

Dataquest

*Consolidated Data Base*  
*U.S. Markets 1983-1992*

A large grid of vertical lines on a black background, representing a data table structure. The grid consists of 10 vertical lines spaced evenly across the page, creating 9 columns. The lines are thin and white, extending from the top of the page to the bottom, just above the date.

335

*September 1988*

# Dataquest

## *Consolidated Data Base U.S. Markets 1983-1992*


*September 1988*

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## INTRODUCTION

Dataquest's market research encompasses the broad range of worldwide high-technology industries and markets. This consolidated data base presents definitions and selected summary-level historical and forecast data for the principal U.S. market segments analyzed by twenty of Dataquest's technology industry services. These data and definitions are organized into five broad areas of coverage:

- Semiconductors
- Information systems
- Peripherals
- Office equipment
- Industrial automation

The content of this report is current as of the time of publication. It is subject to revision.

The content of this report represents our interpretations and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.

## DEFINITION OF TERMS

The definitions in this section describe what Dataquest counts in order to compile each market analysis table in this report. Because of space limitations, some of the corresponding terms in the tables are abbreviated.

Annual Unit Shipments are the number of new and refurbished units shipped by manufacturers to U.S. destinations in response to bona fide purchase orders.

Average Selling Price is the average price received from the end user for a product of average configuration. Unless otherwise stated, the average selling price includes the cost of hardware and any bundled items, such as software, installation, and documentation.

Total End-User Revenue is the average selling price times the annual unit shipments.

Year-End Installed Base is the cumulative shipments through year end, minus cumulative retirements through year end.

CAGR (Compound Annual Growth Rate) is computed as follows:

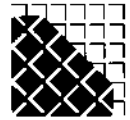
$$\text{CAGR} = \left( \frac{\text{Value in year } 1+n}{\text{Value in year } 1} \right)^{\left(\frac{1}{n}\right)} - 1$$

### Assumptions:

Years are always assumed to be calendar years and end on December 31.

All historical and forecast data for Average Selling Price and Total End-User Revenue appear in current dollars. Dataquest assumes an annual rate of inflation not to exceed 7 percent during the forecast period.

# Dataquest



## *Semiconductors*

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## SEMICONDUCTOR COMPONENTS

**SEMICONDUCTORS:** Dataquest defines semiconductors as devices fabricated from materials that exhibit semiconductor properties. Such materials include silicon, germanium, gallium arsenide, selenium, silicon carbide, and other compounds that exhibit the properties of both a conductor and insulator. Semiconductors are segmented into two primary market segments based on the level of integration of the device.

**INTEGRATED CIRCUITS:** Integrated circuits (ICs) combine several digital or analog functions on a monolithic chip. ICs are segmented, as follows, based on the functions performed, such as memory and logic, and on the fabrication technologies used, such as bipolar and MOS.

**BIPOLAR DIGITAL ICs:** Bipolar digital integrated circuits are memory and logic devices fabricated using bipolar technology. Examples are ECL RAM (random access memory), TTL and ECL standard logic families, ECL gate arrays, and PLDs (programmable logic devices).

**MOS MEMORY ICs:** MOS memory ICs are storage elements fabricated using MOS (metal oxide semiconductor) technology. These ICs include DRAM, SRAM, ROM, EPROM, EEPROM, NVRAM, and specialty memory devices.

**MOS MICROCOMPONENTS:** MOS microcomponents include microprocessors, (MPUs), microcontrollers (MCUs), and microperipherals (MPRs). MPUs perform central processing functions, while MCUs integrate some processing, memory, and peripheral functions on a single chip. MPR includes microprocessor support chips and chip sets for system support, peripheral control, and communications control.

**MOS LOGIC ICs:** MOS logic devices include MOS digital circuits such as standard logic, gate arrays, PLDs, CBICs (cell-based ICs) and full-custom ICs.

**ANALOG ICs:** Analog circuits sense and amplify small signals and/or convert them into larger, more useful signals. These include devices used in interface, input/output, and power applications. These also include specialty telecommunications circuits, consumer circuits, and linear arrays.

**DISCRETE AND OPTOELECTRONIC CIRCUITS:** Discrete semiconductors include simple-function devices such as transistors, diodes, and thyristors. Optoelectronic semiconductors are light-sensing and/or light-emitting devices. These products include displays, lamps, couplers, and fiber-optic couplers.

DATAQUEST CONSOLIDATED DATA BASE  
Semiconductor Components  
United States

	1983	1984	Actual 1985	1986	1987	1988	1989	Estimated 1990	1991	1992	CAGR (%) 1983-87	CAGR (%) 1988-92
Semiconductors												
Revenue (\$M)	8,461.9	12,225.6	8,854.8	9,369.9	11,156.9	13,836.8	14,641.4	14,321.8	16,913.4	21,013.7	7.2%	11.0%
Integrated Circuits												
Revenue (\$M)	6,862.9	10,423.7	7,291.6	7,709.9	9,391.5	11,921.1	12,684.4	12,294.3	14,715.7	18,576.3	8.2%	11.7%
Bipolar Digital ICs												
Revenue (\$M)	1,564.2	2,648.9	1,810.4	1,870.6	1,947.7	2,132.9	2,232.5	2,110.3	2,376.3	2,748.6	5.6%	6.5%
MOS Memory ICs												
Revenue (\$M)	1,927.9	3,220.4	1,647.8	1,721.1	2,206.2	3,275.9	3,497.7	3,289.1	4,029.8	5,579.8	3.4%	14.2%
MOS Microcomponents												
Revenue (\$M)	972.0	1,536.0	1,182.5	1,207.9	1,708.0	2,208.1	2,350.0	2,232.5	2,716.6	3,344.5	15.1%	10.9%
MOS Logic ICs												
Revenue (\$M)	1,166.5	1,356.4	1,232.3	1,336.7	1,846.2	2,434.6	2,648.0	2,622.6	3,200.7	4,042.0	12.2%	13.5%
Analog ICs												
Revenue (\$M)	1,232.3	1,661.9	1,418.5	1,573.6	1,683.5	1,869.7	1,956.1	2,039.8	2,392.3	2,861.4	8.1%	11.2%
Discrete and Optoelectronic Circuits												
Revenue (\$M)	1,598.9	1,802.0	1,563.2	1,660.0	1,765.3	1,915.7	1,957.1	2,027.6	2,197.7	2,437.4	2.5%	6.2%

Source: Dataquest  
September 1988



## SEMICONDUCTOR FABRICATION EQUIPMENT

**SEMICONDUCTOR FABRICATION EQUIPMENT:** Dataquest defines semiconductor fabrication equipment as the equipment used in manufacturing semiconductor products. Dataquest segments this market into the various types of equipment shown below.

**LITHOGRAPHY EQUIPMENT:** Lithography equipment includes contact and proximity aligners, scanning projection aligners, steppers, e-beam systems for direct-write on silicon and gallium arsenide, e-beam systems for maskmaking, and X-ray aligners. Optical pattern generators and photorepeaters used in maskmaking are not included.

**AUTOMATIC PHOTORESIST EQUIPMENT:** Automatic photoresist processing equipment, or track equipment as it is more commonly referred to, includes wafer clean/bake, wafer prime, coat/bake, develop/bake, and resist stabilization equipment. This equipment generally prepares the photoresist before the lithography step.

**ETCH AND CLEAN EQUIPMENT:** Etch and clean equipment includes wet process, dry strip, dry etch, and ion milling equipment. This equipment is generally used to clean wafers, delineate device patterns, and strip resist during the production process.

**DEPOSITION EQUIPMENT:** Deposition equipment includes chemical vapor, physical vapor, and epitaxy equipment. This equipment generally deposits the layers used in building semiconductors.

**DOPING AND ANNEALING EQUIPMENT:** Doping and annealing equipment is a summary of the diffusion, rapid thermal processing, and ion implantation segments. The doping and annealing processes change the physical and chemical properties of a silicon wafer.

**ION IMPLANTATION EQUIPMENT:** Ion implantation equipment is a summary of medium-current, high-current, and high-voltage implantation equipment. This equipment is used as an alternative to diffusion doping to introduce doping impurities into semiconductor materials.

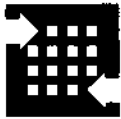
**PROCESS CONTROL EQUIPMENT:** Process control is a broad category that includes mask and wafer inspection equipment, process-monitoring equipment, surface analysis equipment, and analytical instrumentation. This equipment generally provides information on and feedback into the semiconductor manufacturing processes.

**AUTOMATION EQUIPMENT:** Factory automation equipment includes CIM software for shop floor control, factory host computer systems, cell controllers and interface hardware, and wafer transport systems including automatic guided vehicles (AGVs), robotics equipment, and rail transport systems.

DATAQUEST CONSOLIDATED DATA BASE  
Semiconductor Fabrication Equipment  
United States

	1983		Actual			Estimated			1992		CAGR (%)	CAGR (%)
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1983-87	1988-92
<b>Semiconductor Fabrication Equipment</b>												
Revenue (\$M)	925.3	1,500.6	1,258.3	1,089.0	1,078.7	1,412.8	1,349.9	1,512.4	1,773.7	2,168.8	3.9%	11.3%
<b>Lithography Equipment</b>												
Revenue (\$M)	251.1	389.1	329.6	323.2	264.0	335.1	329.7	368.4	433.8	532.8	1.3%	12.3%
<b>Automatic Photoresist Equipment</b>												
Revenue (\$M)	46.0	84.9	68.5	59.1	52.6	66.9	65.8	73.6	86.8	106.6	3.4%	12.3%
<b>Etch and Clean Equipment</b>												
Revenue (\$M)	159.5	247.2	201.6	149.6	152.0	205.0	193.2	220.5	261.2	322.0	-1.2%	12.0%
<b>Deposition Equipment</b>												
Revenue (\$M)	164.6	258.6	251.7	221.1	253.7	342.6	325.5	365.6	429.1	522.4	11.4%	11.1%
<b>Doping and Annealing Equipment</b>												
Revenue (\$M)	44.8	80.9	82.8	65.1	71.3	81.8	77.1	77.3	80.4	89.9	12.3%	2.4%
<b>Ion Implantation Equipment</b>												
Revenue (\$M)	73.1	119.5	79.1	40.6	56.6	77.7	71.4	84.8	103.8	129.5	-6.2%	13.6%
<b>Process Control Equipment</b>												
Revenue (\$M)	135.8	228.9	168.0	162.2	158.3	210.7	193.6	218.8	258.7	319.8	3.9%	11.0%
<b>Automation Equipment</b>												
Revenue (\$M)	18.0	39.0	33.0	30.0	32.5	43.4	46.6	50.9	58.4	70.1	15.9%	12.7%
<b>Other Wafer Fab Equipment</b>												
Revenue (\$M)	32.4	52.5	44.0	38.1	37.6	49.6	47.0	52.6	61.5	75.8	3.8%	11.2%

Source: Dataquest  
September 1988



*Information Systems*

1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7

## COMPUTER SYSTEMS

**COMPUTER SYSTEMS:** Dataquest defines a computer system as a combination of programmable hardware and software that minimally includes a central processing unit (CPU), input/output (I/O) capability, internal memory, system peripherals, system software, a power supply, and some form of cabinetry. As shown below, this market analysis is a combination of the corporate resource, business unit, large department, small department, work group, single-user enhanced, and personal computer segments of Dataquest's business, technical, and personal computer industry data.

**CORPORATE RESOURCE COMPUTERS:** Corporate resource computer systems are large-scale computer systems that are capable of supporting more than 150 concurrent users. They support the central data processing needs of a large organization, or the needs of a smaller number of users performing computationally intensive applications. This segment includes systems commonly called mainframe computers and supercomputers. Current pricing typically exceeds \$1.5 million. This market analysis is a combination of Dataquest's business and technical computer industry data.

**BUSINESS UNIT COMPUTERS:** Business unit computer systems are medium- to large-scale systems that are capable of supporting from 65 to 150 concurrent users. They serve the data processing needs of a large business unit of a large organization, or the central data processing needs of a smaller organization with equivalent requirements. These systems may also support a smaller number of users engaged in computationally intensive applications. This segment includes systems commonly called superminicomputers. Current pricing typically ranges from \$250,000 to \$1.5 million. This market analysis is a combination of Dataquest's business and technical computer industry data.

**LARGE DEPARTMENT COMPUTERS:** Large department computer systems are medium-scale computer systems that are capable of supporting from 21 to 64 concurrent users. They serve the data processing needs of a large department in a large organization, or the central data processing needs of a smaller organization with equivalent requirements. These systems may also support a smaller number of users engaged in computationally intensive applications. This segment includes systems commonly called minicomputers and superminicomputers. Current pricing typically ranges from \$75,000 to \$250,000. This market analysis is a combination of Dataquest's business and technical computer industry data.

**SMALL DEPARTMENT COMPUTERS:** Small department computer systems are small- to medium-scale computer systems that are capable of supporting from 11 to 20 concurrent users. They serve the data processing needs of a department in a large organization, or the central data processing needs of a smaller organization with equivalent requirements. These systems may also support a smaller number of users engaged in computationally intensive applications. This segment includes systems commonly called supermicrocomputers and minicomputers. Current pricing typically ranges from \$25,000 to \$75,000. This market analysis is a combination of Dataquest's business and technical computer industry data.

**WORK GROUP COMPUTERS:** Work group computer systems are small-scale computer systems that are capable of supporting from 2 to 10 concurrent users. These systems have resident multiuser capability and are commonly referred to as multiuser microcomputers. Current pricing typically is less than \$25,000. This market analysis is a combination of Dataquest's business and technical computer industry data.

**SINGLE-USER ENHANCED COMPUTERS:** Single-user enhanced technical computer systems are computer systems that support no more than one user and are typically intended for dedicated use in a technical application. The dedicated purpose of a system is usually evident in the packaging, hardware and software configuration, selling channels, and other characteristics of the product. This segment includes systems commonly called technical workstations, instrument controllers, and automation devices. Current pricing typically is less than \$75,000.

**PERSONAL COMPUTERS:** A personal computer is a human-oriented, single-user computer system that has a full alphanumeric keyboard, local programming capability using high-level programming languages, a resident operating system, the ability to run general-purpose applications, and a retail price of not more than \$10,000.

DATAQUEST CONSOLIDATED DATA BASE  
Computer Systems  
United States

	Actual					Estimated			CAGR (%) 1983-87	CAGR (%) 1988-92		
	1983	1984	1985	1986	1987	1988	1989	1990			1991	1992
<b>Computer Systems</b>												
Shipments (K)	6,419.8	8,044.1	6,733.0	7,403.4	9,132.4	10,691.7	11,750.1	12,598.9	13,536.5	14,610.6	9.2%	8.1%
A.S.P. (\$K)	5.3	5.4	6.9	6.6	5.5	5.3	5.3	5.4	5.4	5.3	1.2%	-2%
Revenue (\$M)	33,828.1	43,232.6	46,790.7	48,608.7	50,535.7	57,161.8	62,765.8	68,274.5	72,801.1	77,528.3	10.6%	7.9%
I.B. (K)	11,128.9	18,646.5	24,058.4	29,156.6	34,050.0	41,070.6	48,137.1	56,070.0	64,299.7	63,778.9	33.0%	11.6%
<b>Corporate Resource Computers</b>												
Shipments (K)	3.3	3.5	3.4	3.3	3.6	3.8	4.1	4.2	4.4	4.8	2.1%	6.1%
A.S.P. (\$K)	3,565.2	3,767.3	3,800.2	3,837.6	3,752.0	3,813.5	3,742.2	3,769.4	3,739.0	3,717.5	1.3%	-0.6%
Revenue (\$M)	11,915.0	13,046.0	12,879.0	12,756.3	13,649.7	14,346.3	15,294.2	15,892.0	16,593.6	17,702.7	3.5%	5.4%
I.B. (K)	15.2	17.6	20.0	22.0	24.4	26.5	28.5	30.5	32.5	34.4	12.6%	6.7%
<b>Business Unit Computers</b>												
Shipments (K)	5.2	6.4	7.3	8.1	8.1	8.9	10.7	12.0	13.5	15.6	11.8%	15.0%
A.S.P. (\$K)	643.6	571.8	535.3	535.8	577.8	574.9	544.2	536.7	534.3	521.5	-2.7%	-2.4%
Revenue (\$M)	3,324.7	3,660.0	3,917.0	4,352.1	4,666.0	5,124.3	5,817.1	6,452.5	7,225.8	8,140.3	8.8%	12.3%
I.B. (K)	39.6	44.2	48.8	53.5	58.4	63.8	71.0	79.3	89.3	100.2	10.2%	11.9%
<b>Large Department Computers</b>												
Shipments (K)	22.3	23.3	23.4	25.1	23.6	25.3	28.5	30.8	32.2	33.8	1.4%	7.5%
A.S.P. (\$K)	184.9	200.4	209.0	222.6	182.9	186.1	186.8	186.6	190.1	192.5	-3%	.9%
Revenue (\$M)	4,122.0	4,659.0	4,890.0	5,581.0	4,314.0	4,708.7	5,324.7	5,740.5	6,127.7	6,504.5	1.1%	8.4%
I.B. (K)	85.8	101.5	114.2	126.3	134.8	144.2	157.9	174.3	192.5	211.3	12.0%	10.0%
<b>Small Department Computers</b>												
Shipments (K)	53.3	66.8	83.4	88.6	83.8	94.2	108.9	122.2	127.3	130.5	12.0%	8.5%
A.S.P. (\$K)	54.6	52.5	49.7	48.9	42.1	42.0	42.3	42.1	41.5	40.1	-6.3%	-1.1%
Revenue (\$M)	2,913.0	3,507.0	4,144.0	4,332.3	3,526.0	3,950.3	4,610.2	5,149.1	5,280.7	5,233.6	4.9%	7.3%
I.B. (K)	328.1	365.6	412.7	460.5	486.6	509.9	528.9	559.5	606.7	644.7	10.4%	6.0%
<b>Work Group Computers</b>												
Shipments (K)	146.4	196.7	210.4	218.2	237.3	267.5	297.2	323.2	350.1	376.0	12.8%	8.9%
A.S.P. (\$K)	19.0	18.9	18.8	18.6	18.2	17.5	16.9	16.6	16.1	15.8	-1.1%	-2.5%
Revenue (\$M)	2,782.4	3,714.6	3,964.7	4,048.0	4,313.0	4,668.2	5,017.6	5,355.4	5,650.3	5,937.2	11.6%	6.2%
I.B. (K)	444.1	583.2	715.1	826.3	917.2	988.0	1,074.9	1,180.0	1,292.6	1,420.3	19.9%	9.5%
<b>Single-User Enhanced Computers</b>												
Shipments (K)	3.3	7.5	19.1	35.1	62.0	99.1	171.7	268.5	369.9	480.9	108.1%	48.4%
A.S.P. (\$K)	39.9	50.7	39.9	35.5	25.0	19.6	15.3	13.5	11.8	10.1	-11.0%	-15.4%
Revenue (\$M)	132.0	382.0	764.0	1,247.0	550.0	1,944.0	2,625.0	3,611.0	4,375.0	4,834.0	65.1%	25.6%
I.B. (K)	67.1	74.5	93.5	128.0	179.7	270.2	426.9	649.4	1,006.2	1,450.0	27.9%	52.2%

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Computer Systems  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
Personal Computers												
Shipments (K)	6,186.0	7,740.0	6,386.0	7,025.0	8,714.0	10,193.0	11,129.0	11,838.0	12,639.0	13,569.0	8.9%	7.4%
A.S.P. (\$K)	1.4	1.8	2.5	2.3	2.1	2.2	2.2	2.2	2.2	2.2	11.1%	-6%
Revenue (\$M)	8,639.0	14,264.0	16,232.0	16,292.0	18,517.0	22,420.0	24,077.0	26,074.0	27,548.0	29,176.0	21.0%	6.8%
I.B. (K)	10,149.0	17,460.0	22,654.0	27,540.0	33,049.0	39,068.0	45,849.0	53,397.0	61,080.0	59,918.0	34.3%	11.3%

Source: Dataquest  
September 1988

## BUSINESS COMPUTER SYSTEMS

**BUSINESS COMPUTER SYSTEMS:** Dataquest defines a business computer system as a computer system designed primarily to support the management and operations of organizations. This includes systems for general business administration, office automation, manufacturing management, and vertical market business applications. Dataquest segments business computer systems into five market segments based on the number of concurrent users supported as shown below.

**CORPORATE RESOURCE BUSINESS COMPUTERS:** Corporate resource business computer systems are large-scale computer systems that are capable of supporting more than 150 concurrent users. They are used primarily for applications that support the management and operations of organizations. This segment includes systems commonly called mainframe computers. Current pricing typically exceeds \$1.5 million.

**BUSINESS UNIT BUSINESS COMPUTERS:** Business unit business computer systems are medium- to large-scale systems that are capable of supporting from 65 to 150 concurrent users. They are used primarily for applications that support the management and operations of organizations, typically a large business unit in an organization. This segment includes systems commonly called superminicomputers. Current pricing typically ranges from \$250,000 to \$1.5 million.

**LARGE DEPARTMENT BUSINESS COMPUTERS:** Large department business computer systems are medium-scale computer systems that are capable of supporting from 21 to 64 concurrent users. They are used primarily for applications that support the management and operations of organizations, typically a large department in an organization. This segment includes systems commonly called minicomputers and superminicomputers. Current pricing typically ranges from \$75,000 to \$250,000.

**SMALL DEPARTMENT BUSINESS COMPUTERS:** Small department business computer systems are small- to medium-scale computer systems that are capable of supporting 11 to 20 concurrent users. They are used primarily for applications that support the management and operations of organizations, typically a department in an organization. This segment includes systems commonly called supermicrocomputers and minicomputers. Current pricing typically ranges from \$25,000 to \$75,000.

**WORK GROUP BUSINESS COMPUTERS:** Work group business computer systems are small-scale computer systems that are capable of supporting from 2 to 10 concurrent users. They are used primarily for applications that support the management and operations of organizations, typically a work group within an organization. This segment includes systems commonly called supermicrocomputers or multiuser microcomputers. Current pricing typically is less than \$25,000.



DATAQUEST CONSOLIDATED DATA BASE  
Business Computer Systems  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Business Computer Systems</b>												
Shipments (K)	177.8	237.6	272.8	284.3	290.9	329.5	374.6	412.6	442.5	470.8	13.1%	9.3%
A.S.P. (\$K)	110.6	94.0	83.4	80.4	78.2	73.7	71.1	68.4	66.6	65.9	-8.3%	-2.7%
Revenue (\$M)	19,657.1	22,337.6	22,753.7	22,864.7	22,755.7	24,271.8	26,651.8	28,225.5	29,459.1	31,032.3	3.7%	6.3%
I.B. (K)	498.6	674.6	858.4	1,021.3	1,137.4	1,232.3	1,336.3	1,466.6	1,619.3	1,779.4	22.9%	9.6%
<b>Corporate Resource Business Computer Systems</b>												
Shipments (K)	3.0	3.1	3.0	2.9	3.1	3.2	3.5	3.6	3.8	4.1	.8%	6.4%
A.S.P. (\$K)	3,466.3	3,663.2	3,679.3	3,696.0	3,637.3	3,671.7	3,558.3	3,556.4	3,477.0	3,435.3	1.2%	-1.6%
Revenue (\$M)	10,399.0	11,356.0	11,038.0	10,718.3	11,275.7	11,749.3	12,454.2	12,803.0	13,212.6	14,084.7	2.0%	4.6%
I.B. (K)	12.7	14.9	17.0	18.8	20.9	22.8	24.6	26.4	28.2	29.9	13.3%	7.0%
<b>Business Unit Business Computers</b>												
Shipments (K)	4.5	5.0	5.3	5.4	5.0	5.1	6.0	6.3	6.6	7.3	2.7%	9.4%
A.S.P. (\$K)	623.7	573.8	527.9	533.2	562.0	564.8	520.9	516.0	522.5	509.8	-2.6%	-2.5%
Revenue (\$M)	2,806.7	2,869.0	2,798.0	2,879.1	2,810.0	2,880.3	3,125.1	3,250.5	3,448.8	3,721.3	.0%	6.6%
I.B. (K)	37.7	40.9	43.6	45.8	47.3	48.6	50.3	52.0	53.7	55.2	5.8%	3.2%
<b>Large Department Business Computers</b>												
Shipments (K)	14.1	14.5	13.6	14.1	14.5	15.4	17.7	19.0	19.4	19.8	.7%	6.5%
A.S.P. (\$K)	178.7	186.2	191.2	184.4	175.9	182.6	185.6	186.7	194.3	200.4	-.4%	2.4%
Revenue (\$M)	2,520.0	2,700.0	2,600.0	2,600.0	2,550.0	2,811.7	3,284.7	3,546.5	3,768.7	3,968.5	.3%	9.0%
I.B. (K)	51.8	61.1	67.0	71.7	72.1	73.0	77.0	81.9	86.8	91.3	8.6%	5.8%
<b>Small Department Business Computers</b>												
Shipments (K)	32.1	44.1	62.0	65.6	53.3	61.1	73.4	84.2	86.8	88.0	13.5%	9.5%
A.S.P. (\$K)	53.3	51.0	46.5	46.7	43.5	43.8	44.6	44.8	44.6	43.2	-4.9%	-3%
Revenue (\$M)	1,710.0	2,250.0	2,880.0	3,064.3	2,320.0	2,673.3	3,277.2	3,772.1	3,874.7	3,804.6	7.9%	9.2%
I.B. (K)	113.7	142.6	184.0	226.1	247.3	264.3	275.7	294.3	327.8	354.7	21.4%	7.6%
<b>Work Group Business Computers</b>												
Shipments (K)	124.1	170.9	188.9	196.3	215.0	244.7	274.0	299.5	325.9	351.6	14.7%	9.5%
A.S.P. (\$K)	17.9	18.5	18.2	18.4	17.7	17.0	16.5	16.2	15.8	15.5	-.3%	-2.3%
Revenue (\$M)	2,221.4	3,162.6	3,437.7	3,603.0	3,800.0	4,157.2	4,510.6	4,853.4	5,154.3	5,453.2	14.4%	7.0%
I.B. (K)	282.7	415.1	546.8	658.9	749.8	823.6	908.7	1,012.0	1,122.8	1,248.3	27.6%	11.0%

Source: Dataquest  
September 1988

## PERSONAL COMPUTER SYSTEMS

**PERSONAL COMPUTERS:** Dataquest defines a personal computer as a human-oriented, single-user computer system that has a full alphanumeric keyboard, local programming capability using high-level programming languages, a resident operating system, the ability to run general purpose applications, and a retail price of not more than \$10,000. Dataquest segments the personal computer market into three market segments based on price as shown below.

**PCs LESS THAN \$1,000:** The less than \$1,000 segment of the personal computer market includes computers with an average system configuration retail sales price in this price range.

**PCs GREATER THAN \$1,000:** The greater than \$1,000 segment of the personal computer market includes computers with an average system configuration retail sales price in this price range.

DATAQUEST CONSOLIDATED DATA BASE  
Personal Computer Systems  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Personal Computers</b>												
Shipments (K)	6,186.0	7,740.0	6,386.0	7,025.0	8,714.0	10,193.0	11,129.0	11,838.0	12,639.0	13,569.0	8.9%	7.4%
A.S.P. (\$K)	1.4	1.8	2.5	2.3	2.1	2.2	2.2	2.2	2.2	2.2	11.1%	-.6%
Revenue (\$M)	8,639.0	14,264.0	16,232.0	16,292.0	18,517.0	22,420.0	24,077.0	26,074.0	27,548.0	29,176.0	21.0%	6.8%
I.B. (K)	10,149.0	17,460.0	22,654.0	27,540.0	33,049.0	39,068.0	45,849.0	53,397.0	61,080.0	59,918.0	34.3%	11.3%
<b>PCs Less Than \$1,000</b>												
Shipments (K)	3,965.0	3,212.0	1,614.0	1,644.0	1,929.0	1,959.0	2,350.0	2,631.0	2,911.0	3,091.0	-16.5%	12.1%
A.S.P. (\$K)	.4	.5	.5	.6	.6	.5	.6	.6	.6	.6	8.9%	3.7%
Revenue (\$M)	1,553.0	1,692.0	886.0	923.0	1,062.0	1,051.0	1,445.0	1,693.0	1,796.0	1,919.0	-9.1%	16.2%
I.B. (K)	5,809.0	8,679.0	9,285.0	9,133.0	9,002.0	9,395.0	10,527.0	12,300.0	14,205.0	13,043.0	11.6%	8.5%
<b>PCs Greater Than \$1,000</b>												
Shipments (K)	2,221.0	4,528.0	4,772.0	5,381.0	6,785.0	8,234.0	8,779.0	9,207.0	9,728.0	10,478.0	32.2%	6.2%
A.S.P. (\$K)	3.2	2.8	3.2	2.9	2.6	2.6	2.6	2.6	2.6	2.6	-5.2%	.1%
Revenue (\$M)	7,086.0	12,572.0	15,346.0	15,369.0	17,455.0	21,369.0	22,632.0	24,381.0	25,752.0	27,257.0	25.3%	6.3%

Source: Dataquest  
September 1988

## TECHNICAL COMPUTER SYSTEMS

**TECHNICAL COMPUTER SYSTEMS:** Dataquest defines a technical computer system as a computer system used primarily for computationally intensive technical and engineering applications. These applications include industrial automation, design automation, earth resources, scientific, real time/data acquisition and control, and others. Dataquest segments the technical computer market into six market segments based on the number of concurrent users supported as shown below.

**CORPORATE RESOURCE TECHNICAL COMPUTERS:** Corporate resource technical computer systems are large-scale computer systems that are used primarily for computationally intensive technical and engineering applications. This segment includes systems commonly called mainframe computers and supercomputers. Current pricing typically exceeds \$1.5 million.

**BUSINESS UNIT TECHNICAL COMPUTERS:** Business unit technical computer systems are medium- to large-scale computer systems that are used primarily for computationally intensive technical and engineering applications. This segment includes systems commonly called superminicomputers. Current pricing typically ranges from \$250,000 to \$1 million.

**LARGE DEPARTMENT TECHNICAL COMPUTERS:** Large department technical computer systems are medium- to large-scale computer systems that are used primarily for computationally intensive technical and engineering applications. This segment includes systems commonly called minicomputers and superminicomputers. Current pricing typically ranges from \$75,000 to \$250,000.

**SMALL DEPARTMENT TECHNICAL COMPUTERS:** Small department technical computer systems are small- to medium-scale computer systems that are used primarily for computationally intensive technical and engineering applications. This segment includes systems commonly called supermicrocomputers and minicomputers. Current pricing typically ranges from \$25,000 to \$75,000.

**WORK GROUP TECHNICAL COMPUTERS:** Work group technical computer systems are small scale computer systems that are used primarily for computationally intensive technical and engineering applications. This segment includes systems commonly called supermicrocomputers or multiuser microcomputers. Current pricing typically is less than \$25,000.

**SINGLE-USER ENHANCED TECHNICAL COMPUTERS:** Single-user enhanced technical computer systems are computer systems that support no more than one user and are typically intended for dedicated use in a technical application. This segment includes systems commonly called technical workstations, instrument controllers, and automation devices. Current pricing typically is less than \$75,000.

DATAQUEST CONSOLIDATED DATA BASE  
 Technical Computer Systems  
 United States

	Actual					Estimated				1992	CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991			
<b>Technical Computer Systems</b>												
Shipments (K)	56.0	66.5	74.2	94.1	127.5	169.2	246.5	348.3	455.0	570.8	22.8%	35.5%
A.S.P. (\$K)	98.7	99.7	105.2	100.5	72.7	61.9	48.8	40.1	34.7	30.3	-7.4%	-16.3%
Revenue (\$M)	5,532.0	6,631.0	7,805.0	9,452.0	9,263.0	10,470.0	12,037.0	13,975.0	15,794.0	17,320.0	13.8%	13.4%
I.B. (K)	481.3	511.9	546.0	595.3	663.6	770.3	951.8	1,206.4	1,600.4	2,081.5	8.4%	28.2%
<b>Corporate Resource Technical Computers</b>												
Shipments (K)	.3	.4	.4	.4	.5	.6	.6	.6	.6	.7	12.0%	4.2%
A.S.P. (\$K)	4,432.7	4,655.6	4,732.6	4,806.6	4,412.6	4,621.0	4,838.2	5,014.6	5,299.4	5,465.3	-1%	4.3%
Revenue (\$M)	1,516.0	1,690.0	1,841.0	2,038.0	2,374.0	2,597.0	2,840.0	3,089.0	3,301.0	3,616.0	11.9%	8.6%
I.B. (K)	2.5	2.7	3.0	3.2	3.5	3.7	3.9	4.1	4.3	4.5	8.8%	4.6%
<b>Business Unit Technical Computers</b>												
Shipments (K)	.7	1.4	2.0	2.7	3.1	3.8	4.7	5.7	6.9	8.3	46.6%	21.5%
A.S.P. (\$K)	777.8	564.6	554.8	540.9	603.6	588.5	574.0	559.6	545.5	531.8	-6.1%	-2.5%
Revenue (\$M)	518.0	791.0	1,119.0	1,473.0	1,856.0	2,244.0	2,692.0	3,202.0	3,777.0	4,419.0	37.6%	18.5%
I.B. (K)	1.9	3.3	5.2	7.7	11.1	15.2	20.7	27.3	35.6	45.0	54.8%	31.1%
<b>Large Department Technical Computers</b>												
Shipments (K)	8.2	8.8	9.8	11.0	9.1	9.9	10.8	11.8	12.8	14.0	2.6%	9.0%
A.S.P. (\$K)	195.7	223.9	233.8	271.7	194.1	191.5	188.9	186.4	183.9	181.3	-2%	-1.4%
Revenue (\$M)	1,602.0	1,959.0	2,290.0	2,981.0	1,764.0	1,897.0	2,040.0	2,194.0	2,359.0	2,536.0	2.4%	7.5%
I.B. (K)	34.0	40.4	47.2	54.6	62.7	71.2	80.9	92.4	105.7	120.0	16.6%	13.9%
<b>Small Department Technical Computers</b>												
Shipments (K)	21.2	22.7	21.4	23.0	30.5	33.1	35.5	38.0	40.5	42.5	9.5%	6.5%
A.S.P. (\$K)	56.7	55.5	59.1	55.2	39.6	38.6	37.5	36.2	34.7	33.6	-8.6%	-3.4%
Revenue (\$M)	1,203.0	1,257.0	1,264.0	1,268.0	1,206.0	1,277.0	1,333.0	1,377.0	1,406.0	1,429.0	.1%	2.9%
I.B. (K)	214.4	223.0	228.7	234.4	239.3	245.6	253.2	265.2	278.9	290.0	2.8%	4.2%
<b>Work Group Technical Computers</b>												
Shipments (K)	22.3	25.8	21.5	21.9	22.3	22.8	23.2	23.7	24.2	24.4	.0%	1.8%
A.S.P. (\$K)	25.1	21.4	24.6	20.3	23.0	22.4	21.8	21.2	20.5	19.8	-2.2%	-3.1%
Revenue (\$M)	561.0	552.0	527.0	445.0	513.0	511.0	507.0	502.0	496.0	484.0	-2.2%	-1.3%
I.B. (K)	161.4	168.1	168.3	167.4	167.4	164.4	166.2	168.0	169.8	172.0	.9%	1.1%
<b>Single-User Enhanced Computers:</b>												
Shipments (K)	3.3	7.5	19.1	35.1	62.0	99.1	171.7	268.5	369.9	480.9	108.1%	48.4%
A.S.P. (\$K)	39.9	50.7	39.9	35.5	25.0	19.6	15.3	13.5	11.8	10.1	-11.0%	-15.4%
Revenue (\$M)	132.0	382.0	764.0	1,247.0	1,550.0	1,944.0	2,625.0	3,611.0	4,375.0	4,834.0	85.1%	25.6%
I.B. (K)	67.1	74.5	93.5	128.0	179.7	270.2	426.9	649.4	1,006.2	1,450.0	27.9%	52.2%

Source: Dataquest  
 September 1988

## INTEGRATED OFFICE SYSTEMS SOFTWARE

**INTEGRATED OFFICE SYSTEMS SOFTWARE:** Dataquest defines office systems software as a set of integrated software tools that provide document management, messaging, administrative support, and decision support functions to two or more users. Dataquest segments the office systems software market into two segments as shown below.

**PROPRIETARY OFFICE SYSTEMS SOFTWARE:** Proprietary integrated office systems software includes licensed products that provide a set of integrated software tools. This section includes software that is limited to one manufacturer's hardware.

**UNIX OFFICE SYSTEMS SOFTWARE:** UNIX integrated office systems software includes licensed products that provide a set of integrated software tools. This section includes software that functions on standard UNIX systems.

DATAQUEST CONSOLIDATED DATA BASE  
Integrated Office Systems Software  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Integrated Office Systems Software</b>												
Shipments (K)	1.9	4.7	17.5	33.2	40.1	49.2	58.0	65.5	72.1	79.3	115.7%	12.7%
A.S.P. (\$K)	16.9	18.6	18.5	17.0	15.4	13.7	12.2	11.0	9.4	8.0	-2.2%	-12.5%
Revenue (\$M)	31.2	87.7	323.0	563.0	618.0	673.1	708.8	720.9	680.6	634.5	111.0%	-1.5%
I.B. (K)	3.0	7.7	25.1	58.3	98.4	147.6	205.6	271.1	343.2	422.4	140.1%	30.1%
<b>Proprietary Office Systems Software</b>												
Shipments (K)	1.8	4.3	7.2	13.4	17.3	20.8	23.9	26.3	29.0	31.9	75.5%	11.2%
A.S.P. (\$K)	16.9	19.1	21.5	19.4	17.3	15.7	14.1	12.8	11.0	9.5	.6%	-11.8%
Revenue (\$M)	30.9	81.7	155.1	260.1	300.1	326.8	337.5	337.0	318.6	302.7	76.5%	-1.9%
I.B. (K)	2.9	7.2	14.4	27.8	45.2	66.0	89.9	116.3	145.2	177.1	98.0%	28.0%
<b>UNIX Office Systems Software</b>												
Shipments (K)	.0	.4	10.2	19.8	22.7	28.4	34.1	39.2	43.1	47.4	473.5%	13.7%
A.S.P. (\$K)	14.3	13.6	16.4	15.3	14.0	12.2	10.9	9.8	8.4	7.0	-.5%	-13.0%
Revenue (\$M)	.3	6.0	167.9	302.9	317.9	346.3	371.3	383.9	362.0	331.8	470.5%	-1.1%

Source: Dataquest  
September 1988

## PERSONAL COMPUTER SOFTWARE

**PERSONAL COMPUTER SOFTWARE:** Dataquest defines PC software products as software used to create or support other software products (e.g., operating systems, operating environments, languages, software tools, utilities, and communications products) and application-specific programs. This definition includes bundled and unbundled software. Dataquest segments the PC software market into six primary categories as shown below.

**PC PRODUCTIVITY SOFTWARE:** Productivity software is used as a general tool to increase individual productivity in many areas. It implies a software product that can be used by any person in any occupation in any user environment. Applications include word processing, spreadsheets, desktop publishing, file managers, and e-mail.

**PC BUSINESS SOFTWARE:** Business software is used to manage an organization's money and/or assets. These products perform functions unique to a particular industry, profession, or subject and cover such areas as general ledger, accounts receivable, inventory control, checkbook management, and real estate management.

**PC INSTRUCTIONAL SOFTWARE:** These software programs are used for increasing understanding (either problem solving or self improvement) of a specific subject matter.

**PC SYSTEMS SOFTWARE:** Systems products are used to support or create other software products, such as operating systems, operating environments, languages, software tools, utilities, communications products, and database managers.

**PC ENTERTAINMENT SOFTWARE:** These products are used for amusement or pastime and are not intended to increase productivity or skill.

**PC TECHNICAL/ENGINEERING/SCIENTIFIC SOFTWARE:** These products are used to produce a product or perform scientific/engineering/technical analysis and measurement for an organization.



DATAQUEST CONSOLIDATED DATA BASE  
Personal Computer Software  
United States

	Actual			Estimated						CAGR (%)	CAGR (%)	
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1983-87	1988-92
<b>Personal Computer Software</b>												
Shipments (K)	.0	.0	.0	.0	45,691.0	55,142.0	61,621.0	69,470.0	76,626.0	87,301.0	NA	12.2%
A.S.P. (\$K)	.0	.0	.0	.0	.2	.2	.2	.2	.2	.2	NA	3.0%
Revenue (\$M)	.0	.0	.0	.0	7,394.0	9,268.0	10,715.0	12,650.0	14,182.0	16,515.0	NA	15.5%
<b>PC Productivity Software</b>												
Shipments (K)	.0	.0	.0	.0	10,465.0	13,324.0	15,648.0	18,732.0	21,696.0	26,034.0	NA	18.2%
A.S.P. (\$K)	.0	.0	.0	.0	.2	.3	.3	.3	.3	.3	NA	1.8%
Revenue (\$M)	.0	.0	.0	.0	2,603.0	3,427.0	4,107.0	5,071.0	5,927.0	7,177.0	NA	20.3%
<b>PC Business Software</b>												
Shipments (K)	.0	.0	.0	.0	2,370.0	2,810.0	3,114.0	3,489.0	3,835.0	4,358.0	NA	11.6%
A.S.P. (\$K)	.0	.0	.0	.0	.5	.5	.5	.5	.5	.5	NA	.8%
Revenue (\$M)	.0	.0	.0	.0	1,119.0	1,361.0	1,510.0	1,736.0	1,905.0	2,183.0	NA	12.5%
<b>PC Instructional Software</b>												
Shipments (K)	.0	.0	.0	.0	5,315.0	6,091.0	6,398.0	6,623.0	6,894.0	7,295.0	NA	4.6%
A.S.P. (\$K)	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	NA	.7%
Revenue (\$M)	.0	.0	.0	.0	296.0	342.0	361.0	378.0	395.0	422.0	NA	5.4%
<b>PC System Software</b>												
Shipments (K)	.0	.0	.0	.0	20,426.0	24,742.0	27,544.0	31,152.0	34,093.0	38,689.0	NA	11.8%
A.S.P. (\$K)	.0	.0	.0	.0	.1	.1	.2	.2	.2	.2	NA	1.4%
Revenue (\$M)	.0	.0	.0	.0	2,986.0	3,678.0	4,233.0	4,912.0	5,361.0	6,077.0	NA	13.4%
<b>PC Entertainment Software</b>												
Shipments (K)	.0	.0	.0	.0	6,507.0	7,433.0	8,107.0	8,555.0	9,116.0	9,805.0	NA	7.2%
A.S.P. (\$K)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	NA	.0%
Revenue (\$M)	.0	.0	.0	.0	228.0	260.0	284.0	299.0	319.0	343.0	NA	7.2%
<b>PC Technical/Engineering/Scientific Software</b>												
Shipments (K)	.0	.0	.0	.0	608.0	742.0	810.0	919.0	992.0	1,120.0	NA	10.8%
A.S.P. (\$K)	.0	.0	.0	.0	.3	.3	.3	.3	.3	.3	NA	.9%
Revenue (\$M)	.0	.0	.0	.0	162.0	200.0	220.0	254.0	275.0	313.0	NA	11.8%

Source: Dataquest  
September 1988

## TELECOMMUNICATIONS EQUIPMENT AND SERVICES

**TELECOMMUNICATIONS:** Dataquest defines telecommunications as products and services that provide or manage the flow of information from person to person, person to machine, machine to person, or machine to machine. Dataquest segments the telecommunications market into a combination of the premises and public telecommunications market segments.

**PREMISES TELECOMMUNICATIONS EQUIPMENT:** Premises telecommunications includes the transmission and switching equipment used by end users in implementing premises voice and data networks. This market analysis is a combination of the following segments: data communications equipment, premises switching equipment, call processing equipment, desktop terminal equipment, and image processing equipment.

**DATA COMMUNICATIONS EQUIPMENT:** Data communications equipment includes equipment used for data communications. This market analysis is a combination of the following segments: modems, statistical multiplexers, T-1 multiplexers, front-end processors, data PBX systems, data network management systems, DSU/CSU equipment, local area networks, and private packet data switching equipment.

**MODEMS:** Modems are electronic devices that provide modulation and demodulation functions of transmitted data signals over telephone lines, and convert digital data signals to analog for transmission over leased lines or the analog public switched telephone network. This market analysis is a combination of the data terminal, high-speed, and personal computer modem segments.

**STATISTICAL MULTIPLEXERS:** Statistical multiplexers are electronic devices that consolidate several data streams onto a single high-speed telephone line.

**T-1 MULTIPLEXERS:** A T-1 multiplexer is an electronic device that consolidates or pools multiple data streams onto a single high-speed T-1 data line. A T-1 line operates at 1.544 Mbits/sec and allows multiplexing of 24 64-Kbit/sec channels on a single line. T-1 multiplexers are synonymous with the telephone company term "DS-1 Facility."

**FRONT-END PROCESSORS:** Front-end processors are computer-based products expressly designed to relieve host computers of certain communications processing tasks. Included are remote concentrators that are not attached directly to a host computer. This segment does not include general-purpose computer systems functioning as front-end processors.

**DATA PBX SYSTEMS:** Data PBX systems are digital private branch exchange systems that allow terminals to switch and contend for computer ports by providing RS-232-C connections; they do not provide voice switching. This market analysis includes revenue from both data PBX base units and add-on channels.

**DATA NETWORK MANAGEMENT SYSTEMS:** Data network management systems are products or devices that diagnose, isolate, reinstate, or accumulate information for network components or provide reports and analysis of network performance.

**DSU/CSU:** Data service units (DSUs) and channel service units (CSUs) provide an interface to digital services such as the Bell Dataphone Service (BDS).

**LOCAL AREA NETWORKS:** Local area networks are the hardware and software that enable connection of a device to a cable-based network system that serves a building or a campus environment. Excluded are connections that are point-to-point, or go through PBXs or data PBXs. This market analysis is a combination of the local area network computer system, terminal, personal computer, office workstation, CAE, and special connection segments.

**PRIVATE PACKET DATA SWITCHING:** Private packet data network switches connect terminals and PADs to a packet node utilizing a high-speed link (56,000 bps).

**PREMISES SWITCHING EQUIPMENT:** Switching equipment includes voice equipment that provide switching or call routing functions. This market analysis is a combination of PBX telephone systems, centrex connections, and key telephone systems.

**PBX TELEPHONE SYSTEMS:** Private branch exchange systems are customer premises telephone switching systems that, by dialing an access code, permits a telephone to interface to the public telephone central exchange or office. This market analysis is a combination of all line-size segments for PBX systems.

**CENTREX CONNECTIONS:** Centrex connections are central office-based communications systems serving multiple end users. Centrex connections are provided by the local telephone utility on a rental-only basis. This market analysis is a combination of all line-size segments for centrex connections.

**KEY TELEPHONE SYSTEMS:** Key telephone systems are customer premises telephone switching systems that allow telephones to interface to the public telephone central exchange or office without using an access code. This market analysis is a combination of the electromechanical 1A2 and electronic segments; it is also a combination of all the key telephone system line-size segments.

**CALL PROCESSING EQUIPMENT:** Call processing equipment provide additional functions and capabilities beyond traditional call processing. This market analysis is a combination of the following segments: voice messaging systems, call accounting/station message detail recording, and automatic call distributors.

**VOICE MESSAGING SYSTEMS:** Voice messaging systems are computer-based systems that enable flexible, nonsimultaneous voice communications. This definition does not include personal computer board-level products.

**CALL ACCOUNTING/SMDR:** Call accounting/station message detail recording is the equipment and service that records the calling activity of a centrex, PBX, or key telephone system in order to generate reports that support telephone cost allocation and other telephone management information needs.

**AUTOMATIC CALL DISTRIBUTORS:** Automatic call distributors are customer premises, computer-based systems that provide real-time monitoring of the telephone system work load, distribute calls to the agent who is idle the longest, and employ a queuing or waiting list assignment to manage telephone system traffic.

**DESKTOP TERMINAL EQUIPMENT:** Desktop terminal equipment is the telecommunications equipment that is actually used on a desktop. This segment includes single-line business telephone equipment and integrated voice/data workstations.

**SINGLE-LINE BUSINESS TELEPHONES:** Single-line telephone sets are non-electronic terminals or handsets used for voice communications. A single-line telephone functions as an interface between a user and a telephone switching system. This market analysis includes business telephones sets.

**INTEGRATED VOICE/DATA WRKSTNS:** Integrated voice/data workstations are desktop or board-level devices that integrate the functionality of a telephone and a terminal, or a telephone and a personal computer. This integrated functionality includes, at a minimum, simultaneous voice and data transmission. This market analysis is a combination of the asynchronous, synchronous, and personal computer integrated voice/data workstation segments, plus the integrated voice/data add-on segment.

**IMAGE PROCESSING EQUIPMENT:** Image processing equipment includes equipment used in a business or residence for image processing. This market analysis is a combination of facsimile equipment and video teleconferencing.

**FACSIMILE EQUIPMENT:** Dataquest defines a facsimile machine as an electronic photocopy machine that uses telephone lines to transmit documents to and receive documents from a second facsimile machine. These devices include document scanners, telephone modems, and paper printers. This market analysis is a combination of the Groups I, II, III, and IV facsimile machine segments.

**VIDEO TELECONFERENCING:** Video teleconferencing is the equipment and service related to one-way and two-way video communications that use specialized video equipment and/or transmission networks. These communications enable conferencing between locations.

**PUBLIC TELECOMMUNICATIONS:** Public telecommunications are public network services and equipment. This includes the various voice and data communications provided by common carriers and the transmission and switching equipment used to implement these networks. This market analysis combines the transmission equipment, switching equipment, public telephone equipment, public telecommunications services, and cellular mobile radio segments.

**TRANSMISSION EQUIPMENT:** Transmission equipment is the equipment used in public telecommunications to transmit voice and data signals. This market analysis is a combination of the following segments: multiplex equipment, carrier equipment, microwave radio equipment, and satellite earth station equipment.

**MULTIPLEX EQUIPMENT:** Multiplex equipment is used in public telecommunications to combine a number of voice frequency message channels for transmission over a common medium, such as satellite, microwave radio, cable carrier, or fiber-optic cable. Excluded from this definition are data-only customer premises multiplex equipment and multiplex equipment that is integral to carrier or microwave radio systems.

**CARRIER SYSTEMS:** Carrier systems are cable-based systems that provide transmission of multiple voice frequency signals over a common cable. This segment includes both subscriber carrier systems and trunk carrier systems.

**MICROWAVE RADIO EQUIPMENT:** Microwave radio equipment includes transmitter/receiver systems, power supplies, repeaters, and other equipment used in microwave radio systems. This segment includes both analog and digital equipment used in both public and common carrier and private industrial systems.

**SATELLITE EARTH STATION EQUIPMENT:** Satellite earth station equipment is the very small aperture terminal (VSAT) segment of the total earth-based equipment used in connection with orbiting, geostationary satellites. It includes antennae and electronic transmitting/receiving terminals. This market analysis is a combination of data broadcast, human/computer, and multiapplication segments.

**PUBLIC SWITCHING EQUIPMENT:** Switching equipment is used in public telecommunications to switch or route voice and data calls. This market analysis is a combination of digital central office switching equipment and cellular base station switching equipment.

**DIGITAL CENTRAL OFFICE SWITCHING EQUIPMENT:** Digital central office switching equipment comprises electronic systems that interconnect local telephone lines (loops) and connect local telephone lines to long distance trunk lines. This definition includes equipment used by both the Bell operating companies and the independent telephone companies.

**CELLULAR BASE STATION SWITCHING EQUIPMENT:** Cellular base station switching equipment is the base/centralized station equipment associated with cellular mobile radio systems.

**PUBLIC TELEPHONE EQUIPMENT:** Public telephone equipment includes terminal equipment typically provided by the local public utility to the general public. This market analysis includes residential and cellular telephone handsets.

**SINGLE-LINE RESIDENTIAL TELEPHONES:** Single-line telephone sets are nonelectronic terminals or handsets used for voice communications. A single-line telephone functions as an interface between a user and a telephone switching system. This market analysis includes residential telephones sets.

**CELLULAR TELEPHONES:** Cellular telephone equipment is the mobile radio equipment associated with cellular mobile radio systems.

**PUBLIC TELECOMMUNICATIONS SERVICES:** Public telecommunications services are services provided by the public telecommunications sector. This market analysis is a combination of the following segments: local telephone services, long distance telephone services, and public data network services.

**LOCAL TELEPHONE SERVICES:** Local telephone services are the service and equipment charges, messages unit charges, public coin telephone service charges, private line service charges, and local revenue from toll charges.

**LONG DISTANCE TELEPHONE SERVICES:** Long distance telephone services are the charges made by all long distance carriers for interstate and intrastate long distance telephone service.

**PUBLIC DATA NETWORK SERVICES:** Public data network services are the equipment and service charges associated with data communications networks that are offered to the general public. These networks connect user terminals and computers to the network. They may offer enhanced or value-added services, such as conversion of speeds, codes, or protocols; electronic mail; or facsimile.

**CELLULAR MOBILE RADIO:** Cellular mobile radio is the services or network revenue associated with cellular mobile radio systems.

DATAQUEST CONSOLIDATED DATA BASE  
Telecommunications Equipment and Services  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Telecommunications Equipment and Services</b>											3.3%	3.9%
Revenue (\$M)	128,005.7	126,431.5	135,123.4	141,551.3	146,005.5	151,245.0	156,916.1	163,148.5	169,564.3	176,586.3		
<b>Premises Telecommunications Equipment</b>											9.6%	8.6%
Revenue (\$M)	9,483.7	11,034.1	11,890.0	12,463.1	13,684.0	15,424.6	17,364.7	18,904.9	20,231.7	21,433.0		
<b>Data Communications Equipment</b>											27.2%	12.7%
Revenue (\$M)	1,920.8	2,786.8	3,431.1	4,102.1	5,025.4	6,177.8	7,453.8	8,368.1	9,166.6	9,963.2		
<b>Modems</b>											29.1%	12.0%
Shipments (K)	777.2	1,065.4	1,329.1	1,643.7	2,157.0	2,429.5	2,779.0	3,150.9	3,510.1	3,824.2	-15.5%	-18.6%
A.S.P. (\$K)	1.2	1.0	.9	.8	.6	.5	.4	.4	.3	.2	9.1%	-8.8%
Revenue (\$M)	917.6	1,047.1	1,166.6	1,242.5	1,299.9	1,268.6	1,238.2	1,138.8	1,009.7	878.8	16.7%	13.8%
I.B. (K)	6,307.7	7,300.1	8,518.5	10,015.9	11,684.2	13,660.7	15,636.4	17,843.9	20,267.8	22,876.2		
<b>Statistical Multiplexers</b>											14.5%	2.5%
Shipments (K)	50.0	68.2	73.5	84.7	85.8	88.7	91.9	94.7	96.9	98.0	-7.4%	-7.2%
A.S.P. (\$K)	4.9	4.2	4.1	3.8	3.6	3.4	3.1	2.9	2.7	2.5	6.0%	-4.9%
Revenue (\$M)	245.0	288.7	303.3	319.3	309.0	299.0	289.0	270.0	257.9	245.0	64.0%	15.9%
I.B. (K)	50.0	118.2	191.7	276.4	362.1	450.3	540.7	631.9	722.8	812.7		
<b>T-1 Multiplexers</b>											59.5%	19.7%
Shipments (K)	1.3	2.5	5.9	9.7	8.4	10.6	16.0	16.0	19.4	21.7	12.3%	-2.7%
A.S.P. (\$K)	23.1	24.0	27.0	30.0	36.7	38.0	31.3	37.5	35.0	34.0	79.1%	16.4%
Revenue (\$M)	30.0	60.9	157.9	292.0	308.8	403.0	500.0	600.0	680.0	739.4	114.6%	29.1%
I.B. (K)	1.3	3.8	9.7	19.3	27.6	38.0	53.4	68.2	85.9	105.6		
<b>Front-End Processors</b>											10.2%	7.9%
Shipments (K)	3.7	4.1	4.5	5.0	5.5	6.1	6.6	7.2	7.7	8.2	.5%	-1.8%
A.S.P. (\$K)	102.0	103.0	104.0	105.0	104.0	102.0	100.0	98.0	96.0	95.0	10.8%	6.0%
Revenue (\$M)	381.5	424.9	472.3	526.0	574.1	617.7	661.3	703.1	740.5	780.4	17.7%	12.6%
I.B. (K)	19.2	23.2	27.4	31.9	36.9	42.4	48.3	54.5	61.1	68.1		
<b>Data PBX Systems</b>											-3.1%	-4.2%
Shipments (K)	1.0	1.0	.9	.9	.9	.8	.8	.8	.8	.7	4.7%	.9%
A.S.P. (\$K)	79.0	125.3	156.3	97.3	95.0	96.4	97.9	98.3	99.3	100.0	1.5%	-3.3%
Revenue (\$M)	77.0	119.0	143.0	85.6	81.8	80.0	78.3	76.2	74.5	70.0	30.0%	9.5%
I.B. (K)	1.9	2.8	3.7	4.6	5.4	6.2	6.9	7.7	8.3	8.9		
<b>Data Network Management Systems</b>											NA	13.8%
Revenue (\$M)	.0	302.2	320.9	375.7	409.6	457.1	530.0	600.0	680.0	767.4		

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DATAQUEST CONSOLIDATED DATA BASE  
Telecommunications Equipment and Services  
United States

	Actual					Estimated					CAGR (%)	CAGR (%)
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1983-87	1988-92
<b>DSU/CSU</b>												
Shipments (K)	36.3	73.5	90.0	106.9	125.1	153.1	189.7	222.9	261.0	313.8	36.3%	19.7%
A.S.P. (\$K)	1.0	1.0	.8	.8	.8	.8	.8	.8	.7	.7	-5.6%	-3.9%
Revenue (\$M)	36.1	70.1	72.3	85.9	99.0	121.9	147.0	170.0	194.0	213.4	28.7%	15.0%
I.B. (K)	78.3	151.8	241.8	348.7	473.7	625.3	811.8	1,030.2	1,285.4	1,591.3	56.8%	26.3%
<b>Local Area Networks</b>												
Shipments (K)	150.0	340.0	690.0	1,160.0	2,100.0	3,453.0	5,132.0	6,602.0	7,874.0	9,180.0	93.4%	27.7%
A.S.P. (\$K)	1.0	1.0	.9	.8	.8	.7	.7	.7	.6	.6	-6.1%	-4.3%
Revenue (\$M)	150.0	326.0	593.0	913.0	1,630.0	2,580.0	3,620.0	4,380.0	5,060.0	5,760.0	81.6%	22.2%
I.B. (K)	333.0	671.0	1,355.0	2,500.0	4,540.0	7,908.0	12,910.0	19,332.0	26,986.0	35,876.0	92.2%	45.9%
<b>Private Packet Data Switching</b>												
Revenue (\$M)	83.6	147.9	201.8	262.1	313.2	350.5	390.0	430.0	470.0	508.8	39.1%	9.8%
<b>Premises Switching Equipment</b>												
Revenue (\$M)	6,482.5	7,099.9	6,932.7	6,883.4	6,658.7	6,651.6	6,690.2	6,766.8	6,886.1	7,066.0	.7%	1.5%
<b>PBX Systems</b>												
Shipments (K)	26.9	28.1	29.5	32.8	29.9	30.8	32.0	33.6	35.2	36.8	2.7%	4.6%
A.S.P. (\$K)	104.3	109.7	106.9	96.2	103.8	100.7	96.4	91.4	87.7	85.4	-1%	-4.0%
Revenue (\$M)	2,808.0	3,086.0	3,151.0	3,155.0	3,103.0	3,101.0	3,086.0	3,072.0	3,088.0	3,143.0	2.5%	.3%
I.B. (K)	185.0	193.5	202.3	213.3	220.9	229.3	238.3	248.1	258.6	269.8	4.5%	4.2%
<b>Centrex Connections</b>												
Shipments (K)	930.0	774.0	685.0	621.0	922.0	997.0	1,090.0	1,137.0	1,190.0	1,262.0	-.2%	6.1%
A.S.P. (\$K)	1.5	1.8	1.9	1.5	1.4	1.3	1.2	1.2	1.2	1.2	-2.7%	-1.8%
Revenue (\$M)	1,427.0	1,379.0	1,291.0	1,268.0	1,267.0	1,294.0	1,336.0	1,389.0	1,452.0	1,523.0	-2.9%	4.2%
I.B. (K)	6,467.0	6,479.0	6,309.0	6,349.0	6,538.0	6,830.0	7,190.0	7,580.0	8,017.0	8,497.0	.3%	5.6%
<b>Key Telephone Systems</b>												
Shipments (K)	444.6	512.3	491.4	498.9	481.0	499.7	523.3	545.8	567.4	589.7	2.0%	4.2%
A.S.P. (\$K)	5.1	5.1	5.1	4.9	4.8	4.5	4.3	4.2	4.1	4.1	-1.5%	-2.6%
Revenue (\$M)	2,247.5	2,634.9	2,490.7	2,460.4	2,288.7	2,256.6	2,268.2	2,305.8	2,346.1	2,400.0	.5%	1.6%
I.B. (K)	4,256.4	4,395.6	4,535.2	4,671.4	4,812.5	4,953.9	5,099.2	5,248.3	5,403.7	5,565.5	3.1%	3.0%
<b>Call Processing Equipment</b>												
Revenue (\$M)	438.2	515.2	570.2	652.4	835.8	1,093.3	1,363.9	1,571.2	1,696.1	1,767.8	17.5%	12.8%

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**DATAQUEST CONSOLIDATED DATA BASE**  
**Telecommunications Equipment and Services**  
**United States**

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Voice Messaging Systems</b>												
Shipments (K)	.1	.5	1.0	2.0	7.0	14.5	24.0	32.1	39.7	45.2	173.0%	32.9%
A.S.P. (\$K)	289.7	174.5	112.1	83.9	44.0	35.4	30.6	28.0	24.6	22.0	-37.6%	-11.1%
Revenue (\$M)	36.5	82.2	117.1	172.0	307.8	512.7	734.1	897.4	975.6	996.3	70.4%	18.1%
I.B. (K)	.2	.6	1.6	3.4	9.9	22.6	42.0	65.1	90.3	114.3	166.3%	50.0%
<b>Call Accounting/SMDR Systems</b>												
Revenue (\$M)	195.1	208.9	231.1	247.1	263.0	281.2	295.8	310.0	323.0	334.5	7.8%	4.4%
<b>Automatic Call Distributors</b>												
Shipments (K)	1.1	1.6	1.8	2.8	3.2	3.7	4.4	5.1	5.9	6.7	31.7%	16.0%
A.S.P. (\$K)	194.0	141.4	122.3	83.5	82.8	80.9	75.9	71.3	67.4	65.2	-19.2%	-5.2%
Revenue (\$M)	206.6	224.1	222.0	233.3	265.0	299.4	334.0	363.8	397.5	437.0	6.4%	9.9%
I.B. (K)	4.0	5.5	7.2	9.9	12.7	15.9	19.4	23.2	27.5	32.2	33.8%	19.3%
<b>Desktop Terminal Equipment</b>												
Revenue (\$M)	325.9	291.6	344.0	217.4	195.6	196.9	189.5	176.9	177.4	176.0	-12.0%	-2.8%
<b>Single Line Business Telephones</b>												
Shipments (K)	3,800.0	3,600.0	3,400.0	3,400.0	3,200.0	3,200.0	3,000.0	2,800.0	2,600.0	2,400.0	-4.2%	-6.9%
A.S.P. (\$K)	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	-14.5%	.3%
Revenue (\$M)	285.0	216.0	170.0	153.0	128.0	124.0	111.0	98.0	96.2	94.0	-18.1%	-6.7%
I.B. (K)	39,500.0	39,400.0	38,900.0	38,400.0	37,600.0	36,700.0	35,500.0	34,100.0	32,400.0	31,000.0	-1.2%	-4.1%
<b>Integrated Voice/Data Workstations</b>												
Shipments (K)	30.0	55.9	96.4	42.9	48.2	55.4	61.0	63.4	65.9	68.0	12.6%	5.3%
A.S.P. (\$K)	1.4	1.4	1.8	1.5	1.4	1.3	1.3	1.2	1.2	1.2	.7%	-2.2%
Revenue (\$M)	40.9	75.6	174.0	64.4	67.6	72.9	78.5	78.9	81.2	82.0	13.4%	3.0%
I.B. (K)	30.0	84.8	178.6	212.7	250.8	293.8	337.0	376.8	415.3	455.0	70.0%	11.6%
<b>Image Processing Equipment</b>												
Revenue (\$M)	316.3	340.6	612.0	607.8	968.5	1,305.0	1,667.3	2,021.9	2,305.5	2,460.0	32.3%	17.2%
<b>Facsimile Machines</b>												
Shipments (K)	75.4	89.0	156.8	187.5	329.0	493.0	690.0	897.0	1,076.4	1,230.8	44.5%	25.7%
A.S.P. (\$K)	4.2	3.8	3.2	2.5	2.3	2.1	1.9	1.7	1.5	1.4	-13.5%	-9.3%
Revenue (\$M)	316.3	340.6	497.0	467.8	771.5	1,040.5	1,310.3	1,532.9	1,655.5	1,760.0	25.0%	14.0%
I.B. (K)	322.2	356.2	415.6	507.5	635.5	808.4	1,035.2	1,302.7	1,617.2	1,092.7	18.5%	7.8%
<b>Video Teleconferencing</b>												
Revenue (\$M)	.0	.0	115.0	140.0	197.0	264.5	357.0	489.0	650.0	700.0	NA	27.5%
<b>Public Telecommunications</b>												
Revenue (\$M)	118,522.0	115,397.4	123,233.4	129,088.2	132,321.5	135,820.4	139,551.4	144,243.6	149,332.6	155,153.3	2.8%	3.4%

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DATAQUEST CONSOLIDATED DATA BASE  
Telecommunications Equipment and Services  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Transmission Equipment</b>												
Revenue (\$M)	2,188.0	2,484.7	2,785.5	2,990.6	3,014.4	3,295.8	3,464.3	3,692.0	3,905.6	4,330.3	8.3%	7.1%
<b>Multiplex Equipment</b>												
Revenue (\$M)	658.0	727.0	812.0	912.0	942.0	975.0	975.0	956.0	938.0	932.0	9.4%	-1.1%
<b>Carrier Systems</b>												
Revenue (\$M)	1,088.0	1,217.0	1,372.0	1,431.0	1,498.0	1,689.0	1,814.0	1,992.0	2,165.0	2,390.0	8.3%	9.1%
<b>Microwave Radio Equipment</b>												
Revenue (\$M)	442.0	481.0	528.0	585.0	482.4	480.4	482.0	492.0	502.0	515.0	2.2%	1.8%
<b>Satellite Earth Station Equipment</b>												
Revenue (\$M)	.0	59.7	73.5	62.6	92.0	151.4	193.3	252.0	300.6	493.3	NA	34.4%
<b>Public Switching Equipment</b>												
Revenue (\$M)	1,018.0	1,970.0	3,094.0	3,204.0	3,385.0	3,440.0	3,430.0	3,580.0	3,720.0	3,813.0	35.0%	2.6%
<b>Digital Central Office Switching Equipment</b>												
Shipments (K)	3,647.0	7,610.0	13,289.0	14,000.0	14,500.0	14,000.0	13,600.0	13,800.0	14,000.0	14,500.0	41.2%	.9%
A.S.P. (\$K)	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2	-6.0%	1.6%
Revenue (\$M)	912.0	1,690.0	2,724.0	2,800.0	2,830.0	2,690.0	2,650.0	2,760.0	2,860.0	2,973.0	32.7%	2.5%
I.B. (K)	5,540.0	11,200.0	21,100.0	34,800.0	49,100.0	63,300.0	77,100.0	90,800.0	104,700.0	113,800.0	72.5%	15.8%
<b>Cellular Base Station Switching Equipment</b>												
Revenue (\$M)	106.0	280.0	370.0	404.0	555.0	750.0	780.0	820.0	860.0	840.0	51.3%	2.9%
<b>Public Telephone Equipment</b>												
Revenue (\$M)	1,221.0	1,715.2	1,876.0	2,034.0	2,392.0	2,393.0	2,420.0	2,310.0	2,311.0	2,210.0	18.3%	-2.0%
<b>Single Line Residential Telephones</b>												
Shipments (K)	19,900.0	27,400.0	37,300.0	28,200.0	30,000.0	30,100.0	29,900.0	30,000.0	29,800.0	29,500.0	10.8%	-.5%
A.S.P. (\$K)	.1	.1	.0	.1	.1	.1	.1	.1	.1	.1	1.9%	-2.3%
Revenue (\$M)	1,200.0	1,600.0	1,700.0	1,800.0	1,950.0	1,900.0	1,900.0	1,800.0	1,800.0	1,700.0	12.9%	-2.7%
I.B. (K)	167,700.0	178,400.0	185,100.0	189,700.0	194,300.0	197,100.0	198,500.0	199,000.0	197,300.0	196,000.0	3.7%	-.1%
<b>Cellular Telephones</b>												
Shipments (K)	7.0	72.0	160.0	260.0	590.0	705.0	800.0	880.0	930.0	980.0	203.0%	8.6%
A.S.P. (\$K)	3.0	1.6	1.1	.9	.7	.7	.7	.6	.5	.5	-29.3%	-7.1%
Revenue (\$M)	21.0	115.2	176.0	234.0	442.0	493.0	520.0	510.0	511.0	510.0	114.2%	.9%
I.B. (K)	7.0	79.0	239.0	499.0	1,089.0	1,785.0	2,575.0	3,395.0	4,225.0	5,055.0	253.2%	29.7%
<b>Public Telecommunications Services</b>												
Revenue (\$M)	114,095.0	109,153.5	115,221.9	120,259.6	122,105.1	124,341.6	126,867.1	129,981.6	133,596.0	138,210.0	1.7%	2.7%

DATAQUEST CONSOLIDATED DATA BASE  
Telecommunications Equipment and Services  
United States

	Actual			Estimated						CAGR (%) 1983-87	CAGR (%) 1988-92	
	1983	1984	1985	1986	1987	1988	1989	1990	1991			1992
<b>Local Telephone Services</b>												
Revenue (\$M)	76,200.0	69,100.0	72,700.0	75,900.0	77,900.0	79,500.0	81,600.0	84,200.0	86,900.0	90,200.0	.6%	3.2%
<b>Long Distance Telephone Services</b>												
Revenue (\$M)	37,700.0	39,800.0	42,200.0	44,000.0	43,800.0	44,400.0	44,800.0	45,300.0	46,200.0	47,500.0	3.8%	1.7%
<b>Public Data Network Services</b>												
Revenue (\$M)	195.0	253.5	321.9	359.6	405.1	441.6	467.1	481.6	496.0	510.0	20.1%	3.7%
<b>Cellular Mobile Radio Services</b>												
Revenue (\$M)	.0	74.0	256.0	600.0	1,425.0	2,350.0	3,370.0	4,680.0	5,800.0	6,590.0	NA	29.4%

Source: Dataquest  
September 1988

## ALPHANUMERIC DISPLAY TERMINALS

**ALPHANUMERIC DISPLAY TERMINALS:** Dataquest defines an alphanumeric display terminal as a display terminal that provides character information to the human operator. Dataquest segments the various alphanumeric display terminals into five market segments based on the type of host supported, as shown below.

**MINICOMPUTER-BASED TERMINALS:** A minicomputer-based terminal is a display terminal supplied by and primarily attached to minicomputers that are manufactured by the same vendor. The segment also includes other vendors' terminals that are protocol-specific to IBM's S/3X computers, along with clustered, distributed processing terminals.

**NON-IBM, PROTOCOL-SPECIFIC TERMINALS:** A non-IBM host, protocol-specific alphanumeric display terminal is protocol-specific to Honeywell or Unisys computer systems.

**IBM 3270-COMPATIBLE TERMINALS:** An IBM 3270 alphanumeric display terminal is an editing terminal that operates in block mode but is protocol-specific to IBM 3270-type systems. This segment includes all IBM 3270 and 3270-compatible terminals produced by other manufacturers. This segment also includes products that are directly plug-compatible with the IBM 3270 and products that incorporate software emulation of the 3270 protocol. Not included are devices connected through protocol converters.

**NONHOST-SPECIFIC TERMINALS:** A nonhost specific terminal is a display terminal that is not protocol specific. Although these terminals typically are manufactured by independent vendors that do not provide mainframe or minicomputer systems, mainframe and minicomputer manufacturers recently entered this segment and are included, if appropriate. These terminals generally support ASCII or ANSI standards.

**PROCESSING TERMINALS:** A processing terminal is a display terminal that has local processing capabilities through the use of a microprocessor. These terminals do not have a mass storage device; they must communicate with a file server, controller, or computer where files and applications are retained.



# *Peripherals*

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DATAQUEST CONSOLIDATED DATA BASE  
Alphanumeric Display Terminals  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Alphanumeric Display Terminals</b>												
Shipments (K)	1,806.2	2,251.8	2,354.4	2,441.9	2,765.7	3,016.5	3,290.5	3,646.4	4,108.7	4,464.0	11.2%	10.3%
A.S.P. (\$K)	2.1	1.9	1.5	1.2	1.1	.9	.8	.8	.7	.6	-15.7%	-10.1%
Revenue (\$M)	3,869.4	4,279.0	3,604.1	3,022.2	2,985.5	2,803.8	2,688.3	2,756.6	2,768.2	2,715.3	-6.3%	-8%
I.B. (K)	7,011.4	8,595.4	10,211.9	11,858.2	13,597.0	15,086.5	16,383.0	17,480.4	18,515.1	19,449.1	18.0%	6.6%
<b>Minicomputer-Based Terminals</b>												
Shipments (K)	532.5	660.1	654.1	705.7	785.1	841.5	885.3	922.5	952.1	922.1	10.2%	2.3%
A.S.P. (\$K)	3.4	3.1	1.9	1.5	1.2	.9	.8	.7	.6	.5	-23.4%	-13.7%
Revenue (\$M)	1,836.7	2,034.3	1,251.2	1,025.3	934.7	756.9	708.0	645.7	571.2	461.0	-15.5%	-11.7%
I.B. (K)	2,193.4	2,641.8	3,087.3	3,481.0	3,885.3	4,246.8	4,532.1	4,704.6	4,756.7	4,528.8	15.4%	1.6%
<b>Non-IBM, Protocol-Specific Terminals</b>												
Shipments (K)	103.7	119.6	89.9	64.1	88.1	80.0	60.0	52.0	42.0	30.0	-4.0%	-21.7%
A.S.P. (\$K)	2.1	2.1	1.9	1.5	1.3	1.2	1.0	.9	.8	.7	-10.4%	-13.0%
Revenue (\$M)	215.4	252.8	172.1	96.9	118.0	93.2	60.8	45.9	32.2	20.0	-14.0%	-31.9%
I.B. (K)	461.2	549.3	604.2	628.3	662.8	692.8	697.8	698.8	661.8	606.8	9.5%	-3.3%
<b>IBM 3270-Compatible Terminals</b>												
Shipments (K)	547.5	687.6	740.4	690.4	750.6	815.0	880.0	941.8	950.0	902.1	8.2%	2.6%
A.S.P. (\$K)	2.1	1.9	2.0	1.8	1.6	1.5	1.3	1.2	1.0	.8	-6.7%	-13.3%
Revenue (\$M)	1,162.8	1,303.1	1,495.4	1,262.0	1,208.2	1,222.5	1,146.6	1,111.3	902.5	765.0	1.0%	-11.1%
I.B. (K)	2,208.9	2,663.0	3,132.5	3,702.4	4,273.0	4,638.0	4,868.0	4,959.8	4,834.8	4,586.9	17.9%	-3%
<b>Nonhost-Specific Terminals</b>												
Shipments (K)	622.5	782.5	865.6	975.1	1,116.6	1,228.3	1,350.0	1,425.0	1,525.0	1,600.0	15.7%	6.8%
A.S.P. (\$K)	1.1	.9	.8	.6	.6	.5	.5	.4	.3	.3	-12.6%	-13.9%
Revenue (\$M)	654.5	685.6	678.1	623.9	684.0	648.5	612.9	557.2	513.9	464.0	1.1%	-8.0%
I.B. (K)	2,147.9	2,739.3	3,381.5	4,033.5	4,738.6	5,421.9	6,086.9	6,621.9	7,146.9	7,646.9	21.9%	9.0%
<b>Processing Terminals</b>												
Shipments (K)	.0	2.0	4.4	6.6	25.3	51.7	115.2	305.1	639.6	1,009.8	NA	110.2%
A.S.P. (\$K)	.0	1.6	1.7	2.1	1.6	1.6	1.4	1.3	1.2	1.0	NA	-11.2%
Revenue (\$M)	.0	3.2	7.3	14.1	40.6	82.7	160.0	396.5	748.3	1,005.3	NA	86.7%
I.B. (K)	.0	2.0	6.4	13.0	37.3	87.0	198.2	495.3	1,114.9	2,079.7	NA	121.1%

Source: Dataquest  
September 1988

## COMPUTER STORAGE DEVICES

**COMPUTER STORAGE DEVICES:** Dataquest defines computer storage as the products used for mass storage of digital computer data. Dataquest segments the computer storage market into four primary market segments based on general product categories, as shown below.

**RIGID DISK DRIVES:** Rigid disk drives are magnetic mass storage devices that offer high-density, noncontact recording to a rigid disk platter. This market analysis is a combination of rigid disk drives for the following platter diameters:

**3- TO 4-INCH RIGID DISK DRIVES:** The 3- to 4-inch rigid disk drive market includes drives that use disk platters in this diameter range.

**5.25-INCH RIGID DISK DRIVES:** The 5.25-inch rigid disk drive market includes drives that use disk platters with this diameter.

**8- TO 10.5-INCH RIGID DISK DRIVES:** The 8- to 10.5-inch rigid disk drive market includes drives that use disk platters in this diameter range.

**14-INCH RIGID DISK DRIVES:** The 14-inch rigid disk drive market includes drives that use disk platters with this diameter.

**FLEXIBLE DISK DRIVES:** Flexible disk drives are magnetic mass storage devices that offer low-density, contact recording to a flexible diskette. This market analysis is a combination of flexible disk drives for the following diameters:

**3.5-INCH FLEXIBLE DISK DRIVES:** The 3.5-inch flexible disk drive market includes drives that use diskettes with this diameter.

**5.25-INCH FLEXIBLE DISK DRIVES:** The 5.25-inch flexible disk drive market includes drives that use diskettes with this diameter.

**8-INCH FLEXIBLE DISK DRIVES:** The 8-inch flexible disk drive market includes drives that use diskettes with this diameter.

**TAPE DRIVES:** Tape drives are magnetic mass storage devices that offer serial magnetic recording on flexible magnetic tape. This market analysis is a combination of both reel-to-reel and cartridge digital tape drives of the following segments:



**1/8-INCH TAPE DRIVES:** The 1/8-inch tape drive market includes drives that use flexible magnetic tapes of this size.

**1/4-INCH TAPE DRIVES:** The 1/4-inch tape drive market includes drives that use flexible magnetic tapes of this size. This segment combines start-stop and streaming tape markets.

**1/2-INCH TAPE DRIVES:** The 1/2-inch tape drive market includes drives that use flexible magnetic tapes of this size. This segment combines traditional open-reel format, start-stop, streaming, and cartridge tape markets.

**HELICAL SCAN TAPE DRIVES:** Helical scan drives are high-capacity computer storage tape drives that record data in a diagonal strip rather than a traditional horizontal strip. Helical scanning technology utilizes a rotating head rather than the traditional stationary head, with the primary benefit being greater data storage capacity. This market segment includes only those devices used in the computer industry.

**OPTICAL DISK DRIVES:** Optical disk drives are mass storage devices that offer high-density, noncontact storage and retrieval capability, using a laser and various optical platter media. This market segment is a combination of the following optical drive segments:

**CD-ROM OPTICAL DISK DRIVES:** The CD-ROM optical disk drive market includes drives that are able to use a CD-size (4.72-inch) disk containing read-only (ROM) data.

**WORM OPTICAL DISK DRIVES:** The WORM (Write Once, Read Many) optical disk drive market includes drives that can write and read data using various optical disk mediums. This analysis is a combination of the 5.25-inch, 8- to 12-inch, and 14-inch optical drive markets.

**ERASABLE OPTICAL DISK DRIVES:** The erasable optical disk drive market includes drives that can write, read, and then rewrite data onto an optical disk.

DATAQUEST CONSOLIDATED DATA BASE  
Computer Storage Devices  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Computer Storage Devices</b>												
Shipments (K)	7,681.8	10,711.1	12,115.1	15,668.1	18,666.1	24,954.9	28,606.7	32,762.8	36,101.7	38,255.1	24.9%	11.3%
A.S.P. (\$K)	1.7	1.3	1.2	1.1	1.0	.9	.9	.9	.9	1.0	-12.6%	1.9%
Revenue (\$M)	13,009.9	14,159.1	15,059.4	17,328.2	18,481.5	21,993.8	25,486.1	28,308.8	31,550.3	36,346.7	9.2%	13.4%
I.B. (K)	18,342.6	28,634.3	39,911.6	54,140.7	72,022.4	95,787.5	122,417.2	152,464.8	184,404.3	217,398.0	40.8%	22.7%
<b>Rigid Disk Drives</b>												
Shipments (K)	1,216.0	2,239.6	2,738.3	4,263.9	4,683.3	8,458.1	9,864.5	11,495.1	13,063.0	14,064.9	40.1%	13.6%
A.S.P. (\$K)	6.3	4.2	3.6	2.8	2.6	1.9	1.9	1.8	1.8	1.9	-19.6%	.4%
Revenue (\$M)	7,610.3	9,316.4	9,876.1	12,043.6	12,273.9	15,698.7	18,431.2	20,402.4	22,889.3	26,572.6	12.7%	14.1%
I.B. (K)	3,467.7	5,656.9	8,318.8	12,467.3	16,984.3	25,158.4	34,330.7	44,802.2	56,313.9	68,178.2	48.8%	28.3%
<b>3- to 4-Inch Rigid Disk Drives</b>												
Shipments (K)	22.5	128.3	226.0	477.9	1,453.6	4,929.6	6,408.5	8,202.8	10,089.5	11,090.4	183.5%	22.5%
A.S.P. (\$K)	1.2	1.1	1.0	1.0	.7	.8	.9	.9	1.0	1.3	-13.2%	13.9%
Revenue (\$M)	27.4	145.4	230.1	468.3	1,003.0	3,746.5	5,511.3	7,136.5	10,089.5	14,206.0	146.0%	39.5%
I.B. (K)	22.5	150.9	376.8	853.5	2,303.0	7,191.0	13,442.0	21,375.6	31,020.0	41,360.0	218.0%	54.9%
<b>5.25-Inch Rigid Disk Drives</b>												
Shipments (K)	718.6	1,606.0	2,046.9	3,315.4	2,710.8	2,984.7	2,859.7	2,781.2	2,496.5	2,484.0	39.4%	-4.5%
A.S.P. (\$K)	1.7	1.2	1.4	1.2	1.1	1.2	1.3	1.4	1.5	1.4	-10.4%	3.9%
Revenue (\$M)	1,248.2	1,887.8	2,825.9	4,044.8	3,036.1	3,641.3	3,689.0	3,949.4	3,744.7	3,527.2	24.9%	-.8%
I.B. (K)	882.4	2,488.3	4,533.8	7,839.6	10,528.0	13,470.2	16,074.0	18,330.0	20,116.0	21,620.0	85.9%	12.6%
<b>8- to 10.5-Inch Rigid Disk Drives</b>												
Shipments (K)	211.3	249.0	270.3	290.4	334.3	361.0	406.0	308.3	289.6	312.2	12.2%	-3.6%
A.S.P. (\$K)	7.3	7.2	8.2	9.1	9.0	8.6	8.4	9.1	9.2	9.2	5.3%	1.8%
Revenue (\$M)	1,547.5	1,800.2	2,220.4	2,634.3	3,009.1	3,104.7	3,426.9	2,805.2	2,670.3	2,878.2	18.1%	-1.9%
I.B. (K)	589.9	838.0	1,106.0	1,388.0	1,706.3	2,043.5	2,403.7	2,626.8	2,794.7	2,961.0	30.4%	9.7%
<b>14-Inch Rigid Disk Drives</b>												
Shipments (K)	263.6	256.3	195.1	180.2	184.5	182.8	190.4	202.7	187.5	170.3	-8.5%	-1.8%
A.S.P. (\$K)	18.2	21.4	23.6	27.2	28.3	28.5	30.5	32.1	34.1	35.0	11.8%	5.3%
Revenue (\$M)	4,787.2	5,483.1	4,599.7	4,896.2	5,225.7	5,206.2	5,804.1	6,511.4	6,384.7	5,961.2	2.2%	3.4%
I.B. (K)	1,972.8	2,179.7	2,302.1	2,386.2	2,447.1	2,453.7	2,411.0	2,469.9	2,383.2	2,237.2	5.5%	-2.3%
<b>Flexible Disk Drives</b>												
Shipments (K)	6,244.4	8,177.1	8,830.4	10,642.7	13,000.2	15,355.8	17,276.3	19,382.8	20,625.5	20,931.9	20.1%	8.1%
A.S.P. (\$K)	.6	.3	.3	.2	.2	.2	.2	.1	.1	.1	-22.7%	-6.4%
Revenue (\$M)	3,566.6	2,801.0	2,406.8	2,425.3	2,644.9	2,505.2	2,631.6	2,698.5	2,729.6	2,622.4	-7.2%	1.1%
I.B. (K)	14,008.4	21,853.6	29,971.6	39,360.9	51,845.6	66,457.1	82,677.6	100,689.5	119,130.9	137,460.5	38.7%	19.9%

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Computer Storage Devices  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>3.5-Inch Flexible Disk Drives</b>												
Shipments (K)	100.6	255.7	566.8	836.6	4,822.2	7,233.3	10,126.6	13,164.7	15,797.6	17,376.8	163.1%	24.5%
A.S.P. (\$K)	.4	.2	.2	.2	.2	.2	.1	.1	.1	.1	-13.9%	-5.6%
Revenue (\$M)	40.8	60.7	105.6	150.7	1,073.5	1,137.9	1,502.8	1,797.4	2,063.1	2,166.2	126.4%	17.5%
I.B. (K)	114.7	370.4	937.2	1,761.4	6,574.4	13,750.3	23,683.3	36,505.4	51,589.7	67,951.7	175.2%	49.1%
<b>5.25-Inch Flexible Disk Drives</b>												
Shipments (K)	5,239.6	7,229.5	7,760.6	9,432.9	8,037.0	8,037.0	7,106.4	6,204.0	4,822.2	3,553.2	11.3%	-18.5%
A.S.P. (\$K)	.5	.3	.2	.2	.2	.2	.2	.1	.1	.1	-22.3%	-5.1%
Revenue (\$M)	2,522.3	1,971.8	1,739.5	1,845.5	1,407.4	1,264.2	1,075.7	883.5	658.3	453.5	-13.6%	-22.6%
I.B. (K)	9,528.5	16,669.9	24,061.8	32,713.6	40,369.1	47,844.8	54,198.7	59,469.9	62,917.2	64,992.1	43.5%	8.0%
<b>8-Inch Flexible Disk Drives</b>												
Shipments (K)	904.3	691.8	502.9	373.2	141.0	85.5	43.2	14.1	5.6	1.9	-37.2%	-61.5%
A.S.P. (\$K)	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.4	1.5	1.2%	5.3%
Revenue (\$M)	1,003.6	768.5	561.8	429.2	164.1	103.1	53.1	17.6	8.1	2.8	-36.4%	-59.4%
I.B. (K)	4,365.3	4,813.4	4,972.6	4,885.9	4,902.1	4,862.0	4,795.6	4,714.3	4,624.0	4,516.8	2.9%	-1.8%
<b>Tape Drives</b>												
Shipments (K)	221.4	294.4	543.8	741.5	932.6	1,058.0	1,281.9	1,497.0	1,665.2	1,958.3	43.3%	16.6%
A.S.P. (\$K)	8.3	6.9	5.0	3.7	3.6	3.3	2.9	2.7	2.4	2.3	-18.8%	-8.7%
Revenue (\$M)	1,832.9	2,041.8	2,734.5	2,724.8	3,352.6	3,482.4	3,748.5	3,997.5	4,047.7	4,475.7	16.3%	6.5%
I.B. (K)	866.5	1,123.9	1,618.5	2,289.8	3,119.7	4,016.3	5,069.2	6,248.6	7,494.4	9,011.3	37.7%	22.4%
<b>1/8-Inch Tape Drives</b>												
Shipments (K)	.0	35.1	83.3	95.5	53.7	45.3	49.9	56.4	43.1	33.1	NA	-7.6%
A.S.P. (\$K)	.0	.7	.8	.8	.9	.9	.9	.9	.7	.6	NA	-7.6%
Revenue (\$M)	.0	25.9	67.1	76.3	47.3	39.8	43.0	48.0	31.9	21.2	NA	-14.6%
I.B. (K)	.0	35.1	118.4	214.0	267.7	313.0	347.5	386.8	410.3	422.2	NA	7.8%
<b>1/4-Inch Tape Drives</b>												
Shipments (K)	133.5	164.6	346.6	538.2	725.1	838.2	1,021.4	1,191.7	1,357.2	1,614.0	52.7%	17.8%
A.S.P. (\$K)	2.8	2.2	1.9	1.5	1.3	1.2	1.0	.9	.9	.9	-17.3%	-8.3%
Revenue (\$M)	380.1	370.0	657.8	807.6	966.6	1,009.7	1,042.1	1,122.7	1,226.9	1,371.9	26.3%	8.0%
I.B. (K)	382.6	536.9	870.5	1,382.3	2,055.8	2,791.3	3,662.2	4,622.7	5,652.0	6,920.1	52.3%	25.5%
<b>1/2-Inch Tape Drives</b>												
Shipments (K)	87.9	94.8	113.8	107.8	152.4	164.0	176.1	184.5	177.9	191.3	14.8%	3.9%
A.S.P. (\$K)	16.5	17.4	17.7	17.1	15.3	14.2	13.4	12.6	12.2	11.9	-2.0%	-4.4%
Revenue (\$M)	1,452.8	1,645.9	2,009.5	1,840.9	2,324.8	2,332.7	2,355.6	2,320.4	2,161.9	2,276.4	12.5%	-.6%
I.B. (K)	483.9	551.9	629.5	693.6	795.0	900.2	1,013.2	1,128.4	1,234.4	1,351.3	13.2%	10.7%

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Computer Storage Devices  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Helical Scan Tape Drives</b>												
Shipments (K)	.0	.0	.0	.0	1.3	10.5	34.6	64.4	86.9	119.9	NA	83.8%
A.S.P. (\$K)	.0	.0	.0	.0	10.5	9.5	8.9	7.9	7.2	6.7	NA	-8.4%
Revenue (\$M)	.0	.0	.0	.0	13.9	100.3	307.8	506.5	626.9	806.2	NA	68.4%
I.B. (K)	.0	.0	.0	.0	1.3	11.8	46.4	110.8	197.8	317.6	NA	127.7%
<b>Optical Disk Drives</b>												
Shipments (K)	.0	.0	2.7	20.0	50.0	83.0	184.0	388.0	748.0	1,300.0	NA	98.9%
A.S.P. (\$K)	.0	.0	15.6	6.7	4.2	3.7	3.7	3.1	2.5	2.1	NA	-13.7%
Revenue (\$M)	.0	.0	42.0	134.4	210.1	307.5	674.7	1,210.4	1,883.8	2,675.9	NA	71.8%
I.B. (K)	.0	.0	2.7	22.7	72.7	155.7	339.7	724.4	1,465.0	2,748.0	NA	105.0%
<b>CD-ROM Optical Disk Drives</b>												
Shipments (K)	.0	.0	.1	12.0	32.0	52.0	106.0	208.0	366.0	616.0	NA	85.5%
A.S.P. (\$K)	.0	.0	2.0	1.5	1.2	1.2	.9	.6	.4	.3	NA	-31.9%
Revenue (\$M)	.0	.0	.2	18.0	37.9	61.6	94.1	129.2	159.2	157.2	NA	26.4%
I.B. (K)	.0	.0	.1	12.1	44.1	96.1	202.1	408.1	770.0	1,370.6	NA	94.3%
<b>WORM Optical Disk Drives</b>												
Shipments (K)	.0	.0	2.6	8.0	18.0	29.0	66.0	135.0	241.0	374.0	NA	89.5%
A.S.P. (\$K)	.0	.0	16.1	14.6	9.6	8.1	7.9	6.4	5.0	4.1	NA	-15.4%
Revenue (\$M)	.0	.0	41.8	116.4	172.2	233.9	521.2	860.7	1,199.2	1,545.0	NA	60.3%
I.B. (K)	.0	.0	2.6	10.6	28.6	57.6	123.6	257.3	495.6	869.9	NA	97.1%
<b>Erasable Optical Disk Drives</b>												
Shipments (K)	.0	.0	.0	.0	.0	2.0	12.0	45.0	141.0	310.0	NA	252.8%
A.S.P. (\$K)	.0	.0	.0	.0	.0	6.0	5.0	4.9	3.7	3.1	NA	-14.9%
Revenue (\$M)	.0	.0	.0	.0	.0	12.0	59.4	220.5	525.4	973.7	NA	200.1%
I.B. (K)	.0	.0	.0	.0	.0	2.0	14.0	59.0	199.4	507.5	NA	299.1%

Source: Dataquest  
September 1988

## ELECTRONIC PRINTERS

**ELECTRONIC PRINTERS:** Dataquest defines an electronic printer as a mechanism that uses computer-originated or digital electronic signals to create alphanumeric or graphics symbols on paper. This definition is limited to printers that print at least 80 columns; it does not include electronic typewriters. Dataquest segments electronic printers into three primary segments based on general product categories as shown below.

**SERIAL PRINTERS:** Serial printers are electronic printers that print one character at a time. This market analysis comprises both impact and nonimpact serial printers of all speeds, provided the printer can produce hard copy in formats of 80 columns or more. Electronic typewriters are not included.

**SERIAL, FULLY FORMED PRINTERS:** Serial, fully formed printers are electronic printers that print one character at a time using an impact printing technology and fully formed characters.

**SERIAL, DOT MATRIX PRINTERS:** Serial, dot matrix printers are electronic printers that print one character at a time using an impact printing technology and a dot matrix printing method.

**SERIAL, INK JET PRINTERS:** Serial, nonimpact, ink jet printers are electronic printers that print one character at a time using ink jet technology.

**SERIAL, THERMAL TRANSFER PRINTERS:** Serial, nonimpact, thermal transfer printers are electronic printers that print one character at a time using thermal transfer technology.

**SERIAL, DIRECT THERMAL PRINTERS:** Serial, nonimpact, direct thermal printers are electronic printers that print one character at a time using direct thermal technology.

**LINE PRINTERS:** Line printers are electronic printers that print one line of information at a time. This segment includes any printer that uses a head that covers a full line of the printed page and a striking mechanism that will print one full line at a time. This market analysis combines impact and nonimpact line printing technologies of all speeds; it excludes electronic printers that will not print at least 80 columns.

**LINE, FULLY FORMED PRINTERS:** Line, fully formed printers are electronic printers that print one line of information at a time using an impact technology and a printing method that employs fully formed characters.

**LINE, DOT MATRIX PRINTERS:** Line, dot matrix printers are electronic printers that print one line of information at a time using an impact technology and a dot matrix printing method.

**LINE, THERMAL TRANSFER PRINTERS:** Line, nonimpact, thermal transfer printers are electronic printers that print one line of information at a time using thermal transfer technology.

**PAGE, NONIMPACT PRINTERS:** Page nonimpact printers are electronic printers that print one page of information at a time. This market analysis covers printers of this type at all speed segments and nonimpact technologies, including electrophotography, magnetography, and ionography.

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Printers  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Electronic Printers</b>											16.5%	6.8%
Shipments (K)	3,529.6	5,423.4	5,024.5	4,646.0	6,510.3	7,186.0	7,674.6	8,170.3	8,825.7	9,348.9	-12.8%	-1.9%
A.S.P. (\$K)	1.9	1.3	1.1	1.2	1.1	1.2	1.1	1.1	1.1	1.1	1.7%	4.8%
Revenue (\$M)	6,592.1	6,831.4	5,517.6	5,557.8	7,044.8	8,278.8	8,758.6	9,314.6	9,805.5	9,991.6	30.6%	12.4%
I.B. (K)	8,583.8	13,303.0	17,199.7	20,340.5	24,953.0	29,634.9	34,210.4	38,564.9	42,985.2	47,364.7		
<b>Serial Printers</b>											13.9%	3.8%
Shipments (K)	3,423.3	5,247.0	4,786.1	4,237.7	5,767.1	6,046.6	6,284.1	6,464.9	6,772.1	7,007.3	-20.5%	-3.9%
A.S.P. (\$K)	1.4	.9	.7	.6	.6	.6	.6	.5	.5	.5	-9.4%	-.3%
Revenue (\$M)	4,769.8	4,493.1	3,126.8	2,552.4	3,213.7	3,415.3	3,472.9	3,507.5	3,490.9	3,375.9	30.8%	9.8%
I.B. (K)	7,843.8	12,457.3	16,192.6	19,007.7	22,969.4	26,647.6	30,066.3	33,093.4	36,031.5	38,794.0		
<b>Serial, Fully Formed Printers</b>											-26.4%	-9.8%
Shipments (K)	743.7	1,092.4	553.9	291.0	217.9	178.7	161.6	147.3	125.1	118.2	-18.2%	-6.3%
A.S.P. (\$K)	1.7	1.2	.7	.8	.7	.7	.7	.6	.6	.6	-39.9%	-15.5%
Revenue (\$M)	1,244.8	1,273.6	406.3	229.7	162.9	131.4	109.2	91.5	71.1	67.0	13.1%	-5.8%
I.B. (K)	1,792.2	2,722.1	3,013.5	3,008.9	2,929.6	2,805.7	2,665.2	2,514.6	2,353.1	2,206.5		
<b>Serial, Dot Matrix Printers</b>											19.2%	1.4%
Shipments (K)	2,542.4	3,656.8	3,681.0	3,535.5	5,128.9	5,265.1	5,430.7	5,406.6	5,523.6	5,567.8	-19.6%	-4.2%
A.S.P. (\$K)	1.3	.8	.6	.6	.5	.5	.5	.5	.5	.5	-4.1%	-2.8%
Revenue (\$M)	3,322.0	2,826.8	2,312.9	2,103.5	2,805.2	2,873.2	2,908.3	2,848.7	2,751.4	2,562.9	34.0%	10.3%
I.B. (K)	5,573.8	8,783.6	11,724.4	14,216.7	17,956.9	21,324.6	24,435.3	27,062.8	29,448.0	31,540.6		
<b>Serial, Ink Jet Printers</b>											125.5%	29.2%
Shipments (K)	7.0	173.7	165.7	117.3	201.8	378.3	470.2	672.1	871.8	1,052.5	-43.1%	-4.8%
A.S.P. (\$K)	5.1	.8	.6	.6	.5	.7	.7	.6	.6	.6	28.3%	23.0%
Revenue (\$M)	39.5	135.9	102.7	66.2	107.1	261.4	310.6	417.8	519.4	597.7	141.7%	35.1%
I.B. (K)	18.0	190.5	349.3	445.8	615.5	938.3	1,305.1	1,794.6	2,416.1	3,128.7		
<b>Serial, Thermal Transfer Printers</b>											NA	9.3%
Shipments (K)	.0	84.2	256.6	202.7	157.3	165.1	172.7	193.1	212.7	235.3	NA	-6.5%
A.S.P. (\$K)	.0	.5	.9	.5	.7	.8	.7	.7	.6	.6	NA	2.1%
Revenue (\$M)	.0	40.0	228.5	107.9	111.2	125.7	127.9	133.5	135.5	136.7	NA	11.6%
I.B. (K)	.0	84.2	339.2	530.1	660.8	781.2	888.3	984.5	1,090.0	1,210.7		
<b>Serial, Direct Thermal Printers</b>											-17.1%	-13.3%
Shipments (K)	129.3	239.9	128.8	91.2	61.2	59.4	49.0	45.9	38.9	33.6	-23.0%	-3.3%
A.S.P. (\$K)	1.3	.9	.6	.5	.4	.4	.3	.3	.3	.3	-36.1%	-16.2%
Revenue (\$M)	163.5	216.8	76.4	45.1	27.2	23.5	16.9	15.9	13.5	11.6	15.1%	-3.0%
I.B. (K)	459.8	676.8	766.1	806.1	806.5	797.8	772.4	737.0	724.3	707.5		

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Printers  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Line Printers</b>												
Shipments (K)	101.1	114.5	117.6	112.5	108.9	112.0	113.6	115.7	117.2	116.9	1.9%	1.1%
A.S.P. (\$K)	12.9	11.8	11.7	12.3	11.4	11.3	10.7	10.3	9.9	9.5	-3.0%	-4.2%
Revenue (\$M)	1,301.3	1,356.7	1,372.0	1,382.3	1,240.4	1,266.7	1,216.8	1,191.1	1,162.0	1,113.3	-1.2%	-3.2%
I.B. (K)	727.1	770.9	811.9	845.3	875.5	906.3	930.2	954.8	985.1	1,017.6	4.8%	2.9%
<b>Line, Fully Formed Printers</b>												
Shipments (K)	78.3	79.8	71.7	59.0	46.8	43.8	41.5	39.5	37.1	34.8	-12.1%	-5.6%
A.S.P. (\$K)	14.4	14.0	14.4	16.2	16.1	16.6	15.8	15.5	15.3	15.0	2.9%	-2.5%
Revenue (\$M)	1,127.3	1,116.0	1,036.3	959.1	754.8	727.8	654.6	612.1	567.6	521.6	-9.5%	-8.0%
I.B. (K)	631.0	645.9	646.2	633.3	610.4	584.8	551.1	517.1	488.3	461.7	-.8%	-5.7%
<b>Line, Dot Matrix Printers</b>												
Shipments (K)	22.5	34.2	45.0	50.0	49.4	50.3	49.9	49.9	50.0	50.2	21.8%	-.0%
A.S.P. (\$K)	7.6	6.9	7.3	7.8	7.9	7.9	7.9	7.8	7.8	7.6	.9%	-1.0%
Revenue (\$M)	171.3	236.2	327.8	391.9	391.2	399.2	394.8	391.8	389.4	383.2	22.9%	-1.0%
I.B. (K)	95.8	124.3	164.1	207.0	247.7	287.2	324.4	360.1	394.0	427.4	26.8%	10.5%
<b>Line, Thermal Transfer Printers</b>												
Shipments (K)	.3	.5	.8	3.5	12.6	17.9	22.3	26.3	30.1	32.0	158.5%	15.7%
A.S.P. (\$K)	9.9	9.5	9.3	9.0	7.5	7.8	7.5	7.1	6.8	6.5	-6.7%	-4.4%
Revenue (\$M)	2.8	4.5	7.9	31.2	94.5	139.6	167.4	187.2	205.1	208.5	141.2%	10.6%
I.B. (K)	.3	.8	1.6	5.1	17.4	34.4	54.7	77.6	102.7	128.4	180.2%	39.0%
<b>Page, Nonimpact Printers</b>												
Shipments (K)	5.3	61.9	120.8	295.8	634.4	1,027.5	1,276.9	1,589.6	1,936.3	2,224.6	231.3%	21.3%
A.S.P. (\$K)	99.0	15.8	8.4	5.5	4.1	3.5	3.2	2.9	2.7	2.5	-54.9%	-8.3%
Revenue (\$M)	521.0	981.6	1,018.7	1,623.1	2,590.7	3,596.8	4,068.9	4,616.0	5,152.5	5,502.4	49.3%	11.2%
I.B. (K)	12.9	74.8	195.2	487.4	1,108.1	2,081.0	3,213.9	4,516.8	5,968.5	7,553.2	204.6%	38.0%

Source: Dataquest  
September 1988



## ELECTRONIC PUBLISHING EQUIPMENT

**ELECTRONIC PUBLISHING:** Dataquest defines electronic publishing as the application of computer hardware and software to generate text and graphics onto a single page. The software functions of electronic publishing emulate traditional layout and design processes (cutting and pasting, scaling, anamorphic sizing, and pattern implementation) to facilitate page composition. Dataquest segments the components of electronic publishing systems into dedicated and nondedicated market segments as shown below.

**DEDICATED ELECTRONIC PUBLISHING:** Dedicated electronic publishing systems are computer-based systems that allow an operator to perform all or most of the usual publishing prepress functions. These systems typically include scanners, automated composition software packages, dedicated computer workstations, and a wide selection of raster image-setters. This market analysis is a combination of the various dedicated segments shown below.

**DEDICATED SYSTEMS:** A dedicated system is a computer-based system that includes a keyboard and monitor and prepares text and graphics that it aesthetically assembles onto pages. Dedicated systems can reside on personal computers, microcomputers, or mainframe computer systems.

**PHOTOTYPESETTERS:** Phototypesetters are devices that set type in specified sizes and styles, similar to page printers, but at higher resolution. Images are set onto a light-sensitive material that is developed and processed. The output from a typesetter is used as pasteup material rather than distributed copy.

**DEDICATED PRINTERS:** Dedicated printers are typically nonimpact page printers that use a raster imaging processing system.

**DEDICATED SCANNERS:** Scanners are graphic input devices used for optical sensing of images for conversion to dot matrix patterns (pixels). These devices range from optical character readers to halftone scanners.

**NONDEDICATED ELECTRONIC PUBLISHING:** Nondedicated electronic publishing systems (generically known as desktop publishing systems) are high-performance personal computer-based systems that include keyboards and monitors and allow operators to perform most of the usual publishing prepress functions. These systems typically include scanners, interactive composition software packages, nondedicated personal computers, and a limited selection of raster imagesetters. This market analysis is a combination of the various nondedicated segments shown below.

**NONDEDICATED SYSTEMS:** Nondedicated systems are high-performance processors that prepare text and graphics and aesthetically assemble them onto pages. This market analysis is a combination of the graphics type--referred to as MAC-type and the nongraphic type--referred to as IBM-type computer systems.

**SOFTWARE:** Nondedicated software includes word processing, graphics, and composition programs for use on either the MAC- or IBM-type systems described above.

**NONDEDICATED LASER PRINTERS:** Laser printers are nonimpact printers that combine laser beams and electrophotographic technology to form images on paper.

**NONDEDICATED SCANNERS:** Scanners are devices that convert externally created images into a digital representation. These images can be photographs, graphics, or text. Text can be converted into an ASCII file if the scanner has the proper type of character recognition capability (OCR, ICR).

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Publishing Equipment  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Electronic Publishing</b>											NA	42.7%
Shipments (K)	.0	2.2	69.9	168.9	634.0	966.8	1,440.2	2,069.5	2,925.1	4,010.1	NA	-4%
A.S.P. (\$K)	.0	65.8	4.4	3.3	1.7	1.7	1.6	1.6	1.6	1.6	NA	42.2%
Revenue (\$M)	.0	141.7	304.7	549.5	1,099.4	1,612.6	2,314.5	3,296.9	4,806.5	6,590.7	NA	60.7%
I.B. (K)	.0	2.2	72.0	240.7	874.4	1,840.5	3,279.5	5,347.0	8,268.6	12,271.1		
<b>Dedicated Electronic Publishing</b>											NA	36.7%
Shipments (K)	.0	2.2	3.7	6.2	8.6	11.9	16.4	22.5	30.6	41.5	NA	-13.4%
A.S.P. (\$K)	.0	65.8	52.0	43.9	39.1	32.7	27.7	23.8	20.8	18.4	NA	18.3%
Revenue (\$M)	.0	141.7	191.0	273.7	335.3	389.4	454.2	533.8	636.7	763.9	NA	42.2%
I.B. (K)	.0	2.2	5.8	11.8	20.1	31.4	46.6	67.0	94.2	128.0		
<b>Dedicated Systems</b>											NA	40.6%
Shipments (K)	.0	.7	1.2	2.1	3.3	4.9	7.1	10.1	14.1	19.2	NA	-14.8%
A.S.P. (\$K)	.0	73.2	63.6	56.5	51.8	41.5	33.9	28.5	24.8	21.9	NA	19.8%
Revenue (\$M)	.0	48.0	78.4	116.6	172.6	204.2	242.0	288.0	349.3	421.0	NA	48.3%
I.B. (K)	.0	.7	1.9	3.9	7.1	11.7	18.3	27.4	39.9	56.6		
<b>Phototypesetters</b>											NA	25.5%
Shipments (K)	.0	1.1	1.4	2.4	2.7	3.6	4.5	5.7	7.1	8.8	NA	-8.5%
A.S.P. (\$K)	.0	64.1	54.7	46.4	39.2	34.4	30.9	27.9	25.6	24.1	NA	14.8%
Revenue (\$M)	.0	71.7	77.8	111.0	107.2	122.4	139.9	159.7	182.5	212.7	NA	32.7%
I.B. (K)	.0	1.1	2.5	4.8	7.4	10.7	14.8	19.8	25.9	33.2		
<b>Dedicated Printers</b>											NA	44.7%
Shipments (K)	.0	.2	.7	1.3	1.8	2.6	3.7	5.3	7.7	11.2	NA	-14.2%
A.S.P. (\$K)	.0	74.6	35.2	24.8	21.4	17.3	14.3	12.4	10.7	9.4	NA	24.3%
Revenue (\$M)	.0	16.4	24.8	33.3	38.8	44.3	52.4	65.0	82.2	105.6	NA	48.7%
I.B. (K)	.0	.2	.9	2.2	4.0	6.4	9.7	14.5	21.3	31.1		
<b>Dedicated Scanners</b>											NA	26.5%
Shipments (K)	.0	.2	.3	.4	.7	.9	1.1	1.4	1.8	2.2	NA	-15.0%
A.S.P. (\$K)	.0	35.1	32.3	29.7	23.7	21.2	18.1	15.3	13.0	11.0	NA	7.5%
Revenue (\$M)	.0	5.7	10.0	12.8	16.7	18.5	19.9	21.2	22.7	24.7	NA	28.6%
I.B. (K)	.0	.2	.5	.9	1.6	2.6	3.8	5.3	7.1	7.1		
<b>Nondedicated Electronic Publishing</b>											NA	42.8%
Shipments (K)	.0	.0	66.2	162.7	625.4	954.9	1,423.7	2,047.0	2,894.5	3,968.6	NA	3.5%
A.S.P. (\$K)	.0	.0	1.7	1.7	1.2	1.3	1.3	1.3	1.4	1.5	NA	47.7%
Revenue (\$M)	.0	.0	113.7	275.9	764.1	1,223.2	1,860.3	2,763.1	4,169.9	5,826.7	NA	61.0%
I.B. (K)	.0	.0	66.2	228.9	854.3	1,809.2	3,232.9	5,280.0	8,174.4	12,143.0		

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Publishing Equipment  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Nondedicated Systems</b>												
Shipments (K)	.0	.0	27.6	63.3	226.6	352.4	536.4	789.2	1,148.7	1,582.2	NA	45.6%
A.S.P. (\$K)	.0	.0	2.0	1.9	1.2	1.4	1.5	1.6	1.8	1.8	NA	6.9%
Revenue (\$M)	.0	.0	55.3	117.7	270.5	495.8	807.7	1,262.7	2,038.5	2,903.5	NA	55.6%
I.B. (K)	.0	.0	27.6	90.8	317.4	669.8	1,206.2	1,995.4	3,144.1	4,726.3	NA	63.0%
<b>Electronic Publishing Software</b>												
Shipments (K)	.0	.0	27.6	62.6	213.8	320.4	466.5	652.2	890.4	1,198.7	NA	39.1%
A.S.P. (\$K)	.0	.0	.4	.4	.7	.7	.7	.7	.8	.7	NA	1.1%
Revenue (\$M)	.0	.0	11.0	25.0	146.3	228.3	340.2	488.3	670.0	893.6	NA	40.7%
I.B. (K)	.0	.0	27.6	90.2	303.9	624.3	1,090.7	1,742.9	2,633.4	3,832.0	NA	57.4%
<b>Nondedicated Laser Printers</b>												
Shipments (K)	.0	.0	8.5	26.1	145.3	201.1	286.7	392.6	533.7	713.1	NA	37.2%
A.S.P. (\$K)	.0	.0	4.4	3.8	1.6	1.5	1.4	1.5	1.6	1.6	NA	1.8%
Revenue (\$M)	.0	.0	37.8	98.1	233.6	296.5	410.6	585.9	834.2	1,127.8	NA	39.7%
I.B. (K)	.0	.0	8.5	34.6	180.0	381.0	667.8	1,060.3	1,594.1	2,307.2	NA	56.9%
<b>Nondedicated Scanners</b>												
Shipments (K)	.0	.0	2.6	10.7	39.7	81.1	134.1	213.1	321.6	474.7	NA	55.6%
A.S.P. (\$K)	.0	.0	3.8	3.3	2.9	2.5	2.3	2.0	2.0	1.9	NA	-6.6%
Revenue (\$M)	.0	.0	9.7	35.1	113.8	202.6	301.7	426.2	627.2	901.9	NA	45.2%
I.B. (K)	.0	.0	2.6	13.3	53.0	134.1	268.2	481.2	802.9	1,277.5	NA	75.7%

Source: Dataquest  
September 1988



# *Office Equipment*

4	4	4	4	4	6
1	1	1	3	1	1
1	1	1	1	1	1
1	1	1	1	1	1
1	1	1	1	1	1
1	1	1	1	1	1

## COPIERS

**COPIERS:** Dataquest defines a plain paper copier as an electromechanical device that reproduces on plain paper, an original image that is on paper. These devices usually employ the xerographic process, in which a charge pattern of an image is formed on a photoconductor, developed, and then transferred to paper where it is fixed by pressure or heat fusing. Dataquest defines six copier market segments based on their capabilities, plus the personal copier segment as shown below.

**PERSONAL COPIERS:** A personal copier is a compact, tabletop plain paper copier that produces an average monthly copy volume of 400 copies and has a current pricing of less than \$1,600. Other personal copier characteristics include a moving platen, single cassette, minimal features, ease of installation and service, superior reliability, lightweight, and a multiple copy speed of up to 12 copies per minute.

**SEGMENT 1 COPIERS:** A segment 1 copier is a plain paper copier of tabletop size that produces an average monthly volume of up to 5,000 copies. Current pricing ranges from \$1,295 to \$3,595. Other segment 1 copier features include a moving platen (generally), single cassette, multiple copy speeds of up to 20 copies per minute, and minimal features such as reduction, enlargement, interrupt, optional feeder, and optional sorter.

**SEGMENT 2 COPIERS:** A segment 2 copier is a plain paper copier of tabletop size that produces an average monthly volume of 8,000 copies. Current pricing ranges from \$3,095 to \$6,395. Other segment 2 copier features include a stationary platen, dual cassettes/trays (generally), A3 maximum copy size, and a multiple copy speed of from 21 to 30 copies per minute. Features on these copiers may include reduction, enlargement, optional on-line feeder, sorter, and large-capacity paper cassette.

**SEGMENT 3 COPIERS:** A segment 3 copier is a plain paper copier of tabletop or console size that produces a monthly copy volume of from 5,000 to 30,000, with an average monthly volume of 18,000 copies. Current pricing ranges from \$4,445 to \$8,795. Multiple copy speeds range from 31 to 45 copies per minute. Features, which are often bundled, may include reduction, enlargement, automatic duplexing, feeder, sorter, and 1,000-sheet tray.

**SEGMENT 4 COPIERS:** A segment 4 copier is a plain paper copier of tabletop or console size that is designed to support an average monthly volume of 32,000 copies. Current pricing ranges from \$5,695 to \$26,500. A segment 4 copier has a stationary platen, is highly featured, and offers a multiple copy speed of from 40 to 75 copies per minute.

**SEGMENT 5 COPIERS:** A segment 5 copier is a plain paper copier of console size that supports an average monthly copy volume of 65,000 copies. Current pricing is from \$15,000 to \$75,000, depending on configuration. These copiers have a stationary platen and are highly featured, with an increasing emphasis on modularity of the features. Multiple copy speeds range from 70 to 90 copies per minute.

**SEGMENT 6 COPIERS:** A segment 6 copier is a large plain paper copier designed for use in a central reproduction department environment. These copiers are intended for monthly copy volumes in excess of 100,000 copies; the average monthly volume is 232,000 copies. Current prices range from \$43,000 to \$129,775, depending on configuration. Specialized features may include image shift, slip-sheet insertion, and variable reduction. Multiple copy speeds run 91 copies per minute and higher.

DATAQUEST CONSOLIDATED DATA BASE  
Copiers  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
Copiers											14.2%	6.7%
Shipments (K)	690.4	942.5	1,046.8	1,061.1	1,172.9	1,306.6	1,456.5	1,558.0	1,642.0	1,693.0	15.5%	10.6%
I.B. (K)	2,726.5	3,106.1	3,587.4	4,252.3	4,852.7	5,467.2	6,111.1	6,796.5	7,511.3	8,168.6		
Personal Copiers											39.1%	17.9%
Shipments (K)	66.0	133.7	206.0	214.0	246.9	310.0	410.0	480.0	550.0	600.0	87.5%	20.4%
I.B. (K)	66.0	199.7	405.7	619.7	816.1	996.1	1,206.0	1,476.0	1,791.0	2,091.0		
Segment 1 Copiers											7.0%	3.3%
Shipments (K)	414.8	490.7	485.8	474.6	543.6	589.0	620.0	645.0	660.0	670.0	10.9%	7.3%
I.B. (K)	1,418.1	1,542.0	1,599.7	1,883.4	2,143.9	2,382.9	2,603.0	2,797.0	2,987.0	3,158.0		
Segment 2 Copiers											9.4%	-2.2%
Shipments (K)	136.0	190.4	201.1	202.4	194.7	208.0	213.0	210.0	200.0	190.0	8.0%	4.5%
I.B. (K)	735.9	767.2	894.3	949.7	1,002.5	1,068.5	1,131.0	1,191.5	1,241.0	1,276.0		
Segment 3 Copiers											19.5%	4.1%
Shipments (K)	39.5	82.0	83.6	78.9	80.6	85.0	90.0	95.0	100.0	100.0	8.9%	7.8%
I.B. (K)	324.6	380.9	415.2	445.0	456.9	486.9	526.9	572.0	617.0	657.0		
Segment 4 Copiers											65.7%	8.9%
Shipments (K)	10.3	18.1	42.7	68.4	77.6	84.0	94.0	104.0	112.0	118.0	28.4%	21.3%
I.B. (K)	91.0	97.9	133.1	193.9	247.3	319.3	403.3	497.3	594.3	692.3		
Segment 5 Copiers											-5.0%	-10.4%
Shipments (K)	20.9	24.5	21.7	12.5	17.0	17.1	17.5	16.0	14.0	11.0	17.9%	7.8%
I.B. (K)	68.3	92.8	108.1	119.1	132.0	146.1	161.6	175.6	188.1	197.6		
Segment 6 Copiers											44.1%	-26.2%
Shipments (K)	2.9	3.1	5.9	10.3	12.5	13.5	12.0	8.0	6.0	4.0	24.3%	9.4%
I.B. (K)	22.6	25.6	31.3	41.5	54.0	67.4	79.3	87.1	92.9	96.7		

Source: Dataquest  
September 1988



## ELECTRONIC TYPEWRITERS

**ELECTRONIC TYPEWRITERS:** Dataquest defines an electronic typewriter as a portable, compact, or desktop-size printing device of letter or near-letter quality that can be activated by depressing the keys of an electronically driven keyboard (flat or movable keys). This action causes type characters to be selected for printing by solid-state electronic logic and circuitry. Dataquest segments the electronic typewriter market into seven market segments based on general product characteristics, as shown below.

**PORTABLE ETs:** Portable electronic typewriters are electronic typewriters that, by virtue of their size and weight, are designed to be easily and frequently carried around by the user. Typewriters in this segment have typing lines of 10 inches or less. Print mechanisms currently use daisywheel, thermal, or ballpoint pen technology.

**COMPACT ETs:** Compact electronic typewriters are electronic typewriters that are compact in size and range between the portable and full-size segments. Typewriters in this segment have typing lines between 10.0 and 13.2 inches. Internal memory is being seen more often in this segment, along with removable memory. Compact electronic typewriters typically use daisywheel technology.

**LOW-END, FULL-SIZE ETs:** A low-end, full-size electronic typewriter is a basic full-size machine with no text memory and limited editing capability. Typewriters in this segment have typing lines of 13.2 inches or greater. Print mechanisms typically are daisywheel or thermal technology.

**MIDRANGE, FULL-SIZE ETs:** A midrange, full-size electronic typewriter has less than 2 Kbytes of internal text memory and simple text editing features. Line display is common and external memory may be offered as an option.

**HIGH-END, FULL-SIZE ETs:** A high-end, full-size electronic typewriter has more than 2 Kbytes of internal text memory and advanced text editing features. Removable memory is often available, as are displays of varying sizes.

**DISPLAY ETs:** Display electronic typewriters have a display screen size of at least 12 lines by 80 characters. These products run proprietary software and may have detachable keyboards, printers, and removable memory.

**PERSONAL COMPUTER/ETs:** Personal computer/electronic typewriters are screen-based units with a minimum screen size of 12 lines by 80 characters. Printers and keyboards may be either fixed or detachable. While these systems run proprietary software, they also have the capability to run industry standard, DOS-based software packages.

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Typewriters  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Electronic Typewriters</b>												
Shipments (K)	1,030.0	1,789.5	2,545.8	4,162.2	4,357.9	4,218.5	4,125.0	3,770.0	3,450.0	3,170.0	43.4%	-6.9%
A.S.P. (\$K)	.8	.7	.7	.6	.6	.6	.6	.6	.6	.6	-7.4%	3.0%
Revenue (\$M)	785.9	1,320.6	1,715.7	2,367.9	2,441.4	2,384.3	2,440.2	2,330.0	2,217.0	2,014.0	32.8%	-4.1%
I.B. (K)	1,917.0	3,706.5	6,236.3	10,330.5	14,416.4	17,913.9	20,693.9	22,532.9	22,183.5	20,902.0	65.6%	3.9%
<b>Portable ETs</b>												
Shipments (K)	250.0	660.0	830.0	2,059.0	2,237.0	2,000.0	1,800.0	1,500.0	1,200.0	1,000.0	73.0%	-15.9%
A.S.P. (\$K)	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	1.8%	-4.5%
Revenue (\$M)	75.0	198.0	249.0	677.5	719.6	600.0	450.0	375.0	300.0	250.0	76.0%	-19.7%
I.B. (K)	300.0	960.0	1,790.0	3,849.0	6,036.0	7,786.0	8,926.0	9,596.0	8,737.0	7,500.0	111.8%	-.9%
<b>Compact ETs</b>												
Shipments (K)	265.0	360.0	586.0	970.9	1,084.7	1,250.0	1,450.0	1,500.0	1,600.0	1,600.0	42.2%	6.4%
A.S.P. (\$K)	.5	.5	.5	.5	.5	.6	.7	.7	.7	.7	1.1%	2.0%
Revenue (\$M)	132.5	180.0	291.8	485.5	566.9	750.0	1,015.0	1,050.0	1,040.0	1,040.0	43.8%	8.5%
I.B. (K)	385.0	745.0	1,331.0	2,301.9	3,266.6	4,251.6	5,341.6	6,255.6	6,884.7	7,400.0	70.7%	14.9%
<b>Low-End, Full-Size ETs</b>												
Shipments (K)	256.0	384.0	455.0	547.0	526.5	455.0	375.0	300.0	200.0	200.0	19.8%	-18.6%
A.S.P. (\$K)	.9	.8	.8	.8	.7	.7	.7	.7	.7	.7	-4.3%	-1.9%
Revenue (\$M)	228.0	319.3	354.3	411.6	393.7	319.0	253.5	195.1	130.0	130.0	14.6%	-20.1%
I.B. (K)	448.0	832.0	1,287.0	1,830.0	2,346.5	2,746.5	2,996.5	3,042.5	2,858.5	2,603.5	51.3%	-1.3%
<b>Mid-Range, Full-Size ETs</b>												
Shipments (K)	108.0	142.0	183.8	76.5	8.7	8.5	.0	.0	.0	.0	-46.7%	NA
A.S.P. (\$K)	1.2	1.0	.9	.9	.6	.7	.0	.0	.0	.0	-14.2%	NA
Revenue (\$M)	126.2	146.3	173.8	66.0	5.5	6.0	.0	.0	.0	.0	-54.3%	NA
I.B. (K)	232.0	374.0	557.8	630.3	629.0	604.5	527.5	419.5	277.5	93.7	28.3%	-37.3%
<b>High-End, Full-Size ETs</b>												
Shipments (K)	151.0	231.0	463.0	478.3	430.2	420.0	400.0	350.0	290.0	220.0	29.9%	-14.9%
A.S.P. (\$K)	1.5	1.8	1.2	1.3	1.3	1.1	1.1	1.1	1.1	.9	-2.8%	-5.4%
Revenue (\$M)	224.2	416.7	544.3	630.6	569.8	471.2	450.2	383.5	319.0	198.0	26.3%	-19.5%
I.B. (K)	552.0	783.0	1,230.0	1,648.3	1,996.5	2,298.5	2,573.5	2,772.5	2,831.5	2,588.5	37.9%	3.0%
<b>Display ETs</b>												
Shipments (K)	.0	12.5	26.2	28.9	47.3	46.7	47.0	42.0	40.0	30.0	NA	-10.5%
A.S.P. (\$K)	.0	4.8	3.7	3.2	2.3	2.5	2.3	2.2	2.2	2.2	NA	-3.2%
Revenue (\$M)	.0	60.3	96.2	91.6	109.6	116.8	108.1	92.4	88.0	66.0	NA	-13.3%
I.B. (K)	.0	12.5	38.7	67.6	114.9	161.6	208.6	250.6	278.1	281.9	NA	14.9%

(Continued)

DATAQUEST CONSOLIDATED DATA BASE  
Electronic Typewriters  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
Personal Computer/ETs												
Shipments (K)	.0	.0	1.8	1.6	23.5	38.3	53.0	78.0	120.0	120.0	NA	33.0%
A.S.P. (\$K)	.0	.0	3.5	3.2	3.2	3.2	3.1	3.0	2.8	2.8	NA	-3.5%
Revenue (\$M)	.0	.0	6.3	5.1	76.3	121.3	163.4	234.0	340.0	330.0	NA	28.4%
I.B. (K)	.0	.0	1.8	3.4	26.9	65.2	118.2	196.2	316.2	434.4	NA	60.7%

Source: Dataquest  
September 1988

## IMAGING SUPPLIES

**IMAGING SUPPLIES:** Dataquest defines imaging supplies as consumables such as paper, ribbons, toner, developer, inks, photoreceptors, and print elements used in copiers, electronic printers, electronic typewriters, and electronic publishing systems. Dataquest segments the imaging market into six market segments as shown below.

**PLAIN PAPER:** Plain paper consumption refers to the volume, tonnage, and retail revenue of cut-sheet plain paper used in electronic printers and plain paper copiers. Unit shipments indicate tons of product.

**TONER AND DEVELOPER:** Toner and developer are consumables used in page printers and plain paper copiers. This analysis is a summary of dual-component dry, monocomponent dry, and liquid toners. Unit shipments indicate pounds of product.

**PHOTORECEPTORS:** The photoreceptors used in copier systems are the medium by which light signals from an exposure are converted into an image. This market analysis is a combination of the seven electronic page printer and plain paper copier market segments.

**PAPER FORMS:** Continuous forms constitute a class of business forms used exclusively by electronic printers. Nearly all are fanfolded with holes punched in the margins to facilitate handling by tractor feed mechanisms.

**ELECTRONIC PRINTER RIBBONS:** Electronic printer ribbon consumption refers to cartridge (fabric, multistrike, and film), fabric spool ribbons, and towel ribbons. This market analysis is a summary of cartridge and spool ribbons used in serial and line electronic printers.

**PRINT ELEMENTS:** Print elements are used in serial, fully formed printers to form an alphanumeric image on the paper. This market analysis is a combination of the thimble, monoplastic, dual-plastic, and metal segments.

DATAQUEST CONSOLIDATED DATA BASE  
Imaging Supplies  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Imaging Supplies</b>												
Revenue (\$M)	7,648.6	8,566.4	9,405.0	9,982.8	13,515.1	15,084.1	17,517.4	19,295.5	21,573.1	23,298.3	15.3%	11.5%
<b>Plain Paper</b>												
Revenue (\$M)	1,704.4	2,011.1	2,296.1	2,579.7	3,017.8	3,650.7	4,333.7	5,038.3	6,014.7	6,788.9	15.4%	16.8%
<b>Toner and Developer</b>												
Revenue (\$M)	1,055.5	1,134.9	1,225.8	1,323.1	1,509.9	1,711.8	1,979.3	2,262.1	2,580.3	2,877.5	9.4%	13.9%
<b>Photoreceptors</b>												
Revenue (\$M)	.0	.0	.0	.0	2,418.0	2,780.9	3,177.1	3,488.7	3,912.3	3,863.1	NA	8.6%
<b>Paper Forms</b>												
Revenue (\$M)	4,101.8	4,455.8	4,836.9	4,936.5	5,297.3	5,504.4	6,371.6	6,597.9	7,011.9	7,406.0	6.6%	7.7%
<b>Electronic Printer Ribbons</b>												
Revenue (\$M)	732.1	877.0	952.8	1,063.3	1,208.0	1,381.8	1,611.1	1,871.7	2,021.8	2,336.0	13.3%	14.0%
<b>Print Elements</b>												
Revenue (\$M)	54.8	87.6	93.4	80.2	64.1	54.5	44.6	36.8	32.1	26.8	4.0%	-16.3%

Source: Dataquest  
September 1988

## WORD PROCESSING SYSTEMS

**WORD PROCESSORS:** Dataquest defines a word processor as a workstation that is designed for entering, manipulating, printing, and filing text documents. Workstations are defined as computer-based products that perform specifically defined functions as an aid to a user in completing a specifically defined task or series of tasks. Dataquest segments the word processing market into three market segments as shown below.

**STANDALONE WORD PROCESSORS:** Standalone word processors are capable of functioning independently from a central controller or storage device. Standalone word processors may communicate with each other and generally have removable magnetic media. Products that have evolved from electronic typewriters generally are not included in this segment.

**SHARED-SYSTEM WORD PROCESSORS:** Shared-system word processors are connected to an external file server or controller.

**WORD PROCESSOR FILE SERVERS:** File servers are centralized data storage devices that are accessible and dedicated to shared word processing units.

DATAQUEST CONSOLIDATED DATA BASE  
Word Processing Systems  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Word Processors</b>												
Shipments (K)	194.6	213.5	188.1	111.4	19.2	8.3	2.2	.0	.0	.0	-44.0%	NA
A.S.P. (\$K)	8.0	7.6	7.7	6.9	6.5	5.6	4.4	.0	.0	.0	-5.0%	NA
Revenue (\$M)	1,550.3	1,617.7	1,455.2	763.6	124.4	46.8	9.6	.0	.0	.0	-46.8%	NA
I.B. (K)	644.6	818.3	1,029.1	1,053.6	971.7	832.4	746.5	643.5	541.8	462.5	10.8%	-13.7%
<b>Standalone Word Processors</b>												
Shipments (K)	93.9	99.8	100.2	64.2	8.7	3.2	1.0	.0	.0	.0	-44.8%	NA
A.S.P. (\$K)	6.0	5.5	4.7	4.5	4.0	3.5	3.0	.0	.0	.0	-9.6%	NA
Revenue (\$M)	563.4	548.9	470.9	288.9	34.8	11.2	3.0	.0	.0	.0	-50.1%	NA
I.B. (K)	348.2	425.8	460.8	444.0	408.7	338.9	305.9	277.7	230.8	198.2	4.1%	-12.6%
<b>Shared-System Word Processors</b>												
Shipments (K)	100.7	113.7	66.2	37.4	8.2	4.1	1.0	.0	.0	.0	-46.6%	NA
A.S.P. (\$K)	9.8	9.4	9.1	8.5	7.0	6.0	5.0	.0	.0	.0	-8.1%	NA
Revenue (\$M)	986.9	1,068.8	602.4	317.9	57.4	24.6	5.0	.0	.0	.0	-50.9%	NA
I.B. (K)	296.4	392.5	468.5	500.0	464.0	406.8	365.9	302.3	257.0	218.5	11.9%	-14.4%
<b>Word Processor File Servers</b>												
Shipments (K)	.0	.0	21.7	9.8	2.3	1.0	.2	.0	.0	.0	NA	NA
A.S.P. (\$K)	.0	.0	17.6	16.0	14.0	11.0	8.0	.0	.0	.0	NA	NA
Revenue (\$M)	.0	.0	381.9	156.8	32.2	11.0	1.6	.0	.0	.0	NA	NA
I.B. (K)	.0	.0	99.8	109.6	99.0	86.7	74.7	63.5	54.0	45.8	NA	-14.7%

Source: Dataquest  
September 1988

**Dataquest**



*Industrial Automation*

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## CAD/CAM WORKSTATIONS

**CAD/CAM WORKSTATIONS:** Dataquest defines CAD/CAM workstations as graphics display devices and the associated computer hardware and software that support a single user. They are used primarily for computer-aided design and/or computer-aided manufacturing applications. CAD/CAM platforms include personal computers, technical workstations, and host-dependent systems. Dataquest segments the CAD/CAM workstation market into six market segments based on applications as shown below.

**ELECTRONIC COMPUTER-AIDED CAD/CAM:** Electronic computer-aided engineering (ECAE) CAD/CAM workstations are used for the engineering and design of the logical or functional elements of electronic products, as opposed to their physical layout. These systems may offer the following functions: schematic capture, modeling, synthesis, logic simulation, circuit simulation, netlist extraction, and engineering documentation. Users are most often electrical engineers.

**PRINTED-CIRCUIT BOARD CAD/CAM:** Printed-circuit board layout CAD/CAM workstations are used by printed-circuit board drafters to create the layout of the traces and components to be placed on the board. The system output is the graphical description of the board's layout, and usually includes photoplotter tape, silk screens, insertion drawings, and numerical control drill tapes.

**INTEGRATED CIRCUIT CAD/CAM:** Integrated circuit layout CAD/CAM workstations are used to create the geometrical descriptions of an integrated circuit and to output associated pattern generation data. These workstations typically support geometry creation and editing, layout verification, array place and route, cell place and route, silicon compilation, PLA compiler, symbolic layout, or spacing and compaction.

**FACILITIES DESIGN CAD/CAM:** Facilities design CAD/CAM workstations are used to aid the design of buildings, power plants, process plants, ships, and other types of nondiscrete entities. These workstations are commonly used by architects, contractors, or civil engineers.

**MAPPING CAD/CAM:** Mapping CAD/CAM workstations are used to graphically represent data used in the creation of maps. Applications include the following types of mapping: exploration, utilities, cadastral, coordinate geometry conversion, contour, and geophysical.

**MECHANICAL CAD/CAM:** Mechanical CAD/CAM workstations are used for the design, analysis, and manufacture of discrete parts, components, and assemblies. Functions include design modeling, detail drafting, kinematics, numerical control tool path generation, and other manufacturing functions.

**DATACQUEST CONSOLIDATED DATA BASE**  
CAD/CAM Workstations  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>CAD/CAM Workstations</b>												
Shipments (K)	9.2	34.5	51.4	82.7	132.7	174.0	215.7	260.7	302.9	337.3	94.9%	16.0%
A.S.P. (\$K)	133.6	61.1	56.2	39.7	26.7	22.7	20.1	18.3	16.8	15.6	-33.1%	-9.1%
Revenue (\$M)	1,227.0	2,106.0	2,889.0	3,283.0	3,546.0	3,956.0	4,345.0	4,767.0	5,085.0	5,246.0	30.4%	7.3%
I.B. (K)	15.3	49.7	100.9	182.3	310.1	472.4	662.5	876.1	1,101.1	1,323.0	112.2%	29.4%
<b>Electronic Computer-Aided CAD/CAM</b>												
Shipments (K)	1.3	6.5	10.9	13.1	16.2	19.4	22.5	24.8	26.3	27.4	88.9%	9.0%
A.S.P. (\$K)	75.5	35.9	38.9	32.8	26.7	22.7	20.1	18.9	18.2	17.8	-22.9%	-5.9%
Revenue (\$M)	96.0	234.0	425.0	430.0	433.0	441.0	451.0	469.0	479.0	487.0	45.7%	2.5%
I.B. (K)	1.4	7.9	18.8	31.9	47.6	65.1	82.8	99.2	113.8	126.6	142.8%	18.1%
<b>Printed-Circuit Board CAD/CAM</b>												
Shipments (K)	.8	3.8	3.3	5.0	8.0	10.0	11.0	11.8	12.5	13.2	79.5%	7.2%
A.S.P. (\$K)	135.8	92.3	73.2	45.6	29.8	25.2	23.9	23.5	22.4	21.2	-31.6%	-4.3%
Revenue (\$M)	105.0	170.0	239.0	227.0	239.0	251.0	264.0	277.0	279.0	279.0	22.8%	2.7%
I.B. (K)	1.4	3.3	6.5	11.3	18.9	28.1	37.7	46.7	54.6	60.9	90.3%	21.3%
<b>Integrated Circuit CAD/CAM</b>												
Shipments (K)	.4	.8	1.2	1.6	1.9	2.1	2.5	2.9	3.3	3.7	50.5%	14.7%
A.S.P. (\$K)	183.3	127.7	115.7	89.7	76.7	72.7	66.2	60.8	56.6	52.0	-19.6%	-8.0%
Revenue (\$M)	68.0	101.0	137.0	143.0	146.0	156.0	166.0	176.0	185.0	193.0	21.0%	5.5%
I.B. (K)	.8	1.6	2.8	4.3	5.9	7.7	9.6	11.7	13.7	16.0	62.6%	20.2%
<b>Facilities Design CAD/CAM</b>												
Shipments (K)	1.3	6.9	11.4	19.1	43.1	64.4	85.5	108.5	131.6	151.0	140.0%	23.8%
A.S.P. (\$K)	155.6	41.8	43.2	27.3	13.6	10.2	8.4	7.3	6.4	5.8	-45.6%	-13.2%
Revenue (\$M)	202.0	373.0	494.0	522.0	585.0	658.0	722.0	790.0	845.0	876.0	30.5%	7.4%
I.B. (K)	2.7	11.6	23.0	41.8	83.7	145.0	224.0	319.7	427.7	536.2	136.5%	38.8%
<b>Mapping CAD/CAM</b>												
Shipments (K)	.6	.7	1.3	2.5	3.7	5.0	6.7	8.6	10.8	13.0	54.5%	26.8%
A.S.P. (\$K)	98.0	127.4	112.1	79.8	66.3	56.8	47.9	40.2	35.0	30.9	-9.3%	-14.1%
Revenue (\$M)	63.0	94.0	144.0	200.0	243.0	285.0	319.0	348.0	377.0	401.0	40.1%	6.9%
I.B. (K)	1.3	2.0	3.3	5.7	9.1	13.6	19.6	27.1	35.9	45.9	62.3%	35.5%
<b>Mechanical CAD/CAM</b>												
Shipments (K)	4.8	15.7	23.3	41.4	59.8	73.1	87.5	104.2	118.4	129.1	87.6%	15.3%
A.S.P. (\$K)	143.5	72.4	62.2	42.5	31.8	29.6	27.7	26.0	24.7	23.3	-31.4%	-5.8%
Revenue (\$M)	693.0	1,134.0	1,450.0	1,761.0	1,900.0	2,165.0	2,423.0	2,707.0	2,920.0	3,010.0	28.7%	8.6%
I.B. (K)	7.7	23.3	46.5	87.3	144.9	212.6	288.8	371.7	455.4	535.4	106.6%	25.9%

Source: Dataquest  
September 1988

## GRAPHICS AND IMAGING DEVICES

**GRAPHICS AND IMAGING DEVICES:** Dataquest defines a graphics device as a device that uses raster refresh or vector refresh technology to produce a graphical presentation of information to the human operator. Dataquest defines an imaging device as a device which enhances, analyzes or otherwise manipulates images which are captured or acquired by an external device such as a sensor, camera, or scanner.

**GRAPHIC TERMINALS:** Dataquest defines a graphic terminal as a host-dependent device that uses raster refresh or vector refresh technology to provide a graphical and alphanumeric presentation of information to the human operator.

**IBM/CONE ADD-ON GRAPHICS PCB:** An IBM graphics printed circuit board is used for graphics and/or imaging applications for a PC, XT, AT, PS/2, RT PC bus, or expansion slot. This segment is a summary of PC boards which have a resolution greater than and less than 1,024 X 768.

**APPLE ADD-ON GRAPHICS PCB:** An Apple-compatible graphics PCB is a printed circuit board that is used for graphics and/or imaging applications for the Apple NUBUS.

**SUBSYSTEMS:** Dataquest defines graphics and/or imaging subsystems as a host dependent device which uses raster refresh or vector refresh technology to provide a graphical presentation of information to a human operator.

DATAQUEST CONSOLIDATED DATA BASE  
Graphics and Imaging Devices  
United States

	Actual					Estimated					CAGR (%) 1983-87	CAGR (%) 1988-92
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992		
<b>Graphics and Imaging Devices</b>												
Shipments (K)	41.5	87.9	940.3	2,671.3	9,054.4	11,130.2	14,182.8	17,261.5	20,362.3	23,309.9	284.3%	20.3%
A.S.P. (\$K)	11.7	7.1	1.1	.5	.3	.2	.2	.2	.2	.2	-60.2%	-10.7%
Revenue (\$M)	487.0	624.4	1,018.8	1,263.8	2,672.9	2,667.8	2,819.1	3,063.7	3,337.0	3,557.6	53.1%	7.5%
<b>Graphic Terminals</b>												
Shipments (K)	41.5	87.9	110.3	118.3	138.1	137.0	134.8	140.1	149.2	157.2	35.1%	3.5%
A.S.P. (\$K)	11.7	7.1	6.8	6.0	4.5	4.3	3.9	3.5	3.2	3.0	-21.3%	-9.1%
Revenue (\$M)	487.0	624.4	754.8	713.8	622.9	591.6	528.7	496.9	482.9	463.9	6.3%	-5.9%
<b>IBM/Clone Add-On Graphic PCBs</b>												
Shipments (K)	.0	.0	830.0	2,553.0	8,811.0	10,769.0	13,472.0	16,120.0	18,690.0	20,960.0	NA	18.1%
A.S.P. (\$K)	.0	.0	.3	.2	.1	.1	.1	.1	.1	.1	NA	-10.0%
Revenue (\$M)	.0	.0	264.0	550.0	1,147.0	1,225.0	1,360.0	1,489.0	1,574.0	1,564.0	NA	6.3%
<b>Apple Add-On Graphic PCBs</b>												
Shipments (K)	.0	.0	.0	.0	77.0	191.0	536.0	952.0	1,460.0	2,110.0	NA	82.3%
A.S.P. (\$K)	.0	.0	.0	.0	.4	.4	.4	.4	.4	.4	NA	-2.7%
Revenue (\$M)	.0	.0	.0	.0	30.0	75.0	205.0	366.0	548.0	742.0	NA	77.4%
<b>Graphic Subsystems</b>												
Shipments (K)	.0	.0	.0	.0	28.3	33.2	40.0	49.4	63.1	82.7	NA	25.6%
A.S.P. (\$K)	.0	.0	.0	.0	30.8	23.4	18.1	14.4	11.6	9.5	NA	-20.1%
Revenue (\$M)	.0	.0	.0	.0	873.0	776.2	725.4	711.8	732.1	787.7	NA	.4%

Source: Dataquest  
September 1988

## MANUFACTURING AUTOMATION SYSTEMS

**MANUFACTURING AUTOMATION SYSTEMS:** Dataquest defines manufacturing automation systems as computer hardware, software, and programmable equipment used in an industrial manufacturing environment. This market analysis is segmented into four primary categories as shown below.

**MANUFACTURING COMPUTERS:** A manufacturing computer is a system used primarily for the processing and/or control of manufacturing operations. Computers can be classified as to their size and/or the applications being performed. Examples of applications include plant operations such as fabrication, inspection/test, process control; and planning/control/analysis applications such as shop floor control, scheduling, and quality assurance. This market analysis is based on a combination of the generic categories of mainframe, mini, and workstation computers, plus controllers as shown below.

**MAINFRAME COMPUTERS:** Mainframe computers are systems that allow multiuser environments on a single host. These systems are used primarily for large-scale manufacturing operations that incorporate several processing and/or control operations simultaneously.

**MINICOMPUTERS:** A minicomputer is a generic term that includes all general-purpose and special purpose small multiuser computer systems used in manufacturing operations.

**WORKSTATION COMPUTERS:** A workstation computer is a generic term that applies to principally single-user systems used for a dedicated manufacturing operation.

**CONTROLLERS:** A programmable controller is a dedicated computer used for operational control functions. This segment is a combination of programmable controllers and micro CPU board products.

**MANUFACTURING SOFTWARE:** Software used in manufacturing operations to support a specific manufacturing application is included in this market analysis. This analysis is a combination of artificial intelligence, planning systems, operation control, quality analysis, maintenance management, numeric control programming, and procurement/distribution segments.

**MANUFACTURING NETWORKS/DECISION SUPPORT SYSTEMS:** Manufacturing networks/ decision support systems include data transmission networks and decision support systems used in manufacturing operations. This analysis is a combination of the local area networks, data acquisition systems, and decision support systems markets shown below.

**LOCAL AREA NETWORKS:** Local area networks are the hardware and software that enable connection of a device to a cable-based network within a manufacturing location. This analysis is a combination of MAP broadband, MAP carrierband, TOP, Ethernet, proprietary broadband, proprietary programmable control, and proprietary distributed control systems segments.

**DATA INPUT SYSTEMS:** Data input systems include equipment used in the manufacturing environment for data collection and production monitoring applications.

**MANUFACTURING SYSTEMS:** Manufacturing systems include programmable equipment used for the actual production of goods. This market analysis includes equipment and/or systems used for fabrication, assembly, inspection/test, material handling, and process control.

**FABRICATION SYSTEMS:** Fabrication systems are used to make discrete products. This analysis is a combination of the programmable machine tools, flexible manufacturing systems, injection molding systems, structural foam equipment, extrusion equipment, flow molding equipment, thermoforming equipment, reaction molding equipment, semiconductor production systems, and robotic machining systems market segments.

**INSPECTION SYSTEMS:** Inspection and test systems are used to verify that products conform to specifications. This analysis is a combination of electronic ATE, mechanical systems ATE, mechanical parts ATE, and machine vision systems analysis.

**OTHER SYSTEMS:** Other manufacturing systems include assembly systems used in mechanical, semiconductor, spot and arc welding operations; material-handling systems such as automated guided vehicle systems, robotic material-handling programmable conveyors, overhead cranes; and process control systems such as process flow control systems, industrial sensors, and robotic painting systems.

DATAQUEST CONSOLIDATED DATA BASE  
Manufacturing Automation Systems  
United States

	1983	1984	Actual 1985	1986	1987	1988	1989	Estimated 1990	1991	1992	CAGR (%) 1983-87	CAGR (%) 1988-92
<b>Manufacturing Automation Systems</b>												
Revenue (\$M)	11,347.9	13,504.0	15,539.8	16,536.6	17,796.6	19,985.5	22,011.2	24,182.0	26,680.8	29,783.0	11.9%	10.5%
<b>Manufacturing Computers</b>												
Revenue (\$M)	2,719.3	3,104.5	3,400.8	3,644.5	3,994.9	4,533.5	5,106.4	5,490.2	5,982.7	6,792.3	10.1%	10.6%
<b>Manufacturing Mainframe Computers</b>												
Revenue (\$M)	459.1	498.8	533.7	557.7	587.8	651.8	715.7	746.9	795.7	891.0	6.4%	8.1%
<b>Manufacturing Mini Computers</b>												
Revenue (\$M)	1,068.3	1,247.0	1,366.8	1,472.1	1,626.3	1,863.5	2,108.4	2,231.6	2,427.2	2,817.7	11.1%	10.9%
<b>Manufacturing Work Station Computers</b>												
Revenue (\$M)	828.3	958.8	1,060.4	1,135.2	1,263.9	1,446.0	1,655.0	1,857.6	2,063.7	2,305.5	11.1%	12.4%
<b>Manufacturing Controllers</b>												
Revenue (\$M)	363.6	399.9	439.9	479.5	516.9	572.2	627.3	654.1	696.1	778.1	9.2%	8.0%
<b>Manufacturing Software</b>												
Revenue (\$M)	690.9	876.5	1,091.0	1,328.7	1,578.6	1,806.7	2,013.3	2,255.7	2,515.4	2,842.9	22.9%	12.0%
<b>Manufacturing Networks/Decision Support Systems</b>												
Revenue (\$M)	266.7	280.6	310.6	387.4	463.4	579.0	710.3	937.6	1,388.2	2,119.5	14.8%	38.3%
<b>Manufacturing Local Area Networks</b>												
Revenue (\$M)	123.5	129.4	141.2	133.4	156.1	195.7	245.6	363.3	664.6	1,221.2	6.0%	58.1%
<b>Manufacturing Data Input Systems</b>												
Revenue (\$M)	143.2	151.2	169.4	254.0	307.3	383.3	464.7	574.3	723.6	898.3	21.0%	23.7%
<b>Manufacturing Systems</b>												
Revenue (\$M)	7,671.0	9,242.4	10,737.4	11,176.0	11,759.7	13,066.3	14,181.2	15,498.5	16,794.5	18,028.3	11.3%	8.4%
<b>Manufacturing Fabrication Systems</b>												
Revenue (\$M)	3,137.2	3,682.1	4,443.4	4,377.0	4,603.2	5,069.3	5,430.1	5,945.7	6,446.8	6,918.8	10.1%	8.1%
<b>Manufacturing Inspection Systems</b>												
Revenue (\$M)	1,305.8	1,496.3	1,640.8	1,853.3	1,957.2	2,179.7	2,335.5	2,501.7	2,672.4	2,840.9	10.6%	6.8%
<b>Other Manufacturing Systems</b>												
Revenue (\$M)	3,228.0	4,064.0	4,653.2	4,945.7	5,199.3	5,817.3	6,415.6	7,051.1	7,675.3	8,268.6	12.7%	9.2%

Source: Dataquest  
September 1988

# Dataquest

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