Rack	3.25 x 5.75 x 8.0	5.12 x 8.55 x 14.25
Drive dimensions (h x w x d), inches	10 x 17.5 x 28.5	10 x 17.5 x 28.5	10 x 17.5 x 28.5	5.5	25
Drive weight, pounds	170	170	170	—	Internal
Power source for drives	Internal	Internal	Internal		
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Contact vendor	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Formatter	Included	Included	Included	—	—
Interface	Included	Included	Included	—	—
First drive	$6,400	$7,300	$8,100	$1,230 to $2,150	$4,350 to $5,100
Additional drive	—	—	—	—	—
Software	$400	$400	$400	—	—
Maintenance—				—	—
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	June 1980	June 1980	June 1980	1982	1982
Availability, days ARO	45 to 60	45 to 60	45 to 60	120	120
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Ampex	Ampex	Ampex	Ampex	Ampex
COMMENTS	Integrated disk cartridge provides 16 megabytes of additional storage	Integrated disk cartridge provides 16 megabytes of additional storage	Integrated disk cartridge provides 16 megabytes of additional storage		

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SUPPLIER AND MODEL	Applied Data Communications Series 90 (8-inch)	Applied Data Communications Series 90 (14-inch)	BASF Systems 6171	BASF Systems 6172	BASF Systems 6173
COMPUTERS INTERFACED	DEC LSI-11, DG Nova, S-100 bus, IEEE-488, RS-232	DEC LSI-11, DG Nova, S-100 bus, IEEE-488, RS-232	See Comments	See Comments	See Comments
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester plus floppy disk	Winchester plus floppy disk	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	14	8	8	8
CAPACITY					
Recording surfaces per drive unit	2 or 4	2, 4, or 8	1 plus 1 servo	3 plus 1 servo	5 plus 1 servo
Tracks per surface	512	1616	600 plus 14 spares	600 plus 14 spares	600 plus 14 spares
Unformatted capacity per drive unit, bytes	4.2M or 8.4M	12.6M, 25.2M, or 50.2M	8.19M	24.58M	40.97M
PERFORMANCE					
Head movement time—					
1 track, msec	19	20	8	8	8
Average (move of 1/3 of tracks), msec	70	65	27	27	27
Across all tracks, msec	150	140	80	80	80
Average rotational delay (1/2 rev.), msec	9.6	10	8.3	8.3	8.3
Data transfer rate, *bytes* per second	542,000	889,000	800,640	800,640	800,640
SOFTWARE SUPPORT	File macros	File macros	None	None	None
PACKAGING					
Controller	Yes	Yes	No	No	No
Formatter	Yes	Yes	No	No	Integral
Interface	RS-232 standard, others optional	RS-232 standard, others optional	Integral	Integral	—
Drive units per controller	2	2	—	—	—
Drive units per formatter	—	—	—	—	—
Drive mounting	Rack	Rack	Varies	Varies	Varies
Drive dimensions (h x w x d), inches	8.75 x 19 x 24	8.75 x 19 x 24	4.6 x 9 x 18	4.6 x 9 x 18	4.6 x 9 x 18
Drive weight, pounds	70	70	20	20	20.5
Power source for drives	Internal	Internal	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	Included	—	—	—
Formatter	Included	Included	—	—	—
Interface	$275 to $525	$275 to $525	$2,400 to $2,800	$3,000 to $3,400	$3600 to $4,000
First drive	$7,227 to $7,740	$7,790 to $9,977	—	—	—
Additional drive	$2,590 to $3,150	$3,000 to $5,400	—	—	—
Software	$395	$395	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	Up to 25%	Up to 25%	Yes	Yes	Yes
Quantity discounts available					
First delivery, month, year	NA	NA	August 1979	August 1979	July 1981
Availability, days ARO	NA	NA	60	60	90
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory, 3rd party	Factory, 3rd party	Factory	Factory	Factory
COMMENTS	Basic box holds up to 2 Winchester disks and 2 floppy disks	Basic box holds up to 2 Winchester disks and 2 floppy disks	Interfaces device level disk bus, ANSI type std., and SMD	Interfaces device level disk bus, ANSI type std., and SMD	Interfaces device level disk bus, ANSI type std., and SMD

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SUPPLIER AND MODEL	BASF Systems 6181	BASF Systems 6182	BASF Systems 6183	Century Data Systems AMS 190	Century Data Systems AMS 380
COMPUTERS INTERFACED	—	—	—	Most popular mini-computers	Most popular mini-computers
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	5.25	5.25	14	14
CAPACITY					
Recording surfaces per drive unit	2	4	6	7	7
Tracks per surface	153	153	153	480	712
Unformatted capacity per drive unit, bytes	3.19M	6.38M	9.57M	191M	378.5M
PERFORMANCE					
Head movement time—					
1 track, msec	2	2	2	6	6
Average (move of 1/3 of tracks), msec	100	100	100	25	25
Across all tracks, msec	300	300	300	50	50
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3	12.5	12.5
Data transfer rate, *bytes* per second	625,000	625,000	625,000	960,000	1,280,000
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	No	Yes	Yes
Formatter	No	No	No	With controller	With controller
Interface	Seagate ST506-compatible	Seagate ST506-compatible	Seagate ST506-compatible	SMD	SMD
Drive units per controller	—	—	—	1	1
Drive units per formatter	—	—	—	—	—
Drive mounting	Varies	Varies	Varies	Optional	Optional
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8.27	3.25 x 5.75 x 8.27	3.25 x 5.75 x 8.27	8.12 x 16.5 x 24.5	8.12 x 16.5 x 24.5
Drive weight, pounds	—	—	6.2	65	65
Power source for drives	Separate	Separate	Separate	Optional	Optional
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	Included With controller	Included With controller
Formatter	—	—	—	—	—
Interface	—	—	—	Contact vendor	Contact vendor
First drive	Contact vendor	Contact vendor	Contact vendor	—	—
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	September 1981	September 1981	September 1981	3rd quarter 1982	3rd quarter 1982
Availability, days ARO	90	90	90	60	60
Number of drives installed to date	NA	NA	NA	—	—
Serviced by	Factory	Factory	Factory	Factory	Factory
COMMENTS				Controller/formatter is not sold separately; available in desk-top or rack-mounted modules	See AMS 190 comments

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SUPPLIER AND MODEL	Century Data Systems Marksman M20	Century Data Systems Marksman M40	Century Data Systems Marksman M80	Century Data Systems Marksman M160	Charles River Data Systems HD-11
COMPUTERS INTERFACED	Most popular mini computers	Most popular mini computers	Most popular mini computers	Most popular mini computers	DEC PDP-11, LSI-11
PRIMARY MARKET	OEM	OEM	OEM	OEM	End user, OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester with opt. tape drive
Disk diameter, inches	14	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	2	4	3	3	4
Tracks per surface	213	213	569	845	202
Unformatted capacity per drive unit, bytes	20.16M	40.32M	80.64M	161M	29M
PERFORMANCE					
Head movement time—					
1 track, msec	20	20	12	12	20
Average (move of 1/3 of tracks), msec	65	65	50	50	65
Across all tracks, msec	130	130	100	100	125
Average rotational delay (1/2 rev.), msec	12.5	12.5	12.5	12.5	10.1
Data transfer rate, *bytes* per second	960,000	960,000	960,000	1,280,000	889,000
SOFTWARE SUPPORT	None	None	None	None	Diagnostics
PACKAGING					
Controller	Yes	Yes	Yes	Yes	Integral
Formatter	With controller	With controller	With controller	With controller	Yes
Interface	Proprietary	Proprietary	Proprietary	Proprietary	Yes
Drive units per controller	1	1	1	1	1
Drive units per formatter	1	1	1	1	1
Drive mounting	Optional	Optional	Optional	Optional	Separate Chassis
Drive dimensions (h x w x d), inches	8.6 x 16.2 x 24	8.6 x 16.2 x 24	8.75 x 16.5 x 22	8.75 x 16.5 x 22	10.5 x 19 x 24
Drive weight, pounds	45	45	48	48	100
Power source for drives	Optional	Optional	Optional	Optional	Included
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	Included	Included	Included	Included
Formatter	With controller	With controller	With controller	With controller	Included
Interface	—	—	—	—	Included
First drive	Contact vendor	Contact vendor	Contact vendor	Contact vendor	$6,500
Additional drive	—	—	—	—	—
Software	—	—	—	—	Included
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	Yes
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	September 1978	September 1980	February 1982	2rd quarter 1982	March 1980
Availability, days ARO	60	60	60	60	30
Number of drives installed to date	8000	3000	NA	NA	Over 500
Serviced by	Factory	Factory	Factory	Factory	Factory
COMMENTS	See AMS 190 comments	See AMS 190 comments	See AMS 190 comments	See AMS 190 comments	

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SUPPLIER AND MODEL	Computer Memories CM 5206	Computer Memories CM 5412	Computer Memories CM 5617	Control Data 230 Series	Control Data 240 Series
COMPUTERS INTERFACED	—	—	—	IBM Series/1	IBM Series/1
PRIMARY MARKET	OEM	OEM	OEM	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester plus floppy disk
Disk diameter, inches	5.25	5.25	5.25	14	14
CAPACITY					
Recording surfaces per drive unit	2	4	6	—	—
Tracks per surface	306	306	306	303 or 320	303 or 320
Unformatted capacity per drive unit, bytes	6.38M	12.76M	16.0M	9.3M, 13.9M or 63.2M	9.3M, 13.9M or 63.2M
PERFORMANCE					
Head movement time—					
1 track, msec	3	3	3	7	7
Average (move of 1/3 of tracks), msec	90	90	90	30	30
Across all tracks, msec	223	223	223	35	35
Average rotational delay (1/2 rev.), msec	8.33	8.33	9.2	8.3	8.3
Data transfer rate, *bytes* per second	625,000	625,000	542,500	1,208,750	1,208,750
SOFTWARE SUPPORT	—	—	—	Diagnostics	Diagnostics
PACKAGING					
Controller	No	No	No	Yes	Yes
Formatter	No	No	No	With controller	With controller
Interface	No	No	No	Yes	Yes
Drive units per controller	4	4	4	—	—
Drive units per formatter	4	4	4	—	—
Drive mounting	OEM configuration	OEM configuration	OEM configuration	Rack	Rack
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8.0	3.25 x 5.75 x 8.0	3.25 x 5.75 x 8.0	19.25 x 19 x 24	19.25 x 19 x 24
Drive weight, pounds	5	5	5	—	—
Power source for drives	Separate	Separate	Separate	—	—
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	Included	Included
Formatter	—	—	—	Included	Included
Interface	—	—	—	Included	Included
First drive	$1,370	$1,725	$2,140	See Comments	See Comments
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	March 1981	March 1981	March 1981	June 1979	June 1979
Availability, days ARO	30	30	30	—	—
Number of drives installed to date	2000 (all models)	2000 (all models)	2000 (all models)	NA	NA
Serviced by	Factory	Factory	Factory	Customer or CDC	Customer or CDC
COMMENTS				In quantity of 50, prices for 9.3MB, 13.9MB, and 63.2MB capacities are $7,800, $8,300, and $10,150, respectively. fixed-head versions are available	In quantity of 50, prices for 9.3MB, 13.9MB, and 63.2MB capacities are $10,200, $10,830, and $12,700, respectively. floppy disk provides 0.6MB of storage

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SUPPLIER AND MODEL	Control Data 9410 Finch	Control Data 9454/9455 Lark	Control Data 9730	Control Data 9775	Control Data 33501/33502
COMPUTERS INTERFACED	—	Custom or SMD/CMD-compatible	Custom	SMD-compatible	IBM S/370, 303X, 4300
PRIMARY MARKET	OEM	OEM	OEM	OEM	End user
TYPE					
Style	Winchester disk only	Winchester plus cartridge disk	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	14	14	14
CAPACITY					
Recording surfaces per drive unit	1, 3, or 5	4	—	20	40 (2 HDAs)
Tracks per surface	605	202 plus 4	606 to 823	1686	1110
Unformatted capacity per drive unit, bytes	8M, 24M, or 32M	8M	80M or 160M	675M	635M/1270M (2 HDAs)
PERFORMANCE					
Head movement time—					
1 track, msec	10	10	14	10	4
Average (move of 1/3 of tracks), msec	50	25	40	25	25
Across all tracks, msec	100	50	60	50	—
Average rotational delay (1/2 rev.), msec	8.33	8.55	8.3	8.3	8.4
Data transfer rate, *bytes* per second	806,250	1,200,000	1,200,000	1,200,000	1,198,000
SOFTWARE SUPPORT	—	—	None	—	Diagnostics
PACKAGING					
Controller	No	No	No	No	CDC 38302, 38304
Formatter	No	No	Separate	No	With controller
Interface	—	Proprietary (9454), SMD (9455)	—	Yes	Yes
Drive units per controller	4	4	—	—	16
Drive units per formatter	—	—	8	—	—
Drive mounting	—	Rack	Separate chassis	Stand-alone cabinet	Stand-alone cabinet
Drive dimensions (h x w x d), inches	4.16 x 8.57 x 14.25	5.18 x 8.58 x 21	10.2 x 16.75 x 30	36.2 x 23 x 38	50 x 42 x 33
Drive weight, pounds	21	40	85	635	760 to 900
Power source for drives	Power supply optional	Separate	With drive	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—					$42,063 to $58,015
Controller	—	—	—	—	With controller
Formatter	—	—	Special quote	—	Included
Interface	—	Included	—	Included	$40,000 or $50,000
First drive	See Comments	See Comments	See Comments	$15,650 (qty. 51-100)	$31,680 or $41,680
Additional drive	—	—	—	—	—
Software	—	—	—	—	$176 to $226
Maintenance—	—	—	—	—	—
Controller	—	—	—	—	$128 to $220
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	1978
First delivery, month/year	December 1981	1st qtr. 1981/1982	1977	3rd quarter 1980	NA
Availability, days ARO	—	—	120	—	CDC
Number of drives installed to date	NA	NA	NA	NA	
Serviced by	Customer or CDC	Customer or CDC	Customer or CDC	Customer or CDC	
COMMENTS	In quantity of 2000, prices for 8MB, 24MB, and 32MB capacities are $1,295, $1,560, and $1,755 respectively	Removable disk cartridge provides 8 megabytes of additional storage; 9454 costs $2,665 in quantity of 1000; 9455 costs $3,060 in quantity of 250	In quantity of 51-100, prices for 80MB and 160MB capacities are $4,970 and $6,195 respectively	Fixed-head option provides 1.9 megabytes of zero seek time storage; dual channel option available	Model A2 includes controller for up to 3 Model B2 drives; plug-compatible with IBM 3350; fixed-head option available; also see Report 7006:263:10

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SUPPLIER AND MODEL	Control Data 33801	Corona Starfire 5	Corvus 6X	Corvus 11X	Corvus 20X
COMPUTERS INTERFACED	IBM S/370	Apple II	See Comments	See Comments	See Comments
PRIMARY MARKET	End user	Dealer, OEM, large end user	OEM, dealer	OEM, dealer	OEM, dealer
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	5.25	5.25	8	8
CAPACITY					
Recording surfaces per drive unit	30, 1110 or 1616	4	4	3	5
Tracks per surface	635M or 800M	153	144	380	380
Unformatted capacity per drive unit, bytes	(2 HDAs)	5M	6.9M	11.3M	20.5M
PERFORMANCE					
Head movement time—					
1 track, msec	10	3	3	6	6
Average (move of 1/3 of tracks), msec	25	98	125	35	35
Across all tracks, msec	50	251	240	65	65
Average rotational delay (1/2 rev.), msec	8.4	8.3	6.25	8.3	8.3
Data transfer rate, *bytes* per second	1,198,000	625,000	960,000	648,000	648,000
SOFTWARE SUPPORT	Diagnostics	Extended DOS 3.3, CP/M, utilities, diagnostics, initialization	Interface, diagnostics	Interface, diagnostics	Interface, diagnostics
PACKAGING					
Controller	CDC 38302	Included	Yes	Yes	Yes
Formatter	With controller	Included	Yes	Yes	Yes
Interface	Yes	Included	Yes	Yes	Yes
Drive units per controller	16	1	4	4	4
Drive units per formatter	—	1	4	4	4
Drive mounting	Stand alone cabinet	Separate chassis	Separate chassis	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	50 x 42 x 33	6 x 8 x 13.5	3.25 x 5.75 x 8	5.5 x 8.5 x 24.5	5.5 x 8.5 x 24.5
Drive weight, pounds	900 to 1100	20	5	27	27
Power source for drives	Internal	Internal	Internal	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—	$43,400 to $50,200	Included	Included	Included	Included
Controller	With controller	Included	Included	Included	Included
Formatter	Included	Included	Included	Included	Included
Interface	$44,930	$2,995	$3,195	$4,995	$5,995
First drive	$36,610	—	—	—	—
Additional drive	—	Included	Included	Included	Included
Software	—	—	—	—	—
Maintenance—	$179 to $205	—	—	—	—
Controller	—	—	—	—	—
Interface	$128 to $170	—	—	—	—
Drive	—	Yes	Yes	Yes	Yes
Quantity discounts available	1977	February 1982	March 1981	1980	1980
First delivery, month/year	—	30	30 to 60	30 to 60	30 to 60
Availability, days ARO	NA	NA	NA	NA	NA
Number of drives installed to date	CDC	Factory or dealer	Dealer or factory	Dealer or factory	Dealer or factory
Serviced by					
COMMENTS	Model A2 includes controller for up to 3 Model B2 drives; plug-compatible with IBM 3350; fixed-head option available; also see Report 7006:263:14	One-year warranty; software supports double-volume files	Versions are available for a number of small computers including Apple II & III, IBM Personal Computer, TRS-80, and Xerox 820; drive is manufactured by IMI	See Model 6X Comments	See Model 6X Comments

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SUPPLIER AND MODEL	Cyberchron CHD-11	Cyberdata Wave 80 Model 11	Cyberdata Wave 80 Model 22	Cynthia Peripheral Corp D 160 Series	Dastek 4830 Series
COMPUTERS INTERFACED	DEC LSI-11 and custom	Xerox 820, IBM Personal Computer	Xerox 820, IBM Personal Computer	Custom	16- and 32-bit minicomputers
PRIMARY MARKET	OEM, end user	End user, OEM	End user, OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester, floppy disk opt	Winchester, floppy disk opt	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	8	11.5	14
CAPACITY					
Recording surfaces per drive unit	3 plus servo	4	8	4, 6, or 8	3, 5, or 6
Tracks per surface	600 plus 14 spare	244	244	1176 plus 1	1646
Unformatted capacity per drive unit, bytes	24M	11.7M	23.4M	60M, 90M, or 120M (formatted)	202.2M, 337.1M or 404.5M
PERFORMANCE					
Head movement time—					
1 track, msec	8	19	19	10	5
Average (move of 1/3 of tracks), msec	42	70	70	40	25
Across all tracks, msec	80	140	140		55
Average rotational delay (1/2 rev.), msec	8.3	10.6	10.6	8.3	16.8
Data transfer rate, *bytes* per second	800,000	See Comments	See Comments	920,000	1,200,000
SOFTWARE SUPPORT	DEC RL01 and RL02 emulation	Full disk utilities for file management	Full disk utilities for file management	—	Diagnostics
PACKAGING					
Controller	Included	Yes	Yes	Optional	No
Formatter	Yes	Yes	Yes	—	No
Interface	Yes	Yes	Yes	—	SMD
Drive units per controller	4	1	1	—	—
Drive units per formatter	4	1	1	—	—
Drive mounting	Separate chassis	Desk top	Desk top	—	Rack
Drive dimensions (h x w x d), inches	5.25 x 19 x 22	8.75 x 18.5 x 19.75	8.75 x 18.5 x 19.75	5.6 x 12.2 x 21.8	10.1 x 17.75 x 29.29
Drive weight, pounds	45	33	36	53	120
Power source for drives	Included	Internal	Internal	Separate	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	—	—	$980	—
Formatter	—	—	—		—
Interface	—	—	—	Included	—
First drive	$6,495	$6,200	$7,200	See Comments	Contact vendor
Additional drive	$3,995	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	February 1981	January 1982	January 1982	1981	October 1981
Availability, days ARO	30	45	45	60	Contact vendor
Number of drives installed to date	Over 50	6	10	NA	NA
Serviced by	Factory	Cyberdata	Cyberdata	Cynthia Peripheral	Customer
COMMENTS	A 40MB model and a 22-bit Q bus address will be available in the 2nd quarter of 1982	Data transfer rate is 58K bytes/sec for IEEE 488 interface, 60K bytes/sec for 8-bit parallel interface, and 150 to 19,200 bits/sec for RS-232 interface. 1MB floppy disk opt	See Model 11 Comments	Quantity 100 prices range from $3,160 to $3,720, can be intermixed with other Cynthia disk drives on same controller, manufactured by Cii Honeywell Bull	Includes thin-film heads

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SUPPLIER AND MODEL	Dastek 4835 Series	Data General 6063, 6064	Data General 6098, 6099, 6100, 6103	Data General 6101, 6102, 6104, 6105	Data General 6160, 6161
COMPUTERS INTERFACED	16- and 32-bit minicomputers	DG Nova and Eclipse	DG Nova and Eclipse	DG microNova	DG Nova, Eclipse CS/50, CS/70
PRIMARY MARKET	OEM	End user, OEM	End user, OEM	End user, OEM	End user, OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	3, 5, or 6	2	2 or 4	2 or 4	5 or 10
Tracks per surface	1646	32 or 64 plus 2	384	384	823
Unformatted capacity per drive unit, bytes	202.2M, 337.1M or 404.5M	—	—	—	73M, 147M
PERFORMANCE					
Head movement time—					
1 track, msec	5	—	15	15	5
Average (move of 1/3 of tracks), msec	25	—	60	60	30
Across all tracks, msec	55	—	130	130	55
Average rotational delay (1/2 rev.), msec	10.1	10.2	10.1	10.1	8.33
Data transfer rate, *bytes* per second	2,000,000	910,000	910,600	910,600	1,209,000
SOFTWARE SUPPORT	Diagnostics	DG RDOS, AOS, and AOS/VS languages and file structures	All DG real-time and multiprogramming systems	microNova, DOS, and MP/OS systems	RDOS, AOS, and AOS/VS plus languages and utilities
PACKAGING					
Controller	No	Yes	Yes	Yes	Yes
Formatter	No	Yes	In controller	In controller	With controller
Interface	SMD	Yes	In controller	In controller	With controller
Drive units per controller	—	4	1	1	2
Drive units per formatter	—	4	—	—	—
Drive mounting	Rack	Rack	Rack	Rack	Rack
Drive dimensions (h x w x d), inches	10.1 x 17.75 x 29.29	8.75 x 19 x 27	10.5 x 19 x 28.09	10.5 x 19 x 28.09	10.5 x 19 x 30
Drive weight, pounds	120	76	75	75	125
Power source for drives	Internal	Included	Included	Included	Included
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	Included	Included	Included	Included
Formatter	—	Included	Included	Included	Included
Interface	—	Included	Included	Included	Included
First drive	Contact vendor	$9,900 to $13,900	$6,050 to $11,220	$5,720 to $11,220	$18,000 to $24,000
Additional drive	—	$7,900 to $11,900	—	—	$14,500 to $20,500
Software	—	Varies	Varies	Varies	Varies
Maintenance—					
Controller	—	Included	Included	Included	Included
Interface	—	Included	Included	Included	Included
Drive	—	$90 to $125	$47 to $85	$45 to $83	$90 to $120
Quantity discounts available	Yes	Up to 40%	Up to 40%	Up to 40%	Yes
First delivery, month/year	April 1982	November 1977	August 1979	August 1979	January 1982
Availability, days ARO	Contact vendor	90	90	90	90
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Customer	Data General	Data General	Data General	Data General
COMMENTS	Includes thin-film heads	Dual-porting optional; both models can be intermixed on same controller; can be used with 10 MB/sec burst multiplexer channel, channel program control			

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SUPPLIER AND MODEL	Data Peripherals DP-400	Data Systems Design DSD 880X/8	Data Systems Design DSD 880X/20	Data Systems Design DSD 880X/30	Digital Equipment Corp RM80
COMPUTERS INTERFACED	—	DEC PDP-11, LSI-11	DEC PDP-11, LSI-11	DEC PDP-11, LSI-11	DEC VAX-11/750 VAX-11/780
PRIMARY MARKET	OEM	OEM	OEM	OEM	End user
TYPE					
Style	Winchester disk only	Winchester plus floppy disk	Winchester plus floppy disk	Winchester plus floppy disk	Winchester disk only
Disk diameter, inches	8	8	8	8	14
CAPACITY					
Recording surfaces per drive unit	4	4	6	8	7 plus 1 servo
Tracks per surface	852 plus 12 spares	256	256	256	—
Unformatted capacity per drive unit, bytes	46.4M	10M	30M	40M	124M (formatted)
PERFORMANCE					
Head movement time—					
1 track, msec	15	19	15	15	6
Average (move of 1/3 of tracks), msec	60	47	60	65	25
Across all tracks, msec	150	107	100	100	50
Average rotational delay (1/2 rev.), msec	8.3	9.6	10	10	8.3
Data transfer rate, *bytes* per second	875,000	204,000	204,000	204,000	1,200,000
SOFTWARE SUPPORT	None	Handlers, diagnostics	Handlers, diagnostics	Handlers, diagnostics	Diagnostics
PACKAGING					
Controller	Optional	Yes	Yes	Yes	Yes
Formatter	Optional	No	No	No	Yes
Interface	—	Yes	Yes	Yes	Yes
Drive units per controller	4	2	2	2	8
Drive units per formatter	—	—	—	—	—
Drive mounting	Separate chassis	Separate chassis	Separate chassis	Separate chassis	Stand-alone cabinet
Drive dimensions (h x w x d), inches	4.62 x 8.55 x 14.25	5.25 x 17.6 x 23.75	5.25 x 17.6 x 23.75	5.25 x 17.6 x 23.75	39 x 21.5 x 33
Drive weight, pounds	15.8	56.5	56.5	56.5	370
Power source for drives	Separate, DC only	Internal	Internal	Internal	—
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Contact vendor	Included	Included	Included	Included
Formatter	—	—	—	—	Included
Interface	—	Included	Included	Included	Included
First drive	Contact vendor	$6,895 (2 drives)	$8,545 (2 drives)	$9,195 (2 drives)	$19,900
Additional drive	—	—	—	—	—
Software	—	Included	Included	Included	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	—
First delivery, month, year	January 1982	November 1980	November 1981	October 1981	1981
Availability, days ARO	60	30	30	30	—
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory	Factory	Factory	Factory	DEC
COMMENTS	Can be daisy chained with DP-100 removable-media drive				Available with dual access feature for $22,000

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SUPPLIER AND MODEL	DMA Systems Micro-Magnum 5/5	Fujitsu M2280 Series	Fujitsu M2301B, M2301K	Fujitsu M2302B, M2302K	Fujitsu M2311, M2312
COMPUTERS INTERFACED	—	—	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester plus cartridge disk	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	14	8	8	8
CAPACITY					
Recording surfaces per drive unit	4	2, 2, 4, or 5	4	8	4, 7
Tracks per surface	306 plus 5 spares	1646	244	244	589
Unformatted capacity per drive unit, bytes	6.75M	84.3M, 67.4M 134.8M, or 168.6M	11.7M	23.4M	48.3M, 84.4M
PERFORMANCE					
Head movement time—					
1 track, msec	3	6	30	30	5
Average (move of 1/3 of tracks), msec	40	27	70	70	20
Across all tracks, msec	80	55	140	140	40
Average rotational delay (1/2 rev.), msec	6	10.12	10.1	10.1	8.3
Data transfer rate, *bytes* per second	625,000	1,012,000	592,800	592,800	1,228,000
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	See Comments	See Comments	No
Formatter	No	No	See Comments	See Comments	No
Interface	No	SMD	See Comments	See Comments	SMD
Drive units per controller	4	8	4 or 1	4 or 1	8
Drive units per formatter	4	—	—	—	—
Drive mounting	Rack or table-top	Rack	Floppy compatible	Floppy compatible	Floppy compatible
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 10.5	9.8 x 16.4 x 25.6	4.4 x 8.5 x 14	4.4 x 8.5 x 14	5.1 x 8.5 x 15
Drive weight, pounds	9	100	14 or 15	14 or 15	20
Power source for drives	—	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$2,200	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	March 1982	4th quarter 1979	August 1980	August 1980	December 1980
Availability, days ARO	90	90	90	90	90
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Customer	Fujitsu, customer	Fujitsu, customer	Fujitsu, customer	Fujitsu, customer
COMMENTS	Cartridge disk drive provides 6.75 megabytes of additional storage. Winchester features non-contact heads, embedded servo system	Optional fixed heads provide 655K bytes of storage	M2301K includes integral controller/formatter and requires PCB adapter for computer interface. M2301B has SA 4000 interface, no controller	M2302K includes integral controller/formatter and requires PCB adapter for computer interface. M2302B has SA 4000 interface, no controller	

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SUPPLIER AND MODEL	Fujitsu M2351A	Harris 5330/5331	Harris 5350/5351	Harris 5660/5661	Hewlett-Packard 7908
COMPUTERS INTERFACED	—	Harris H80 to H800	Harris H80 to H800	Harris H80 to H800	HP 250, 6400, 9845, 1000 L, E, F
PRIMARY MARKET	OEM	End user	End user	End user	End user, OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester plus cartridge tape
Disk diameter, inches	10.5	14	14	14	8
CAPACITY					
Recording surfaces per drive unit	10	5	5	20	5
Tracks per surface	1684	823	1646	1686	374 plus 6 spares
Unformatted capacity per drive unit, bytes	474.2M	82.9M	165.9M	675M	20.5M
PERFORMANCE					
Head movement time—					
1 track, msec	5	7	7	10	5
Average (move of 1/3 of tracks), msec	18	30	30	25	41.6
Across all tracks, msec	35	55	55	50	70
Average rotational delay (1/2 rev.), msec	7.5	8.33	8.33	8.3	8.33
Data transfer rate, *bytes* per second	1,859,000	1,209,000	1,209,000	1,200,000	537,600
SOFTWARE SUPPORT	None	Diagnostics, initializing, etc	Diagnostics, initializing, etc	Diagnostics	Driver, initializer, diagnostics
PACKAGING					
Controller	No	With 5330 drive	With 5350 drive	With 5660 drive	Yes
Formatter	No	Yes	Yes	Yes	With controller
Interface	SMD	Yes	Yes	Yes	Yes
Drive units per controller	8	8	8	8	1
Drive units per formatter		—	—	—	1
Drive mounting	Rack	Up to 4 per cabinet	Up to 4 per cabinet	Stand-alone cabinet	Stand-alone cabinet or rack
Drive dimensions (h x w x d), inches	10.4 x 17.2 x 24	10.2 x 16.75 x 30	10.2 x 16.75 x 30	36.2 x 23 x 38	See Comments
Drive weight, pounds	140	85	85	635	See Comments
Power source for drives	Internal	Internal	Internal	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	Included	Included	Included	—
Formatter	—	Included	Included	Included	—
Interface	—	Included	Included	Included	—
First drive	Contact vendor	$21,900 ($5330) $14,500 ($5331)	$28,300 ($5350) $20,900 ($5351)	$48,000 ($5660) $40,000 ($5661)	$9,900
Additional drive	—	Included	Included	Included	—
Software	—	Included	Included	Included	—
Maintenance—					
Controller	—	$104 to $150	$110 to $160	$317 to $475	$46
Interface	—	No	No	No	Yes
Drive	—				
Quantity discounts available	Yes				
First delivery, month, year	1st quarter 1982	2nd quarter 1981	1st quarter 1982	1st quarter 1981	September 1981
Availability, days ARO	90	—	—	—	70
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Fujitsu, customer	Harris	Harris	Harris	Hewlett-Packard
COMMENTS		Uses Harris Universal Disk Controller. Model 5330 includes controller. Model 5331 is disk drive only; drive is manufactured by Control Data	Uses Harris Universal Disk Controller. Model 5350 includes controller. Model 5351 is disk drive only; drive is manufactured by Control Data	Uses Harris Universal Disk Controller. Model 5660 includes controller. Model 5661 is disk drive only; drive is manufactured by Control Data	Stand-alone model measures 28.4 x 14 x 29.1 inches and weighs 160 lbs. rack mounted model measures 7 x 19 x 27 and weighs 81.6 lbs

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SUPPLIER AND MODEL	Hewlett-Packard 7911	Hewlett-Packard 7912	Hewlett-Packard 9134A	Hewlett-Packard 9135A	Hitachi DK62-10/20/40/80
COMPUTERS INTERFACED	HP 250, 1000, 3000, 9845, 64000	HP 250, 1000, 3000, 9845, 64000	HP 9826, 9836, 9845, 9835, 98257, 85, 87, 125, 1000 L	HP 9826, 9836, 85, 87, 125, 1000 L	Modified SMD or Diablo
PRIMARY MARKET	End user, OEM	End user, OEM	End user, system OEM	End user, system OEM	OEM
TYPE					
Style	Winchester plus cartridge tape	Winchester plus cartridge tape	Winchester disk only	Winchester plus floppy disk	Winchester disk only
Disk diameter, inches	14	14	5.25	5.25	14
CAPACITY					
Recording surfaces per drive unit	2	4	4	4	2, 4, 8, 16
Tracks per surface	572 plus 8 spares	572 plus 8 spares	150 plus 4 spares	150 plus 2 spares	301 plus 2 spares
Unformatted capacity per drive unit, bytes	31.5M	73.5M	6.4M	6.4M	10.8M, 21.7M, 43.3M, 86.6M
PERFORMANCE					
Head movement time—					
1 track, msec	5	5	3	5	10
Average (move of 1/3 of tracks), msec	26.7	26.7	60	60	37
Across all tracks, msec	50	50	173	173	75
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3	8.3	10.1
Data transfer rate, *bytes* per second	983,000	983,000	50,000	50,000	889,000
SOFTWARE SUPPORT	Driver, initializer, diagnostics	Driver, initializer, diagnostics	Driver, initializer, diagnostics, copy and file maintenance system exerciser	Driver, initializer, diagnostics, copy and file maintenance system exerciser	None
PACKAGING					
Controller	Included	Included	Included	Included	No
Formatter	With controller	With controller	Included	Included	No
Interface	HP-IB	HP-IB	IEEE-488	IEEE-488	Yes
Drive units per controller	1	1	1	1	—
Drive units per formatter	1	1	1	1	—
Drive mounting	Stand-alone cabinet or rack	Stand-alone cabinet or rack	Stand-alone unit	Stand-alone unit	Computer chassis
Drive dimensions (h x w x d), inches	See Comments	See Comments	5.1 x 16.7 x 18.7	5.1 x 16.7 x 18.7	11.4 x 17 x 28.4
Drive weight, pounds	See Comments	See Comments	29.5	32.5	77.8 or 106.7
Power source for drives	Internal	Internal	Internal	Internal	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	Included	Included	Included	—
Formatter	Included	Included	Included	Included	—
Interface	System specific	System specific	Included	Included	—
First drive	$12,500	$15,000	$4,500	$5,500	Contact vendor
Additional drive	$12,500	$15,000	—	—	—
Software	System specific	System specific	Computer dependent	$0 to $500	—
Maintenance—					
Controller	Included	Included	Included	Included	—
Interface	System specific	System specific	Included	Included	—
Drive	$43	$45	$6	$6	—
Quantity discounts available	Yes	Yes	Yes	Yes	—
First delivery, month, year	November 1981	November 1981	January 1982	January 1982	September 1972
Availability, days ARO	70	70	6 weeks	4 weeks	Contact vendor
Number of drives installed to date	NA	NA	NA	NA	12,000
Serviced by	Hewlett-Packard	Hewlett-Packard	Hewlett-Packard	Hewlett-Packard	Customer
COMMENTS	Stand-alone model measures 28.4 x 14 x 29.1 inches and weighs 188 lbs. rack-mounted model measures 12.25 x 19 x 27.8 inches and weighs 148 lbs.	Stand-alone model measures 28.4 x 14 x 29.1 inches and weighs 188 lbs. rack-mounted model measures 12.25 x 19 x 27.8 inches and weighs 148 lbs.		Integrated floppy disk drive provides 420K bytes of additional storage and has a data transfer rate of 6.5K bytes per second	Fixed head versions available

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SUPPLIER AND MODEL	Hitachi DK801-1, DK801-2	Hitachi DK811-2, DK811-4	Hitachi DK811-8	Hitachi DKU-95I	Hitachi DKU-97I
COMPUTERS INTERFACED	Modified SMD	Modified SMD	Modified SMD	Hitachi, IBM 370	Hitachi, IBM 370
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	8	14	14
CAPACITY					
Recording surfaces per drive unit	2, 4	3, 6	11	30 (2 HDAs)	40 (2 HDAs)
Tracks per surface	230 plus 1 spare	521 plus 1 spare	526 plus 2 spares	1110	1666
Unformatted capacity per drive unit, bytes	6.9M, 13.9M	23.5M, 47M	89M	665M (2 HDAs)	1330M (2 HDAs)
PERFORMANCE					
Head movement time—					
1 track, msec	30	12	12	6	6
Average (move of 1/3 of tracks), msec	70	25	25	20	20
Across all tracks, msec	150	55	55	45	45
Average rotational delay (1/2 rev.), msec	8.4	8.4	8.4	8.4	8.4
Data transfer rate, *bytes* per second	889,000	889,000	904,000	1,198,000	1,198,000
SOFTWARE SUPPORT	None	None	None	Diagnostics	Diagnostics
PACKAGING					
Controller	No	No	No	Included with drive	Included with drive
Formatter	No	No	No	No	No
Interface	Yes	Yes	Yes	Yes	Yes
Drive units per controller	—	—	—	4	2
Drive units per formatter	—	—	—	—	—
Drive mounting	Computer chassis	Computer chassis	Computer chassis	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	5.7 x 9.5 x 15.2	6.5 x 9.5 x 15.2	7.9 x 9.5 x 15.2	44.5 x 47.2 x 33.3	46.1 x 62.6 x 33.5
Drive weight, pounds	22	33	39.5	1025	1350
Power source for drives	Separate	Separate	Separate	From first drive	From first drive
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	Contact vendor	Contact vendor
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	Contact vendor	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	—	—	—	—	—
First delivery, month, year	April 1980	April 1981	June 1982	July 1978	December 1980
Availability, days ARO	Contact vendor	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Number of drives installed to date	500	NA	—	1000	NA
Serviced by	Customer	Customer	Customer	Customer	Customer
COMMENTS				Includes dual port feature	Two independent actuators per HDA, includes dual port feature

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SUPPLIER AND MODEL	Hitachi DKU-98I	Hitachi FHD-1000	Hitachi FHD-150	IBM 680	IBM 3310
COMPUTERS INTERFACED	Hitachi	Hitachi	Hitachi (modified SMD interface)	—	IBM 4321, 4331
PRIMARY MARKET	OEM	OEM	OEM	OEM	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	14	8	8
CAPACITY					
Recording surfaces per drive unit	40 (2 HDAs)	2	2	11 plus 1 servo	—
Tracks per surface	—	128 plus 4 spares	128 plus 4 spares	358	358
Unformatted capacity per drive unit, bytes	2660M (2 HDAs)	3.2M	4.8M	64.5M	64.5M or 129M (1 or 2 HDAs)
PERFORMANCE					
Head movement time—					
1 track, msec	5	See Comments	See Comments	9	9
Average (move of 1/3 of tracks), msec	16	—	—	27	27
Across all tracks, msec	33	—	—	46	46
Average rotational delay (1/2 rev.), msec	8.4	10	10	9.6	9.6
Data transfer rate, *bytes* per second	3,000,000	625,000	937,000	1,031,000	1,031,000
SOFTWARE SUPPORT	Diagnostics	None	None	None	Diagnostics
PACKAGING					
Controller	Included with drive	No	No	No	Integrated
Formatter	No	No	No	—	—
Interface	Yes	Yes	Yes	—	Yes
Drive units per controller	4	—	—	—	2
Drive units per formatter	—	—	—	—	—
Drive mounting	Separate chassis	Computer chassis	Computer chassis	Computer or controller chassis	Stand-alone cabinet
Drive dimensions (h x w x d), inches	70.5 x 44.5 x 35.4	9.1 x 16.3 x 17.5	9.1 x 16.3 x 17.5	11.8 x 13.4 x 18.5	39.5 x 23.75 x 32
Drive weight, pounds	1435	57	57	53	240 to 350
Power source for drives	From first drive	Separate	Separate	Separate	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Contact vendor	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	Contact vendor	Contact vendor	Contact vendor	Contact vendor	$14,280 to $23,730
Additional drive	—	—	—	—	$11,300 to $20,750
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	—	—	—	Contact vendor	$61 to $135
First delivery, month, year	1st quarter 1982	October 1975	March 1974	—	—
Availability, days ARO	Contact vendor	Contact vendor	Contact vendor	—	—
Number of drives installed to date	—	5000	NA	—	NA
Serviced by	Customer	Customer	Customer	Customer	IBM
COMMENTS	Two independent actuators per HDA, includes dual port feature	Head-per-track disk	Head-per-track disk		Models A1 (one HDA) and A2 (two HDAs) include controller, one Model B1 (one HDA) or B2 (two HDAs) can be attached to an A1 or A2 unit, see Report 70C-491-08 for details

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SUPPLIER AND MODEL	IBM 3340	IBM 3344	IBM 3350	IBM 3370	IBM 3375
COMPUTERS INTERFACED	IBM S/370, 303X, 308X, 4331, 4341	IBM S/370, 303X, 308X, 4331, 4341	IBM S/370, 303X, 308X, 4341	IBM 303X, 308X, 4331, 4341	IBM 303X, 308X, 4331-2, 4341
PRIMARY MARKET	End user	End user	End user	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	3 or 6	30 (2 HDAs)	30 (2 HDAs)	—	—
Tracks per surface	696	1110 plus 10 spares	1110 plus 10 spares	—	—
Unformatted capacity per drive unit, bytes	69.8M or 139.6M (2 HDAs)	559M (2 HDAs)	635M (2 HDAs)	571.3M	819.7M
PERFORMANCE					
Head movement time—					
1 track, msec	10	10	10	5	—
Average (move of 1/3 of tracks), msec	25	25	25	20	19
Across all tracks, msec	50	50	50	40	—
Average rotational delay (1/2 rev.), msec	10.1	10.1	8.4	10.1	10.1
Data transfer rate, *bytes* per second	885,000	885,000	1,198,000	1,859,000	1,859,000
SOFTWARE SUPPORT	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics
PACKAGING					
Controller	IBM 3830-2, 3880-1, or 3880-2	See Comments	IBM 3830-2 or 3880-1, -2 or -11	Integrated Adapter (4331) or 3880-1 or -2	IBM 3880-1, 3880-2
Formatter	—	—	—	—	—
Interface	Yes	Yes	Yes	Yes	Yes
Drive units per controller	16 to 32	12	16 to 32	16 to 32	16 to 32
Drive units per formatter	—	—	—	—	—
Drive mounting	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet
Drive dimensions (h x w x d), inches	47 x 48 x 34	47 x 45 x 34	47 x 48 x 34	39.5 x 30.5 x 32	39.5 x 30.5 x 32
Drive weight, pounds	600 to 900	750	800 to 1050	375 to 575	375 to 575
Power source for drives	Internal	Internal	Internal	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$23,200 to $78,790	$23,200 to $78,790	$23,200 to $254,550	$78,790	$78,790
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$24,570	$32,940	$41,600	$44,350	$50,720
Additional drive	$13,510 to $17,200	—	$32,940 to $43,030	$29,550	$33,850
Software	—	—	—	—	—
Maintenance—					
Controller	$166 to $176	$166 to $176	$176 to $676	$176	$176
Interface	—	—	—	—	—
Drive	$62 to $116	$128	$128 to $179	$94.50 to $126	$98.50 to $130
Quantity discounts available	—	—	—	—	—
First delivery, month/year	November 1973	1976	1st quarter 1976	—	—
Availability, days ARO	—	—	—	—	—
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	IBM	IBM	IBM	IBM	IBM
COMMENTS	Model A2 includes controller for up to 3 Model B1 (1 HDA) or B2 (2 HDAs) drives, uses removable HDA, see Report 70C-491-06 for details	Attaches to 3340 A2, can be intermixed with 3340 B1 and B2 units, fixed-head models available, see Report 70C-491-06 for details	Model A2 includes controller for up to 3 B2 or 2 B2 and 1 C2 drives, fixed-head models available, see Report 70C-491-06 for details	Two independent actuators per HDA, Model A1 includes controller for up to 3 Model B1 units, see Report 70C-491-08 for details	HDA has two independent actuators, Model A1 includes controller for up to 3 Model B1 or 2 Model B1 and 1 Model D1 unit, see Report 70C-491-08 for details

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SUPPLIER AND MODEL	IBM 3380	IMI 5006	IMI 5006H, 5012H, 5018H	IMI 5007	IMI 7710, 7720
COMPUTERS INTERFACED	IBM 370/158, 370/168, 303X, 308X, 4341	—	—	—	—
PRIMARY MARKET	End user	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	5.25	5.25	5.25	8
CAPACITY					
Recording surfaces per drive unit	—	4	2, 4, 6	4	3, 5
Tracks per surface	—	153	306	144	380
Unformatted capacity per drive unit, bytes	2520M (2 HDAs)	6.38M	6.38M, 12.76M, 19.14M	6.9M	12.3M, 20.5M
PERFORMANCE					
Head movement time—					
1 track, msec	3	3	3	3	6
Average (move of 1/3 of tracks), msec	16	122	122	125	35
Across all tracks, msec	30	36.5	365	240	65
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3	6.25	8.3
Data transfer rate, *bytes* per second	3,000,000	625,000	625,000	960,000	648,000
SOFTWARE SUPPORT	Diagnostics	None	None	None	None
PACKAGING					
Controller	IBM 3880-2, -3, or -13	—	—	Optional	Embedded, optional
Formatter	—	—	—	Optional	Embedded, optional
Interface	Yes	ST506	ST506	—	IMI/ANSI
Drive units per controller	16	—	—	2	—
Drive units per formatter	—	—	—	2	—
Drive mounting	Stand-alone cabinet	Minifloppy-compatible	Minifloppy-compatible	Minifloppy-compatible	Separate chassis
Drive dimensions (h x w x d), inches	70.5 x 42 x 32	3.25 x 5.75 x 8.0	3.25 x 5.75 x 8.0	3.25 x 5.75 x 8.0	5.5 x 8.5 x 19.25
Drive weight, pounds	1000 to 1200	5	5	5	22
Power source for drives	Internal	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$78,790 to $263,910	—	—	$325	$375
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$101,550 to $116,060	$1,000	$925 to $1,270	$1,075	$2,200 to $2,650
Additional drive	$84,240	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	$176 to $711	—	—	—	—
Interface	—	—	—	—	—
Drive	$240 to $325	—	—	—	—
Quantity discounts available	—	Yes	Yes	Yes	Yes
First delivery, month/year	4th quarter 1981	January 1982	June 1982	February 1981	1978
Availability, days ARO	—	60	—	60	60
Number of drives installed to date	NA	NA	—	Over 5000	Over 18,000
Serviced by	IBM	Customer, factory	Customer, factory	Factory, customer	Factory
COMMENTS	Two independent actuators per HDA, Model A4 inclues controller for up to 3 Model B4 units, Model AA4 can be attached to 2 3880 storage directors, see Report 70C-491-06 for details	Uses thin-film plated media	Use thin-film plated media	Uses thin-film plated media	

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SUPPLIER AND MODEL	IMI 7740	IMI 8100	Irwin International 510	ISS/Univac 717	Kennedy 5300-1, -2, -3
COMPUTERS INTERFACED	—	—	DEC LSI-11, S-100 bus, Multibus	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester plus cartridge tape drive	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	5.25	14	14
CAPACITY					
Recording surfaces per drive unit	5	8	2	7	1, 3, 5
Tracks per surface	760	1200	612	1120	700
Unformatted capacity per drive unit, bytes	41M	100M	12.3M	154M	14M, 42M, 70M
PERFORMANCE					
Head movement time—					
1 track, msec	6	5	8	7	10
Average (move of 1/3 of tracks), msec	45	30	25	35	45
Across all tracks, msec	80	60	55	70	80
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3	8.3	10
Data transfer rate, *bytes* per second	648,000	648,000	675,000	1,198,000	1,000,000
SOFTWARE SUPPORT	None	None	Drivers for opt. interfaces, CP/M	—	None
PACKAGING					
Controller	Embedded, optional	Embedded, optional	Optional	—	No
Formatter	Embedded, optional	Embedded, optional	Included with controller	—	No
Interface	IMI/ANSI	IMI/ANSI	Optional	SMD-compatible	No
Drive units per controller	—	1	2	—	—
Drive units per formatter	—	1	—	—	—
Drive mounting	Separate chassis	Same as 8-in. floppy	Minifloppy compatible	Rack	Separate chassis
Drive dimensions (h x w x d), inches	5.5 x 8.5 x 19.25	4.6 x 8.55 x 15.25	3.25 x 5.75 x 8.0	8.75 x 16.66 x 27.75	7 x 19 x 23.5
Drive weight, pounds	22	20	5.5	115	75
Power source for drives	Separate	Separate	Separate	Included	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$375	—	$975	—	—
Formatter	—	—	—	—	—
Interface	—	—	$600	—	—
First drive	$3,100	$3,400	$3,000	Contact vendor	$3,500 to $4,500
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	Contact vendor	—
Quantity discounts available	Yes	Yes	Yes	—	Yes
First delivery, month/year	1981	July 1982	March 1981	June 1979	September 1977
Availability, days ARO	90	—	60	Contact vendor	60
Number of drives installed to date	—	—	575	NA	NA
Serviced by	Factory	Factory	Customer	NA	Factory
COMMENTS			Integrated 7-track, 6250-bpi cartridge tape drive can back up formatted disk contents in 8 minutes		

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SUPPLIER AND MODEL	Kennedy 5380	Kennedy 7300	Memorex 101	Memorex 102	Memorex 306
COMPUTERS INTERFACED	—	—	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	8	8	8	5.25
CAPACITY					
Recording surfaces per drive unit	—	5 plus 1 servo	4	8	4
Tracks per surface	823	411	244	244	—
Unformatted capacity per drive unit, bytes	80M	40M	11.77M	23.4M	6.7M
PERFORMANCE					
Head movement time—					
1 track, msec	10	6	19.5	19.5	18
Average (move of 1/3 of tracks), msec	30	30	70	77	175
Across all tracks, msec	55	55	140	153	495
Average rotational delay (1/2 rev.), msec	10	8.33	10.06	10.06	8.3
Data transfer rate, *bytes* per second	1,000,000	1,200,000	596,600	596,600	625,000
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	No	No	No
Formatter	No	No	No	No	No
Interface	No	No	Floppy compatible	Floppy compatible	ST506 compatible
Drive units per controller	—	—	4	4	—
Drive units per formatter	—	—	—	—	—
Drive mounting	OEM configuration	OEM configuration	Floppy compatible	Floppy compatible	—
Drive dimensions (h x w x d), inches	7 x 19 x 24.75	4.62 x 8.55 x 14.25	4.38 x 8.55 x 14	4.6 x 8.55 x 14	3.25 x 5.75 x 8
Drive weight, pounds	75	27	12	13	5.5
Power source for drives	Internal	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$5,400	$3,200	$1,900	$2,470	$950 (OEM qty.)
Additional drive	—	—	$1,140	$1,400	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	December 1978	August 1981	June 1980	October 1981	2nd quarter 1982
Availability, days ARO	60	90	30	30	—
Number of drives installed to date	NA	NA	2000	NA	—
Serviced by	Factory	Factory	Factory	Factory	—
COMMENTS					

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SUPPLIER AND MODEL	Memorex 310	Memorex 3640	Memorex 3644	Memorex 3650/3653/3654	Memorex 3652/3655/3656
COMPUTERS INTERFACED	—	IBM S/3, S/370, 4300	IBM S/3, S/370, 4300	Amdahl 470V, IBM S/370, 303X, 4341	Amdahl 470V, IBM S/370, 303X, 4341
PRIMARY MARKET	OEM	End user	End user	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	6	12 (2 HDAs)	30 (2 HDAs)	30 (2 HDAs)	30 (2 HDAs)
Tracks per surface	—	696	1120	1120	2240
Unformatted capacity per drive unit, bytes	10M	70M or 140M (2 HDAs)	560M (2 HDAs)	635M (2 HDAs)	1270M (2 HDAs)
PERFORMANCE					
Head movement time—					
1 track, msec	18	7	10	10	7
Average (move of 1/3 of tracks), msec	175	20	25	25	18
Across all tracks, msec	495	45	50	50	30
Average rotational delay (1/2 rev.), msec	8.3	10.1	10.1	8.4	8.4
Data transfer rate, bytes per second	625,000	885,000	885,000	1,198,000	1,198,000
SOFTWARE SUPPORT	None	Diagnostics	Diagnostics	Diagnostics	Diagnostics
PACKAGING					
Controller	No	Memorex 3674, IBM 3830-2, 3880	See Comments	Memorex 3674, 3676, IBM 3830-2, 3880	Memorex 3674, 3676, IBM 3830-2, 3880
Formatter	No	Yes	Yes	Yes	Yes
Interface	ST506 compatible	Yes	Yes	Yes	Yes
Drive units per controller	—	16	12	Up to 16	Up to 16
Drive units per formatter	—	—	—	—	—
Drive mounting	—	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	43.3 x 44.5 x 33.5	46 x 44.5 x 32	46 x 44.5 x 32	46 x 43.3 x 32
Drive weight, pounds	5.5	950	960	980 to 1000	950
Power source for drives	Separate	Internal	Internal	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	$49,440	See Comments	$49,440 or $75,770	$49,440 or $75,770
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$1,250 (OEM qty.)	$36,000	$31,680	$42,000	$74,225
Additional drive	—	$25,200	—	$33,265 or $43,450	$57,745 or $77,830
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	No	No	No	No
First delivery, month/year	2nd quarter 1982	October 1976	October 1978	April 1977	May 1974
Availability, days ARO	—	NA	NA	NA	NA
Number of drives installed to date	—	NA	NA	NA	NA
Serviced by	—	Memorex	Memorex	Memorex	Memorex
COMMENTS		Model 3643 includes controller for up to 3 Model 3640 or 3644 drives; plug-compatible with IBM 3340; uses removable HDA; also see Report 70D6-625-04	Connects to 3643; can be intermixed with 3640 drives; also see Report 70D6-625-04	Model 3653 includes controller for 3 Model 3650 or 2 3650 and 1 3654 drive; plug-compatible with IBM 3350; also see Report 70D6-625-05	Model 3655 includes controller for 3 Model 3652 or 2 3652 and 1 3656 drive; plug-compatible with IBM 3350; also see Report 70D6-625-05

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SUPPLIER AND MODEL	Micro Peripherals Model 10	Micro Technology MD3400 Series	Micro Technology MD3500 Series	Micro Technology MD3700 Series	Microcomputer Systems Corp. 1690 Series
COMPUTERS INTERFACED	—	DEC LSI-11, Q-bus	DEC LSI-11, Q-bus	DEC LSI-11, Q-bus	Hewlett-Packard 1000, 3000 Series
PRIMARY MARKET	OEM	OEM, distributor	OEM, distributor	OEM, distributor	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester plus floppy disk	Dual Winchester disks	Winchester disk only
Disk diameter, inches	5.25	8	8	8	14
CAPACITY					
Recording surfaces per drive unit	4	2, 4, 6, or 8	2, 4, 6, or 8	2, 4, 6, or 8	20
Tracks per surface	352	512	512	512	1686
Unformatted capacity per drive unit, bytes	14.66M	10M, 20M, 30M, or 40M	10M, 20M, 30M, or 40M	10M, 20M, 30M, or 40M	876M
PERFORMANCE					
Head movement time—					
1 track, msec	3	15	15	15	10
Average (move of 1/3 of tracks), msec	25	55 to 65	55 to 65	55 to 65	25
Across all tracks, msec	40	100	100	100	50
Average rotational delay (1/2 rev.), msec	8.33	10	10	10	8.3
Data transfer rate, bytes per second	625,000	542,500	542,500	542,500	1,200,000
SOFTWARE SUPPORT	None	—	—	—	None
PACKAGING					
Controller	No	Optional	Optional	Optional	Included
Formatter	No	—	—	—	—
Interface	Yes	External	External	External	PC board, HP-IB
Drive units per controller	4	—	—	—	—
Drive units per formatter	—	—	—	—	—
Drive mounting	Computer or separate chassis	Rack or desk-top	Rack or desk-top	Rack or desk-top	Separate chassis
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	—	—	—	32.2 x 23 x 38
Drive weight, pounds	4.2	—	—	—	635
Power source for drives	Separate	Included	Included	Included	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	$1,895	$2,695	$1,895	Included
Formatter	—	—	—	—	—
Interface	Included	—	—	—	Included
First drive	$1,150 (qty. 1000)	$4,100 to $6,410	$5,210 to $7,580	$7,265 to $11,965	$34,500 to $39,500
Additional drive	$1,150 (qty. 1000)	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	February 1982	April 1980	April 1980	April 1980	1980
Availability, days ARO	30 to 60	60	60	60	—
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory	Factory	Factory	Factory	Factory
COMMENTS		Also available with streaming tape backup; drive is manufactured by Quantum; also compatible with Shugart SA1000	See MD3400 Comments	See MD3400 Comments	Drive is manufactured by Control Data

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SUPPLIER AND MODEL	Microcomputer Systems Corp 9800 Series	Micropolis 1201/1202/1203	Micropolis 1221/1222/1223	Microtech Business Systems Dart SM-10	Microtech Business Systems Dart SM-34
COMPUTERS INTERFACED	—	—	—	Data General Digidyne Point 4 SCI Bytronix	DG-compatible
PRIMARY MARKET	End user OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester plus 0.25-in tape	Winchester plus 0.25-in tape
Disk diameter, inches	5.25	8	8	8	14
CAPACITY					
Recording surfaces per drive unit	4	1/3/5	1/3/5	4	3
Tracks per surface	153	580	580	185 plus 5 spares	555 plus 6 spares
Unformatted capacity per drive unit, bytes	6.38	9M/27M/45M	9M/27M/45M	10.2M	33.9M
PERFORMANCE					
Head movement time—					
1 track, msec	3	12	12	23	8
Average (move of 1/3 of tracks), msec	170	42	42	73	45
Across all tracks, msec	500	—	—	140	85
Average rotational delay (1/2 rev.), msec	8.33	8.3	8.3	8.4	9.7
Data transfer rate, *bytes* per second	625,000	922,000	922,000	900,000	1,040,000
SOFTWARE SUPPORT	None	None	None	IRIS, RDOS, BLISS, BITS	IRIS, RDOS, BLISS, BITS
PACKAGING					
Controller	Included	No	Yes	Yes	Yes
Formatter	—	No	Yes	Yes	Yes
Interface	HP-IB	Yes	Yes	Yes	Yes
Drive units per controller	—	4	4	4	4
Drive units per formatter	—	4	4	4	4
Drive mounting	Separate chassis	OEM configuration	OEM configuration	Up to 4 drives per cabinet	Up to 4 drives per cabinet
Drive dimensions (h x w x d), inches	6.4 x 10.5 x 12	4.62 x 8.55 x 14.5	4.62 x 8.55 x 14.25	14 x 8.5 x 4.5	20 x 16.6 x 6.8
Drive weight, pounds	20	22	22	20	33
Power source for drives	Internal	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	—	—	$2,050	$2,050
Formatter	—	—	—	$950	$950
Interface	Included	See Comments	See Comments	Included	Included
First drive	$3,450	—	—	$2,400	$3,000
Additional drive	—	—	—	$2,400	$3,000
Software	—	—	—	Included	Included
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	Yes	Yes
Quantity discounts available	Yes	Yes	Yes	May 1981	May 1981
First delivery, month/year	1981	December 1979	December 1979	30	30
Availability, days ARO	Immediate	60 to 90	60 to 90	30	100
Number of drives installed to date	NA	2500	2500	Factory	Factory
Serviced by	Factory	Factory	Factory		
COMMENTS	Drive is manufactured by Seagate. MSC also sells controllers for 5.25-in. Winchester disk drives	$1,672, $2,075, or $2,490 in quantity of 100	$2,078, $2,481, or $2,896 in quantity of 100; coding scheme enhanced pulse modulation provides 2M more bytes per data surface than 1201/1202/1203	Controller includes logic for streaming tape drive which is included in subsystem	Controller includes logic for streaming tape drive which is included in subsystem

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SUPPLIER AND MODEL	Microtech Business Systems Dart SM-68	Microtech Business Systems Dart SM-158	MiniScribe Model 1006	MiniScribe Model 1012	Mitsubishi M2860 Series
COMPUTERS INTERFACED	DG-compatible	DG-compatible	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester plus 0.25-in tape	Winchester plus 0.25-in tape	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	5.25	5.25	8
CAPACITY					
Recording surfaces per drive unit	3	7	2	4	3 or 7
Tracks per surface	1108 plus 3 spares	1108 plus 3 spares	306	306	549
Unformatted capacity per drive unit, bytes	67.8M	158M	6.4M	12.8M	21.73M or 50.71M
PERFORMANCE					
Head movement time—					
1 track, msec	8	8	1.75	1.75	10
Average (move of 1/3 of tracks), msec	45	40	179 (125)*	179 (125)*	35
Across all tracks, msec	85	74	534 (375)*	534 (375)*	60
Average rotational delay (1/2 rev.), msec	9.7	9.7	8.3	8.3	8.33
Data transfer rate, *bytes* per second	1,040,000	1,040,000	625,000	625,000	806,000
SOFTWARE SUPPORT	IRIS, RDOS, BLISS, BITS	IRIS, RDOS, BLISS, BITS	None	None	Diagnostics
PACKAGING					
Controller	Yes	Yes	No	No	No
Formatter	Yes	Yes	No	No	No
Interface	Yes	Yes	No	No	Included
Drive units per controller	4	4	4	4	8
Drive units per formatter	4	4	—	—	—
Drive mounting	Up to 4 drives per cabinet	Up to 4 drives per cabinet	OEM configuration	OEM configuration	Rack or standard
Drive dimensions (h x w x d), inches	20 x 16.6 x 6.8	20 x 16.6 x 6.8	3.25 x 5.75 x 8	3.25 x 5.75 x 8	5.12 x 8.54 x 16.9
Drive weight, pounds	33	36	5.5	5.5	26.5
Power source for drives	Separate	Separate	DC from OEM	DC from OEM	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$2,050	$2,050	—	—	—
Formatter	$950	$950	—	—	—
Interface	Included	Included	—	—	—
First drive	$3,800	$5,350	$1,210	$1,350	Contact vendor
Additional drive	$3,800	$5,350	$1,210	$1,350	—
Software	Included	Included	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	September 1981	January 1982	September 1981	September 1981	3rd quarter 1981
Availability, days ARO	45	70	30	30	90
Number of drives installed to date	30	1	NA	NA	NA
Serviced by	Factory	Factory	Factory	Factory	Mitsubishi customer
COMMENTS	Controller includes logic for streaming tape drive which is included in subsystem	Controller includes logic for streaming tape drive which is included in subsystem	*The faster access times can be achieved through a scheduled seek algorithm in the controller	*The faster access times can be achieved through a scheduled seek algorithm in the controller	

All About Winchester Disk Drives

SUPPLIER AND MODEL	Mitsubishi M4863 Series	National Advanced Systems 7350	National Advanced Systems 7360	NEC Information Systems D1200 Series	NEC Information Systems D1510
COMPUTERS INTERFACED	—	IBM 360/370 and 303X, NAS Advanced Systems	IBM 360/370, 303X, 3081, and 4300, NAS Advanced Systems	SMD-compatible	SMD-compatible
PRIMARY MARKET	OEM	End user	End user	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	2, 4, or 6	30 (2 HDAs)	40 (2 HDAs)	1, 2, or 4	15
Tracks per surface	160	1110 plus 14	1110	520 plus 10 spares	555 plus 6 spares
Unformatted capacity per drive unit, bytes	3.33M, 6.66M, or 10.0M	635M (2 HDAs)	1270M (2 HDAs)	20.8M, 41.5M, or 83.1M	331.5M
PERFORMANCE					
Head movement time—					
1 track, msec	18	6	7	—	4
Average (move of 1/3 of tracks), msec	75	20	20	40	20
Across all tracks, msec	160	45	45	—	35
Average rotational delay (1/2 rev.), msec	8.33	8.3	8.3	8.3	8.3
Data transfer rate, *bytes* per second	625,000	1,198,000	1,198,000	1,200,000	1,198,000
SOFTWARE SUPPORT	None	Diagnostics	Diagnostics	None	None
PACKAGING					
Controller	No	NAS 7830.22	NAS 7860	No	No
Formatter	No	No	No	No	No
Interface	Included	Yes	Yes	Yes	Yes
Drive units per controller	4	16	16	—	—
Drive units per formatter	—	—	—	—	—
Drive mounting	Rack or standard	Stand-alone cabinet	Stand-alone cabinet	Rack	Stand-alone cabinet
Drive dimensions (h x w x d), inches	3.38 x 5.88 x 8.19	44 x 47 x 33	49 x 63 x 34	10 x 17 x 28	39.4 x 22.8 x 31.4
Drive weight, pounds	5.52	924 or 1023	926 or 1345	99	441
Power source for drives	Separate	From first drive	From first drive	Separate	Internal
PRICING AND AVAILABILITY					
Purchase price—		$49,470	$32,800 to $51,380	—	—
Controller	—	—	—	—	—
Formatter	—	Included	Included	See Comments	$11,300
Interface	—	$39,600	$54,730	—	—
First drive	Contact vendor	$31,360 or $41,000	$44,825	—	—
Additional drive	—	—	—	—	—
Software	—	$216	$150 to $175	—	—
Maintenance—	—	—	—	—	—
Controller	—	$145 to $203	$170 to $225	Yes	Yes
Interface	—	No	No	1979	1979
Drive	Yes	March 1979	1st quarter 1982	90	120 (min.)
Quantity discounts available	1st quarter 1982	90	NA	NA	NA
First delivery, month/year	90	Over 200	NAS	Customer	Customer
Availability, days ARO	NA	NAS			
Number of drives installed to date	Mitsubishi			Quantity 100 prices range from $3,050 to $3,870, fixed-head option available for 41.5MB and 83.1MB models	Fixed-head, test and diagnostic options available
Serviced by	customer				
COMMENTS		Two independent actuators per HDA. Model A2 includes controller for up to 3 Model B2 or 2 B2 and 1 C2 drive compatible with IBM 3350; also see Report 70D6-655.02	Two independent actuators per HDA. Model A4 includes controller for 1 Model B4 drive compatible with IBM 3350; can be intermixed with 7350 drives		

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SUPPLIER AND MODEL	NEC Information Systems D2200 Series	New World Computer V-2/0, V-4/0	New World Computer V-4/2, V-4/4	New World Computer VIII-1TF	Olivetti OPE HD 561
COMPUTERS INTERFACED	SMD interface	S-100 Q-bus Multibus, Std-bus Ontel	S-100 Q-bus Multibus, Std-bus Ontel	DEC LSI-11, Ontel	Custom
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester plus cartridge disk	Winchester disk only	Winchester disk only
Disk diameter, inches	8	5.25	5.25	8	5.25
CAPACITY					
Recording surfaces per drive unit	3 or 5	1, 2	2	1	4
Tracks per surface	415	160	160	200 per inch	180
Unformatted capacity per drive unit, bytes	25.5M or 42.5M	2M, 4M	4M (fixed)	4.2M	7.5M
PERFORMANCE					
Head movement time—					
1 track, msec	10	5	5	5	2
Average (move of 1/3 of tracks), msec	30	28.3	28.3	25	120
Across all tracks, msec	60	100	100	75	360
Average rotational delay (1/2 rev.), msec	8.55	8.3	8.3	8.3	8.33
Data transfer rate, *bytes* per second	1,198,000	780,000	780,000	—	625,000
SOFTWARE SUPPORT	None	BIOS drivers, diagnostics	BIOS drivers, diagnostics	None	None
PACKAGING					
Controller	No	Optional	Optional	Optional	—
Formatter	No	Optional	Optional	Optional	—
Interface	Yes	Optional	Optional	Optional	—
Drive units per controller	4	4	4	4	—
Drive units per formatter	—	4	4	4	—
Drive mounting	—	Desk-top or rack mount	Desk-top or rack mount	Desk-top or rack mount	—
Drive dimensions (h x w x d), inches	5.5 x 8.6 x 16.5	2 x 5.75 x 8	3.25 x 5.75 x 8	2 x 8.5 x 12	3.24 x 5.75 x 8
Drive weight, pounds	26	2	3.5	6.6	5.28
Power source for drives	Separate	Separate	Separate	Separate	—
PRICING AND AVAILABILITY					
Purchase price—		$350	$350	$1,000 to $2,500	—
Controller	—	With controller	With controller	—	—
Formatter	—	With controller	With controller	—	—
Interface	—	$500 (OEM qty.)	$1,000 to $1,200	Contact vendor	$1,300
First drive	$3,450 to $3,850	—	—	—	—
Additional drive	—	—	—	—	—
Software	—	Contact vendor	Contact vendor	Contact vendor	—
Maintenance—	—	Contact vendor	Contact vendor	Contact vendor	—
Controller	—	Contact vendor	Contact vendor	Contact vendor	—
Interface	—	Yes	Yes	Yes	Yes
Drive	Yes	July 1981	November 1981	December 1980	August 1981
Quantity discounts available	May 1981	30	30	30	90
First delivery, month/year	90	100 (both models)	20 (both models)	NA	NA
Availability, days ARO	NA	—	—	Factory	Customer factory
Number of drives installed to date	Third party				
Serviced by					
COMMENTS		Contains multiple head assembly with 8 read/write heads per surface to improve access time	Removable cartridge disk provides 2MB or 4MB for additional storage or backup	Contains multiple head assembly with 16 read/write heads; average access time to entire disk capacity is 28.3 milliseconds	

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SUPPLIER AND MODEL	Olivetti OPE HD 562	Onyx M50-101	Onyx M50-102	Onyx M50-103	Onyx M50-109
COMPUTERS INTERFACED	Custom	Perkin-Elmer 16- and 32-bit	Perkin-Elmer 16- and 32-bit	Perkin-Elmer 16- and 32-bit	Perkin-Elmer 16- and 32-bit
PRIMARY MARKET	OEM	End user	End user	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester plus removable disk
Disk diameter, inches	5.25	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	2, 4, or 6	—	—	20	—
Tracks per surface	180	—	—	1686	—
Unformatted capacity per drive unit, bytes	3.75M, 7.5M or 11.25M	80M	160M	675M	80M
PERFORMANCE					
Head movement time—		—	—	10	—
1 track, msec	11	30	30	25	30
Average (move of 1/3 of tracks), msec	66	—	—	50	—
Across all tracks, msec	198	8.3	8.3	8.3	8.3
Average rotational delay (1/2 rev), msec	8.33	1,200,000	1,200,000	1,200,000	1,200,000
Data transfer rate, *bytes* per second	625,000	Diagnostics	Diagnostics	Diagnostics	Diagnostics
SOFTWARE SUPPORT	None				
PACKAGING		Yes	Yes	Yes	Yes
Controller	—	—	—	—	—
Formatter	—	SMD	SMD	SMD	SMD
Interface	—	4	4	4	4
Drive units per controller	—	—	—	—	—
Drive units per formatter	—	Rack	Rack	Pedestal	Rack or pedestal
Drive mounting	—	10.2 x 19 x 30.1	10.2 x 19 x 30.1	36.2 x 23 x 38	10.5 x 19 x 30.5
Drive dimensions (h x w x d), inches	3.24 x 5.75 x 8	125	125	635	170
Drive weight, pounds	5.28	—	Internal	Internal	—
Power source for drives	—				
PRICING AND AVAILABILITY					
Purchase price—		Contact vendor	Contact vendor	Contact vendor	Contact vendor
Controller	—	—	—	—	—
Formatter	—	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Interface	—	—	—	—	—
First drive	$1,090 to $1,560	—	—	—	—
Additional drive	—	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Software	—	—	—	—	—
Maintenance—		Contact vendor	Contact vendor	Contact vendor	Contact vendor
Controller	—	Yes	Yes	Yes	Yes
Interface	—				
Drive	—	NA	NA	NA	NA
Quantity discounts available	Yes	30 to 60	30 to 60	30 to 60	30 to 60
		NA	NA	NA	NA
First delivery, month/year	March 1982	Onyx	Onyx	Onyx	Onyx
Availability, days ARO	90				
Number of drives installed to date	NA				
Serviced by	Customer factory				
COMMENTS		Fixed-head option provides 1.9MB of additional storage; drive is manufactured by Control Data	See MD50.101 Comments	See MD50.101 Comments	Removable-media drive provides 16MB of additional storage; drive is manufactured by Control Data

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SUPPLIER AND MODEL	Pertec TrakStar D 8033	Pertec TrakStar D 8067	Pertec TrakStar D 8084	Plessey FSV06J, FSV06JJ	Plessey FSV06TJ
COMPUTERS INTERFACED	—	—	—	DEC LSI-11	DEC LSI-11
PRIMARY MARKET	OEM	OEM	OEM	End user, OEM	End user, OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester plus 0.25-in. tape
Disk diameter, inches	8	8	8	8	8
CAPACITY					
Recording surfaces per drive unit	4	4	5	5	5
Tracks per surface	476	950	950	580	580
Unformatted capacity per drive unit, bytes	33.71M	67.29M	84.11M	35M	35M
PERFORMANCE					
Head movement time—					
1 track, msec	10	10	10	12	12
Average (move of 1/3 of tracks), msec	45	45	45	42	42
Across all tracks, msec	80	80	80	—	—
Average rotational delay (1/2 rev), msec	8.3	8.3	8.3	8.33	8.33
Data transfer rate, *bytes* per second	1,062,500	1,062,500	1,062,500	922,000	922,000
SOFTWARE SUPPORT	None	None	None	Diagnostics	Diagnostics, cartridge image backup utility, file interchange program utility
PACKAGING					
Controller	No	No	No	Included	Included
Formatter	No	No	No	Included	Included
Interface	Yes	Yes	Yes	Included	Included
Drive units per controller	4	4	4	4	4
Drive units per formatter	—	—	—	4	4
Drive mounting	Computer Chassis	Computer Chassis	Computer Chassis	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	4.65 x 8.58 x 14.3	4.65 x 8.58 x 14.3	4.65 x 8.58 x 14.3	5.25 x 19 x 24	5.25 x 19 x 24
Drive weight, pounds	18	18	18	60 or 85	70
Power source for drives	Separate	Separate	Separate	Internal	Internal
PRICING AND AVAILABILITY					
Purchase price—				Included	Included
Controller	—	—	—	Included	Included
Formatter	—	—	—	Included	Included
Interface	—	—	—	$6,694 or $12,999	$10,920
First drive	$3,625	$4,250	$4,630	Contact vendor	Contact vendor
Additional drive	$1,995	$2,340	$2,550	—	Included
Software	—	—	—		
Maintenance—				Contact vendor	Contact vendor
Controller	—	—	—	—	—
Interface	—	—	—	Contact vendor	Contact vendor
Drive	—	—	—	Yes	Yes
Quantity discounts available	Yes	Yes	Yes		
First delivery, month/year	1st quarter 1982	2nd quarter 1982	3rd quarter 1982	September 1981	September 1981
Availability, days ARO	—	—	—	30	30
Number of drives installed to date	—	—	—	375	Over 300
Serviced by	Pertec	Pertec	Pertec	Plessey	Plessey
COMMENTS	Microcomputer controlled, hard or soft sector, NRZ in, NRZ out, 8-in floppy form factor	See D 8033 Comments	See D 8033 Comments	FSV06J includes one disk drive; FSV06JJ includes two disk drives	Streaming tape drive is bootable from RAM

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SUPPLIER AND MODEL	Plessey PM-FSV06ZJ	Plessey PM-FS11D	Plessey PM-FS11K	Priam DISKOS 1070	Priam DISKOS 3350
COMPUTERS INTERFACED	DEC LSI-11	DEC PDP-11	DEC PDP-11	—	—
PRIMARY MARKET	End user, OEM	End user, OEM	End user, OEM	OEM	OEM
TYPE					
Style	Winchester plus floppy disk	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	14	14	8	14
CAPACITY					
Recording surfaces per drive unit	5	8	16	4	15
Tracks per surface	580	823	823	190	561
Unformatted capacity per drive unit, bytes	35M	80M	160M	10.8M	33.9M
PERFORMANCE					
Head movement time—					
1 track, msec	12	7	7	23	8
Average (move of 1/3 of tracks), msec	42	30	30	73	45
Across all tracks, msec	—	55	55	140	85
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3	8.4	9.7
Data transfer rate, *bytes* per second	922,000	1,200,000	1,200,000	900,000	1,040,000
SOFTWARE SUPPORT	Diagnostics, RK06 emulation	Diagnostics, RP11C/ RP02, RP03 emulation	Diagnostics, RP11C/ RP03 emulation	None	None
PACKAGING					
Controller	Included	Included	Included	Yes	Yes
Formatter	Included	Included	Included	Yes	Yes
Interface	Included	Included	Included	Yes	Yes
Drive units per controller	4	8	8	4	4
Drive units per formatter	4	—	—	4	4
Drive mounting	Separate chassis	Separate chassis	Separate chassis	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	5.25 x 19 x 24	10.2 x 19 x 30.1	10.2 x 19 x 30.1	4.6 x 8.55 x 14.25	6.9 x 16.6 x 17.6
Drive weight, pounds	70	125	125	20	34
Power source for drives	Separate	Separate	Separate	Separate	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	Included	Included	$900	$900
Formatter	Included	Included	Included	$900	$900
Interface	Included	Included	Included	—	—
First drive	$9,492	$8,930	$10,825	$2,195	$3,600
Additional drive	Contact vendor	Contact vendor	Contact vendor	—	$2,020
Software	—	—	—	—	—
Maintenance—					
Controller	Contact vendor	Contact vendor	Contact vendor	—	—
Interface	—	—	—	—	—
Drive	Contact vendor	Contact vendor	Contact vendor	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	September 1981	December 1981	December 1981	August 1980	July 1979
Availability, days ARO	30	30	30	30	30
Number of drives installed to date	80	30	20	NA	NA
Serviced by	Plessey	Plessey	Plessey	Factory, customer	Factory, customer
COMMENTS	Floppy disk drive provides 1.2 MB of RX02-compatible backup				

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SUPPLIER AND MODEL	Priam DISKOS 3450	Priam DISKOS 6650	Priam DISKOS 7050	Priam DISKOS 15450	Quantum Q2010
COMPUTERS INTERFACED	—	—	—	—	Custom
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	14	8	14	8
CAPACITY					
Recording surfaces per drive unit	5	15	5	35	2
Tracks per surface	525	1121	1049	1121	512
Unformatted capacity per drive unit, bytes	35M	67.9M	70M	158.5M	10.66M
PERFORMANCE					
Head movement time—					
1 track, msec	8	8	8	8	15
Average (move of 1/3 of tracks), msec	42	45	42	40	55
Across all tracks, msec	75	85	75	75	100
Average rotational delay (1/2 rev.), msec	8.3	9.7	8.3	9.7	10
Data transfer rate, *bytes* per second	806,000	1,040,000	806,000	1,040,000	542,500
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	Yes	Yes	Yes	Yes	No
Formatter	Yes	Yes	Yes	Yes	No
Interface	Yes	Yes	Yes	Yes	No
Drive units per controller	4	4	4	4	—
Drive units per formatter	4	4	4	4	—
Drive mounting	Separate chassis	Separate chassis	Separate chassis	Separate chassis	8-in. floppy-compatible
Drive dimensions (h x w x d), inches	4.6 x 8.55 x 14.25	6.9 x 16.6 x 17.6	4.6 x 8.55 x 14.25	6.9 x 16.6 x 17.6	4.62 x 8.55 x 14.25
Drive weight, pounds	20	34	20	37	17
Power source for drives	Separate	Internal	Separate	Internal	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$900	$900	$900	$900	—
Formatter	$900	$900	$900	$900	—
Interface	—	—	—	—	—
First drive	$4,100	$4,800	$5,500	$6,700	$1,200 (OEM qty.)
Additional drive	$2,380	$2,700	$2,950	$3,800	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	July 1980	August 1980	January 1982	June 1981	September 1980
Availability, days ARO	120	60	90	120	60 to 90
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory, customer	Factory, customer	Factory, customer	Factory, customer	Factory, customer
COMMENTS					

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SUPPLIER AND MODEL	Quantum Q2020	Quantum Q2030	Quantum Q2040	Rodime RO 101	Rodime RO 102
COMPUTERS INTERFACED	Custom	Custom	Custom	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	8	5.25	5.25
CAPACITY					
Recording surfaces per drive unit	4	6	8	2	4
Tracks per surface	512	512	512	192	192
Unformatted capacity per drive unit, bytes	21.33M	32M	42.66M	4M	8M
PERFORMANCE					
Head movement time—					
1 track, msec	15	15	15	3	3
Average (move of 1/3 of tracks), msec	60	60	65	70	70
Across all tracks, msec	100	100	105	170	170
Average rotational delay (1/2 rev.), msec	10	10	10	8.3	8.3
Data transfer rate, *bytes* per second	542,500	542,500	542,500	625,000	625,000
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	No	No	No
Formatter	No	No	No	No	No
Interface	No	No	No	ST506	ST506
Drive units per controller	—	—	—	4	4
Drive units per formatter	—	—	—	4	4
Drive mounting	8-in. floppy-compatible	8-in. floppy-compatible	8-in. floppy-compatible	See Comments	See Comments
Drive dimensions (h x w x d), inches	4.62 x 8.55 x 14.25	4.62 x 8.55 x 14.25	4.62 x 8.55 x 14.25	3.25 x 5.75 x 8	3.25 x 5.75 x 8
Drive weight, pounds	17	17	17	5.5	5.5
Power source for drives	Separate	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$1,500 (OEM qty.)	$1,800 (OEM qty.)	$2,100 (OEM qty.)	$1,145	$1,435
Additional drive	—	—	—	Contact vendor	Contact vendor
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	September 1980	September 1980	September 1980	June 1981	June 1981
Availability, days ARO	60 to 90	60 to 90	60 to 90	30	30
Number of drives installed to date	NA	NA	NA	150	350
Serviced by	Factory, customer	Factory, customer	Factory, customer	Customer	Customer
COMMENTS				Same mounting and voltage requirements as industry-standard 5.25-in floppy disk drives	Same mounting and voltage requirements as industry-standard 5.25-in floppy disk drives

All About Winchester Disk Drives

SUPPLIER AND MODEL	Rodime RO 103	Rodime RO 104	Rotating Memory Systems RMS 504	Rotating Memory Systems RMS 509	Rotating Memory Systems RMS 513
COMPUTERS INTERFACED	—	—	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	5.25	5.25	5.25	5.25
CAPACITY					
Recording surfaces per drive unit	6	8	2	4	6
Tracks per surface	192	192	216	216	216
Unformatted capacity per drive unit, bytes	12M	16M	4.5M	9M	13.5M
PERFORMANCE					
Head movement time—					
1 track, msec	3	3	2	2	2
Average (move of 1/3 of tracks), msec	70	70	70	70	70
Across all tracks, msec	170	170	175	175	175
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.33	8.33	8.33
Data transfer rate, *bytes* per second	625,000	625,000	625,000	625,000	625,000
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	No	No	No
Formatter	No	No	No	No	No
Interface	ST506	ST506	Standard	Standard	Standard
Drive units per controller	4	4	4	4	4
Drive units per formatter	4	4	—	—	—
Drive mounting	See Comments	See Comments	Floppy form factor	Floppy form factor	Floppy form factor
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	3.25 x 5.75 x 8	3.25 x 5.75 x 8	3.25 x 5.75 x 8	3.25 x 5.75 x 8
Drive weight, pounds	5.5	5.5	4	4	4
Power source for drives	Separate	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$1,790	$2,005	$1,200	$1,545	$1,760
Additional drive	Contact vendor	Contact vendor	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	Yes	Yes	Yes
Quantity discounts available	Yes	Yes			
First delivery, month/year	June 1981	June 1981	April 1981	April 1981	April 1981
Availability, days ARO	30	30	45 to 60	45 to 60	45 to 60
Number of drives installed to date	300	400	NA	NA	NA
Serviced by	Customer	Customer	Factory	Factory	Factory
COMMENTS	Same mounting and voltage requirements as industry-standard 5.25-in floppy disk drives	Same mounting and voltage requirements as industry-standard 5.25-in floppy disk drives	Data separators available	Data separators available	Data separators available

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SUPPLIER AND MODEL	Rotating Memory Systems RMS 518	Scientific Micro Systems FWT Series	Scientific Micro Systems Disk System 11X	Seagate Technology ST412	Seagate Technology ST506
COMPUTERS INTERFACED	—	DEC PDP-11, LSI-11	DEC LSI-11	—	—
PRIMARY MARKET	OEM	OEM	OEM, end user	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester plus floppy disk	Winchester plus floppy disk	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	8	8	5.25	5.25
CAPACITY					
Recording surfaces per drive unit	8	—	2 or 4	4	4
Tracks per surface	216	—	—	306	153
Unformatted capacity per drive unit, bytes	18M	10M, 20M, 30M, or 40M	10M, 20M, 30M, or 40M	12.76M	6.38M
PERFORMANCE					
Head movement time—					
1 track, msec	2	19	Varies	3	3
Average (move of 1/3 of tracks), msec	70	65	—	100	170
Across all tracks, msec	175	—	—	300	500
Average rotational delay (1/2 rev.), msec	8.33	10	—	8.33	8.33
Data transfer rate, *bytes* per second	625,000	543,000	Varies	625,000	625,000
SOFTWARE SUPPORT	None	Diagnostics	Diagnostics	None	None
PACKAGING					
Controller	No	Integrated	Integrated	No	No
Formatter	No	Yes	Yes	No	No
Interface	Standard	Yes	Yes	No	No
Drive units per controller	4	4	—	4	4
Drive units per formatter	—	4	—	4	4
Drive mounting	Floppy form factor	Separate chassis	Rack or table top	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	5.25 x 19 x 21	10.5 x 17.25 x 21	3.25 x 5.75 x 8	3.25 x 5.75 x 8
Drive weight, pounds	4	—	80	4.6	4.6
Power source for drives	Separate	—	Internal	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	Included	—	—
Formatter	—	—	Included	—	—
Interface	—	—	Included	—	—
First drive	$1,980	$6,900 to $9,700	$7,400 to $12,500	$1,620	$1,500
Additional drive	—	—	—	$1,050 (qty. 500)	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	April 1981	1980	September 1980	—	July 1980
Availability, days ARO	45 to 60	30	NA	immediate	60
Number of drives installed to date	NA	NA	NA	NA	32,000
Serviced by	Factory	Factory	Factory	Customer, factory	Customer, factory
COMMENTS	Data separators available		Separate 14-inch Winchester drive with 13.2 or 26.4 megabytes of storage can be added to system		Has the same mounting and voltage requirements as industry-standard minifloppy disk drives

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SUPPLIER AND MODEL	Seagate Technology ST538	Shugart SA602/604	Shugart SA606	Shugart Associates SA1002/ 1004	Shugart SA1104/1106
COMPUTERS INTERFACED	—	—	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	5.25	5.25	8	8
CAPACITY					
Recording surfaces per drive unit	6	2/4	6	2/4	3/5 plus servo
Tracks per surface	612	256 tracks/inch	256 tracks/inch	256	659
Unformatted capacity per drive unit, bytes	38.25M	3.33M/6.66M	10M	5.33M/10.7M	20.3M/33.9M
PERFORMANCE					
Head movement time—					
1 track, msec	NA	18	18	19	10
Average (move of 1/3 of tracks), msec	NA	75	75	70	35
Across all tracks, msec	NA	160	160	150	70
Average rotational delay (1/2 rev.), msec	8.33	8.33	8.33	9.6	9.6
Data transfer rate, *bytes* per second	625,000	625,000	625,000	542,500	542,500
SOFTWARE SUPPORT	None	None	None	None	None
PACKAGING					
Controller	No	No	No	No	No
Formatter	No	No	No	No	No
Interface	No	No	No	No	No
Drive units per controller	4	—	—	—	—
Drive units per formatter	4	—	—	—	—
Drive mounting	Separate chassis	Minifloppy-compatible	Minifloppy-compatible	Rack or standard	Separate chassis
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	3.38 x 5.88 x 8.19	3.38 x 5.88 x 8.19	4.62 x 8.55 x 14.25	4.62 x 8.55 x 14.25
Drive weight, pounds	NA	4	4	17	18
Power source for drives	Separate	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	Contact vendor	Contact vendor	Contact vendor	$995/$1,205	$1,650/$1,980(qty. 500)
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	4th quarter 1982	December 1981	December 1981	1st quarter 1980	1st quarter 1982
Availability, days ARO	NA	NA	NA	NA	90
Number of drives installed to date	—	NA	NA	NA	NA
Serviced by	Customer, factory	Factory, customer	Factory, customer	Factory, customer	Factory, customer
COMMENTS	Uses thin-film heads, can be combined with the ST706 5.25-in. removable cartridge drive for 6.38MB of backup storage				

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SUPPLIER AND MODEL	Shugart Associates SA4004/ 4008	SLI Industries Cheyenne 22	SLI Industries Cheyenne 37	SLI Industries Cheyenne 52	SLI Industries Cheyenne 83
COMPUTERS INTERFACED	—	—	—	—	—
PRIMARY MARKET	OEM	OEM	OEM	OEM	OEM
TYPE	Winchester disk	Winchester disk	Winchester disk	Winchester disk	Winchester disk
Style	only	only	only	only	only
Disk diameter, inches	14	8	8	8	8
CAPACITY					
Recording surfaces per drive unit	2/4	3 plus servo	5 plus servo	7 plus servo	5 plus servo
Tracks per surface	404	656	656	656	823
Unformatted capacity per drive unit, bytes	14.5M/29M	22M	37M	52M	83M
PERFORMANCE					
Head movement time—					
1 track, msec	20	7	7	7	7
Average (move of 1/3 of tracks), msec	65	40	40	40	40
Across all tracks, msec	140	70	70	70	70
Average rotational delay (1/2 rev.), msec	10.1	8.3	8.3	8.3	8.3
Data transfer rate, *bytes* per second	889,000	680,000	680,000	680,000	1,200,000
SOFTWARE SUPPORT	None	Built-in diagnostics	Built-in diagnostics	Built-in diagnostics	Built-in diagnostics
PACKAGING					
Controller	No	No	No	No	No
Formatter	No	No	No	No	No
Interface	No	SMD, ANSI, SA1000	SMD, ANSI, SA1000	SMD, ANSI, SA1000	SMD, ANSI
Drive units per controller	—	8	8	8	8
Drive units per formatter	—	8	8	8	8
Drive mounting	Separate chassis	—	—	—	—
Drive dimensions (h x w x d), inches	5.1 x 16.6 x 21.9	5.1 x 8.75 x 19.4	5.1 x 8.75 x 19.4	5.1 x 8.75 x 19.4	5.1 x 8.75 x 19.4
Drive weight, pounds	35	30	30	30	30
Power source for drives	Separate	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	Included	Included	Included	Included
First drive	$2,550/$3,500	$3,460	$3,780	$4,090	$4,580
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month/year	June 1978	June 1979	June 1979	June 1979	2nd quarter 1982
Availability, days ARO	90	From stock	From Stock	From stock	45
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory, customer	Factory	Factory	Factory	Factory
COMMENTS					

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SUPPLIER AND MODEL	SLI Industries Cheyenne 116	Sperry Univac 8417	Sperry Univac 8450	Sperry Univac 8470	Storage Technology Corp. 8350
COMPUTERS INTERFACED	—	Univac System 80	Univac 90/80 1100 Series	Univac 1100/60 1100/80	IBM 370, 303X, 3081, 4300
PRIMARY MARKET	OEM	End user	End user	End user	End user, OEM
TYPE	Winchester disk	Winchester disk	Winchester disk	Winchester disk	Winchester disk
Style	only	only	only	only	only
Disk diameter, inches	8	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	7 plus servo	7	15 plus servo	16 plus servo	30 (2 HDAs)
Tracks per surface	823	1110	1120	1260	1120
Unformatted capacity per drive unit, bytes	116M	118.2M	243M	403M	635M (2 HDAs)
PERFORMANCE					
Head movement time—					
1 track, msec	7	7	4	4	7
Average (move of 1/3 of tracks), msec	40	35	23	23	25
Across all tracks, msec	70	70	46	46	39
Average rotational delay (1/2 rev.), msec	8.3	8.8	8.3	8.3	8.3
Data transfer rate, *bytes* per second	1,200,000	1,130,000	1,260,000	2,097,000	1,198,000
SOFTWARE SUPPORT	Built-in diagnostics	—	—	—	Diagnostics
PACKAGING					
Controller	No	With host computer	Univac 5046	Univac 5056	STC 8000, 8880, 8890
Formatter	No	—	—	—	Yes
Interface	SMD, ANSI	Yes	Yes	Yes	Yes
Drive units per controller	8	8	Up to 32	Up to 32	32
Drive units per formatter	8	—	—	—	8
Drive mounting	—	Up to 3 drives per cabinet	Free-standing cabinet	Free-standing cabinet	Stand-alone cabinet
Drive dimensions (h x w x d), inches	5.1 x 8.75 x 19.4	—	—	—	47 x 43.5 x 31.5
Drive weight, pounds	30	—	—	—	935 or 1040
Power source for drives	Separate	Internal	Internal	Internal	AC from first drive, DC per drive
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	$102,000	$87,200	$55,500 to $336,323
Formatter	—	—	—	—	Included
Interface	Included	$9,671	$66,600	$33,600	Included
First drive	$5,020	—	—	—	$40,750
Additional drive	—	—	$509	$327	$32,240 or $42,220
Software	—	—	$288	$109	Included
Maintenance—					
Controller	—	$54	—	—	Contact vendor
Interface	—	—	1977	1980	—
Drive	—	—	NA	NA	Contact vendor
Quantity discounts available	Yes	1980	NA	NA	Yes, to OEMs
First delivery, month/year	2nd quarter 1982	NA	Sperry Univac	Sperry Univac	March 1977
Availability, days ARO	45	Sperry Univac			60
Number of drives installed to date	NA				Over 10,000
Serviced by	Factory				STC, customer
COMMENTS		Fixed-head option provides 860KB of additional storage	Fixed-head option provides 181KB of additional storage, can be used with Univac's Cache/ Disk System	Fixed-head option provides 241KB of additional storage, can be used with Univac's Cache/ Disk System, can be intermixed with 8450 drives	Model A2 includes controller for up to 3 Model B2 drives or 2 B2 and 1 C2 drive, plug-compatible with IBM 3350; also see Report 70D6-789-04

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SUPPLIER AND MODEL	Storage Technology Corp. 8360	Storage Technology Corp. 8370	Storage Technology Corp. 8380	Storage Technology Corp. 8650	System Industries 2284
COMPUTERS INTERFACED	IBM 370, 303X, 3081, 4300	IBM 4331, 4341	IBM S/370, 303X, 4341	IBM 370, 303X, 3081, 4300	DEC PDP-11, -11/70, VAX-11/750, VAX 11/780, DG Nova, Eclipse
PRIMARY MARKET	End user, OEM	End user, OEM	End user, OEM	End user, OEM	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	14	14	14	14
CAPACITY					
Recording surfaces per drive unit	30 (2 HDAs)	—	—	30 (2 HDAs)	5
Tracks per surface	1120	—	—	2240	823
Unformatted capacity per drive unit, bytes	635M (2 HDAs)	571M	2520M (2 HDAs)	1270M (2 HDAs)	165M
PERFORMANCE					
Head movement time—					
1 track, msec	6	5	—	6	6
Average (move of 1/3 of tracks), msec	18	20	16	23	27
Across all tracks, msec	28	40	—	39	55
Average rotational delay (1/2 rev.), msec	8.3	10.1	8.3	8.3	10.12
Data transfer rate, *bytes* per second	1,198,000	1,860,000	3,000,000	1,198,000	1,012,000
SOFTWARE SUPPORT	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Operating system diagnostics, micro-diagnostics
PACKAGING					
Controller	STC 8000, 8880, 8890	STC 8880	STC 8880, 8890	STC 8000, 8880, 8890	Yes
Formatter	Yes	With controller	With controller	Yes	Yes
Interface	Yes	Yes	Yes	Yes	Yes
Drive units per controller	16	—	—	16	8
Drive units per formatter	8	—	—	8	8
Drive mounting	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet	Stand-alone cabinet	Computer chassis
Drive dimensions (h x w x d), inches	47 x 43.5 x 31.5	—	—	47 x 43.5 x 31.5	10.3 x 18.9 x 26.6
Drive weight, pounds	935 or 1040	—	—	935	100
Power source for drives	AC from first drive, DC per drive	—	—	AC from first drive, DC per drive	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$55,500 to $336,323	$77,150 to $142,178	$77,150 to $336,323	$55,500 to $336,323	—
Formatter	Included	Included	Included	Included	—
Interface	Included	Included	Included	Included	—
First drive	$50,010	$43,450	$99,515	$60,880	Contact vendor
Additional drive	$37,235	$28,960	$82,555	$51,355	—
Software	Included	Included	Included	Included	—
Maintenance—					
Controller	Contact vendor	Contact vendor	Contact vendor	Contact vendor	—
Interface	—	—	—	—	—
Drive	Contact vendor	Contact vendor	Contact vendor	Contact vendor	—
Quantity discounts available	Yes, to OEMs	Yes, to OEMs	Yes, to OEMs	Yes, to OEMs	Yes
First delivery, month, year	June 1980	4th quarter 1981	2nd quarter 1982	May 1979	1980
Availability, days ARO	60	—	—	60	30 to 45
Number of drives installed to date	Over 500	—	—	Over 2000	Over 450
Serviced by	STC, customer	STC, customer	STC, customer	STC, customer	S.I. field service
COMMENTS	Model A2 includes controller for up to 3 Model B2 drives, plug-compatible with IBM 3350, also see Report 70D6-789-04	Two independent actuators per HDA, Model A1 includes controller for up to 3 Model B1 drives, plug-compatible with IBM 3370, also see Report 70D6-789-04	Two independent actuators per HDA, Model A4 includes controller for up to 3 Model B4 drives, plug-compatible with IBM 3380, also see Report 70D6-789-04	Model A2 includes controller for up to 3 Model B2 drives, plug-compatible with IBM 3350, also see Report 70D6-789-04	

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SUPPLIER AND MODEL	System Industries 9775	Tandon Magnetics TM 601/601E	Tandon Magnetics TM 602/602E	Tandon Magnetics TM 603/603E	Tecstor Sapphire 160
COMPUTERS INTERFACED	DEC PDP-11, -11/70, VAX-11/750, VAX 11/780, DG Nova, Eclipse	—	—	—	SMD-compatible
PRIMARY MARKET	End user	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	5.25	5.25	5.25	14
CAPACITY					
Recording surfaces per drive unit	20	2	4	6	6
Tracks per surface	843	153, 230	153, 230	153, 230	1400 plus 8 spares
Unformatted capacity per drive unit, bytes	675M	3.2M/4.8M	6.4M/9.6M	9.6M/14.4M	169M
PERFORMANCE					
Head movement time—					
1 track, msec	10	3	3	3	8
Average (move of 1/3 of tracks), msec	25	153, 210	153, 210*	153, 210*	35
Across all tracks, msec	50	—	—	—	65
Average rotational delay (1/2 rev.), msec	8.3	8.34	8.34	8.34	10
Data transfer rate, *bytes* per second	1,200,000	625,000, 500,000	625,000, 500,000	625,000, 500,000	1,000,000
SOFTWARE SUPPORT	Operating system, diagnostics, micro-diagnostics	None	None	None	None
PACKAGING					
Controller	Yes	No	No	No	No
Formatter	Yes	—	—	—	No
Interface	Yes	Yes	Yes	Yes	Included
Drive units per controller	8	—	—	—	—
Drive units per formatter	8	—	—	—	—
Drive mounting	Separate cabinet	Minifloppy standard	—	—	Rack
Drive dimensions (h x w x d), inches	36.2 x 23 x 38	3.25 x 5.75 x 8	3.25 x 5.75 x 8	3.25 x 5.75 x 8	10.2 x 18.98 x 24.4
Drive weight, pounds	635	—	6.5	6.5	88
Power source for drives	Internal	—	—	—	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	Included
First drive	Contact vendor	Contact vendor	Contact vendor	Contact vendor	$8,250
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Contact vendor	Contact vendor	Contact vendor	Yes
First delivery, month, year	1980	March 1982	November 1980	November 1980	November 1980
Availability, days ARO	30 to 45	Contact vendor	Contact vendor	Contact vendor	30 to 60
Number of drives installed to date	Over 100	NA	NA	NA	NA
Serviced by	S.I. field service	Customer	Customer	Customer	Factory, customer
COMMENTS		Can be interfaced with Tandon floppy disks	Can be interfaced with Tandon floppy disks, *with fast seek algorithm in the controller, average access time is 98 msec on TM602, 137 msec on TM602E	Can be interfaced with Tandon floppy disks, *with fast seek algorithm in the controller, average access time is 98 msec on TM603, 137 msec on TM603E	

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SUPPLIER AND MODEL	Texas Instruments 525/61	Texas Instruments 525/62	Texas Instruments 525/122	United Peripherals UP-1696	United Peripherals UP-1698
COMPUTERS INTERFACED	—	—	—	HP 3000 Series II, III	HP 3000 Series 30, 33, 40, 44, 64
PRIMARY MARKET	OEM	OEM	OEM	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	5.25	5.25	14	14
CAPACITY					
Recording surfaces per drive unit	2	4	4	40	—
Tracks per surface	306	153	306	843	843
Unformatted capacity per drive unit, bytes	6.38M	6.38M	12.76M	675M	675M
PERFORMANCE					
Head movement time—					
1 track, msec	3	3	3	10	10
Average (move of 1/3 of tracks), msec	100	170	100	25	25
Across all tracks, msec	270	471	270	50	50
Average rotational delay (1/2 rev.), msec	8.33	8.33	8.33	8.3	8.3
Data transfer rate, *bytes* per second	625,000	625,000	625,000	1,200,000	1,000,000
SOFTWARE SUPPORT	None	None	None	Plug-compatible with HP 7925	Diagnostics
PACKAGING					
Controller	No	No	No	Yes	Included
Formatter	No	No	No	—	—
Interface	Yes	Yes	Yes	Yes	Yes
Drive units per controller	—	—	—	4	4
Drive units per formatter	—	—	—	—	—
Drive mounting	—	—	—	Stand-alone cabinet	Stand alone cabinet
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	3.25 x 5.75 x 8	3.25 x 5.75 x 8	36.2 x 23 x 38	36.2 x 23 x 38
Drive weight, pounds	—	—	—	600	635
Power source for drives	Separate	Separate	Separate	—	—
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	—	—	—	—
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$1,225	$1,360	$1,575	Contact vendor	Contact vendor
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	April 1981	3d quarter 1982	3rd quarter 1982	August 1980	January 1982
Availability, days ARO	30	—	—	30	30
Number of drives installed to date	NA	—	—	110	NA
Serviced by	Texas Instruments	Texas Instruments	Texas Instruments	Factory	Factory
COMMENTS	Uses thin-film plated media		Uses thin-film plated media		Emulates four HP 7925 disk drives

70D6-010-50uu
Memory & Storage

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SUPPLIER AND MODEL	United States Design CSS-11	United States Design CSS-525	United States Design CSS-700	United States Design CSS-800	United States Design CSS-900
COMPUTERS INTERFACED	DEC LSI-11	DEC LSI-11, PDP-11, Intel Multibus, IBM Personal Computer	DEC LSI-11, PDP-11, Intel Multibus, IBM Personal Computer	DEC LSI-11, PDP-11, Intel Multibus, IBM Personal Computer	DEC LSI-11, PDP-11, Intel Multibus, IBM Personal Computer
PRIMARY MARKET	OEM	End user	End user, OEM	OEM	OEM
TYPE					
Style	Winchester plus 0.25-in. tape	Winchester disk only	Winchester with opt. floppy or tape	Winchester plus 0.25-in. tape	Winchester plus 0.05-in. tape
Disk diameter, inches	8	5.25	5.25	8	8
CAPACITY					
Recording surfaces per drive unit	5 (20MB)	4	4	5	5
Tracks per surface	380	140	140	525	525
Unformatted capacity per drive unit, bytes	10M, 20M, or 40M	6.7M	6.7M	35M or 70M	35M or 70M
PERFORMANCE					
Head movement time—					
1 track, msec	6	3	3	8	8
Average (move of 1/3 of tracks), msec	35	125	125	42	42
Across all tracks, msec	65	240	240	75	75
Average rotational delay (1/2 rev.), msec	8.3	6.25	6.25	8.3	8.3
Data transfer rate, *bytes* per second	848,000	625,000	625,000	800,000	800,000
SOFTWARE SUPPORT	Diagnostics and driver	Diagnostics	Diagnostics	Diagnostics	Diagnostics
PACKAGING					
Controller	Included	Included	Included	Included	Included
Formatter	With controller	With controller	With controller	With controller	With controller
Interface	Included	Included	Included	Included	Included
Drive units per controller	8	2	2	4	4
Drive units per formatter	8	2	2	4	4
Drive mounting	Table-top or rack mounted	Table-top	Table top or rack-mounted	Table-top or rack mounted	Table top or rack-mounted
Drive dimensions (h x w x d), inches	6.5 x 17.5 x 23	5.25 x 8.5 x 14	7 x 17 x 17.5	5.5 x 17 x 22.5	9.5 x 17 x 22
Drive weight, pounds	48	14	35	42	45
Power source for drives	Included	Included	Included	Included	Included
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	Included	Included	Included	Included
Formatter	Included	Included	Included	Included	Included
Interface	Included	Included	Included	Included	Included
First drive	$10,050	$4,250	$4,900	$12,300	$15,000
Additional drive	—	$3,415	$3,400	—	$4,500
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	September 1979	March 1982	May 1982	March 1982	June 1982
Availability, days ARO	30	60	90	30	90
Number of drives installed to date	170	NA	—	NA	—
Serviced by	Factory, third party	Factory, third party	Factory, third party	Factory, third party	Factory, third party
COMMENTS	32K-byte buffer holds full track of data, runs all DEC software	Emulates DEC RL01 and RL02 drives, runs DEC diagnostics, uses USDC I/O bus	Can be configured with 1 or 2 Winchesters, mini floppy disk or 0.25-in. tape drive backup, and choice of 4- or 8-card backplane, uses USDC I/O bus	Controller includes 32K of multiported memory, cache buffering, and ECC, uses USDC I/O bus, emulates multiple DEC devices	Can be configured with 2 Winchesters and 0.50-in. tape backup or with 1 Winchester and 8-in. floppy or Q-bus or multibus backplane

All About Winchester Disk Drives

SUPPLIER AND MODEL	XCOMP ST/R	XCOMP ST/S	XCOMP X/BT-5	XCOMP X/BT-10	Xycom 3875/3975
COMPUTERS INTERFACED	Custom single board micro	Custom S-100	IBM PC, TRS-80 II, Apple II, Xerox 820, any Z80-based	IBM PC, TRS-80 II, Apple II, Xerox 820, any Z80-based	RS-422-A serial interface, SDLC protocol
PRIMARY MARKET	OEM	OEM	End user	End user	End user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	5.25	5.25	5.25	5.25	8
CAPACITY					
Recording surfaces per drive unit	4	4	4	4	3
Tracks per surface	306	306	306	306	350
Unformatted capacity per drive unit, bytes	6.4M	12.5M	6.4M	12.8M	11.3M
PERFORMANCE					
Head movement time—					
1 track, msec	1.75	1.75	1.75	1.75	6
Average (move of 1/3 of tracks), msec	179	179	179	179	35
Across all tracks, msec	534	534	534	534	65
Average rotational delay (1/2 rev.), msec	—	—	—	—	8.3
Data transfer rate, *bytes* per second	625,000	625,000	625,000	625,000	648,000
SOFTWARE SUPPORT	Driver, formatter, diagnostics	Driver, formatter, diagnostics	Driver, formatter, diagnostics	Driver, formatter, diagnostics	None
PACKAGING					
Controller	Yes	Yes	Yes	Yes	Optional
Formatter	Yes	Yes	Yes	Yes	—
Interface	—	—	Yes	Yes	—
Drive units per controller	4	4	4	4	4
Drive units per formatter	4	4	4	4	—
Drive mounting	—	—	Table-top cabinet	Table-top cabinet	Table top (3875), rack (3975)
Drive dimensions (h x w x d), inches	3.25 x 5.75 x 8	3.25 x 5.75 x 8	4.5 x 8.55 x 14.5	4.5 x 8.55 x 14.5	See Comments
Drive weight, pounds	7.5	7.5	17	17	—
Power source for drives	Optional	Optional	Included	Included	Internal
PRICING AND AVAILABILITY					
Purchase price—					
Controller	$980	$980	Included	Included	—
Formatter	Included	Included	Included	Included	—
Interface	—	—	Included	Included	—
First drive	$1,268	$1,368	$3,495	$3,995	$7,950
Additional drive	$1,268	$1,368	—	—	—
Software	Included	Included	Included	Included	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	December 1980	December 1980	December 1981	September 1981	September 1981
Availability, days ARO	30	30	30	30	60
Number of drives installed to date	100	300	75	150	15
Serviced by	Factory	Factory	Factory	Factory	Factory
COMMENTS					Drive is manufactured by IMI. Model 3875 measures 8 x 16.8 x 20 inches. Model 3975 measures 8 x 18.8 x 20 inches

All About Winchester Disk Drives

SUPPLIER AND MODEL	Xycom 3876/3976	Xylogics XD1000/440	Xylogics XD1000/530	Xylogics XD1000/650	Xylogics XD1000/850
COMPUTERS INTERFACED	RS-422-A serial interface, SDLC protocol	Multibus	DEC LSI-11, -11/23	DEC PDP-11	DG Nova, Eclipse
PRIMARY MARKET	End user	OEM	OEM, end user	OEM, end user	OEM, end user
TYPE					
Style	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	8	8	8 or 14	8	8
CAPACITY					
Recording surfaces per drive unit	5	3 plus 1 servo	3 or 2	3 plus 1 servo	3 plus 1 servo
Tracks per surface	380	600 plus 14 spares	600 or 420	600 plus 14 spares	600 plus 14 spares
Unformatted capacity per drive unit, bytes	20.5M	24M	24M or 20.16M	24M	24M
PERFORMANCE					
Head movement time—					
1 track, msec	6	8	8 or 3	8	8
Average (move of 1/3 of tracks), msec	35	42	42 or 60	42	42
Across all tracks, msec	65	80	80 or 130	80	80
Average rotational delay (1/2 rev.), msec	8.3	8.3	8.3 or 12.5	8.3	8.3
Data transfer rate, *bytes* per second	648,000	800,640	800,640 or 960,000	800,640	800,640
SOFTWARE SUPPORT	None	CP/M driver, 8080/8086 diagnostics	RL01/RL02 emulation	RM02 emulation	IRIS driver, emulator patches to AOS initializer for RDOS, BLISS, COBOL sysgen
PACKAGING					
Controller	Optional	Yes	Yes	Yes	Yes
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
Drive units per controller	4	2	1 or 2	2	2
Drive units per formatter	—	—	—	—	—
Drive mounting	Table top (3876), rack (3976)	Separate chassis	Separate chassis	Separate chassis	Separate chassis
Drive dimensions (h x w x d), inches	See Comments	—	—	—	—
Drive weight, pounds	—	—	—	—	—
Power source for drives	Internal	—	—	—	—
PRICING AND AVAILABILITY					
Purchase price—					
Controller	—	Included	Included	Included	Included
Formatter	—	—	—	—	—
Interface	—	—	—	—	—
First drive	$8,850	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Additional drive	—	—	—	—	—
Software	—	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Contact vendor	Contact vendor	Contact vendor	Contact vendor
First delivery, month, year	September 1981	—	—	—	—
Availability, days ARO	60	Contact vendor	Contact vendor	Contact vendor	Contact vendor
Number of drives installed to date	5	NA	NA	NA	NA
Serviced by	Factory	Factory	Factory	Factory	Factory
COMMENTS	Drive is manufactured by IMI. Model 3876 measures 8 x 16.8 x 20 inches. Model 3976 measures 8 x 18.8 x 20 inches	The XD1000 series is one of many Winchester disk subsystems offered by Xylogics	See XD1000/440 Comments	See XD1000/440 Comments	See XD1000/440 Comments

All About Winchester Disk Drives

SUPPLIER AND MODEL	ZZY Systems ZRP-XXX	3M 8421/8422	3M 8431/8432	3M 8523	3M 8533
COMPUTERS INTERFACED	DEC PDP 11, LSI 11	Custom	DEC LSI-11, S-100 and Intel Multibus compatible, custom	Custom	DEC LSI-11, S-100 and Intel Multibus compatible, custom
PRIMARY MARKET	End user, OEM	OEM	OEM	OEM	OEM
TYPE					
Style	Winchester plus opt. tape drive	Winchester disk only	Winchester disk only	Winchester disk only	Winchester disk only
Disk diameter, inches	14	8	8	8	8
CAPACITY					
Recording surfaces per drive unit	5	2, 4	2, 4	4	4
Tracks per surface	823	280	280	838	838
Unformatted capacity per drive unit, bytes	165M	10M, 20M	10M, 20M	60M	60M
PERFORMANCE					
Head movement time—					
1 track, msec	6	18.6	18.6	6	6
Average (move of 1/3 of tracks), msec	27	65	65	30	30
Across all tracks, msec	55	110	110	55	55
Average rotational delay (1/2 rev.), msec	10	9.6	9.6	9.6	9.6
Data transfer rate, *bytes* per second	1,000,000	933,333	933,333	933,333	933,333
SOFTWARE SUPPORT	Transparent to operating system	None	None	None	None
PACKAGING					
Controller	Yes	No	No	No	No
Formatter	Yes	No	No	No	No
Interface	Yes	3M	ANSI 1226	3M	ANSI 1226
Drive units per controller	2	8	8	8	8
Drive units per formatter	—	8	8	8	8
Drive mounting	Cabinet or rack	Rack mount or computer chassis	Rack mount or computer chassis	Rack mount or computer chassis	Rack mount or computer chassis
Drive dimensions (h x w x d), inches	10.3 x 19 x 26.6	4.51 x 8.55 x 11.75	4.51 x 8.55 x 14.21	4.51 x 8.55 x 11.75	4.51 x 8.55 x 14.21
Drive weight, pounds	50	14, 15	16, 17	15	17
Power source for drives	Separate	Separate	Separate	Separate	Separate
PRICING AND AVAILABILITY					
Purchase price—					
Controller	Included	—	—	—	—
Formatter	Included	—	—	—	—
Interface	Included	—	—	—	—
First drive	Contact vendor	$1,526, $1,910	$2,345, $2,675	$3,570	$5,200
Additional drive	Contact vendor	—	—	—	—
Software	Included	—	—	—	—
Maintenance—					
Controller	—	—	—	—	—
Interface	—	—	—	—	—
Drive	—	—	—	—	—
Quantity discounts available	Yes	Yes	Yes	Yes	Yes
First delivery, month, year	July 1981	April 1981	April 1981	January 1982	January 1982
Availability, days ARO	30	30	30	NA	NA
Number of drives installed to date	NA	NA	NA	NA	NA
Serviced by	Factory	OEM	OEM	OEM	OEM
COMMENTS	Available with streaming tape drive or 75-ips tape drive, up to 4 disks per cabinet	Does not include data handling electronics	Drives are compatible with other ANSI drives and include data separation	Does not include data handling electronics	Drive is compatible with other ANSI drives and includes data separation

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