

# Readers Pick AMD as Top Processor Vendor

## Demand for 8-Bit Processors and CISC Chips Remains High

By Linley Gwennap

In a recent survey, a group of our subscribers, all of whom design or manage the design of microprocessor-based products, gave us their opinions on various chip vendors. The study, conducted independently by Pace-setter Surveys of San Mateo, also asked respondents to share some information about the types of processors they use, as well as their plans for future chips, and also about their own products. To ensure fairness, designers at chip companies were specifically excluded.

From a field of 21 processor vendors, AMD was the clear winner, ranking among the top five vendors in all eight of the different vendor criteria (see Table 1). Among vendors with a large number of respondents in the survey, Motorola also did well, although it apparently suffered from its failure to meet previous commitments on shipment dates. Intel fell in the middle of the pack; it was faulted for uncompetitive prices, slow response to problems, and a failure to provide adequate bug lists.

The vendor portion of the survey asked respondents to rate their vendors in eight different categories, as shown in Table 1. The ratings (based on a four-point scale) were then averaged and placed in rank order (from 1 to 21) for each category; these rankings are listed in the table. The overall vendor rating is a weighted average of the eight rankings; smaller numbers are better. We gave the categories regarding price, performance, and schedule higher weights, as respondents indicated that these were more important criteria in selecting a microprocessor vendor.

Respondents only rated those vendors with which they were familiar. As a result, some vendors were rated by only a few people, leaving the ratings of these vendors with a significant margin of error. On the other hand, popular vendors such as Motorola and Intel were each evaluated by 50 users; their rankings should more accurately reflect the views of their customer base.

Based on the number of responses, AMD was the third most-used vendor among our readers, behind Intel and Motorola. The respondents were also very familiar with Texas Instruments (TI), MIPS, Chips and Technologies (C&T), Cypress, National, and Zilog. This familiarity did not always breed contempt, as AMD was the most highly rated

of all the vendors.

Although few respondents had used Toshiba processors, those that had were impressed, ranking that company highly in most categories. Toshiba's one failing is in application support, an area in which other Japanese vendors were also downgraded. Two other MIPS-processor vendors, VLSI and NEC, took the next two spots in the rankings. The respondents, apparently impressed by the R4000, rated these three MIPS vendors #1 in performance. They also feel that Toshiba and NEC have the best prices, and that both companies have done well in meeting their shipment dates. VLSI apparently excels in customer support, and NEC was knocked for not providing adequate bug lists.

Cyrix topped the charts in overall customer service. Its processors also rated well in price, performance, and meeting first shipment dates. Some respondents felt Cyrix did not do well in providing bug lists, and also faulted the company for not meeting its performance claims. The latter problems may have been caused by Cyrix using small benchmarks to exaggerate the performance of its 486SLC and DLC processors.

Motorola processors, used by most of the respon-

VENDOR (Responses)	Credibility—Performance Claims				Forthrightness—Documenting bugs					OVERALL
	Credibility—Shipment Dates				Quality of Application Support					
	Price Competitiveness				Quality of Data Books					
	CPU Performance				Timely Response					
	(2x)	(2x)	(2x)	(2x)	(1x)	(1x)	(1x)	(1x)	(1x)	
1 AMD (35)	5	4	5	4	2	4	4	2	4.2	
2 Toshiba (3)	1	1	1	9	2	18	1	7	4.9	
3 VLSI Tech (6)	1	8	8	9	1	2	2	5	5.5	
4 NEC (8)	1	2	3	1	20	10	14	3	5.6	
5 Cyrix (10)	7	3	3	14	14	1	4	1	6.5	
6 Motorola (50)	5	6	14	3	8	5	3	4	6.6	
7 Philips-Sign. (4)	12	8	1	5	2	3	15	5	7.1	
8 AT&T (5)	1	13	9	14	2	10	8	7	9.3	
9 IDT (8)	9	7	6	5	11	10	15	12	9.3	
10 Zilog (13)	12	5	12	11	8	15	11	14	11.1	
11 Texas Instr. (21)	15	12	11	11	16	6	10	7	11.7	
12 Intel (50)	9	17	13	5	18	10	6	17	12.2	
13 MIPS (17)	14	15	14	5	11	19	7	16	12.9	
14 DEC (9)	7	21	18	2	20	8	20	19	13.8	
15 Chips & Tech (16)	11	10	19	11	16	8	18	18	13.8	
16 LSI Logic (8)	18	13	9	18	14	10	11	11	14.1	
17 Hitachi (6)	16	18	6	18	6	15	15	12	14.2	
18 National (14)	20	10	16	16	13	17	8	10	14.5	
19 Cypress (15)	18	15	16	17	7	7	13	14	14.7	
20 Inmos (7)	16	20	20	21	8	20	19	20	18.6	
21 Fujitsu (5)	21	18	21	20	18	21	21	21	20.2	

Table 1. Vendor rankings in eight categories. Overall rating is a weighted average using weights shown above double line. Lower numbers are better.

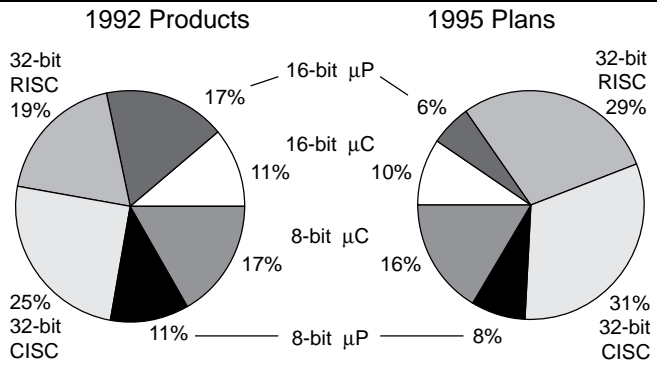


Figure 1. Processor usage over time by processor type among those surveyed. (Source: MPR survey)

dents, were rated as having good performance and a good price. The company is also near the top in the customer-support categories. Many people believed that the company has poor credibility in meeting promised first shipment dates for new products. Motorola's problems in getting the 68040 and 88110 to market undoubtedly hurt them in this area.

Other well-known vendors fell in the middle of the pack. The biggest, of course, is Intel, which did surprisingly well on performance. The company was deemed slow to respond to customer problems and to document its own bugs, perhaps due to its ponderous size and secretive nature. With its stranglehold on the high-end x86 market, Intel also did not fare well in providing competitive prices.

Respondents were equally unimpressed by TI's parts, which include SPARC processors, DSPs, and a range of microcontrollers. TI did get better ratings in the customer service areas. Zilog, a leading supplier of 8-bit microprocessors, also got middling ratings. Competitive pricing, a key factor in such a low-cost market, got Zilog its best rating.

Although AT&T has recently entered the microprocessor business with its Hobbit CPU, few respondents were familiar with that chip. More of them are using DSPs from the company's Microelectronics group. Combining these two products, the company was rated fairly well, particularly for performance and customer support, although price was an issue.

DEC, another newcomer to the microprocessor business, still has a lot to learn. Surprisingly, respondents did not rate its chips at the top for performance. Propelled by Alpha's list price of over \$1000, DEC finished dead last in price competitiveness and was also near the bottom in meeting schedule commitments and most customer support areas.

Two other companies with a moderate number of responses, National and Cypress, did rather poorly, each ranking among the bottom five in three categories. Both companies were deemed to provide inadequate performance from their processors. Fujitsu and Inmos bring up

## Survey Methodology

The survey was sent to 302 subscribers of *Microprocessor Report*, all of whom were qualified as designers of microprocessor systems. Employees of microprocessor companies were specifically excluded. The survey forms were anonymous, and were returned to and tabulated by Pacesetter Surveys. A total of 74 surveys were completed and returned.

The survey results provide the opinions of people who are interested in and knowledgeable about a wide range of processor chips and vendors. They do not necessarily reflect the full spectrum of microprocessor users; many more processors go into PCs, for example, than were represented in our survey. For these reasons, and because of the relatively small number of responses, it is difficult to determine the statistical accuracy of these results. The response rate was high enough to make some broad-based conclusions, but the reader should not put too much emphasis on any individual statistics.

the end of the list. Although both of these companies were rated by just a few respondents, their poor showing reflects some dissatisfaction among their customer base.

### CISC Remains Popular

Among those surveyed, the RISC/CISC debate has not been resolved. Of those using 32-bit processors, slightly more are using CISC processors than RISC (see Figure 1). Looking at future product plans into 1995, RISC chips close the gap but still lag by a few percentage points. The CISC advantage is not based on the requirement for an x86 processor in PC systems—only 18% of the respondents indicated that they are in the PC business. Instead, most of them are building workstations, peripheral cards, or embedded systems that allow much more flexibility in choosing a processor. Among those using a 32-bit CISC chip, about half were using either the Motorola 68000 family or National 32000 family, with the other half choosing x86 chips (see Table 2).

RISC users are taking advantage of a wider range of chips, and based on the survey results, no company has a dominant position, although SPARC and AMD's 29000 are both doing well. The table does not include

8-bit Processor Design-Ins		16-bit Processor Design-Ins		32-bit CISC CPU Design-Ins	
8051	40%	68000	44%	68000	28%
68HC11	21%	x86	35%	486	28%
Z80	21%	68HC16	11%	386	25%
6800	11%	8096	9%	68300	11%
6502	5%	65816	2%	340x0	6%
8048	2%	80166	0%	32xxx	2%
	100%		100%		100%

Table 2. Share of design-ins among those surveyed for various processor families. (Source: MPR survey)

these results because the number of respondents for many of the chips was not statistically significant. Looking at future plans, Hobbit, Alpha, and the ARM (Advanced RISC Machine) processors were the only ones to show significant growth, in part because they had few, if any, current design wins among those surveyed.

Figure 1 also shows that 16-bit processors appear to be caught in the no man's land between the low cost of 8-bit chips and the added performance of 32-bit CPUs. In microprocessor applications, 16-bit chips dwindle to just 6% of product plans by 1995. In this case, the major beneficiaries are the 32-bit chips, both CISC and RISC; combined, the respondents expect these chips to take 60% of the design spots in 1995. These 32-bit chips are seen as less useful in applications requiring a microcontroller (as defined by the respondents); in this area, 8-bit and 16-bit chips will continue to remain popular through the foreseeable future.

Among those using a 16-bit processor today, the 16-bit 68000 chips hold a slight edge over the older versions of the x86 (see Table 2). For 8-bit processors, the multiple-sourced 8051 has a clear lead among our respondents over Zilog's Z80 family and Motorola's 8-bit processors. Of course, these figures represent only the number of design wins; actual unit volumes may be different.

The survey also asked about digital signal processors (DSPs). Currently, our respondents see no clear market winner (see Figure 2), but based on future plans, TI is seen to be pulling ahead while Analog Devices continues to show strength.

### Memory Usage Grows

We also asked about the amount of memory typically used in the respondents' products. For many of them, the answer was "lots." As shown in Figure 3, the average amount of ROM used was around 256K, although several products were over 1M of program memory. For RAM, peak usage was in the 4M category,

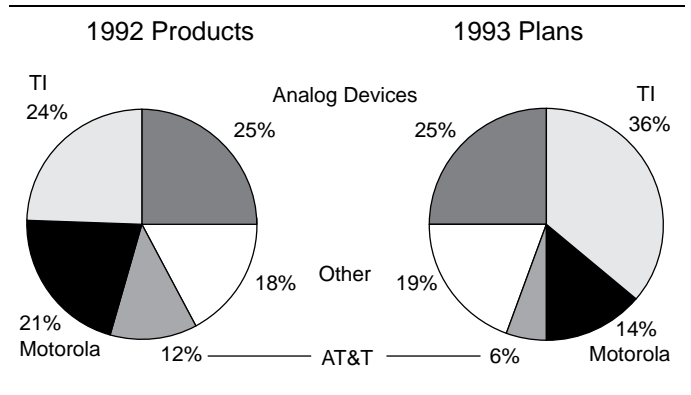


Figure 2. Changes in DSP usage from 1992 to 1993 among those surveyed. (Source: MPR survey)

again with a significant number of responses in the maximum range, above 32M. For cache memory, the response was bifurcated. Low-cost products tend to use little or no cache due to the high cost of discrete SRAMs; such products with any cache at all are probably using on-chip cache. For those vendors requiring maximum performance, using an external cache of 128K or 256K is most popular, and several people reported even larger caches.

### Conclusions

The results show that Motorola and Intel are nearly ubiquitous, but both companies have areas that need improvement. AMD, a rising star, is highly respected. The MIPS-based CPU vendors are, on the whole, viewed well, while the SPARC chip vendors are generally not. It appears that DEC has plenty of work to do to sell Alpha. Despite the RISC hype, CISC processors won't be disappearing in the foreseeable future. Even the older 8-bit and 16-bit chips will continue to be popular, primarily in microcontroller applications. ♦

*A complete copy of the survey results is available for \$195 from our main office.*

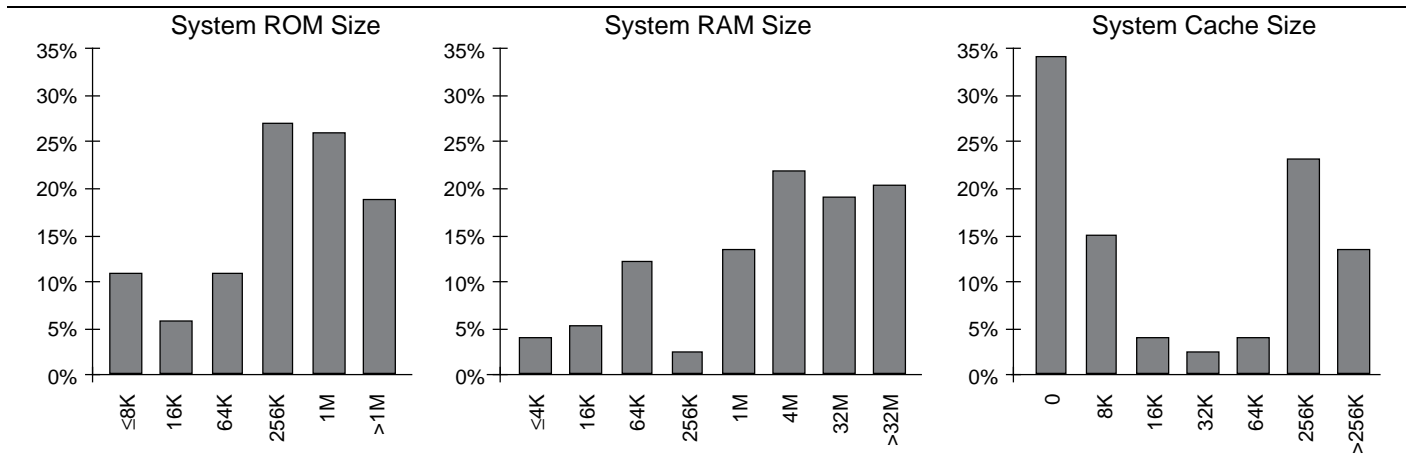


Figure 3. Memory usage in respondents' products. (Source: MPR Survey)