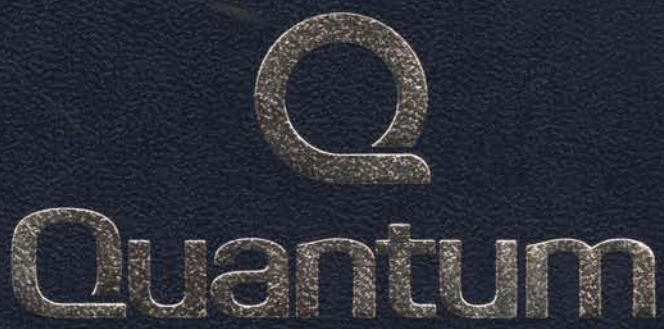

Quantum

October, 1985

This book is intended as a reference guide on Quantum Corporation and the Winchester disk drive market. For further information, contact Joseph T. Rodgers, Jr., Vice President, Finance and Treasurer, or Shirley Ann Stough, Manager, Corporate Communications

1804 McCarthy Blvd. Milpitas, CA 95035 (408) 262-1100

QUANTUM CORPORATION
Corporate Background
October, 1985

Overview

Quantum Corporation, Milpitas, California, was founded in February, 1980. The Company designs, manufactures and markets rigid disk drives based on Winchester technology which are sold to Original Equipment Manufacturers (OEMs) as mass storage units for microcomputer-based systems.

Quantum sells directly to major OEMs through a dedicated sales force located in key high technology areas of the United States. In 1984, a sales and service operation for Europe was established in Frankfurt, West Germany. Service for the Company's disk drives is also provided at the Company's headquarters in Milpitas, the Eastern Regional office in Salem, New Hampshire, and in England through an independent repair center. Quantum's products are distributed in the United States and Canada by Arrow Electronics, Inc., and in other major countries by independent distributors.

Products are initially manufactured in Milpitas. When the production process and the product have matured, manufacturing is transferred to the Company's wholly-owned subsidiary, Quantum Caribe, Inc., in Ponce, Puerto Rico.

In November, 1983, Quantum incorporated a majority-owned subsidiary, Plus Development Corporation, to design and market PC enhancement products to end users. Plus distributes its products through retail outlets, distributors and value-added resellers. In addition, Plus has an account management team to coordinate high volume sales to Fortune 1,000 end user companies.

OEM Products

Quantum's first products, the Q2000 Series® of 8-inch disk drives, were introduced in September, 1980. The products were designed to be a low-cost upgrade for low-capacity 8-inch disk drives (specifically, the Shugart SA1000), or a replacement for 8-inch floppy disk drives. The Q2000 Series was offered in unformatted capacities of 10-, 20-, 30-, and 40-megabytes.

In designing the Q2000 Series, Quantum combined key features of high-capacity, high-performance 14-inch drives with low-cost elements of stepper motor-based floppy and rigid disk drives. The resulting Q2000 Series was an innovative approach to achieving higher capacity and performance at a low manufacturing cost. Most notable is the Q2000 Series' read/write head positioning system, patented by Quantum in 1983. The system incorporates a rotary moving coil actuator for rapid access to data stored on the disks, an optical encoder for coarse positioning and a temperature-compensating wedge servo scheme for precise positioning.

In November, 1982, Quantum announced the Q2080 ®, an 85-megabyte (unformatted) 8-inch disk drive.

Since April, 1981, Quantum has shipped over 120,000 Q2000 Series disk drives to companies such as Wang, Nixdorf, Siemens, Convergent Technologies, Altos Computer Systems, and Xerox.

In November, 1982, Quantum introduced the Q500 Series® of full-height, 5 1/4-inch Winchester disk drives in capacities of 20-, 30-, and 40-megabytes (unformatted). The Q500 Series is based on the same proven technologies as the Q2000 Series. In the first year of production, the Q500 had captured approximately 25 percent market share.

Quantum has shipped over 100,000 Q500 Series disk drives since June, 1983, retaining most of its Q2000 Series OEM customers. In addition, new customers, such as Digital Equipment Corporation and Alpha Microsystems, were added to Quantum's prestigious customer list.

Quantum's third generation of products, the Q200 Series™ was announced in April, 1985 for delivery in early 1986. The Q200 is a half-high 5 1/4-inch Winchester disk drive with an integrated disk drive controller, and is offered in formatted capacities of 53- and 80-megabytes.

A major advancement in disk drive performance and functionality, the Q200 Series incorporates the Small Computer Systems Interface (SCSI) and an integrated drive controller. These features allow the Q200 to manage disk media defects, and to perform various routine functions normally handled by the host computer, thereby freeing the host to perform more user-oriented tasks. The use of large-scale integrated (LSI) electronics allows Quantum to produce highly reliable, low cost drives with significantly higher manufacturing yields than traditional drive designs.

End User Products

In June, 1985, Plus Development Corporation unveiled its first product--a 10-megabyte (formatted) hard disk drive subsystem on a plug-in card. Called Hardcard™, this product allows end users to quickly and easily upgrade IBM PCs and PC-compatible computers for hard disk storage. Hardcard can be installed in a PC with two floppy disk drives to effectively upgrade an IBM PC to the capabilities of a PC XT without giving up one of the floppies. A Hardcard installed in a PC XT with a hard disk drive gives the user an additional 10-megabytes of mass storage.

Hardcard incorporates a 3 1/2-inch oxide disk, LSI circuitry, and some of the same proven technologies from Quantum's products, to provide a complete hard disk subsystem that plugs into an IBM PC expansion card slot.

To quickly achieve high volume and reliability in the manufacture of Hardcard, Plus entered into a manufacturing agreement with Matsushita Kotobuki Electronic Industries, Inc. (MKE), Shikoku, Japan. MKE is a world-class manufacturer of electro-mechanical devices for the consumer market.

Markets

Since Quantum's founding in 1980, the company's products have been targeted for the multi-user, small systems market; that is, business and commercial systems for two to eight users. The new Q200 Series products will provide a capacity upgrade for those systems, as well as opening the larger multi-user systems market (8-16 users), and markets that requires higher capacities and performance, such as advanced graphics, engineering workstations, and file servers for local area networks.

With the formation of Plus, the Company's market penetration now encompasses the single-user, personal computer segment. Hardcard is targeted for sale to the 2.5 million users of IBM PCs and PC-compatibles who have purchased their systems with floppy disk drives only. There is an additional installed base of 900,000 PCs and compatibles which could benefit from Hardcard's additional 10-megbytes of mass storage.

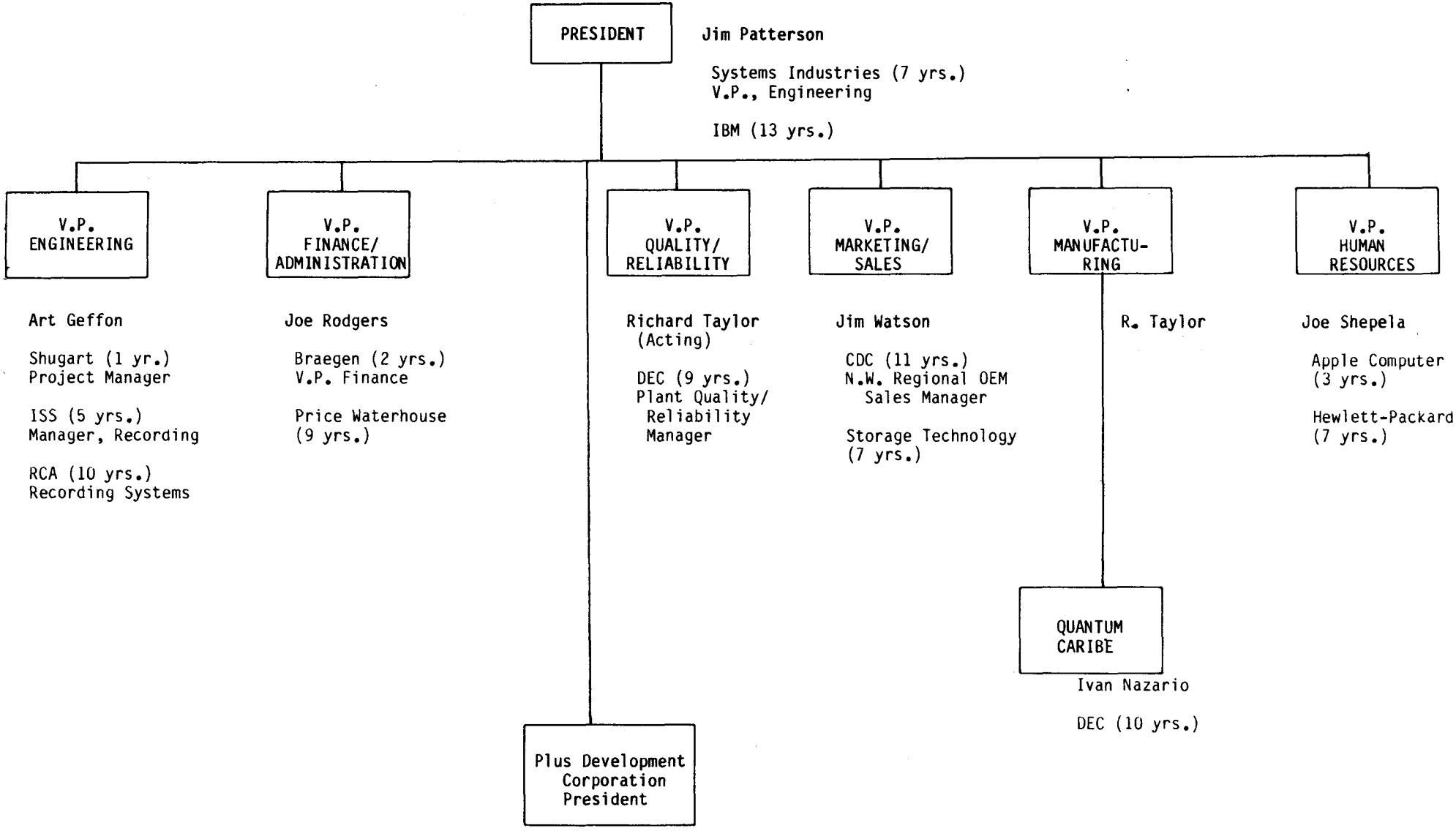
Financial Position

Quantum Corporation has steadily and consistently grown since its inception. The company made its initial public offering in December, 1982 at $20.50 per share, raising $32 million. There is no debt.

There are approximately 9.5 million shares of common stock outstanding. Institutional holdings by 45 organizations represent approximately 50% of outstanding shares.

-30-

QUANTUM CORPORATION ORGANIZATION CHART
October, 1985



QUANTUM CORPORATION
Management Profiles

James L. Patterson — President, Chief Executive Officer

A founder of Quantum, Mr. Patterson has been a director of the company since its inception in February, 1980. He currently serves as Chairman of the Northern California Council of the American Electronics Association. From August 1979 to February 1980, Mr. Patterson was self-employed as a technical and marketing consultant. Prior to August 1979, he served for six years as Vice President, Engineering, of Systems Industries, Inc., a manufacturer of computer peripheral equipment. He spent three years at Memorex as Director of Product Development for communications products and Director of Business Planning for disk drive and microfilm products. Prior to that time, Mr. Patterson held various engineering and management positions at IBM.

Joseph T. Rodgers, Jr. — Vice President, Finance Secretary and Treasurer

Mr. Rodgers joined the company in December 1980 as Vice President, Finance and was elected Secretary in May 1981 and Treasurer in September 1981. From July 1979 to December 1980, he served as Vice President, Finance of Braegen Corporation, a manufacturer of computer peripheral equipment. From September 1978 to July 1979, he served as Assistant Vice President, Finance of Plantronics Corporation, a manufacturer of telecommunications equipment. Prior to that time, Mr. Rodgers was employed by Consolidated Video Systems, a manufacturer of broadcast equipment, as its Vice President, Finance. He also has over nine years' experience at Price Waterhouse, last serving as an audit manager.

James G. Watson — Vice President, Sales and Marketing

Mr. Watson joined Quantum in October 1982 as Director of Sales. He was appointed Vice President, Marketing and Sales in February 1984. Prior to joining the company, Mr. Watson was Northwestern Regional Manager of OEM Peripheral Sales for Control Data Corporation. Previous experience includes seven years in sales and marketing with Storage Technology Corporation.

Arthur P. Geffon — Vice President, Engineering

Mr. Geffon joined Quantum in June 1980 as Manager, Recording Systems. In February 1984, he was promoted to Vice President, Engineering. Previously, Mr. Geffon served at Shugart Associates as Project Manager for the SA850 floppy disk drive program. Other experience includes fives years with ISS and ten years with RCA in recording systems engineering.

Richard P. Taylor — Vice President, Manufacturing

Mr. Taylor joined Quantum in June 1983 as Vice President, Quality and Reliability. He was named Vice President, Manufacturing in February 1984. Prior to joining Quantum, he served for seven years with Digital Equipment

Corporation, most recently as Manager, Quality and Reliability at DEC's Colorado Springs disk drive facility. He has also held various quality and reliability management positions in DEC's storage systems manufacturing, corporate quality assurance and corporate component engineering groups.

Joseph C. Shepela — Vice President, Human Resources

Mr. Shepela joined Quantum in December 1984. Previously, he served as Senior Human Resources Manager for Apple Computer, Inc.'s corporate administrative departments, and has held various other Human Resources management positions with Apple. He also served for seven years in similar capacities with Hewlett-Packard.

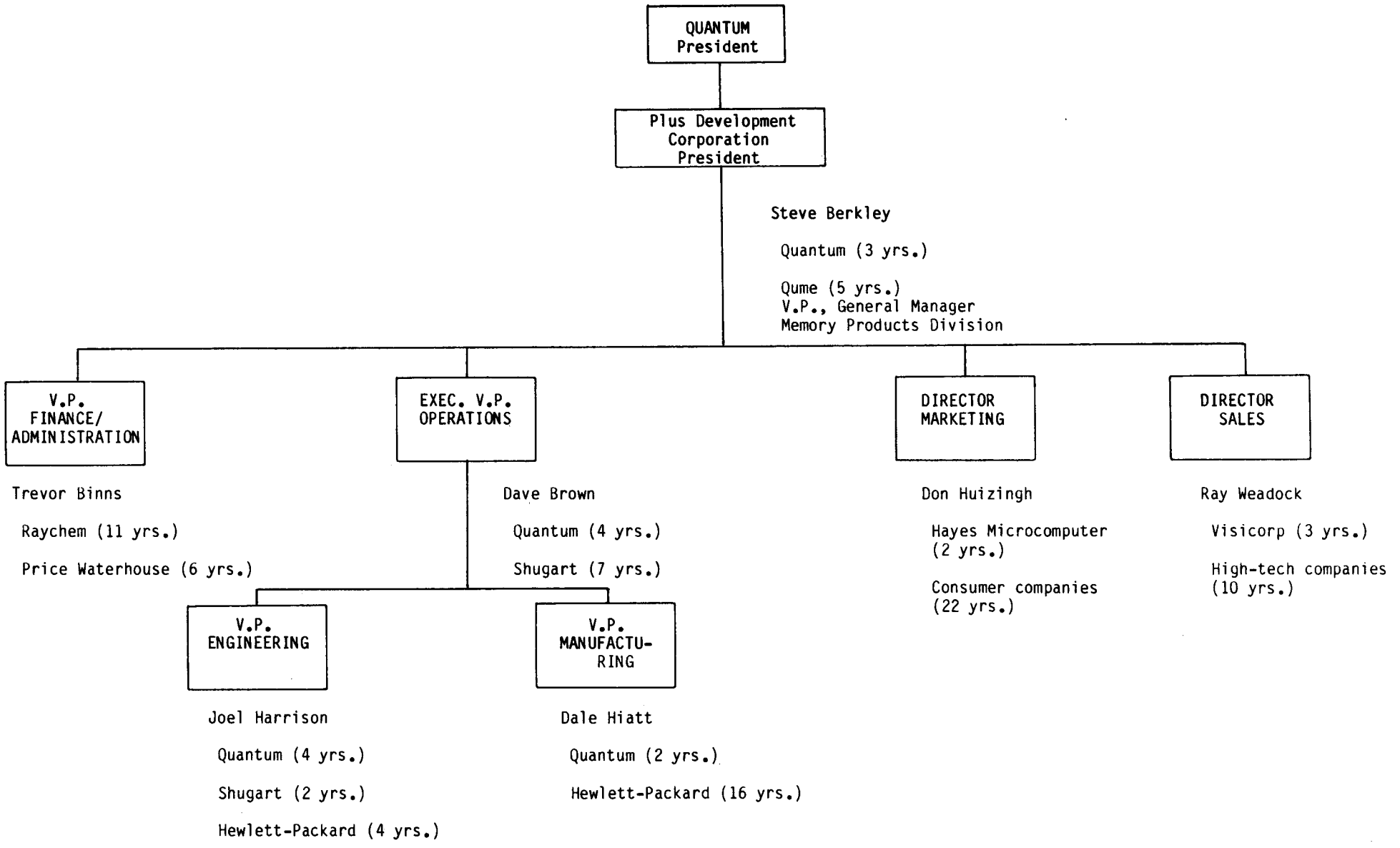
Ivan Narazio — Vice President and General Manager, Quantum Caribe, Inc.

Mr. Nazario joined Quantum in September 1983 as General Manager of Quantum Caribe, Inc. He was promoted to Vice President in June 1984. Prior to joining Quantum, Mr. Nazario served ten years with Digital Equipment Corporation, most recently as Area Resources Manager for the establishment of a Digital manufacturing operation in Mexico.

-30-

QNTMBACK 10/85

PLUS DEVELOPMENT CORPORATION ORGANIZATION CHART
October, 1985



Donald J. Huizingh — Director of Marketing

Don Huizingh joined Plus as Director of Marketing in April, 1984. He was previously employed by Hayes Microcomputer Products, Inc., a manufacturer of data communications products for personal computers, as Director of Marketing and Sales from July, 1982 to February, 1984. Prior to that time, Mr. Huizingh held various marketing management positions with technically-oriented consumer products companies and oil companies for twenty-two years.

Raymond L. Weadock — Director of Sales

Ray Weadock joined Plus as Director of Sales in August, 1984. He was previously employed by Visicorp from July, 1981 to June, 1984, last serving as National Sales Manager. Prior to that time, Mr. Weadock held various sales management positions with high-technology companies for ten years.

-30-

QNTMBACK 10/85

QUANTUM FINANCIAL SUMMARY
($ Millions Except Per-Share Amounts)

Fiscal Year	Revenue	Net Income (Loss)	Earnings (Losses) Per Share
1982			
1Q	$ .4	$ (.9)	$ (.49)
2Q	2.1	(.2)	(.10)
3Q	3.3	(.4)	(.21)
4Q	7.9	1.6	.24
Year End	$ 13.7	$ .2	$ .03
1983			
1Q	$ 8.7	$ 2.1*	$ .28*
2Q	10.0	1.6	.21
3Q	11.3	1.9	.23
4Q	11.9	2.2	.24
Year End	$ 41.8	$ 7.8	$ .96
1984			
1Q	$ 12.5	$ 2.1	$ .22
2Q	15.1	2.5	.26
3Q	17.5	2.9	.30
4Q	21.9	3.2	.34
Year End	$ 67.0	$ 10.7	$ 1.12
1985			
1Q	$ 25.4	$ 4.3	$ .45
2Q	30.1	4.7	.49
3Q	31.8	5.9	.62
4Q	33.1	6.1	.63
Year End	$120.4	$ 21.0	$ 2.19
1986			
1Q	$ 34.0	$ 5.7	$ .60

*Includes extraordinary credit of $814,000 or $.10 per share for tax benefit of loss carryforwards.

Finsumm
10/85

SUMMARY OF FORECASTS BY FINANCIAL ANALYSTS

($ Millions Except per Share Amounts)

			Year Ending March 31			
			1986		1987	
Firm	Analyst	Report Dated	Sales	Earnings Per Share	Sales	Earnings Per Share
Adams, Harkness & Hill	Oakes Spalding		$140	$2.20	$185	$2.90
Donaldson, Lufkin & Jenrette	Tom Rooney	8/29/85	147	2.20-2.25	220	3.50
Drexel, Burnham, Lambert	Jean Orr	9/24/85	135	2.05		
Janney Montgomery Scott	Jim Meyer		155-165	2.30	225-250	3.35
Kidder, Peabody	Bill Easterbrook	8/22/85	130	2.10	170	2.80
Laidlaw, Adams & Tek	Mark Obenzinger			2.25		
Morgan Stanley	David Moy	9/13/85	142.5	2.20		3.50
Robertson, Colman & Stephens	Blake Downing	8/29/85	147.0	2.20	229.5	3.45
Shearson/American Express	Jim Stone			2.00		2.00
Standard & Poors	Lisa Kildahl	9/09/85		2.10		
S G Warburg, Rowe & Pitman, Akroyd	Paul Evans	8/26/85	148.7	2.25	195.6	2.85
Wertheim & Co.	Harvey Allison			2.40		

JTR/ao
17/5
10/01/85

Donaldson, Lufkin & Jenrette

Donaldson, Lufkin & Jenrette Securities Corporation • 140 Broadway, New York, N.Y. 10005 • (212) 504-3000

Research Bulletin

Thomas T. Rooney

August 29, 1985
DJIA: 1331.09
SPII: 209.89

QUANTUM CORPORATION (QNTM-23)*

Reemphasis of Recommendation

	Earnings Per Share			P/E Ratio		
52-Week Range	1985	1986E	1987E	1986E	1987E	Dividend
31-16	$2.19	$2.20-2.25	$3.50	10.3	6.6	Nil

Shares outstanding: 9.6 million

Market capitalization: $221 million

Note: Fiscal year ends March of the following year.

We are highlighting our recommendation of Quantum because the risk of a difficult second quarter (September) and third quarter (December) is now well known, quantifiable, and, in our opinion, discounted, while the potential for accelerating earnings over 1986-87 is not. The potential for weakness has overhung the stock for some time because of the generally soft demand in the industry and the transition that the company has been in while developing new products.

We base our emphasis of Quantum on the following:

1. The risk engendered by new products is largely behind Quantum, with the first of the new products ("Hardcard") slated for volume shipment late in September. The new products represent incremental revenue for Quantum, taking the company above and below its traditional market (the mid-range 20-40 megabytes).

2. We believe that the major element in the company's second-quarter shortfall--delayed orders from DEC--is a short-term macro phenomenon that should be corrected through normal inventory workdown over the next 90 days. DEC represented 15% of fiscal 1985 revenues and better than 20% of first-quarter 1986 as DEC ramped for the new MicroVAX II. About 65-70% of the drives go into the older, economically sensitive PDP-11 line and the other 30-35% into the MicroVAX. Inventory adjustment will result from continued growth in MicroVAX II shipments, or firming in PDP orders, or both.

*DONALDSON, LUFKIN & JENRETTE SECURITIES CORPORATION MAKES A MARKET IN THIS SECURITY AND HAS PERIODIC POSITIONS IN THIS SECURITY IN CONNECTION WITH THIS ACTIVITY.

Additional information is available upon request

3. Quantum represents one of the most leveraged, yet diversified, plays in the compu industry. It enjoys cyclical exposure from the OEM nature of its business, its broad customer base (DEC, Wang, Nixdorf), and new product thrust. We expect a cyclical pickup in the second half of 1985. At the same time, it possesses the disinflationary characteristics of rising unit growth and high return on operating assets. In fact, Quantum's return on operating assets is the highest in our group at nearly 70%.

4. We believe that the company may, on any weakness, enact an open-market stock-purchase program to satisfy option commitments. It would represent only a marginal investment for the company because most of the options are exercisable a $17 or higher and comes at a time when Quantum is generating a sizable positive operating cash flow. Cash and marketables totaled $52 million as of June 30.

We estimate flat earnings for fiscal 1986 (March) of $2.20-2.25 per share ($2.19 in fiscal 1985), with down comparisons in both September and December. The September quarter should post earnings of $0.35-0.40 per share versus $0.49, while December shoul come in at $0.50-0.55 versus $0.62. With the full effect of new products expected in the March quarter, earnings momentum should return and carry through calendar 1986-87 Our fiscal 1987 estimate is $3.50.

Thomas T. Rooney
(212) 504-4266

INVESTMENT RESEARCH
MORGAN STANLEY

EMERGING GROWTH

August 19, 1985

QUANTUM
(QNTM - OTC)

Recent Price	52-Week Price Range	Div	Yield	Earnings Per Share 1985A	1986E	1987E	Price/Earnings 1986E	1987E
22	30 - 16	--	--	$2.19	$2.20	$3.50	10.0	6.3

Common Stock: 9.6-million shares outstanding

DIGITAL EQUIPMENT CUTS ORDERS; ESTIMATES REDUCED

Digital Equipment has cut its orders for Quantum disk drives for the September quarter, primarily for inventory reasons. We have therefore reduced our estimates for Quantum for that interval from $32-million in revenues and $0.50 in per share earnings to $28-million and $0.38, respectively. Our full-year forecasts (fiscal year ends in March 1986) are now $142.5-million in sales and $2.20 in profits, down from $153-million and $2.55 per share, respectively. Our fiscal 1987 projection remains at $3.50, however, and, in view of the modest valuation on the stock, this analyst continues to consider Quantum attractive for purchase.

The computer manufacturer indicated that end-demand for its Micro PDP-11, MicroVax, and Rainbow systems is strong, in aggregate. No "significant" shift in market share has occurred between Quantum and Micropolis in sales of disk drives for the MicroVax II, although the latter firm suggests that it has made some gains.

Digital Equipment emphasized a strong desire to fulfill a three-year-old goal of improving inventory turnover and suggested that, this year, the ratio could rise from the 2.1 of prior years to about 2.3. Such an improvement implies a reduction in buffer stocks and may thus have positive as well as negative consequences. Should demand for the microprocessor-based, low-end programs exceed Digital's estimate, the computer manufacturer may have to increase orders to both of its suppliers immediately.

We believe most original-equipment-manufacturer (OEM) and virtually all the larger, multi-user, end-user MicroVax configurations will incorporate the high-capacity Micropolis product. Single-user/very-small-multi-user configurations and expansions, however, are likely to

employ a mix of Quantum and Micropolis drives, and the split could well be in Quantum's favor. In our opinion, the Micro-PDP-11 will continue to be the most important of Digital's programs for Quantum, although, if the MicroVax II is as successful as some anticipate, Digital Equipment could once again account for 20% to 25% of Quantum's revenues (versus our estimate of under 11% in the September quarter).

David K. Moy
(212) 974-4440

Within the last three years, Morgan Stanley & Co. Incorporated co-managed a public offering of the securities of Quantum.

Morgan Stanley & Co. Incorporated makes a market in the securities of Quantum.

Morgan Stanley & Co. Incorporated has a trading position and holds options in the securities of Digital Equipment.

Additional information on recommended securities is available on request.

1251 AVENUE OF THE AMERICAS
NEW YORK, NEW YORK 10020
(212) 974-4000

QUANTUM CORPORATION**

Current Price	52 Week Range	Ticker Symbol	Fiscal Year	Earnings Per Share F1985	F1986E	F1987E	Calendar P/E 1985E	1986E
$22-1/2	$32-16	QNTM	March	$2.19	$2.20	$3.45	10.5x	7.1x

On August 14, Quantum announced an anticipated 10-20% sequential decline in revenues for its second fiscal quarter ending September 30. We understand reductions in deliveries to DEC underlie the slowup in what was already expected to be a "difficult transition quarter" prior to the commencement of shipments of two major new product lines. We believe that Quantum's shipments to DEC in the June quarter reached peak levels, which we estimate totaled $7 million, or about 20% of revenues. We believe that DEC built inventories in the June quarter in anticipation of its traditional June fiscal year-end "fire sale." We understand that DEC has since ended its fire sale and will probably maintain inventories in line with current shipment rates.

DEC uses Quantum's Q500 5 1/4-inch drives (primarily the 40-megabyte version) in its Professional series of microcomputers, the MicroPDP 11, the MicroVAX I, and the entry-level version of the new MicroVAX II (see our report dated April 29, 1985). With the exception of the MicroVAX I, which should fade into obscurity, we expect DEC to continue to be a customer of Quantum's for the indefinite future. Demand for Quantum's drive for the MicroVAX II is the biggest unknown, as the mainstream version of this product uses the Micropolis 85-megabyte drive. Initial indications are that 20-30% of the systems will go out with Quantum drives.

With the shortfall putting second quarter sales in the $27-30 million range, we anticipate that EPS will be in the $0.35-0.40 range, somewhat below the $0.49 reported a year ago. In the third quarter two new products, the Q200 and the Plus Hardcard, will begin to ship (see our report dated June 11, 1985). While the Q200 will be in the design-in phase with most customers and thus generate nominal estimated revenues of $1 million, we understand that initial Hardcard demand by computer dealers is in excess of planned production capacity. As a result, our prior estimates of $5 million in third quarter revenues from Plus may prove low by as much as 50%. With Plus net margins equal to overall corporate margins, the Hardcard could largely compensate for any continued softness from DEC. Plus should continue its growth in the fourth quarter, supplemented by incremental revenues of $5 million or more from the Q200. Given the uncertain demand from DEC and the steep growth at Plus, fiscal 1986 earnings could fall anywhere in a range of $2.05-2.35. For fiscal 1987, with Q500 revenues of reduced importance, our earnings estimate remains $3.45 per share. While we suspect that the stock may not outperform the market until we are past this difficult transition quarter, we continue to regard Quantum, at 7.1 times calendar 1986 estimated earnings, as attractive for those investors with a long-term investment horizon.

	Fiscal 1986E					
March FY	Q1A	Q2E	Q3E	Q4E	Year	F1987E
Revenues (MM)	$34.0	$30.0	$35.0	$42.0	$141.0	$229.5
Operating Income (MM)	7.2	4.1	6.5	8.6	26.3	45.6
Operating Margin	21.2%	13.6%	18.4%	20.4%	18.6%	19.8%
Pretax Income (MM)	$ 8.2	$ 5.0	$ 7.4	$ 9.5	$ 30.1	$ 49.2
Pretax Margin	24.1%	16.8%	21.1%	22.6%	21.4%	21.4%
Tax Rate	30.0%	30.0%	30.0%	30.0%	30.0%	32.0%
Net Income (MM)	$ 5.7	$ 3.5	$ 5.2	$ 6.7	$ 21.1	$ 33.4
Earnings Per Share	$0.60	$0.36	$0.54	$0.69	$ 2.20	$ 3.45
vs. F1985	0.45	0.49	0.62	0.63	2.19	--

BLAKE L. DOWNING
August 29, 1985

* * * * * * * * * * * *

G. WARBURG, ROWE & PITMAN, AKROYD INC.

ROWAK

CALIFORNIA STREET
AN FRANCISCO, CA 94111
415) 433-2216

60 BROAD STREET
NEW YORK, NY 10004
(212) 269-5710

31 MILK STREET
BOSTON, MA 02109
(617) 451-0490

From July 1st
New York Office
relocated to:

500 PARK AVENUE
NEW YORK, NY 10022
(212) 415-1950

RESEARCH NOTES

INDUSTRY: Microcomputers

ANALYST: Paul A.D. Evans
DATE: August 26, 1985

QUANTUM CORPORATION
(QNTM - OTC)

OPINION: HOLD

Price	52 Week Pr. Range	FY Mar	EPS	P/E	Revs (MIL)	Net Margin	Shares O/S (MIL)	Return on avg Equity	Book Value P/Sh	Div.
$23	$32 - $16	1987E	$2.85	8.1x	$203	13.6%	9.6	20.4%	$15.40	-0-
		1986E	2.25	10.2	149	14.5	9.6	19.6	12.60	-0-
		1985A	2.19	10.5	120	17.4	9.6	29.4	8.50	-0-

Current Yield:	0.0%	Projected Secular Growth Rate:	25%
Current Mkt. Cap ($MIL):	$214M	Price/Current Book Value:	2.7x
Institutional Ownership:	52%	Current Mkt Cap/1986 Revenues:	1.4x
Insider Ownership:	40%	1986 P/E/Proj. Growth Rate:	0.4x
Avg. Mo. Trading Vol.(MIL):	1.5M	Long-Term Debt/Total Capital:	NA

An order cancellation by a large customer has caused management to announce a 10% to 20% sales shortfall in the current quarter. In our view, the reaction in the stock price brings Quantum back to a level where purchases can be contemplated, although our belief that the stock could fall to $20 in the near-term causes us to retain a HOLD rating for the present.

The longer term implication of the order cancellation for the Q500 series drives is that sales of this product are now past their peak. Management's expectations are that sales could fall by 50% during the next 12 months. The outlook for FY87 therefore rests on the Plus Hardcard and the Q200 85 megabyte drive. Both products are receiving an enthusiastic reception in advance of shipment, but there is inevitably uncertainty about the actual rate of sales growth they will achieve.

Our estimates assume that in 1987 (1) Q500 sales will fall to 60,000 units; (2) Q200 sales will reach 50,000 units; and (3) Plus Hardcard sales will reach 150,000 units. At this stage, these numbers could be subject to significant revision, not least because if the Datacard becomes a major 'hit' product, it could achieve substantially higher penetration of the 2.3 million IBM PC's at which it is targeted.

In the longer term, the indications are that management is attempting to broaden the company's product line to ensure more stable growth. The engineering workforce is to be increased from 106 to 120 engineers, and

several new development projects are to be started. These projects are likely to include (1) a second generation hardcard; (2) a follow up to the Q200, probably a 170 megabyte drive with slightly lower access time; and possibly (3) a substantially higher capacity 5-1/4 inch drive in the region of 300 megabytes. One or more of these products could be introduced before the end of calendar 1986 and could therefore contribute to FY87 (not included in our projections).

	1QFY86A 6/30/85	2QFY86 9/30/85	3QFY86 12/31/85	4QFY86 3/31/86	TOTAL FY86 3/31/85	TOTAL FY87 3/31/87
Sales	34,001	30,000	43,625	41,050	148,676	195,550
Gross Margin	13,344	11,805	15,817	15,319	56,284	68,374
R&D	2,750	2,633	2,836	2,750	10,969	12,711
Marketing	2,146	3,159	3,185	2,874	11,363	13,297
G&A	1,232	1,404	1,483	1,437	5,556	7,822
Total Op. Costs	6,128	7,196	7,504	7,061	27,888	33,830
Operating Profit	7,216	4,609	8,313	8,258	28,396	34,544
Int. (Exp.)/Inc.	988	1,001	919	1,048	3,956	4,763
Pretax Profit	8,204	5,609	9,232	9,306	32,352	39,307
Taxation	2,461	1,907	3,139	3,164	10,671	11,792
Net Income	5,743	3,702	6,093	6,142	21,681	27,515
EPS	$0.60	$0.38	$0.63	$0.64	$2.25	$2.85
Avg. Shares O/S	9,638	9,638	9,638	9,638	9,638	9,638
Sales	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Gross Margin	39.25%	39.35%	36.26%	37.32%	37.86%	34.96%
R&D	8.09%	8.78%	6.50%	6.70%	7.38%	6.50%
Marketing	6.31%	10.53%	7.30%	7.00%	7.64%	6.80%
G&A	3.62%	4.68%	3.40%	3.50%	3.74%	4.00%
Total Op. Costs	18.02%	23.99%	17.20%	17.20%	18.76%	17.30%
Operating Profit	21.22%	15.36%	19.06%	20.12%	19.10%	17.66%
Int. (Exp.) Income	2.91%	3.34%	2.11%	2.55%	2.66%	2.44%
Pretax Profit	24.13%	18.70%	21.16%	22.67%	21.76%	20.10%
Taxation	7.24%	6.36%	7.20%	7.71%	7.18%	6.03%
Net Income	16.89%	12.34%	13.97%	14.96%	14.58%	14.07%

COMPETITION

MARKETS

PRODUCTS

CUSTOMERS

QUANTUM MAJOR OEM CUSTOMERS
October, 1985

Company	Quantum Product	OEM Product(s)
Alpha MicroSystems	Q540	AM-1000 Series
Altos Computer Systems	Q540	Altos 486, 580, 586, 986
Convergent Technologies	Q2020, Q2040 Q540	I W S (Burroughs B20) NGEN (Burroughs B25)
Daisy Systems	Q2080	Logician
Digital Equipment Corp.	Q540	Professional 380, Micro PDP-11, MicroVax I, MicroVax II
Intel	Q540	Intel 286/310, 86/310
Nixdorf	Q2020, Q2040	Nixdorf 8000 Series
Tandy	Q540	Tandy 6000
Wang Laboratories	Q540	Professional Computer, Advanced Professional Computer, OIS 60, VS 15
Xerox	Q2040 Q540	Star workstation 6085 workstation

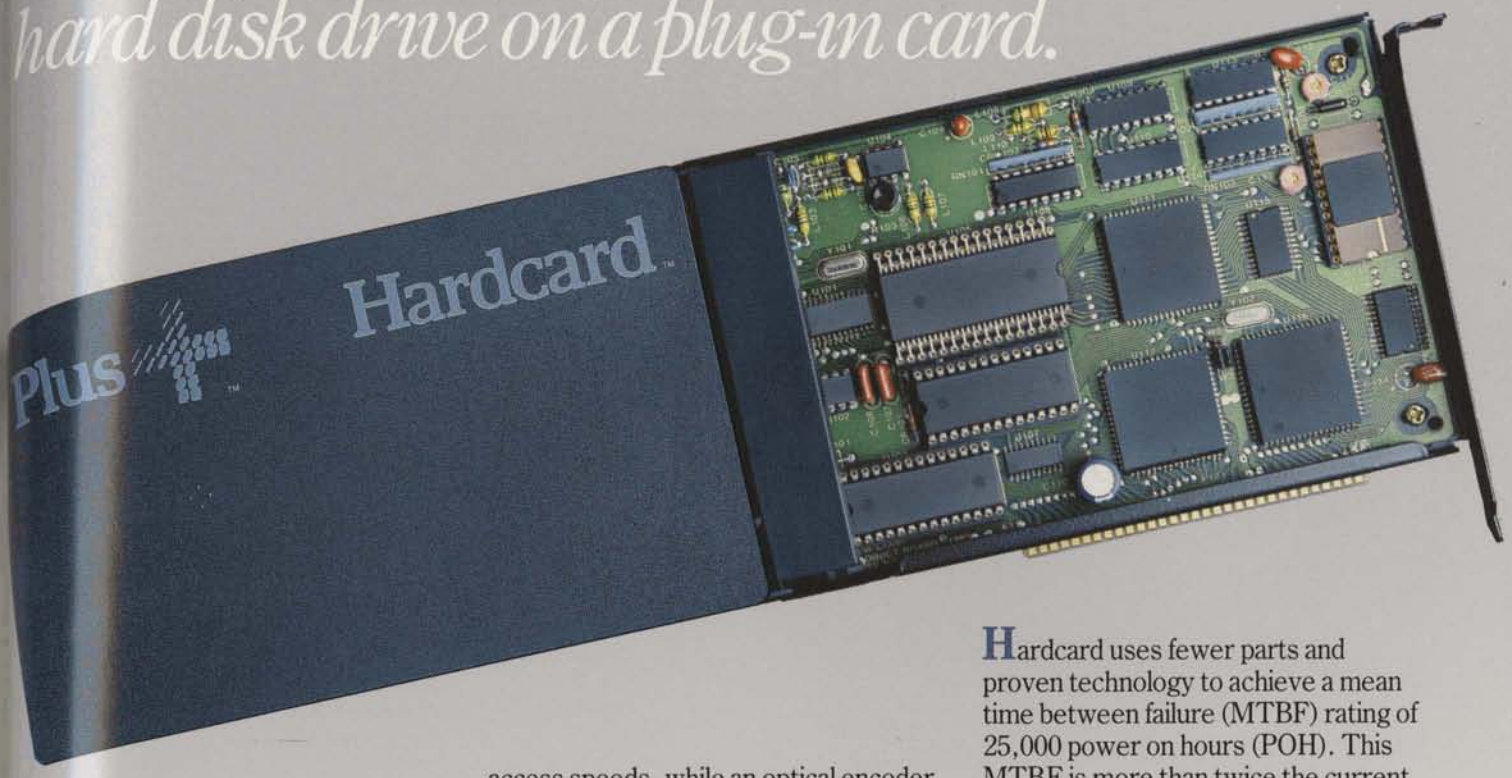
Majcust
10/85

PLUS DEVELOPMENT CORPORATION
Computer Retailers
October, 1985

Company	Number of Outlets
Basic Computer	10
Businessland	54
Compumark	15
Compushop	52
Computercraft	55
Computerease	6
ComputerLand	562 (U.S.)
Computerworks	2
Future Information Systems	2+
Inacomp Computer Centers	39
Morris Decision Systems	1
PacTel Info Systems	7

PLUSCUST
10/85

Hardcard™–the easy-to-use 10 megabyte hard disk drive on a plug-in card.



Hardcard™ is a breakthrough in PC mass storage design: the first 10-megabyte hard disk drive subsystem mounted on an IBM PC-compatible plug-in card. A complete subsystem, Hardcard can be installed in minutes. It offers true IBM PC compatibility and requires no additional power beyond that offered by the PC power supply. Hardcard also has been fully tested to assure compatibility with the IBM PC XT, the Compaq Portable and Compaq Plus, and the AT&T PC 6300.

Hardcard achieves this breakthrough by using miniaturized versions of proven Winchester technologies, readily available components and custom large scale integrated (LSI) circuit designs. Its design uses a single 3.5″ (95mm od 25mm id) oxide disk, along with two 3370-type heads and flexures. A rotary actuator provides fast access speeds, while an optical encoder and a patented wedge servo ensure accurate positioning of the heads over the disk. A unique patented AIRLOCK® mechanism automatically parks and locks the heads in a non-data area called a landing zone when power is turned off, and automatically releases the heads when power is turned on. This gives Hardcard much greater resistance to shock than is typical for hard disk drives. The drive can withstand shock of up to 100 G non-operating and 10 G operating.

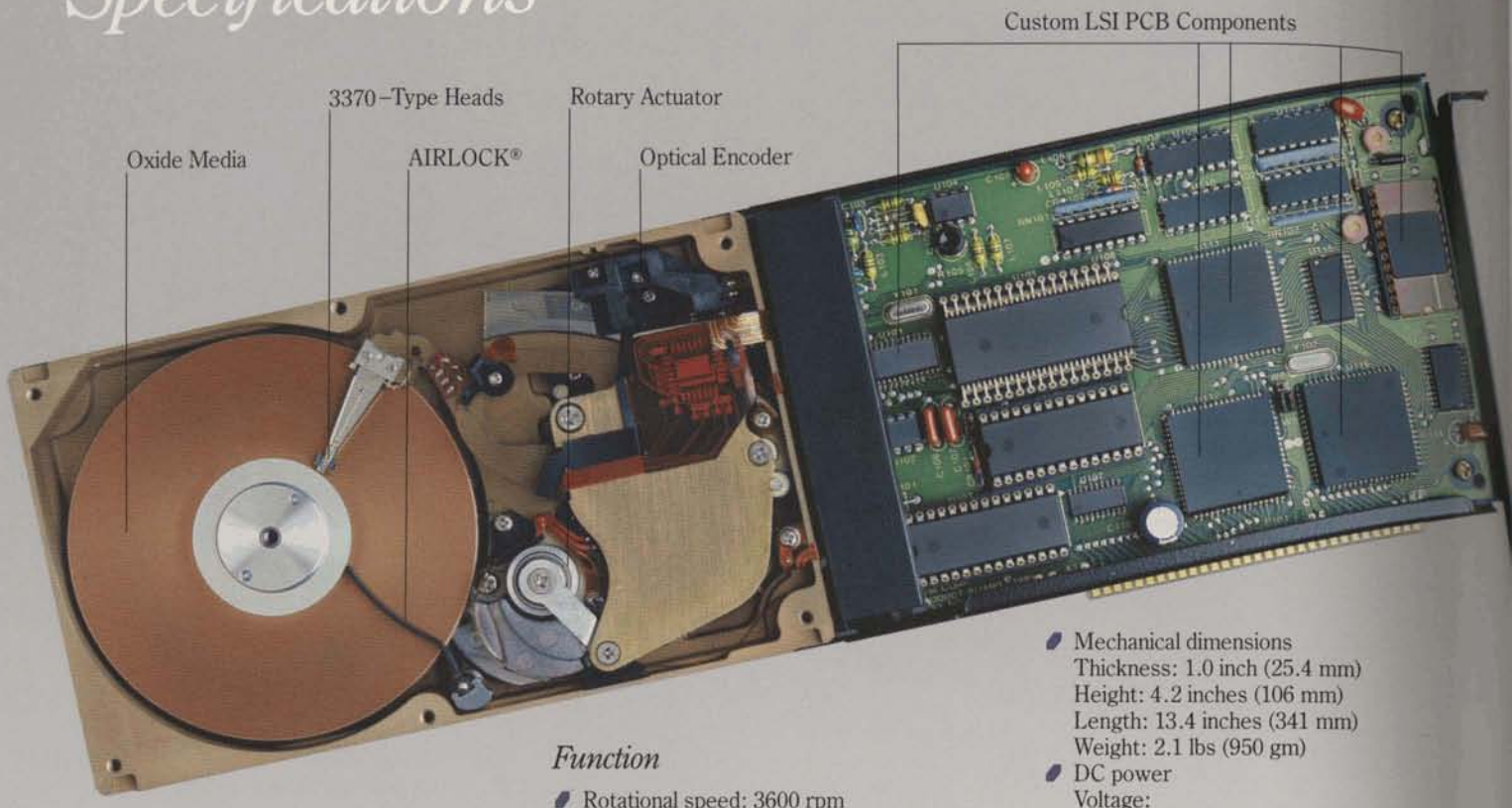
The controller, which is resident on the printed circuit board (PCB), consists of LSI circuitry and is implemented in CMOS for reduced power consumption. For greater data compression, Hardcard has a special encoding scheme. A faster interleave of 3:1 is also utilized to increase the effective system transfer rate of Hardcard across the IBM PC bus.

Hardcard uses fewer parts and proven technology to achieve a mean time between failure (MTBF) rating of 25,000 power on hours (POH). This MTBF is more than twice the current industry norm for PC mass storage drives. Because Hardcard is a more reliable product, Plus backs it with a One Year Limited Warranty.

DOS can be booted directly from Hardcard without requiring a floppy diskette. Hardcard comes pre-formatted and includes software to assist you in its installation and use. An INSTALL program automatically transfers your DOS files from a floppy diskette onto Hardcard. Hardcard Directory is a menu driven program designed to organize your programs and data on Hardcard. A separate file, PROGHELP, contains step-by-step instructions explaining how to install many of the leading business software packages.

Plus™

Specifications



Operational Features

- Industry standard IBM PC slot bus
- 2 full (512 Byte) sector buffers
- Hardware 48 bit ECC polynomial with up to 11 bit burst correction
- Sector interleave: 3
- Automatic head retract to landing zone and lock when powered down

Reliability

- MTBF (POH): 25000
- Preventive maintenance: none
- MTTR (minutes): 20
- Component life (years): 5
- Drive controller and buffer Ram diagnostic commands
- Data reliability assured through 48-Bit ECC on Data Field and 16-Bit CRC on ID Field
- Media defect map stored on drive

Performance

- Capacity
  Formatted: 10.56 Mb
- Transfer rate: 5.00 Mbits/sec
- Access times (includes settle time)
  Track to track: 15 Msec
  Average: 65 Msec
  Full stroke: 105 Msec
  Average latency: 8.33 Msec

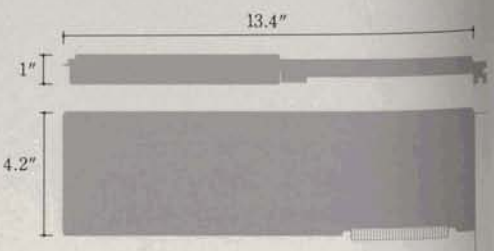
Function

- Rotational speed: 3600 rpm
- Recording density: 13,917 bpi
- Flux density: 9278 fci
- Track density: 812 tpi
- Cylinders
  Physical: 612 Logical: 306
- Tracks: 1224
- Read/Write Heads
  Physical: 2 Logical: 4
- Data disks: 1
- Encoding scheme: RLL 2,7 Code
- Sectors/track: 17 (+ 1 spare)

Physical

- Environmental limits
  Ambient temperature
  Storage/shipping: -40 to +62 C
  Operating: +4 to +50 C
  Ambient relative humidity
  Storage/shipping: 5% to 95% RH
  Operating: 8% to 80% RH
- Altitude
  Storage: 30,000 ft. (9.1 km)
  Operating: 10,000 ft. (3.0 km)
- Shock
  Storage (1/2 sine wave 10 Msec): 100 G
  Operating (1/2 sine wave 10 Msec): 10 G
- Vibration
  Storage (10-500 Hz P-P): 2.0 G
  Operating (10-500 Hz P-P): 0.5 G
- EMI (Electro-Magnetic Interference)
  Operating: FCC Class B
- Acoustic noise output: 55 DBA

- Mechanical dimensions
  Thickness: 1.0 inch (25.4 mm)
  Height: 4.2 inches (106 mm)
  Length: 13.4 inches (341 mm)
  Weight: 2.1 lbs (950 gm)
- DC power
  Voltage:
  +12V, ± 5% regulation
  +5V, ± 5% regulation
  Ripple and noise: 100 mV P-P (12V)
  50 mV P-P (5V)
  Current demand (worst case voltages)
  Average: .67A (12V) .47A (5V)
  Running maximum: .70A (12V) .54A (5V)
  Start-up: 1.27A (12V) .54A (5V)
- Heat dissipation (typical): 10.9 W



Plus Development Corporation
1778 McCarthy Boulevard
Milpitas, California 95035

Plus™

Q200 Series™ Intelligent Disk Drives

Key Features

Interface

Industry standard host interface — ANSI/SCSI

Data Integrity

Reed-Solomon ECC
One 17 bit burst error correction
Three burst error detection
Patented AIRLOCK® and landing zone
Automatic retry for read disk errors
High performance in-line sector defect skipping
Buffer memory parity
Reassignment of new defective sectors without need to reformat
Probability of not recovering data: 1 lost sector in 10^{14} bits read
Probability of miscorrected data: 1 bad sector in 10^{21} bits read

High Performance

Integrated SCSI controller
53 and 80 megabytes formatted capacities
Read/write with a 1:1 interleave operation
Full disconnect/arbitration/reconnect capability
SCSI Copy command capability
Dual port 16K byte FIFO data buffer
Transparent defect mapping
SCSI bus data transfer rate: up to 1.0 Mbytes/second
Average access time of <30 milliseconds
25,000 MTBF POH
Powerful self-diagnostic capability

Operation

512 byte sector format
Logical block addressing
Multiple block data transfer up to 64K blocks
Support for logical block sizes of 512, 1024, or 2048 bytes

Disk Drive Architecture

	Q250	Q280
Capacity (formatted)	53 MB	80 MB
Heads	4	6
Disks	2	3
Format	32 sectors x 512 bytes	
Tracks	3,292	4,938
TPI	876	
BPI	20,000	
FCI	15,000	
Encoding scheme	RLL 1,7	

Q200 SCSI Command Set

Test Unit Ready
Rezero Unit
Request Sense
Format Unit
Reassign Block
Read
Write
Seek
Inquiry
Mode Select
Reserve
Release
Copy
Mode Sense
Start/Stop Unit
Receive Diagnostic Results
Send Diagnostic
Read Capacity
Compare

Physical Specifications

Height: 1.63 in./4.14 cm.
Width: 5.75 in./14.6 cm.
Depth: 8.05 in./20.44 cm.
Weight: 3.5 lbs./1.6 kg.
50 pin dual in-line ANSI/SCSI connector
4 pin industry standard power connector

Environmental Specifications

	Operating	Non-Operating
Temperature	4°C to 50°C	-40°C to 70°C
Humidity (non-condensing)	8% to 85% RH	5% to 95% RH
Altitude	up to 3 km	up to 10 km

Power Requirements

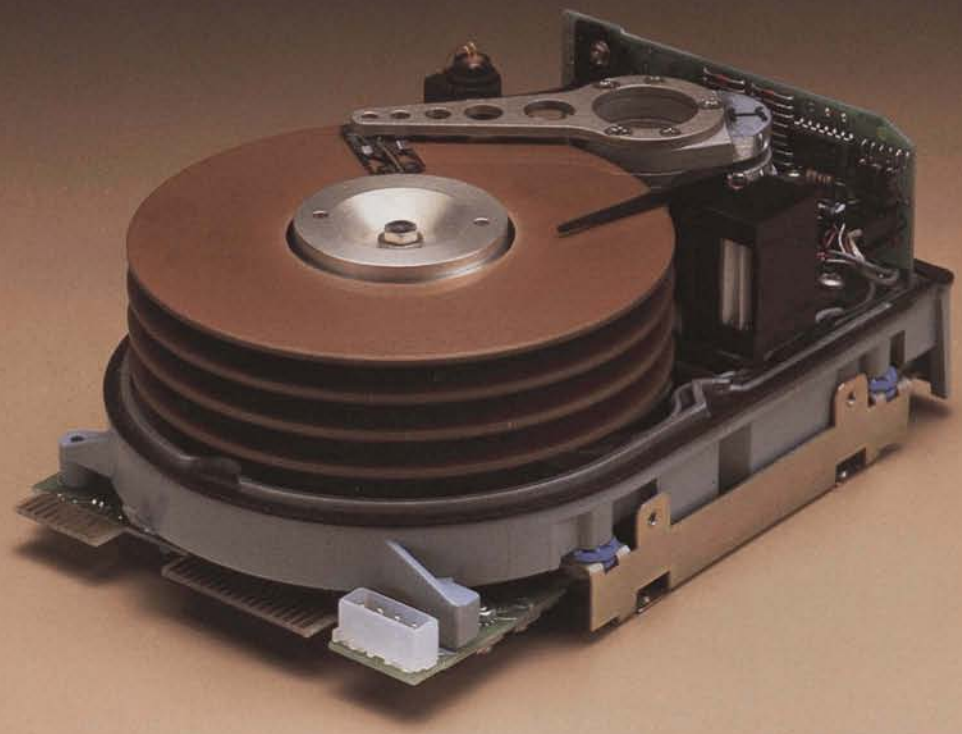
+5 VDC @ 1.8 A (MAX)
+12 VDC @ 2.9 A (MAX)

Preliminary specifications. Subject to change without notice.
Q200 Series is a trademark of Quantum Corporation.
AIRLOCK is a registered trademark of Quantum Corporation.
003 5.0M 10/85

Quantum

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

Quantum Q500 Series® 5¼" Fixed Disk Drives



Quantum's Q500 Series 20-, 30-, and 40-megabyte Winchester disk drives are the cost-effective way to upgrade from 5¼" floppy drives or lower-capacity Winchesters. Competitively priced, the Q500 offers a mass storage upgrade with sufficient capacity to satisfy most commercial applications. They fit within the standard 5¼" disk drive envelope, and are fully compatible with industry standards for electrical interface, power requirements and mounting.

Like all Quantum disk drives, the Q500 Series offers the economy inherent in simple, clean, highly manufacturable designs based on proven technology. Because the Q500 is compatible with the industry-standard ST506/412 interface, it can be integrated with any number of low-cost controllers. Drive control and data signals use the same pin assignments as compatible floppy drives, allowing daisy-chaining of fixed and floppy drives.

Quantum's proprietary head positioning system, evolved from the rotary torque actuator used in our Q2000 Series® 8" drives, enables the Q500 to achieve higher capacity and faster access times than stepper motor drives.

Key Features

- 21.33, 31.99, and 42.66 megabytes (unformatted) storage capacities
- Manufactured with the same quality and reliability procedures as Quantum's 8" disk drives
- Full interface, format and power supply compatibility with ST506/412 standards
- Physical dimensions and mounting holes identical to industry-standard 5¼" form factor
- 5.0 megabits per second transfer rate
- Proven Winchester head and media technology
- Rotary moving coil actuator with patented temperature compensation servo
- Field-proven optical encoder positioning system
- Faster access time than stepper motor drives
- Fail-safe landing and shipping zone
- AIRLOCK™ automatic mechanical shipping lock (patent pending)
- Single external PCB

QUANTUM

Q500 Series® 5¼" Fixed Disk Drives

Recording Media
- Standard Winchester lubricated magnetic iron oxide coating on a 130 mm diameter aluminum substrate

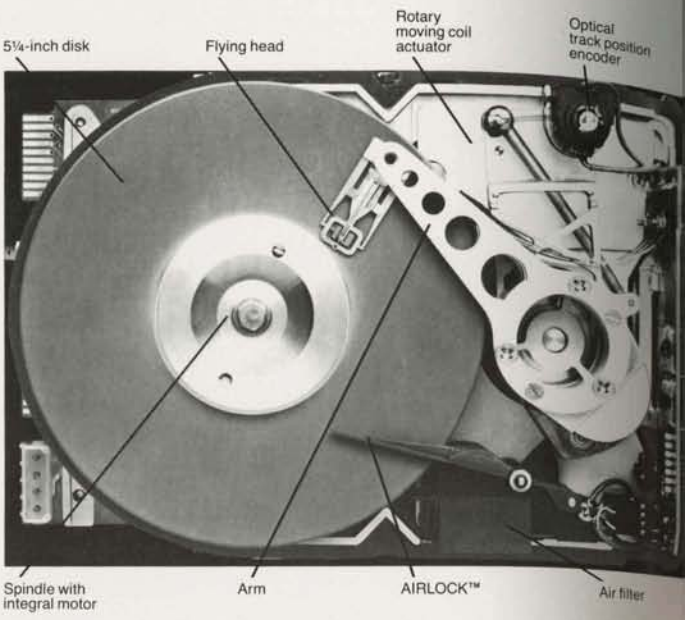
Read/Write Heads
- Monolithic manganese zinc Winchester (IBM 3350) heads
- Low mass/low load force design
- Reliable contact start/stop operation

AIRLOCK
- Heads automatically return to a "fail-safe" landing zone at power-off. No need for software "park" routine
- Actuator is automatically locked in the landing zone position during power-off and shipping

Air Filtration System
- Disks and read/write heads fully sealed in clean air chamber
- Recirculating air system with internal filter
- Absolute breather filter permits pressure equalization without contamination

Rotary Moving Coil Actuator
- Pure torque motor with balanced forces to maximize bearing life
- Simple construction
  - —Two flat-plate magnetic structure
  - —Single-plane moving coils
  - —Two-bearing structure
- Statically-balanced structure for high mechanical stability and maximum vibration resistance
- Low power consumption
- Average access time less than half that of typical stepper motors

Optical Track Position Encoder
- Provides lowest cost, reliable servo system
- Reliable glass reticle/LED/photodiode technology



Temperature Compensation Servo
- Patented servo "wedge" technique provides position feedback from disk without loss of a data surface
- Transparent to controller and host system
- Track location coding embedded between last inter-record gap and index pulse
  - —Data rate, track capacity and unrestricted format the same as ST506/412
  - —ST506/412 compatibility retained by increasing flux reversal density and reducing rotational speed
- Microprocessor-controlled optical servo system is updated once per revolution from the disk

Specifications

Functional/Performance

	Q520	Q530	Q540
Storage Capacity			
Unformatted	21.33 Mb	31.99 Mb	42.66 Mb
Formatted	16.80 Mb	25.20 Mb	33.60 Mb
Data Tracks	2048	3072	4096
Disks	2	3	4
Data Surfaces	4	6	8
Read/Write Heads	4	6	8
Capacity per Surface			
Unformatted	5.33 Megabytes		
Formatted	4.20 Megabytes		
Capacity per Track			
Unformatted	10,416 Bytes		
Formatted	8,192 Bytes		
Capacity per Sector	256 Bytes		
Sectors per Track	32		
Transfer Rate	5.0 Megabits/second		
Rotational Speed	3529 rpm, ±1%		
Recording Density	9200 bpi		
Flux Density	9200 fci		
Track Density	591 tpi		
Cylinders	512		
Index	1		
Access Time	Typical Values (msec)		
Track-to-Track	10		
Average	45		
Full Stroke	80		

Access times specified at the minimum buffered step time of 3 μsec per step pulse. Typical values are measured at nominal steady state temperatures and voltages.

Reliability

MTBF: 12,000 POH, typical usage
Preventive Maintenance: Not required
MTTR: 30 minutes
Component design life: 5 years

Error rates:
Soft read errors: 1 per 10^{10} bits read
Hard errors: 1 per 10^{12} bits read
Seek errors: 1 per 10^{6} seeks

Physical

	Operating	Non-Operating
Environmental Limits		
Ambient Temperature	10°C to 50°C (50°F to 122°F)	−40°C to 62°C (−40°F to 144°F)
Relative Humidity*	8% to 80%	
Maximum Wet Bulb*	26°C (78°F)	46°C (115°F)
Altitude	3.0 km (10,000 ft.)	9.1 km (30,000 ft.)
Temp. Gradient	11°C/hr (20°F/hr)	20°C/hr (36°F/hr)

Nominal Mechanical Dimensions
Height 3.25 inches (82.55mm)
Width 5.75 inches (146.05mm)
Depth 8.05 inches (204.47mm)
Weight 7 pounds (3.18kg)

Power Requirements
+12VDC ± 10%
Typical Currents: 1.2A not seeking; 2.0A seeking.
Maximum Running Currents: 1.5A not seeking; 2.4A seeking.
Maximum Motor Starting Current: 4.5A not to exceed 14 seconds.
+5VDC ± 5%, 0.7A typical, 1.0A maximum

Ripple
5V: 50mV peak-to-peak
12V: 100mV peak-to-peak
Power Sequencing: None required.

Heat Dissipation
Typical: 23W (79 BTU/hr)
Determined using nominal voltages and currents and with a 50 percent seek duty cycle.
Maximum: 31W (106 BTU/hr)
Determined using a 50 percent seek duty cycle and maximum voltages and worst case currents
Worst Case: 37W (126 BTU/hr)
Determined using maximum voltages, worst case currents and continuous seeking.

*Without condensation

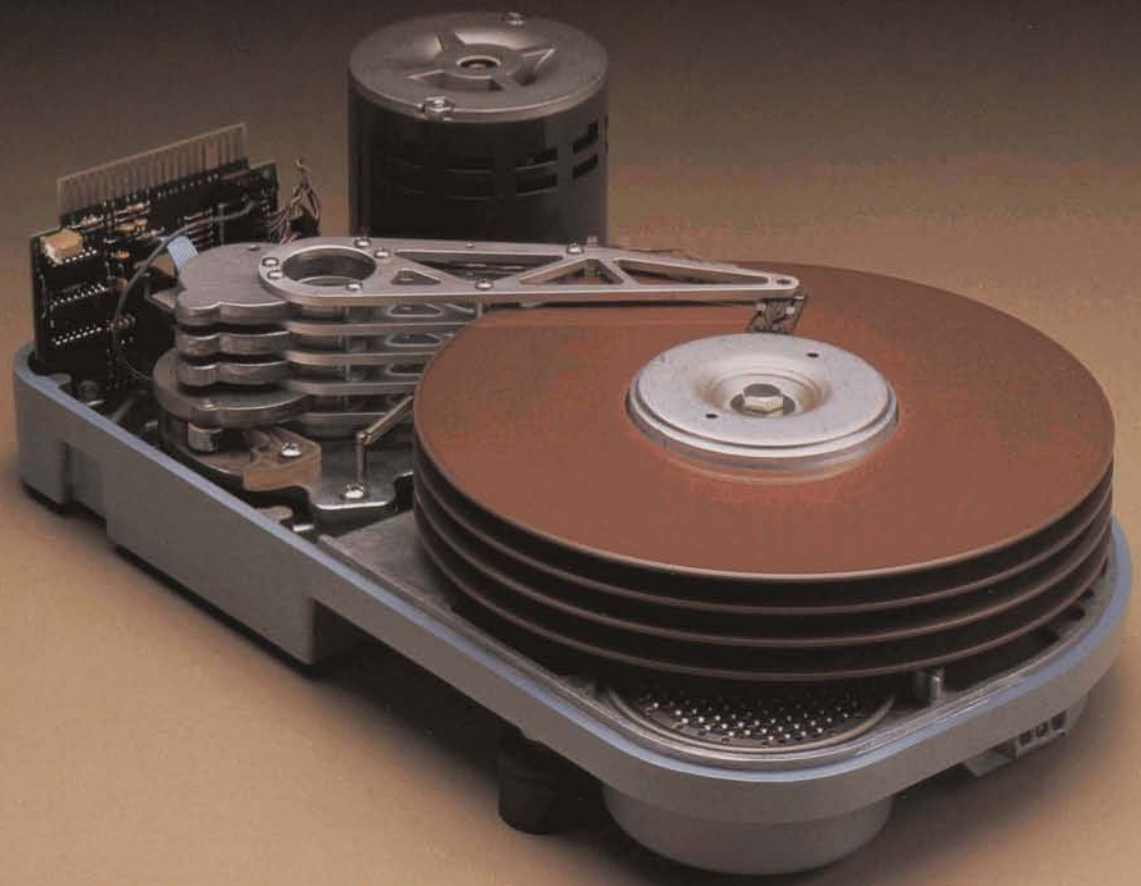
Specifications subject to change without notice.

QUANTUM

Quantum Corporation
Corporate Headquarters: 1804 McCarthy Blvd., Milpitas, CA 95035
(408) 262-1100 TWX 910-338-2203
Eastern Regional Sales Office: (603) 893-2672
Western Regional Sales Office: (408) 980-8555
European Sales Office: (49) 611-6666197 Telex 841 417166

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

Quantum Q2000 Series® 8″ Fixed Disk Drives



The Quantum Q2000 Series is a family of 10-, 20-, 30- and 40-megabyte 8″ fixed disk drives in an 8″ floppy-size package. These reliable Winchester drives provide OEMs with an upgrade path from floppy disk and low-capacity Winchester-based systems.

Q2000 drives are fully compatible with the current industry-standard SA1000/Q2000 Winchester drives, yet provide sufficient storage capacity to satisfy most commercial applications, at a lower cost per megabyte.

The higher capacity and low cost are the result of a proprietary track positioning system. Quantum uses a rotary moving coil actuator and patented temperature compensation servo instead of a conventional stepper motor actuator. This provides twice the track density and per-disk capacity without increasing cost.

Power supply and mounting requirements are fully compatible with industry-standard 8″ floppy drives. Drive control and data signals use the same pin assignments as compatible floppy drives, allowing daisy-chaining of fixed and floppy drives.

DC voltage requirements are identical to those for standard floppy drives and data cartridge streamers. The same power supply can be used for the Q2000 and various back-up drive options.

Key Features

- 10.7, 21.3, 32.0 and 42.7 megabytes (unformatted) storage capacities
- Full interface, format and power supply compatibility with the current industry-standard 8″ Winchester drives
- Physical dimensions and mounting holes identical to those of standard 8″ floppy disk drives
- 4.34 megabits per second transfer rate
- Available in AC or DC power options
- Proven Winchester head and media technology
- Rotary moving coil actuator with patented temperature compensation servo
- Faster access times than stepper motor actuator drives
- Fail-safe head landing and shipping zone
- Half the heat dissipation of comparable drives
- Microprocessor control for drive logic and positioner system—includes self-diagnostics
- Single external PCB

QUANTUM

Q2000 8" Fixed Disk Drives

Recording Media
- Winchester lubricated magnetic iron oxide coating on a 200mm diameter aluminum substrate
- 5.33 megabytes (unformatted) of data per disk surface
- 512 tracks per disk surface

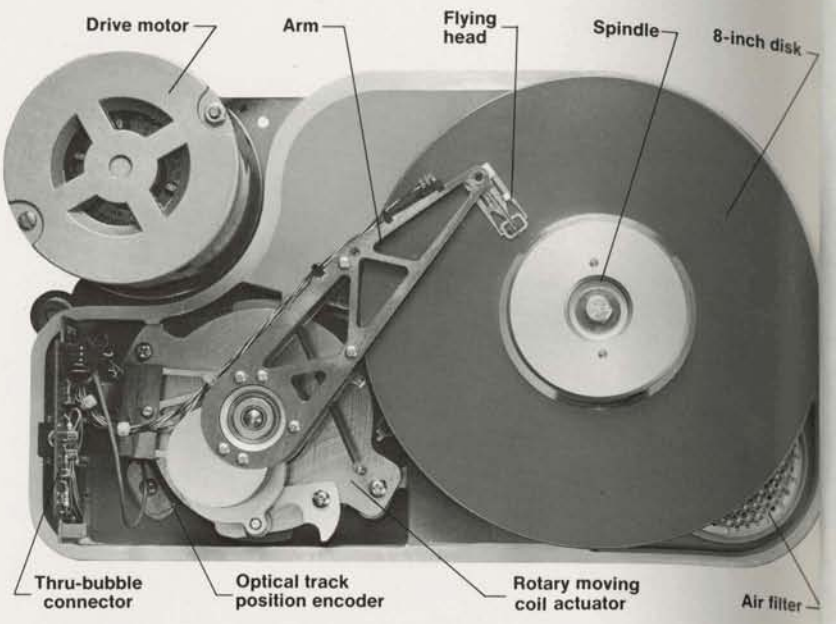
Read/Write Heads
- Winchester (IBM 3340) type flying heads
- Low mass/low load force
- Reliable contact start/stop operation
- Heads return to a "fail-safe landing zone" during power-off and shipping

Air Filtration System
- Disks and read/write heads fully sealed in clean air chamber
- Recirculating air system with absolute filter
- Absolute breather air filter permits pressure equalization with ambient air without contamination

Rotary Moving Coil Actuator
- Pure torque motor with balanced forces to maximize bearing life
- Simple construction
  - —Ring magnet and two flat-plate magnetic structure
  - —Single-plane moving coil
  - —Two-bearing structure
  - —Two-phase driver electronics
- Statically-balanced structure for high mechanical stability and maximum vibration resistance
- Low power consumption
- Average access time up to 20% faster than stepper motor actuators

Optical Track Position Encoder
- Track positioning resolution better than 40 micro-inches
- Reliable glass reticle/LED/photodiode technology

Temperature Compensation Servo
- Direct track position feedback from disk surface
- Transparent to controller and host system
- Track location coding embedded between last inter-record gap and index pulse
- Microprocessor-controlled calibration of optical track position reference from servo feedback once each revolution



Specifications

Performance

	Q2010	Q2020	Q2030	Q2040
Capacity				
Unformatted				
per drive	10.66 Mb	21.33 Mb	32.00 Mb	42.66 Mb
per surface	5.33 Mb	5.33 Mb	5.33 Mb	5.33 Mb
per track	10.40 Kb	10.40 Kb	10.40 Kb	10.40 Kb
Formatted (MFM)				
per drive	8.40 Mb	16.80 Mb	25.20 Mb	33.60 Mb
per surface	4.20 Mb	4.20 Mb	4.20 Mb	4.20 Mb
per track	8.20 Kb	8.20 Kb	8.20 Kb	8.20 Kb
per sector	256 bytes	256 bytes	256 bytes	256 bytes
sectors/track	32	32	32	32
Transfer rate	4.34 Mbits/sec	4.34 Mbits/sec	4.34 Mbits/sec	4.34 Mbits/sec
Access time*				
Track to track	15 ms	15 ms	15 ms	15 ms
Average	55 ms	60 ms	60 ms	65 ms
Maximum	100 ms	100 ms	100 ms	105 ms
Avg. latency	10 ms	10 ms	10 ms	10 ms

*Typical at nominal temperature and power

Functional

	Q2010	Q2020	Q2030	Q2040
Rotational speed	3000 RPM	3000 RPM	3000 RPM	3000 RPM
Recording density	6600 bpi	6600 bpi	6600 bpi	6600 bpi
Flux density	6600 fci	6600 fci	6600 fci	6600 fci
Track density	345 tpi	345 tpi	345 tpi	345 tpi
Cylinders	512	512	512	512
Tracks	1024	2048	3072	4096
Read/Write heads	2	4	6	8
Disks	1	2	3	4
Index	1	1	1	1

Physical

Environmental limits
- Ambient temperature = 50° to 115°F (10° to 46°C)
- Relative humidity = 8% to 80%
- Maximum wet bulb = 78° non-condensing

AC power requirements (AC power option only)
- 50/60 Hz ± 0.5 Hz
- 100/115 VAC installations = 90-127V at 1.0A typical
- 200/230 VAC installations = 180-253V at 0.5A typical

DC voltage requirements
- +24 VDC ± 10% 3.0A typical (DC power option only)
- +24 VDC ± 10% 1.25A typical (AC power option only)
- +5 VDC ± 5% 1.0A typical
- –5 VDC ± 5% (–7 to –16 VDC optional) 0.2A typical

Mechanical dimensions
- Height = 4.50 in. (114.3 mm)
- Width = 8.55 in. (217.2 mm)
- Depth = 14.25 in. (362.0 mm)
- Weight = 19 lbs. (8.6 Kg)

Heat dissipation = 235 BTU/hour typical (70 watts)

Reliability

MTBF: 12,000 POH typical usage
PM: not required
MTTR: 30 minutes
Component life: 5 years
Error rates:
- Soft read errors: 1 per 10^{10} bits read
- Hard read errors: 1 per 10^{12} bits read
- Seek errors: 1 per 10^{6} seeks

Specifications subject to change without notice.

QUANTUM

Quantum Corporation
Corporate Headquarters: 1804 McCarthy Blvd., Milpitas, CA 95035
(408) 262-1100 TWX 910-338-2203
Eastern Region Sales Office: (603) 893-2672
Western Region Sales Office: (408) 980-8555
European Sales Office: (49) 611-6666197 Telex 841 417166

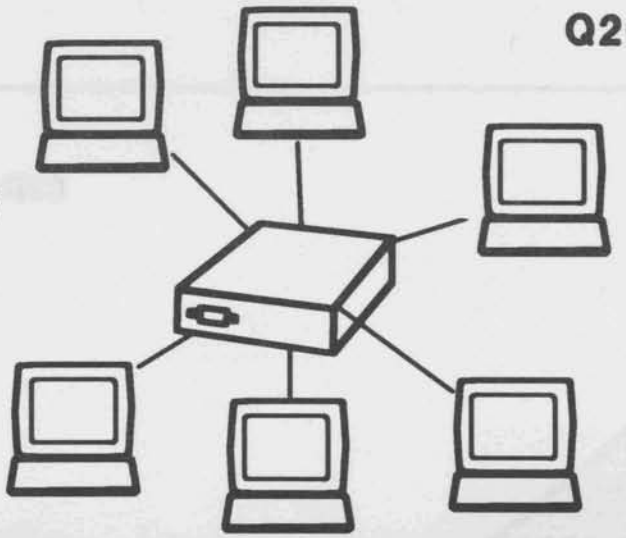
Quantum products are distributed in the United States by Arrow Electronics.

Quantum Market/Product Focus

Plus

Low-End
Single User

Q2000
Q500

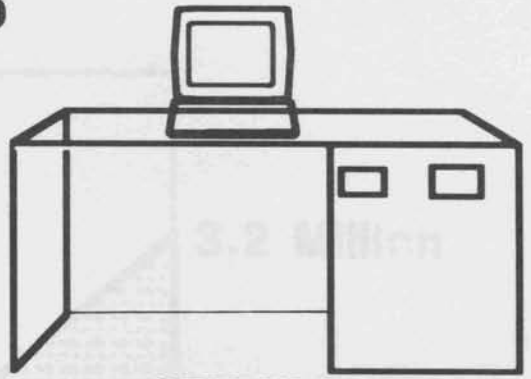


OEM Multi-User

Small (2-8 users)
- Altos 586
- Wang OIS 60
- DEC Micro PDP11

Large (8+ Users)
- File Servers
- "Super" Micros

Q200

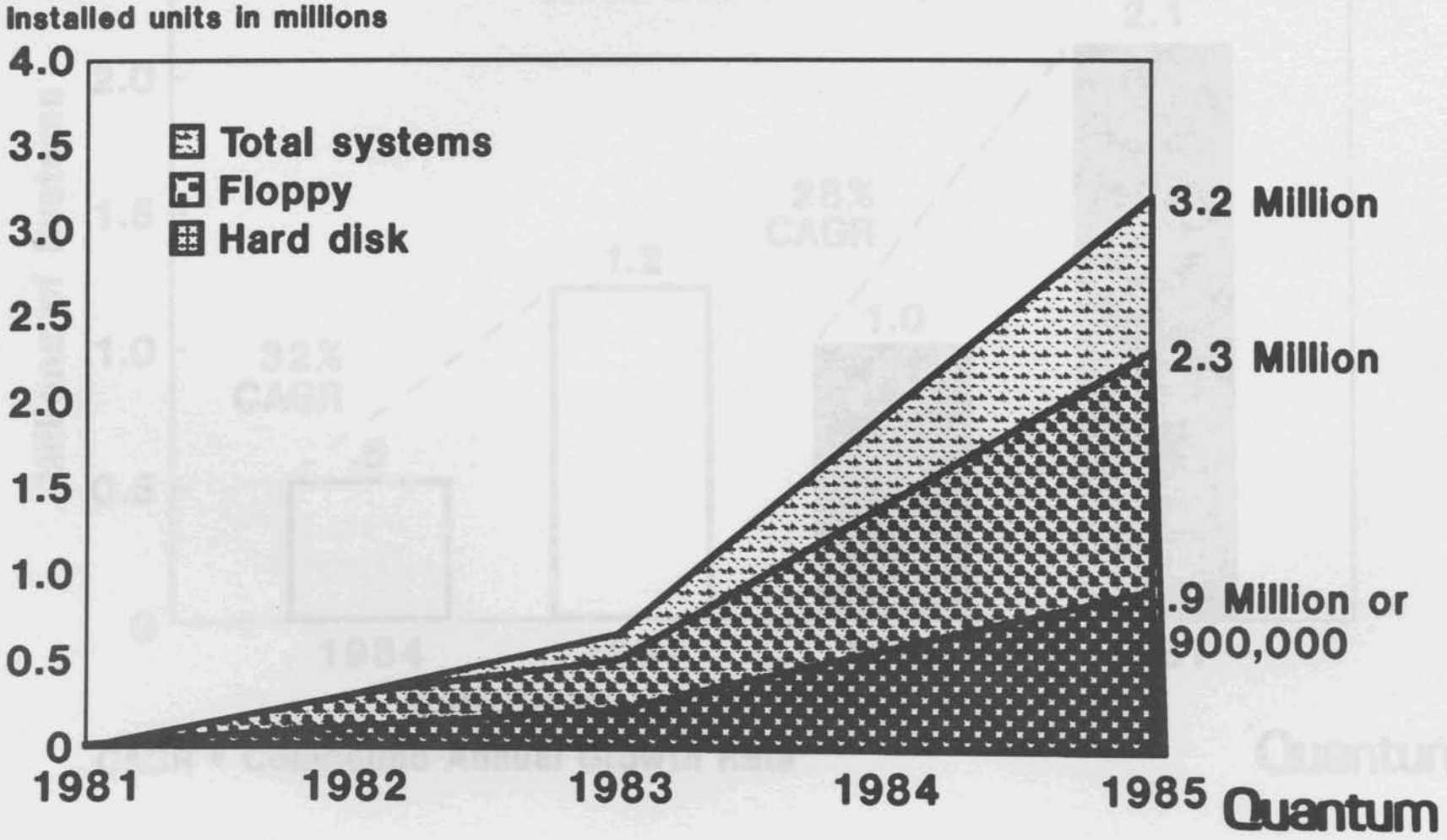


OEM High-End
- CAD/CAE
- Professional Workstations

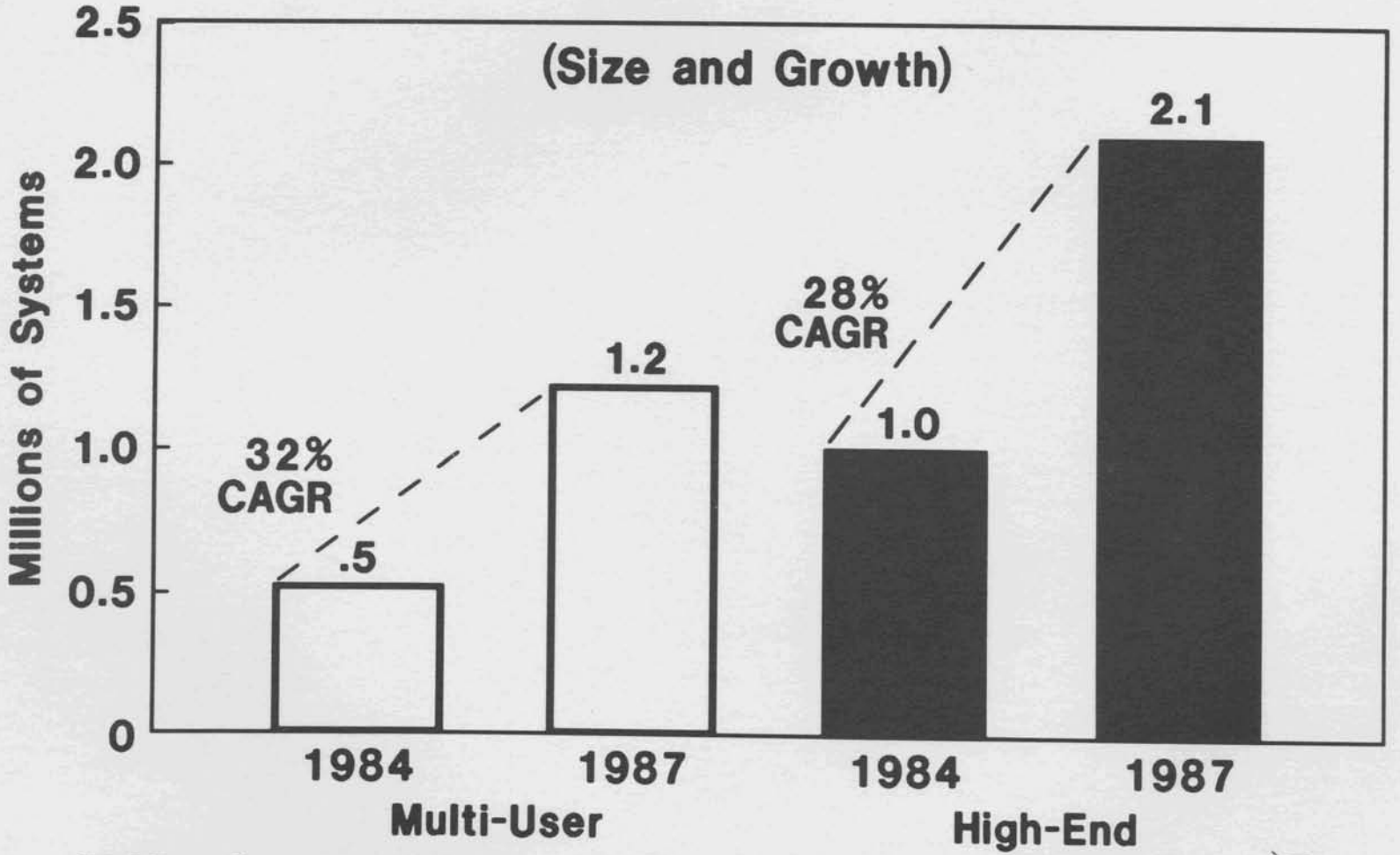
Quantum

IBM and Compatibles Installed Base

Floppy vs. Hard Disk Drives



OEM Microcomputer Markets



CAGR = Compound Annual Growth Rate

Quantum

COMPETITION - 5 1/4-Inch OEM WINCHESTER DISK DRIVES
20 - 100 MEGABYTES (Unformatted unless noted)

Company	Product	Capacity (MB)	Media Technology	Actuator Technology	Avg. Access Time (ms)	OEM Price Qty. 100
CMI	CM3426(H)	26	Thin Film	Band Stepper	85	$500(1,000)
	CM6426	27	Oxide	Rotary Torque	40	$ 1115
	CM6640	40	"	"	40	1225
	CM7660	60	"	"	30	1660
	CM7880	80	"	"	30	1900
CDC	Wren I	36	Oxide	Rotary Voice Coil	40	1660
	Wren II	86	"	"	30	2255
FUJITSU	M2234AS	20	Oxide	Rotary Stepper	83	900
	M2235AS	20	"	"	83	995
	M2241AS	31	"	Rotary Voice Coil	35	1600
	M2242AS	55	"	"	35	1800
	M2243AS	86	"	"	35	2000
HITACHI	DK502-2	20	Oxide	Band Stepper	85	N/A
	DK502-3	27	"	"	85	"
	DK511-3	36	"	Rotary Voice Coil	30	"
	DK511-5	51	"	"	30	"
	DK511-8	86	"	"	30	"
MICROPOLIS	1302	26	Oxide	Rotary Voice Coil	30	1415
	1303	43	"	"	30	1565
	1304	52	"	"	30	1675
	1323	43	"	"	28	1600
	1324	64	"	"	28	1800
	1325	85	"	"	28	1980
	1353	85	Thin Film	"	25	2000
MITSUBISHI	MR533(H)	30	Thin Film	Rotary Voice Coil	38	N/A
	MR535(H)	51	"	"	38	N/A
	MR5310(H)	101	"	"	38	N/A
MAXTOR	XT1085	85	Thin Film	Rotary Voice Coil	28	2080
MINISCRIBE	3425(H)	26	Oxide	Rack & Pinion Stepper	85	695
	4020	20	"	"	133	665
	6032	32	"	Linear Voice Coil	30	N/A
	6053	53	"	"	30	N/A
	6074	75	"	"	30	N/A
	6085	85	"	"	30	$1450(1,000)

COMPETITION - 5 1/4-Inch OEM WINCHESTER DISK DRIVES
20 - 100 MEGABYTES (Unformatted unless noted)

Company	Product	Capacity (MB)	Media Technology	Actuator Technology	Avg. Access Time (ms)	OEM Price Qty. 100
NEC	D5244	26	Oxide	Rotary Stepper	85	$ 875
QUANTUM	Q200(H)	53, 80 (formatted)	Sputtered	Rotary Torque	< 30	$ 995(1,000)
	Q520	21	Oxide	"	45	1245
	Q530	32	"	"	45	1365
	Q540	43	"	"	45	1485
RODIME	R0203	20	Oxide	Rotary Stepper	90	830
	R0204	27	"	"	90	990
	R0202E	27	"	"	55	890
	R0203E	40	"	"	55	1365
	R0204E	53	"	"	55	1515
SEAGATE	ST225(H)	26	Oxide	Band Stepper	85	N/A
	ST425	26	"	"	65	1270
	ST4026	26	"	Linear Voice Coil	40	N/A
	ST4038	38	"	"	40	"
	ST4051	51	Sputtered	"	40	$1100(1,000)
TANDON	TM703	36	Plated	Rotary Voice Coil	39	$ 945(2,500)
	TM755(H)	51	"	Linear Voice Coil	35	N/A
TOSHIBA	MK53FA	43	Oxide	Rotary Voice Coil	30	N/A
	MK54FA	61	"	"	30	N/A
	MK56FA	87	"	"	30	$1200(1,000)
TULIN	TL226(H)	27	Thin Film	Rotary Stepper	85	850
	TL240(H)	40	"	"	85	1055
PRIAM/VERTEX	V130	31	Thin Film	Rotary Voice Coil	30	1480
	V150	51	"	"	30	1700
	V170	72	"	"	30	2050
	V185	85	"	"	30	2195

PLUS DEVELOPMENT CORPORATION
Competitive Products on Plug-In Boards
October, 1985

Company	Product	Capacity (MB)	Compatibility	Retail Price	Remarks
J V C	JD-3812-M	10	IBM PC, XT	N/A	Announced at NCC '85 as an OEM product.
Mountain Computer	DriveCard	10, 20	IBM PC, XT, Compaq 286 and Deskpro, AT&T 6300	$ 995 (10MB) 1,195 (20MB)	Requires two PC expansion slots. Uses LaPine and NEC drives, Mountain controllers.

PLUSCOMP
10/85

Art Geffon