PC Logic Chip Sets--Forecast

FORECAST METHODOLOGY AND ASSUMPTIONS

The PC logic chip set forecast is derived from the Dataquest Personal Computer Industry Service (PCIS) PC forecast and from a survey of worldwide chip set vendors. Dataquest's new chip set forecast for 1989 through 1993 is derived as a function of saturation of the DOS PC market. The estimates for 1987 and 1988 are based on the chip set vendor survey and Dataquest analysis. The following is a summary of the significant assumptions made in these forecasts:

- The worldwide DOS PC market will continue to grow from 1989 through 1993 at a compound annual growth rate (CAGR) of approximately 13 percent.

- As a general trend, discrete chips are being displaced by very large scale integration (VLSI) ICs. In personal computers specifically, discrete logic chips are being replaced by logic chip sets. Because of the advantages that chip set use offers systems manufacturers—lower cost, better performance, faster time to market—this displacement has happened very rapidly.

- Average selling prices (ASPs) will fall in 1989 as a result of price competition. They will rise in 1990 as the introduction of EISA chip sets and increased penetration of the MCA chip sets shifts the product mix toward the high end. ASPs will then come down slowly through the rest of the period as price decreases are offset by the continued move in product mix toward the high end.

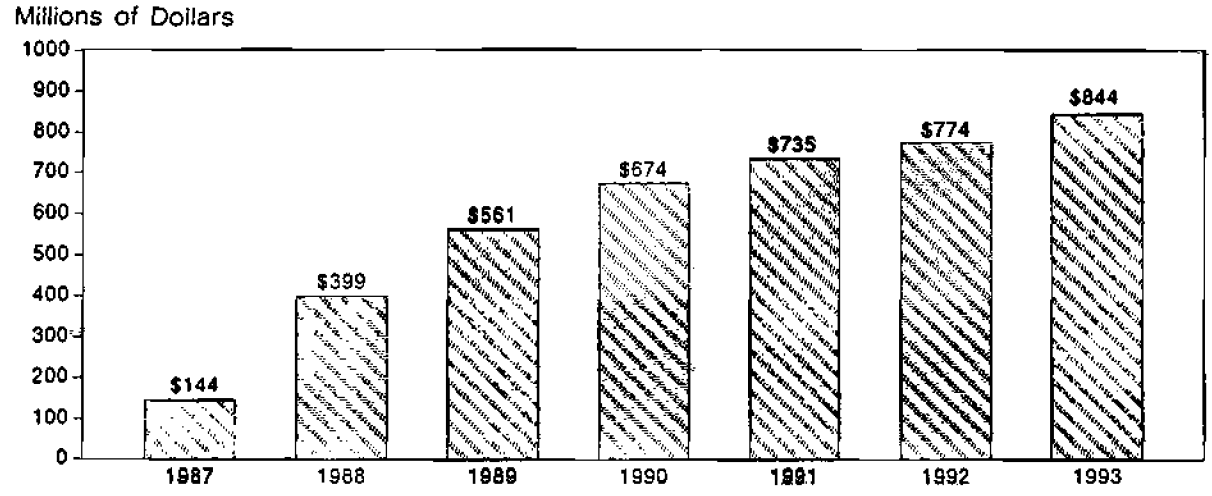
WORLDWIDE PC LOGIC CHIP SET FORECAST

Dataquest estimates 1988 worldwide PC logic chip set revenue to be $399 million compared with the 1987 estimate of $144 million. The forecast for 1989 is $561 million. Dataquest's PC logic chip set revenue forecast is presented in Figure 1. The chip set unit forecast is shown in Figure 2. The data for these figures are given in Table 1.

PC Logic Chip Sets--Forecast

Figure 1

Worldwide PC Logic Chip Set Forecast (Revenue)



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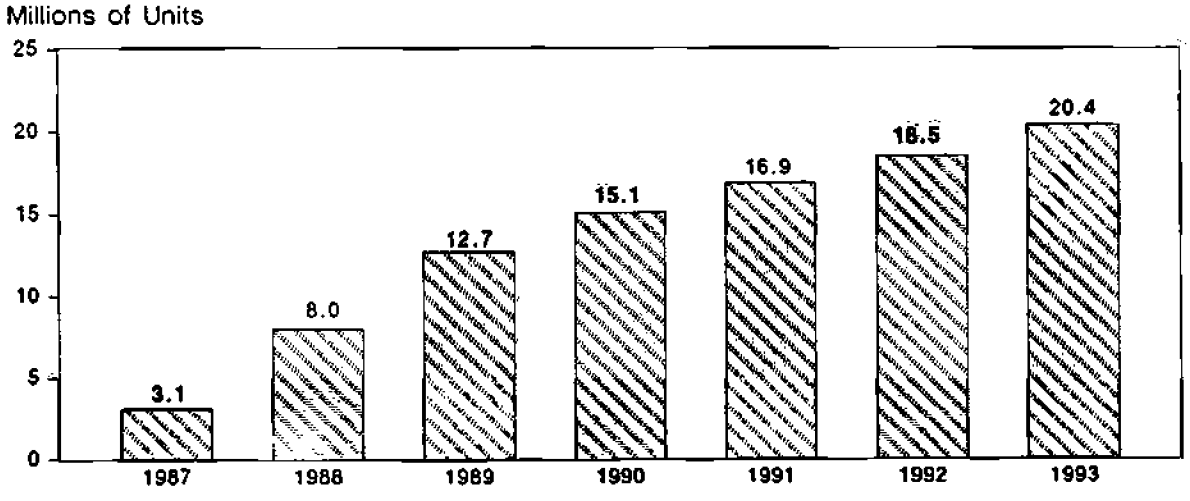
Source: Dataquest June 1989

Figure 2

Worldwide PC Logic Chip Set Forecast (Units)



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Source: Dataquest June 1989

PC Logic Chip Sets--Forecast

Table 1

Worldwide PC Logic Chip Set Forecast
(Millions of Units)

	1987	1988	1989	1990	1991	1992	1993	CAGR 1987-1993
DOS PC Shipments	9.6	12.3	13.8	15.4	17.1	18.7	20.6	13.6%
Chip Set Shipments	3.1	8.0	12.7	15.1	16.9	18.5	20.4	36.8%
Saturation	33%	65%	92%	98%	99%	99%	99%	
Chip Set ASP	$46.13	$49.66	$44.09	$44.71	$43.53	$41.89	$41.38	(1.8%)
Chip Set Revenue ($M)	$144	$399	$561	$674	$735	$774	$844	34.3%
Chip Set Revenue Growth		177.6%	40.5%	20.3%	9.0%	5.2%	9.1%	

Source: Dataquest
June 1989

MARKET DYNAMICS

The CAGR for chip set unit shipments from 1987 to 1993 is approximately 37 percent, an attractive rate of growth to investors, which should entice them to seek ways to participate in this industry. However, because of the nature of the relationship between PC consumption and chip set consumption, it is important to look at the development of this market in terms of the product life cycle.

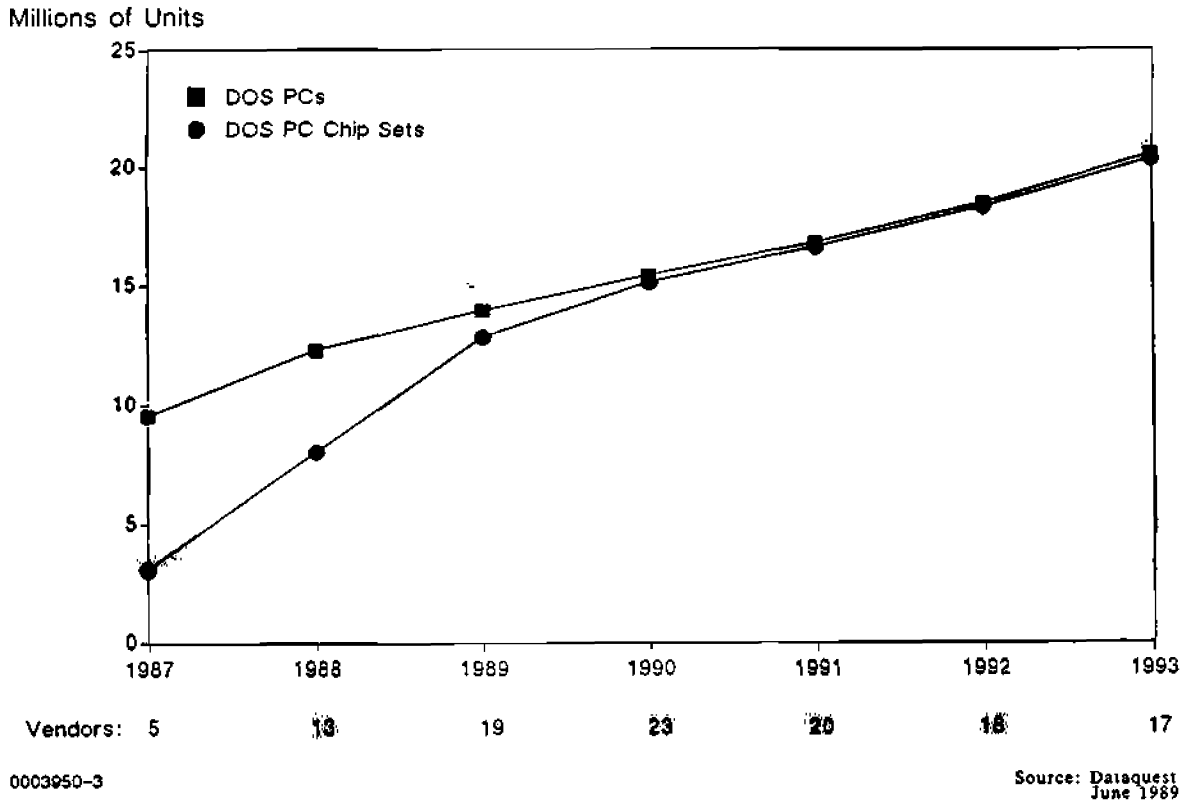
Figure 3 graphs shipments of chip sets against the shipments of DOS PCs. This shows the rapid growth of chip set shipments as they approach the level of PC shipments. Between 1987 and 1988, chip set shipments increased 158 percent. The CAGR for 1987 to 1990 is still almost 70 percent. In this same period, Dataquest estimates that the number of chip set vendors will increase from 6 to 23.

Dataquest believes that in 1990, the penetration of chip sets into PCs will likely approach saturation. By the end of 1989, the penetration is expected to be approximately 92 percent. At this point, the growth rate of chip set shipments will be tied directly to the growth rate of PC shipments. In fact, the CAGR for chip set shipments from 1989 to 1993 is only 12.6 percent. This level of growth should attract fewer new entrants and will cause some participants to exit the industry.

PC Logic Chip Sets--Forecast

Figure 3

Worldwide PC Logic Chip Set Forecast as Compared with the DOS PC Forecast



A CASE OF OVERCAPACITY

According to a Dataquest survey, worldwide logic chip set vendors expect to ship more than 15 million units in 1989. Table 2 lists the results of this survey along with Dataquest's estimated actual and forecast numbers for chip set and PC unit consumption for the period from 1987 through 1989. The vendors expect to ship 19 percent more than the forecast for chip sets in 1989 and 9 percent more than the forecast PC consumption.

The difference between the vendor's expectations and the Dataquest forecast might be explained by aggressive goal setting on the part of the vendors. One could argue also that some units will be shipped into inventory. It is clear, however, that more than enough capacity exists to satisfy the demand for chip sets, and new entrants to the industry are expected to aggravate this situation.

This analysis implies that the competition for market share in this industry is likely to lead to aggressive, if not predatory, pricing policies on the part of participants. Given the degree of standardization of these products, they will take on more of the attributes of a commodity, where pricing and service are the keys to success.

Table 2

Worldwide PC Logic Chip Set Vendor Survey Results
(Millions of Units)

	1987	1988	1989
DOS PC Consumption Forecast	9.5	12.3	13.8
DOS Chip Set Consumption Forecast	3.1	8.0	12.7
Vendor Estimated Chip Set Shipments	3.1	8.0	15.1

Source: Dataquest
June 1989

HIGHLIGHTS OF THE PC LOGIC CHIP SET FORECASTS

Dataquest forecasts the PC logic chip set market by bus architecture, microprocessor type, and speed grade by microprocessor type.

Forecast by Bus Architecture

The Dataquest chip set forecast by bus architecture is presented in Figure 4 and Table 3. Points worth noting about the bus architecture forecast include:

- The PC XT bus unit shipments are expected to peak in 1989 at about 4.5 million units, and then decline as the bus is phased out and displaced by low-end PC AT products. PC XT chip set unit shipments are expected to decline approximately 9 percent annually for the period of 1987 through 1993.

- The PC AT bus will remain the dominant architecture through the period, with a CAGR of 50.9 percent.

- The Micro Channel bus chip sets began shipping in 1988. The EISA bus chip sets are expected to be available in the second half of 1989. This gives the MCA bus a head start in the marketplace and will allow it to gain and hold a larger share of the high-end market.

PC Logic Chip Sets--Forecast

Figure 4

Worldwide PC Logic Chip Set Forecast By Bus Architecture

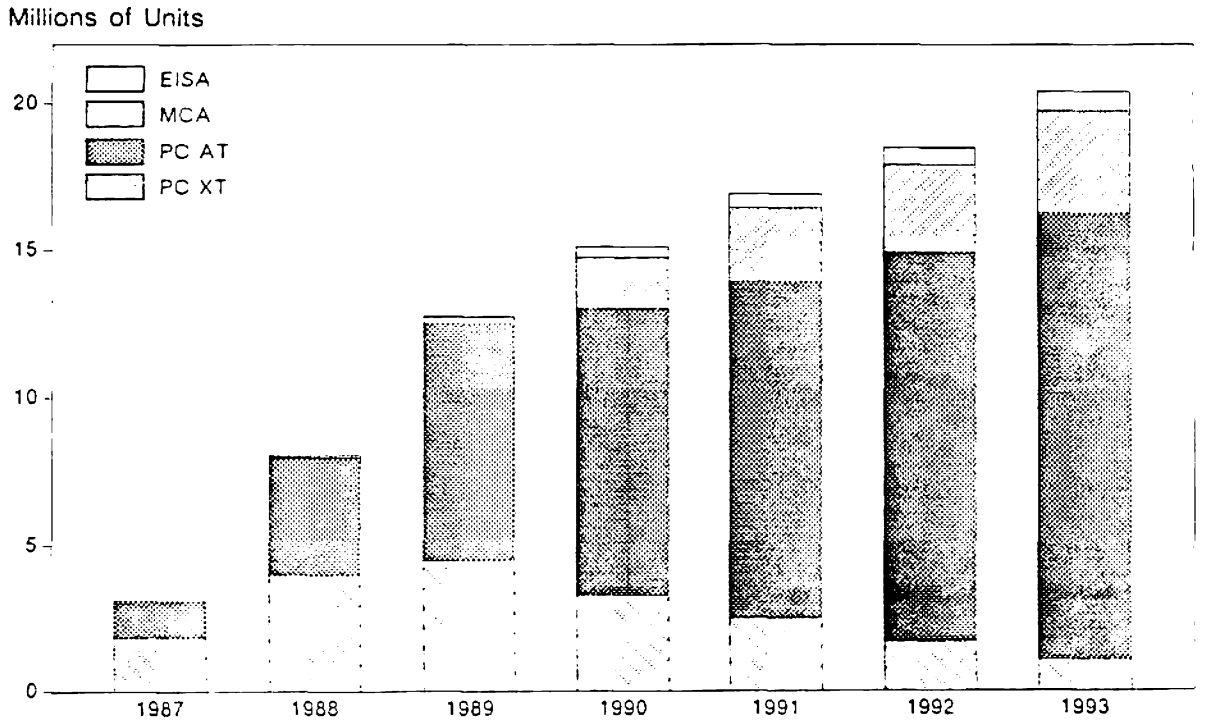


Table 3

Worldwide PC Logic Chip Set Forecast by Bus Architecture
(Thousands of Units)

	1987	1988	1989	1990	1991	1992	1993	CAGR 1987-1993
PC XT	1,829	3,988	4,476	3,279	2,481	1,658	1,039	(9.0%)
PC AT	1,287	3,986	8,015	9,720	11,419	13,230	15,165	50.9%
MCA	0	61	221	1,716	2,511	3,006	3,545	125.5%
EISA	0	0	8	370	484	572	654	203.4%
Total	3,116	8,035	12,720	15,085	16,895	18,466	20,403	36.8%

Source: Dataquest
June 1989

PC Logic Chip Sets--Forecast

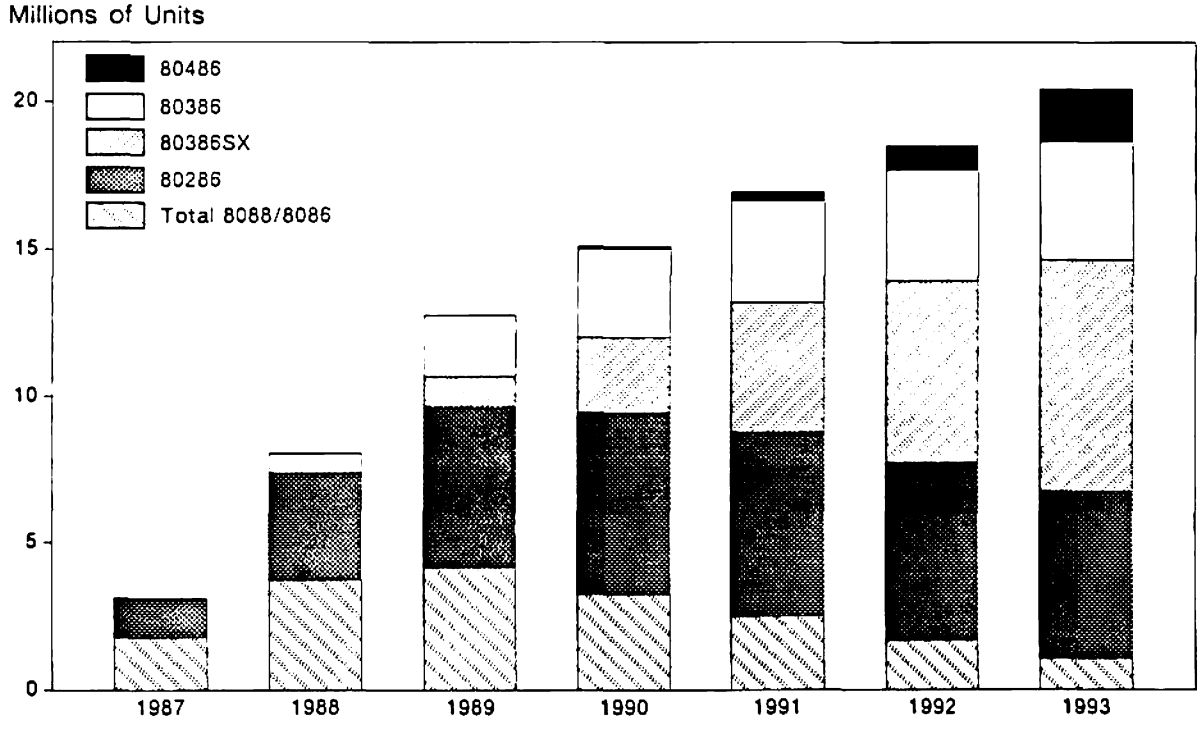
Forecast by Microprocessor Type

The Dataquest chip set forecast by microprocessor type is presented in Figure 5 and Table 4. Points worth noting about the microprocessor forecast include:

- The 8088/8086 segment parallels the PC XT bus decline, forecast to peak in 1989 and then gradually to be displaced by the 80286.
- The 80286 unit shipments are expected to peak in 1991 and then begin to decline. The 80386SX is expected to take share from the 80286, with the 80286 becoming the dominant low-end product, and the 80386SX moving into the dominant position as the midrange product by 1993.
- The 80386 shares the high-end segment with the 80486, which was introduced in April of this year. Dataquest believes that this will dampen the growth of the 80386 product, as the 80486 displaces the 80386 at the very high end of the market.

Figure 5

Worldwide PC Logic Chip Set Forecast By Microprocessor Type



PC Logic Chip Sets--Forecast

Table 4

Worldwide PC Logic Chip Set Unit Forecast by Microprocessor Type
(Thousands of Units)

	1987	1988	1989	1990	1991	1992	1993	CAGR 1987-1993
8088	787	1,507	1,767	1,114	757	260	137	(25.3%)
8086	983	2,207	2,372	2,116	1,732	1,398	903	(1.4%)
Total 8088/8086	1,770	3,714	4,139	3,230	2,489	1,658	1,039	(8.5%)
80286	1,267	3,606	5,486	6,189	6,258	6,040	5,658	28.3%
80386	78	659	2,077	3,010	3,441	3,770	4,039	93.2%
80386SX	0	55	1,017	2,569	4,408	6,191	7,896	169.6%
Total 80386 (All)	78	714	3,094	5,579	7,849	9,960	11,935	131.5%
80486	0	0	0	86	306	807	1,771	1,109.3%
Total	3,115	8,034	12,719	15,084	16,895	18,465	20,403	36.8%

Source: Dataquest
June 1989

Forecast by Speed Grade

The Dataquest PC logic chip set forecast of speed grades for all microprocessors is presented in Figure 6. The forecast for speed grades of individual microprocessors is presented in Figures 7 through 11. Data for these figures are presented in Table 5. Points worth noting about the speed forecast include:

- In general, the lower speed grades (8, 10 and 12 MHz) are only available on the older microprocessors (the 8088, 8086 and 80286). These older products are being displaced in the market by the newer designs, which will continue to cause a secular shift in the market mix away from the slower speed grades.
- As each microprocessor product approaches maturity, the speed grade profile approaches a more normal distribution. This is also true of the profile for the total of all microprocessors.
- In 1987, the median speed was 10 MHz. Dataquest believes that the median speed for all microprocessors currently is 12 MHz. By 1993, the median speed is expected to be 20 MHz.

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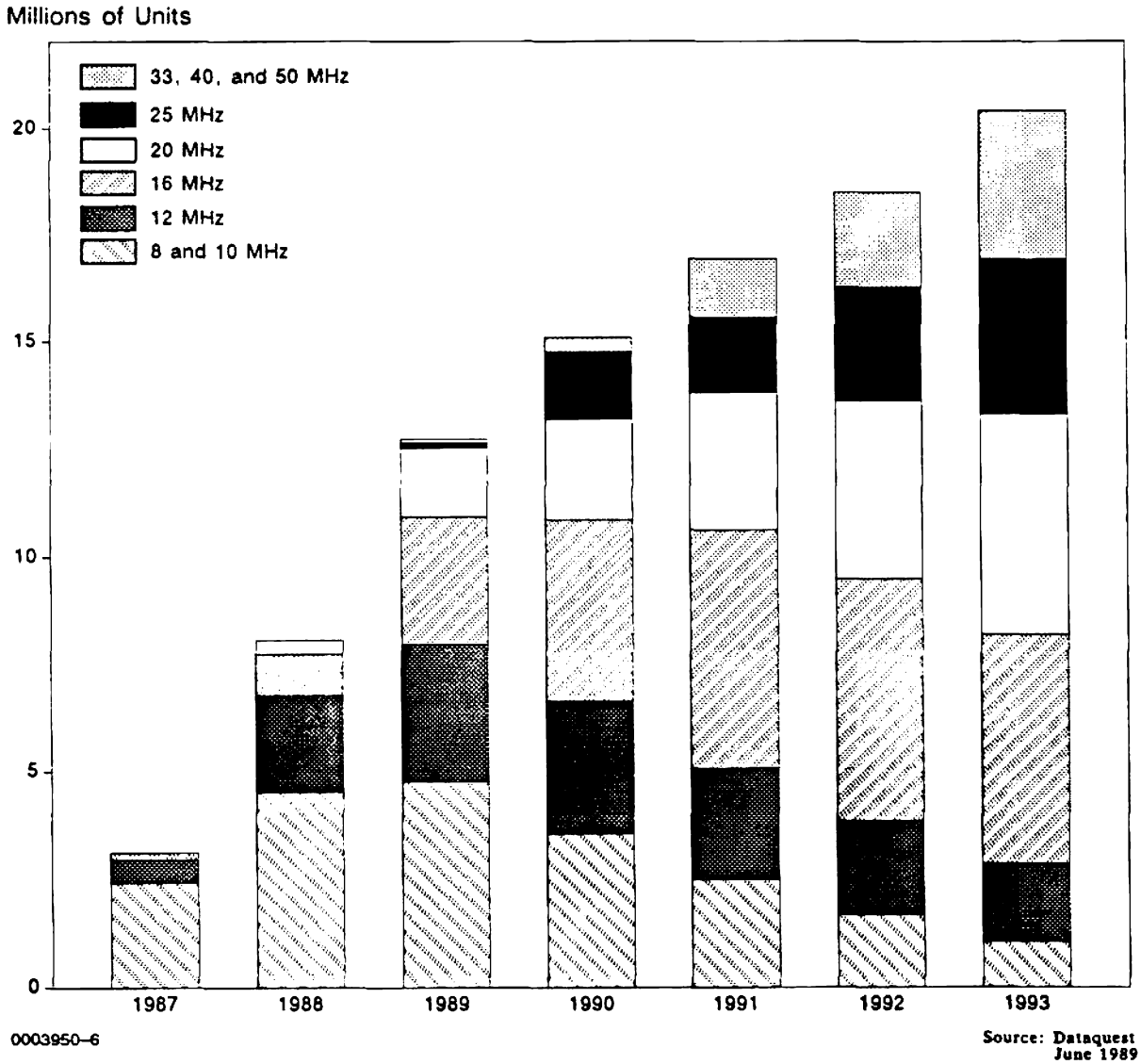
Figure 6

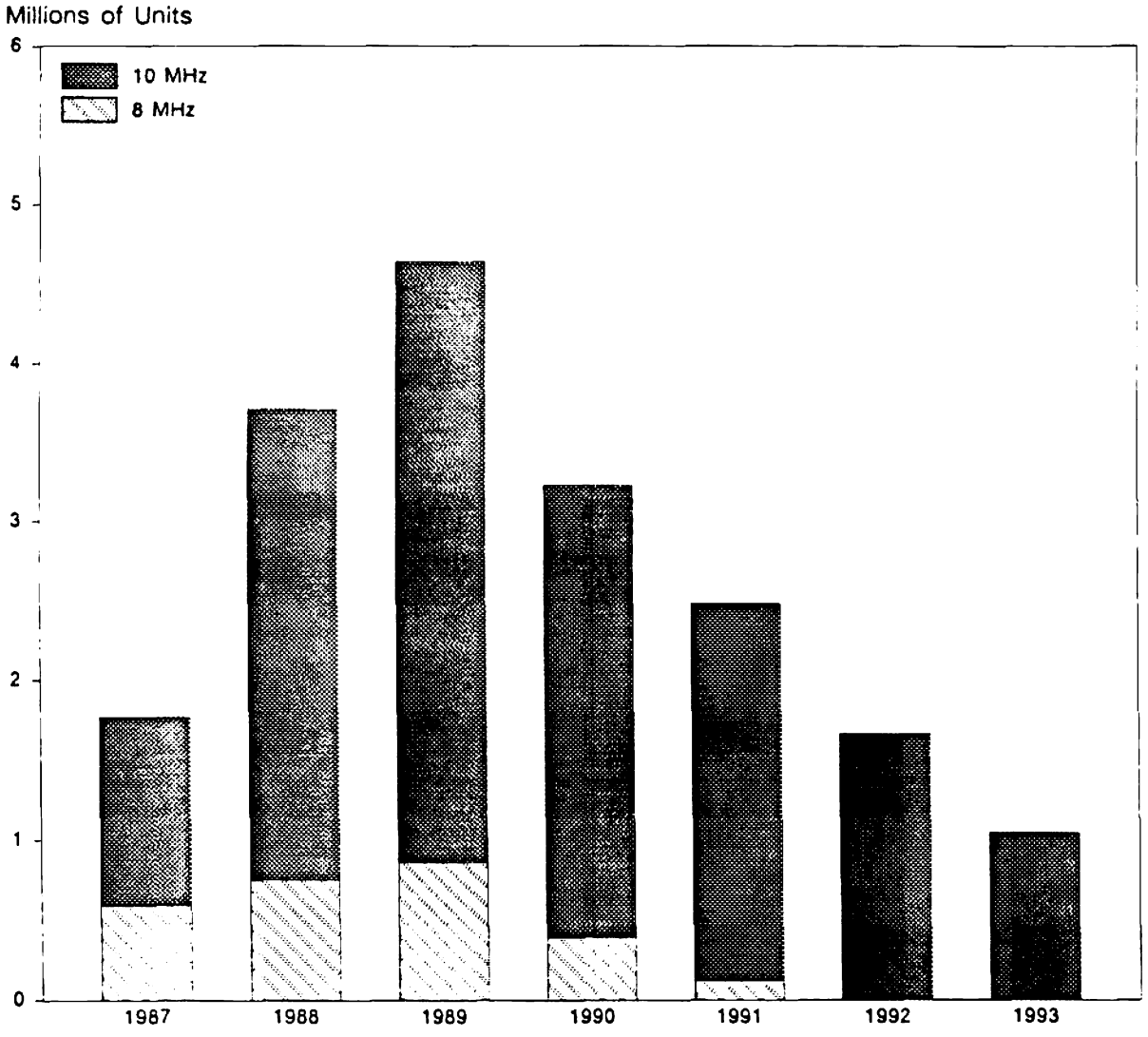
Worldwide PC Logic Chip Set Forecast by Speed for All Microprocessors



PC Logic Chip Sets--Forecast

Figure 7

Worldwide 8088/8086 PC Logic Chip Set Forecast By Speed



PC Logic Chip Sets--Forecast

Figure 8

Worldwide 80286 PC Logic Chip Set Forecast By Speed

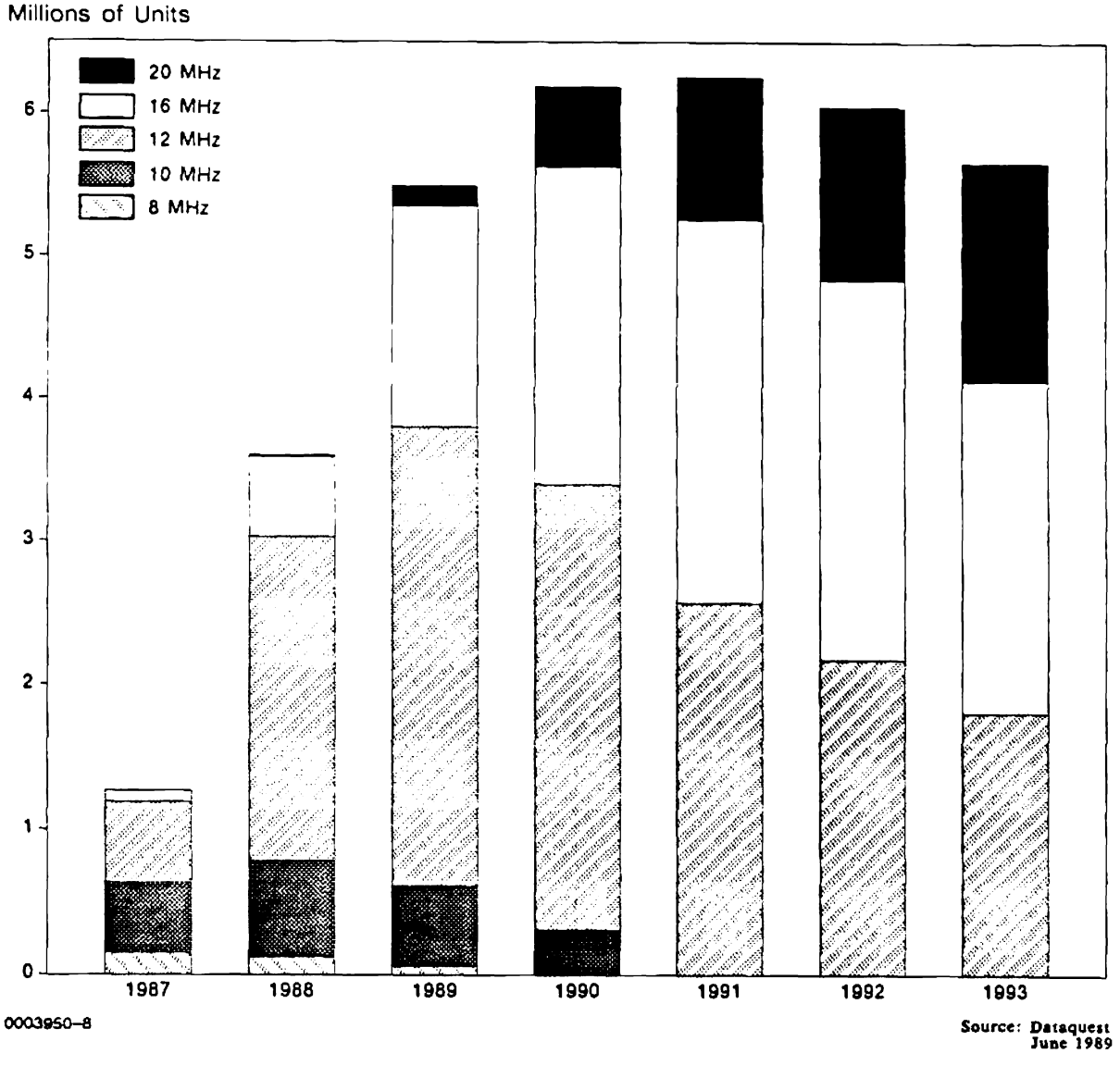


Figure 9

Worldwide 80386SX PC Logic Chip Set Forecast By Speed

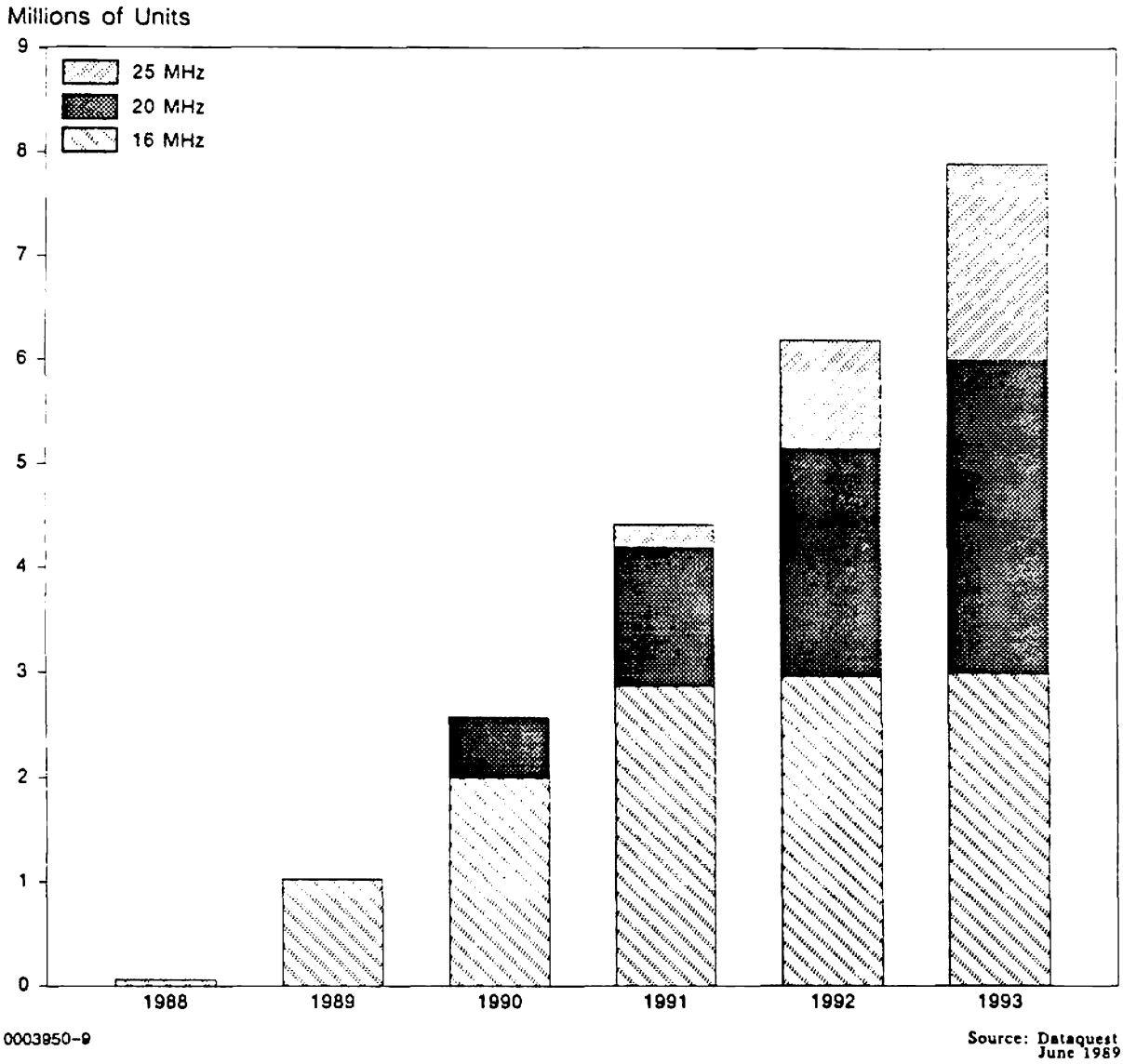


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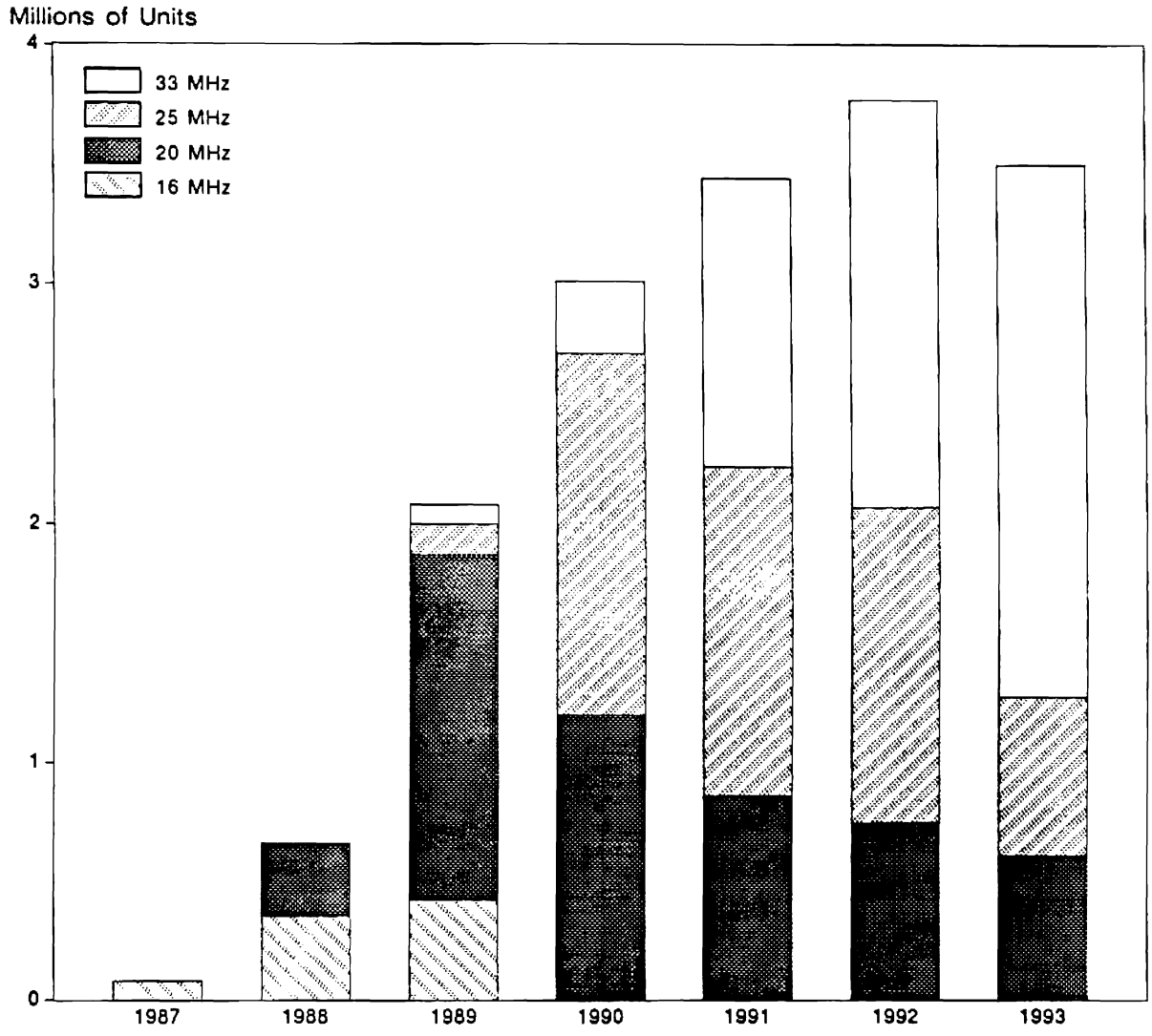
Figure 10

Worldwide 80386 PC Logic Chip Set Forecast By Speed



0003950-10

Source: Dataquest
June 1989

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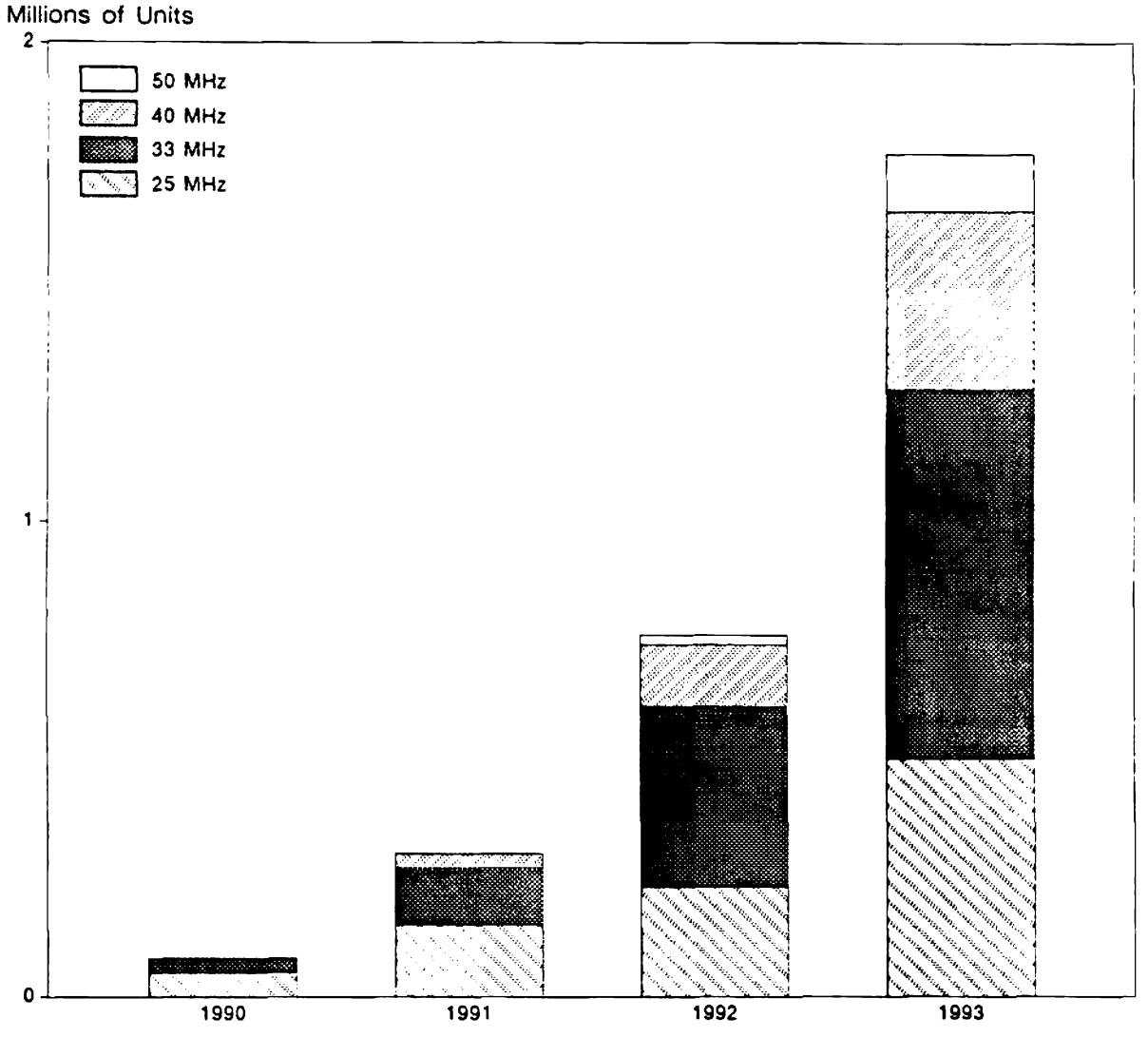
Figure 11

Worldwide 80486 PC Logic Chip Set Forecast By Speed



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Source: Dataquest
June 1989

PC Logic Chip Sets--Forecast

Table 5

Worldwide PC Logic Chip Set Forecast by Speed
(Thousands of Units)

Speeds	1987	1988	1989	1990	1991	1992	1993
Units by Speed							
8088/8086							
8 MHz	589	754	857	388	124	0	0
10 MHz	1,181	2,960	3,282	2,842	2,357	1,658	1,039
Total	1,770	3,714	4,139	3,230	2,481	1,658	1,039
80286							
8 MHz	151	123	55	0	0	0	0
10 MHz	480	664	554	309	0	0	0
12 MHz	556	2,250	3,187	3,094	2,566	2,175	1,811
16 MHz	80	555	1,552	2,228	2,691	2,658	2,320
20 MHz	0	14	137	557	1,001	1,208	1,528
Total	1,267	3,606	5,486	6,189	6,258	6,040	5,658
80386SX							
16 MHz	0	55	1,017	2,004	2,865	2,971	3,000
20 MHz	0	0	0	565	1,322	2,167	3,000
25 MHz	0	0	0	0	220	1,052	1,895
33 MHz	0	0	0	0	0	0	0
Total	0	55	1,017	2,569	4,408	6,191	7,896
80386							
16 MHz	78	349	415	0	0	0	0
20 MHz	0	310	1,454	1,204	860	754	606
25 MHz	0	0	125	1,505	1,376	1,319	1,212
33 MHz	0	0	83	301	1,204	1,696	2,221
Total	78	659	2,077	3,010	3,441	3,770	4,039

(Continued)

Table 5 (Continued)

Worldwide PC Logic Chip Set Forecast by Speed
(Thousands of Units)

Speeds	1987	1988	1989	1990	1991	1992	1993
80486							
25 MHz	0	0	0	53	153	282	496
33 MHz	0	0	0	29	122	379	779
40 MHz	0	0	0	3	31	129	372
50 MHz	0	0	0	0	0	16	124
Total	0	0	0	86	306	807	1,771
Speed Totals							
8 MHz	740	877	912	388	124	0	0
10 MHz	1,661	3,623	3,836	3,152	2,357	1,658	1,039
12 MHz	556	2,250	3,187	3,094	2,566	2,175	1,811
16 MHz	158	960	2,985	4,232	5,556	5,629	5,320
20 MHz	0	324	1,591	2,326	3,184	4,129	5,134
25 MHz	0	0	125	1,558	1,750	2,654	3,602
33 MHz	0	0	83	330	1,327	2,076	3,000
40 MHz	0	0	0	3	31	129	372
50 MHz	0	0	0	0	0	16	124
Total	3,115	8,034	12,719	15,084	16,895	18,465	20,402

Source: Dataquest
June 1989