

QUANTUM

CORPORATION

BUSINESS

PLAN

APPENDIX

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APPENDIX

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Winchester boom to broaden

By the end of 1984, Winchester's boom is expected to broaden to include a wider range of products and markets.

Wordings from: APPENDIX I MARKET BACKGROUND

The market for Winchester's products is expected to broaden to include a wider range of products and markets. This is due to the fact that Winchester's products are of high quality and are well known throughout the world. The market for Winchester's products is expected to broaden to include a wider range of products and markets. This is due to the fact that Winchester's products are of high quality and are well known throughout the world.

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Fig. 1. Market background for Winchester's products. The market for Winchester's products is expected to broaden to include a wider range of products and markets.



Fig. 2. Market background for Winchester's products. The market for Winchester's products is expected to broaden to include a wider range of products and markets.

Winchester boom to broaden

ANDREW ROMAN, Roman Associates International

Worldwide market for 14-inch drives to top \$2.6 billion by 1984, while shipments of 8-inch units will grow at more than 100 percent annually

The mushrooming market for small-to-medium-sized computer systems in applications ranging from accounting, payroll and inventory in small businesses to distributed data processing has created a booming demand for Winchester disk drives as part of these systems. The requirement for small data bases—20M bytes or less—prompted the advent of the 8-in. Winchester drive, while medium-to-large systems—requiring 100M to 600M bytes or more of mass storage—account for most of the 14-in. Winchester drives.

And the widening use of Winchester drives in the late

1970s can only continue to unfold in this decade. The worldwide market for 14-in. Winchester drives in 1979 was 124,000 spindles, valued at \$1.352 billion. Those figures will jump to 253,000 spindles and \$2.687 billion, respectively, by 1984—a compounded annual growth rate of 15 percent in shipments of both units and dollars.

Similarly, worldwide shipments of 8-in. Winchester disk drives will increase from a projected 1980 level of 102,000 drives, valued at \$590.2 million, to a 1984 level of 544,000 spindles, valued at \$1.729 billion. Compounded annual growth rates for 8-in. Winchester unit

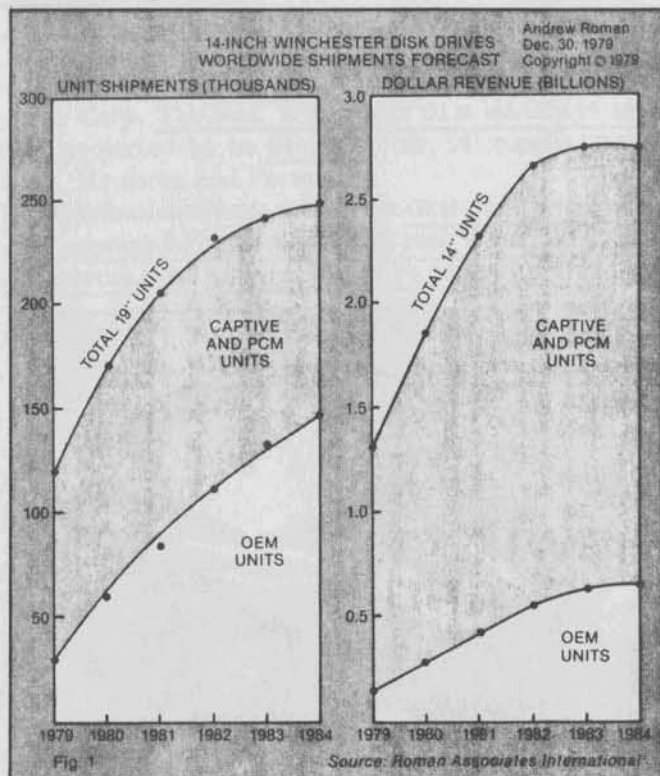


Fig. 1. Forecast shows shipments of 14-in. Winchester disk drives approaching 250,000 units, worth \$2.68 billion, by 1984.

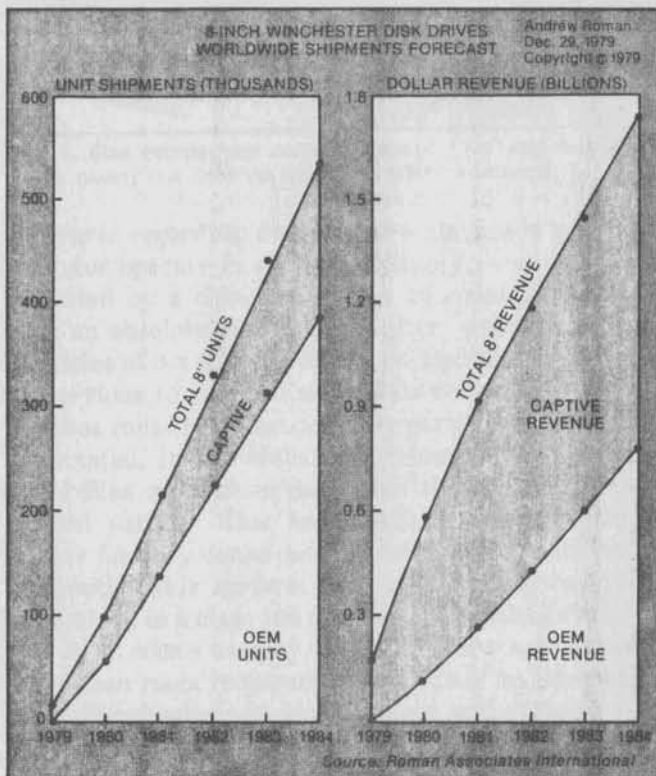


Fig. 2. Total shipments of 8-in. Winchester drives will top 500,000, with a value of almost \$1.8 billion, by 1984.

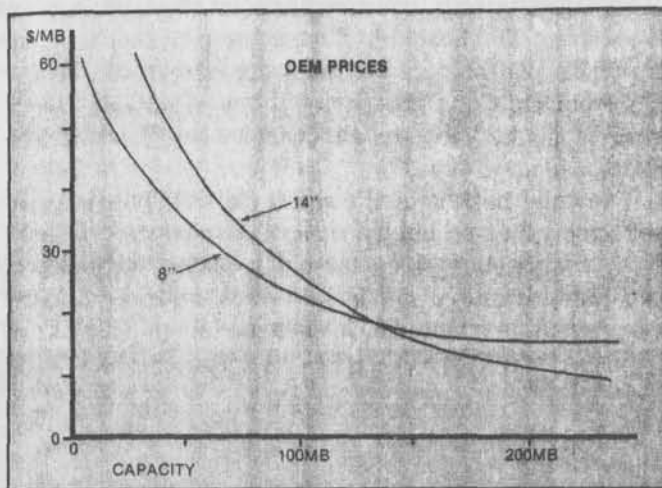


Fig. 3. OEM price curve shows that 8-in. drives are more cost-effective than 14-in. units for capacities less than 100M bytes.

shipments are 101.2 percent, with revenue growth of 58.6 percent—slightly lower because of anticipated average price decreases.

Only three manufacturers shared in the 1979 8-in. Winchester drive market: IBM, with an estimated 13,600 units, International Memories Inc. and BASF, with a combined total of 2900 units. It is, then, more relevant to forecast 1980 shipments for the 8-in. Winchester drive market.

The OEM Winchester market

The OEM market for Winchester disk drives is growing at a compounded annual growth rate of 38 percent for 14-in. drives and 167 percent for 8-in. drives. Besides IBM, market leaders for 1979, ranked in order of number of spindles shipped for 14-in. Winchester drives, are Storage Technology Corp., Memorex, CDC/MPI, Shugart, Okidata and Century Data Corp. The 8-in. Winchester OEM leaders in 1980 are projected to be Shugart, IMI, Micropolis, BASF, CDC, Memorex and Pertec.

Distribution trends show that OEM market channels will account for 43 percent of all 1980 Winchester drive shipments, and will increase to 70 percent by 1984. By

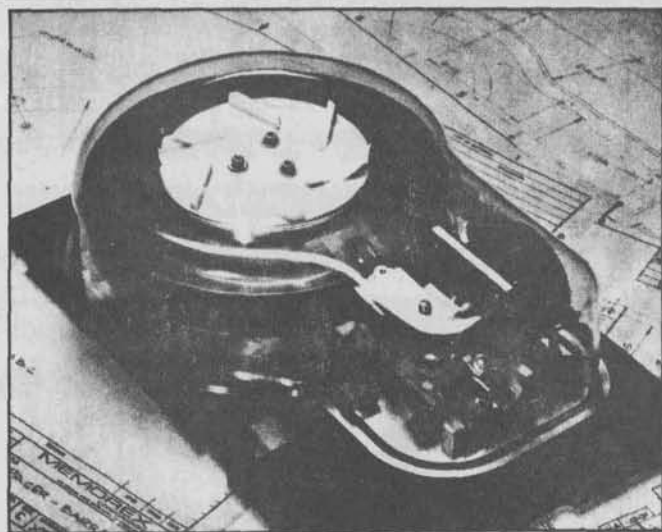


Fig. 4. Memorex model 101 8-in. drive has 11.7M-byte capacity.

that same year, 80 percent of all moving head rigid magnetic disk drives will be Winchester-type fixed disks, representing an increase of 100 percent, or double 1979's worldwide Winchester shipments.

Shipments of microcomputers, minicomputers and mainframes, growing at 30 percent annually, are causing the explosive demand for Winchester disk drives. The largest applications for Winchesters are in small and medium business and commercial computer systems, distributed data processing and general-purpose applications. These include science, economics, government and manufacturing, which require reliable, direct access storage devices (DASD), such as Winchesters.

Winchester technology

The essence of Winchester technology is that the head-to-disk assembly (HDA) of Winchester disks is sealed from outside air and is non-removable. The

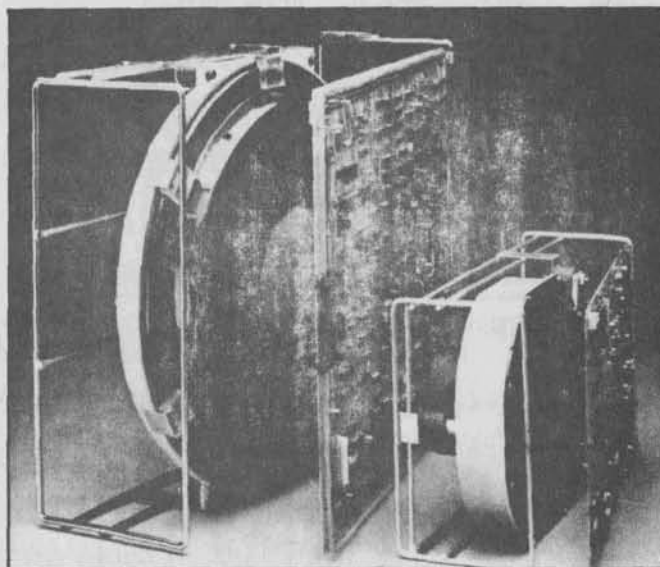


Fig. 5. Size comparison between Priam's 14-in. and 8-in. (right) drives clearly illustrates the smaller drive's compactness.

magnetic recording disks, read/write heads and head actuator operate in a contamination-free environment provided by a closed-loop filter to equalize pressure, plus an absolute recirculation filter, which arrests all particles of 0.3 microns or larger. Because the drive is impervious to external air and its contaminants, head crashes caused by dust and dirt particles are virtually eliminated. In this sealed environment, the read/write head flies 20 micro-inches from the magnetic oxide-coated surface. This head-to-disk surface proximity allows for very dense data-bit and track density on the magnetic oxide surface. This HDA module has to be assembled in a class 100 clean room, which is similar to the clean rooms used by semiconductor manufacturers. The clean room requirement is a costly investment for new Winchester market entrants and, therefore, a barrier to competing in the Winchester business.

During read/write/seek operations, the Winchester head flies 20 micro-inches above the surface on an air bearing, supported by carefully balanced aerodynamic

AVERAGE POSITIONING TIME (msec.)	ACTUATOR TYPE	DATA TRANSFER RATE (kilobytes/sec.)	INTERFACE TYPE	PRICE (single-unit/OEM)	COMMENTS
40		1198			0.96M-byte fixed-head option available
20		1198	IBM		1.19M-byte fixed-head option and OEM version available
20		885	IBM		IBM 3344 plug compatible; 1.004M-byte fixed-head option available
20		1198	IBM		IBM 3350 plug compatible; 1.144M-byte fixed-head option available
35	rotary	1305	SMD		track-embedded servo; 3340 technology
50		1030	SMD		66M- and 154M-byte versions also available
87	stepper	889	floppy	\$3500/\$2000	3340 technology; OEM model; 0.144M-byte fixed-head option available
20		806	SMD		3350 technology; 1.15M-byte fixed-head option available
25		768	SMD		3350 technology; OEM model
25		1198	IBM		IBM 3350 plug compatible; 1.14M-byte fixed-head option available
25		1198	IBM		IBM 3350 plug compatible; 1.14M-byte fixed-head option available
40		896	OEM		0.26M-byte fixed-head option available

Company	Circle No.	Company	Circle No.
Data Recording Equipment Ltd., Middlesex, England	251	Mitsubishi Electric Corp., c/o NCL Data Inc., Santa Clara, Calif.	265
Datapoint Corp., San Antonio, Texas	252	NEC Information Systems, Inc., Wellesley, Mass.	266
Digital Equipment Corp., Maynard, Mass.	253	New World Computer Co., Inc., Costa Mesa, Calif.	267
Fujitsu America, Inc., Santa Clara, Calif.	254	Nippon Peripherals Ltd., Kanagawa-Ken, Japan	268
Hewlett-Packard Co., Boise, Idaho	255	Okidata Corp., Mount Laurel, N.J.	270
Hitachi America Ltd., San Francisco, Calif.	256	Pertec Computer Corp., Chatsworth, Calif.	271
IBM Corp., Armonk, N.Y.	257	Philips Data Systems BV, Apeldorn, Netherlands	272
International Memories, Inc., Cupertino, Calif.	258	Priam Corp., San Jose, Calif.	273
ISS/Univac, Cupertino, Calif.	259	Shugart Associates, Sunnyvale, Calif.	274
Kennedy Co., Monrovia, Calif.	260	Siemens Corp., Iselin, N.J.	275
Memorex Corp., Santa Clara, Calif.	261	Storage Technology Corp., Louisville, Colo.	276
Microcomputer Systems Corp., Sunnyvale, Calif.	262	Toshiba Corp., Tokyo, Japan	277
Microdata Corp., Irvine, Calif.	263		
Micropolis Corp., Canoga Park, Calif.	264		

