

Microcontroller Forecast

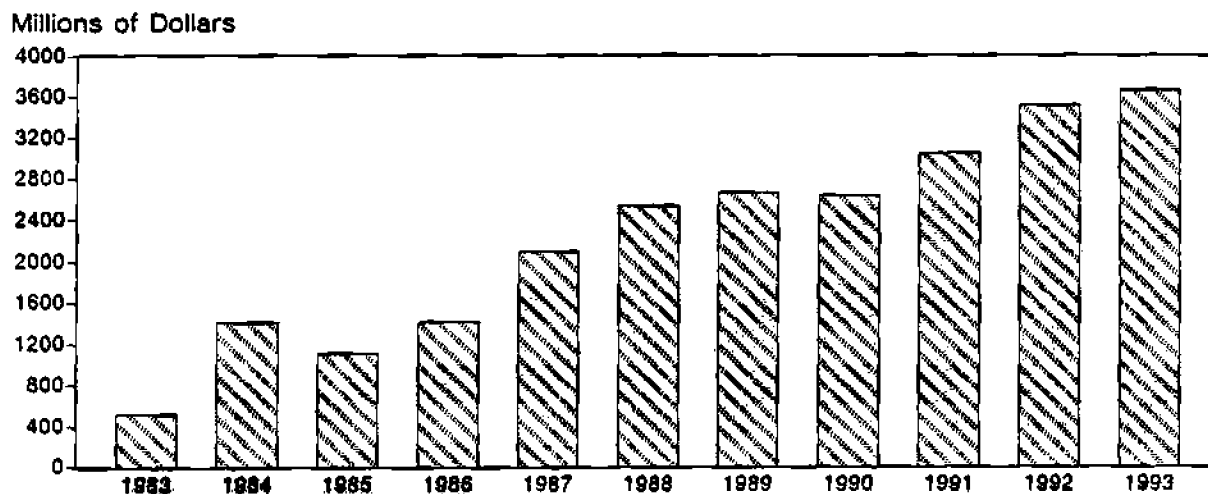
HIGHLIGHTS OF THE MOS MICROCONTROLLER FORECAST

Points worth noting about Dataquest's MOS microcontroller forecast include the following:

- Microcontroller revenue is expected to exceed \$2.5 billion in 1988 and to exceed \$3 billion annually by 1991, as shown in Figure 1.
- Unit shipments of 4-bit microcontrollers remain strong, with a forecast CAGR of 9.1 percent through 1993.
- Shipments of 8-bit microcontrollers are expected to climb steadily, overtaking those of 4-bit microcontrollers this year.
- The market for 16-bit microcontrollers has been slow to materialize, but emerging applications, such as antiskid braking and recent product introductions, are expected to fuel growth in the next five years.
- Dataquest anticipates a mild downturn in overall semiconductor consumption beginning in mid-1989 and extending through mid-1990. However, both years are expected to show positive growth in microcomponent unit consumption. According to this industry model, the next cyclical downturn will occur in 1993.

Figure 1

Estimated Worldwide MOS Microcontroller Consumption
1983-1993



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Source: Dataquest
November 1988

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COMPARISON WITH EARLIER FORECASTS

Microcontroller unit shipment projections have increased substantially over the February 1988 forecast. The average selling price (ASP) for 4- and 16-bit microcontrollers remained unchanged, while 8-bit ASPs strengthened for the forecast period. Forecast revenue for both 4- and 8-bit microcontrollers increased significantly as a result.

WORLDWIDE MOS MICROCONTROLLER FORECAST

Dataquest's MOS microcontroller forecast is presented in Tables 1 through 9. The tables included in this forecast are as follows:

- Table 1—Worldwide MOS Microcontroller Revenue Forecast
- Table 2—Worldwide MOS Microcontroller Unit Shipment Forecast
- Table 3—Worldwide MOS Microcontroller ASP Forecast
- Table 4—Estimated Worldwide MOS Microcontroller Revenue, 1979–1983
- Table 5—Estimated Worldwide MOS Microcontroller Revenue, 1984–1987
- Table 6—Estimated Worldwide MOS Microcontroller Unit Shipments, 1979–1983
- Table 7—Estimated Worldwide MOS Microcontroller Unit Shipments, 1984–1987
- Table 8—Estimated Worldwide MOS Microcontroller ASPs, 1979–1983
- Table 9—Estimated Worldwide MOS Microcontroller ASPs, 1984–1987

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Table 1

**Worldwide MOS Microcontroller Revenue Forecast
(Millions of Dollars)**

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>CAGR 1988-1993</u>
4-Bit MCU	\$ 944.7	\$ 991.4	\$ 979.0	\$1,081.3	\$1,174.6	\$1,181.8	4.6%
Growth	19.2%	4.9%	(1.2%)	10.4%	8.6%	0.6%	
8-Bit MCU	\$1,576.3	\$1,654.4	\$1,626.0	\$1,911.0	\$2,219.6	\$2,267.8	7.5%
Growth	21.8%	5.0%	(1.7%)	17.5%	16.1%	2.2%	
16-Bit MCU	\$ 15.0	\$ 17.9	\$ 30.0	\$ 58.1	\$ 125.6	\$ 219.1	70.9%
Growth	19.4%	19.1%	67.5%	93.3%	116.4%	74.4%	
Total							
Revenue	\$2,536.0	\$2,663.7	\$2,635.0	\$3,050.3	\$3,519.8	\$3,668.7	7.7%
Growth	20.8%	5.0%	(1.1%)	15.8%	15.4%	4.2%	

Source: Dataquest
November 1988

Table 2

**Worldwide MOS Microcontroller Unit Shipment Forecast
(Millions of Units)**

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>CAGR 1988-1993</u>
4-Bit MCU	470.0	533.0	550.0	625.0	695.0	725.0	9.1%
Growth	19.8%	13.4%	3.2%	13.6%	11.2%	4.3%	
8-Bit MCU	485.0	580.5	600.0	735.0	895.0	965.0	14.8%
Growth	45.5%	19.7%	3.4%	22.5%	21.8%	7.8%	
16-Bit MCU	1.2	1.8	3.5	7.5	18.0	35.0	96.3%
Growth	50.0%	50.0%	94.4%	114.3%	140.0%	94.4%	
Total							
Units	956.2	1,115.3	1,153.5	1,367.5	1,608.0	1,725.0	12.5%
Growth	31.6%	16.6%	3.4%	18.6%	17.6%	7.3%	

Source: Dataquest
November 1988

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Table 3

Worldwide MOS Microcontroller ASP Forecast

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>CAGR 1988-1993</u>
4-Bit MCU Growth	\$ 2.01 (0.5%)	\$1.86 (7.5%)	\$1.78 (4.3%)	\$1.73 (2.8%)	\$1.69 (2.3%)	\$1.63 (3.6%)	(4.1%)
8-Bit MCU Growth	\$ 3.25 (16.2%)	\$2.85 (12.3%)	\$2.71 (4.9%)	\$2.60 (4.1%)	\$2.48 (4.6%)	\$2.35 (5.2%)	(6.3%)
16-Bit MCU Growth	\$12.54 (20.3%)	\$9.96 (20.6%)	\$8.58 (13.9%)	\$7.74 (9.8%)	\$6.98 (9.8%)	\$6.26 (10.3%)	(13.0%)
Aggregate ASP Growth	\$ 2.65 (8.4%)	\$2.39 (9.9%)	\$2.28 (4.4%)	\$2.23 (2.4%)	\$2.19 (1.9%)	\$2.13 (2.8%)	(4.3%)

Source: Dataquest
November 1988

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Table 4

**Estimated Worldwide MOS Microcontroller Revenue
1979-1983
(Millions of Dollars)**

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>CAGR 1979-1983</u>
4-Bit MCU Growth	\$110.4	\$206.6 87.1%	\$267.1 29.3%	\$253.0 (5.3%)	\$257.9 1.9%	23.6%
8-Bit MCU Growth	\$ 75.3	\$108.7 44.3%	\$136.2 25.3%	\$173.2 27.1%	\$267.3 54.4%	37.2%
16-Bit MCU Growth	\$ 0.05	\$ 0.15 200.0%	\$ 0.9 500.0%	\$ 0.9 (5.6%)	\$ 1.1 33.0%	118.1%
Total Revenue Growth	\$185.8	\$315.4 69.8%	\$404.2 28.2%	\$427.0 5.6%	\$526.3 23.3%	29.7%

Table 5

**Estimated Worldwide MOS Microcontroller Revenue
1984-1987
(Millions of Dollars)**

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>CAGR 1984-1987</u>
4-Bit MCU Growth	\$ 475.8 84.5%	\$ 382.3 (19.6%)	\$ 554.7 45.1%	\$ 792.4 42.9%	18.5%
8-Bit MCU Growth	\$ 930.3 248.1%	\$ 728.0 (21.7%)	\$ 853.4 17.2%	\$1,293.6 51.6%	11.6%
16-Bit MCU Growth	\$ 0.7 (41.6%)	\$ 4.0 506.4%	\$ 7.0 74.7%	\$ 12.6 80.1%	167.2%
Total Revenue Growth	\$1,406.7 167.3%	\$1,114.3 (20.8%)	\$1,415.1 27.0%	\$2,098.6 48.3%	14.3%

Source: Dataquest
November 1988

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Table 6

**Estimated Worldwide MOS Microcontroller Unit Shipments
1979-1983
(Millions of Units)**

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>CAGR 1979-1983</u>
4-Bit MCU Growth	50.5	96.1 90.3%	133.5 38.9%	158.2 18.5%	171.9 8.7%	35.8%
8-Bit MCU Growth	11.6	21.7 87.6%	34.9 60.6%	54.1 55.0%	90.6 67.4%	67.2%
16-Bit MCU Growth	0.001	0.005 400.0%	0.04 700.0%	0.05 25.0%	0.09 80.0%	208.0%
Total Units Growth	62.1	117.8 89.8%	168.5 43.0%	212.4 26.1%	262.6 23.7%	43.4%

Table 7

**Estimated Worldwide MOS Microcontroller Unit Shipments
1984-1987
(Millions of Units)**

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>CAGR 1984-1987</u>
4-Bit MCU Growth	193.4 12.5%	177.0 (8.5%)	271.9 53.6%	392.3 44.3%	26.6%
8-Bit MCU Growth	163.5 80.5%	163.6 0.1%	224.0 36.9%	333.4 48.8%	26.8%
16-Bit MCU Growth	0.06 (33.3%)	0.23 283.3%	0.4 73.9%	0.8 100.0%	137.1%
Total Units Growth	357.0 35.9%	340.8 (4.5%)	496.3 45.6%	726.5 46.4%	26.7%

Source: Dataquest
November 1988

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Table 8

Estimated Worldwide MOS Microcontroller ASPs
1979-1983

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>CAGR</u> <u>1979-1983</u>
4-Bit MCU Growth	\$ 2.19	\$ 2.15 (1.6%)	\$ 2.00 (6.9%)	\$ 1.60 (20.1%)	\$ 1.50 (6.2%)	(9.0%)
8-Bit MCU Growth	\$ 6.50	\$ 5.00 (23.1%)	\$ 3.90 (22.0%)	\$ 3.20 (17.9%)	\$ 2.95 (7.8%)	(17.9%)
16-Bit MCU Growth	\$50.00	\$30.00 (40.0%)	\$22.50 (25.0%)	\$17.00 (24.4%)	\$12.56 (26.1%)	(29.2%)
Aggregate ASP Growth	\$ 2.99	\$ 2.68 (10.5%)	\$ 2.40 (10.4%)	\$ 2.01 (16.2%)	\$ 2.00 (0.3%)	(9.5%)

Table 9

Estimated Worldwide MOS Microcontroller ASPs
1984-1987

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>CAGR</u> <u>1984-1987</u>
4-Bit MCU Growth	\$ 2.46 64.0%	\$ 2.16 (12.2%)	\$ 2.04 (5.6%)	\$ 2.02 (1.0%)	(6.4%)
8-Bit MCU Growth	\$ 5.69 92.9%	\$ 4.45 (21.8%)	\$ 3.81 (14.4%)	\$ 3.88 1.8%	(12.0%)
16-Bit MCU Growth	\$11.00 (12.4%)	\$17.40 58.2%	\$17.48 0.5%	\$15.74 (10.0%)	12.7%
Aggregate ASP Growth	\$ 3.94 96.6%	\$ 3.27 (17.0%)	\$ 2.85 (12.8%)	\$ 2.89 1.3%	(9.8%)

Source: Dataquest
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