Exponential Decays, Bipolar Flames Out

The last hope for bipolar technology has been extinguished. Exponential Technology, hoping to bring bipolar technology into the mainstream with its x704 PowerPC chip (see MPR 10/28/96, p. 1), has canceled the x704 program and closed its main office in San Jose (Calif.).

Although the chip design was complete and ready to begin shipments at a speed of 410 MHz (see MPR 5/12/97, p. 5), Apple, expected to be the major customer for the part, withdrew its plans to ship x704-based systems. Several Macintosh clone vendors were interested in the high-speed part, but as part of its crackdown on the clone makers, Apple reportedly refused to supply the Mac ROMs needed to support the Exponential chip.

The product's failure cannot be blamed entirely on rotten Apple ploys, however. The initial version of the x704 came in about 20% below its expected clock-speed target, and although Exponential hoped to eliminate that gap within a few months, there was no certainty it would succeed. In the meantime, Motorola and IBM had accelerated the schedule of their G3 processors (see MPR 4/21/97, p. 1) to the point that those parts are due to deliver about the same application performance at the same time the x704 was to be available.

Once again, bipolar technology failed to deliver on its promises. The bipolar x704 core, despite its impressive clock speed, failed to deliver a significant performance advantage over contemporary CMOS processors. Apple decided to stick with multisourced parts that fit into standard systems rather than modifying its products to deal with the extra heat and unique socket of the single-sourced Exponential part. The only advantage of the x704, a high clock speed sure to impress unsophisticated consumers, proved too ephemeral to sustain Apple's interest.

Like many startups, Exponential had raised just enough funding to reach the initial product launch. With no guests arriving at the party, the company has been forced to turn off the lights and send the band home. The only remnants are a handful of patents and a 30-person team in Austin (Texas) that continues to work without pay on a new processor, rumored to be an x86 chip. A few executives are trying to raise money to fund continued development of this processor, which will not use bipolar technology. —*L.G.*

Pentium/MMX Reaches 133, 233 MHz

Improved yields on its Pentium/MMX (P55C) chip have led Intel to announce today a 233-MHz speed grade of the part. The new product uses a slightly compacted die built in the same 0.28-micron CMOS process as previous Pentium/MMX chips (see MPR 1/27/97, p. 4) but is otherwise physically identical to those products. The new die is 128 mm^2, about 10% smaller than its predecessor.

The 233-MHz P55C is rated at 7.12 SPECint95 (base) and 4.23 SPECfp95 (base). It is available immediately at a list price of $594. The new part fits into Intel's product line between the 200-MHz Pentium/MMX at $492 and the 233-MHz Pentium II (PII) at $636.

There may be some confusion between the two 233-MHz parts among unsophisticated consumers. Pentium II is about 10% faster on Winstone 97, however, about the same as the gap between a P55C-200 and P55C-233, for example. In addition, Pentium II offers significantly better performance on applications, such as some 3D games, that use floating-point math. The extra bandwidth of Pentium II is useful for video and other applications that process lots of data.

Taking into account Pentium II's 512K cache, the prices of the two 233-MHz parts are almost identical. Thus, the PII-233 offers slightly better price/performance than the P55C-233, giving PC makers an incentive to move to the new Slot 1 platform. Because of the higher costs (and margins) associated with Slot 1, we expect P55C-233 systems to sell for a couple of hundred dollars less than PII-233 systems.

Of course, Intel could give PC makers an even stronger incentive to move to Slot 1 by refusing to supply a 233-MHz Pentium/MMX at all, much in the way it declined to sell 486 processors faster than 100 MHz. But due to the larger die size (203 mm^2) of Pentium II and the company's manufacturing constraints (see MPR 4/21/97, p. 3), Intel can't produce enough Pentium II chips to make this transition until next year. Thus, the new clock speed provides a highly profitable device to fill this gap.

Coincidentally, the 233-MHz Pentium/MMX gives Intel a stronger competitor for the recently announced AMD K6-233 and Cyrix 6x86MX-PR233 (see MPR 6/2/97, p. 12), both of which far outperform a P55C-200. The good news for Intel's competitors, however, is that this announcement signals a longer lifetime for Socket 7. We expect Intel to ship Socket 7 processors through the end of 1998.

At 17 W (maximum), the new Pentium/MMX is for the desktop only. Intel is developing a 0.25-micron version of the P55C, code-named Tillamook (see MPR 5/12/97, p. 4), that will greatly reduce this power level. Tillamook, due later this summer, should provide 200- and 233-MHz Pentium/MMX parts for Intel's mobile lineup. Until then, the Mobile P55C-166 will remain Intel's fastest notebook processor.

At the other end of the product line, Intel deployed a Mobile Pentium/MMX at 133 MHz. The new version gives notebook makers P55C at three speed grades, allowing them to offer MMX at more price points. The new mobile part dissipates just 6.2 W (maximum), easily fitting into Pentium-class notebook designs. It is available in TCP, PGA, and Mobile Module packages. The list price is $284, about $60 less than the Mobile P55C-150 but $120 more than the older 133-MHz Mobile Pentium without MMX. —*L.G.*

PA-8200 Takes Second Place

Failing in its goal to regain the performance lead, HP has rolled out the first systems based on the PA-8200 processor. The systems, K-series servers with a starting price of $67,000, are slated to begin volume shipments in August, two months later than HP's original schedule for the PA-8200. The company did not announce any workstations based on the new chip, indicating that production in significant volumes may be further delayed until autumn.

At last fall's Microprocessor Forum (see MPR 10/28/96, p. 18), HP's Paul Perez claimed the PA-8200 would reach speeds of 220 MHz and surpass the performance of all processors shipping this summer. Unfortunately, the chip has emerged at 200 MHz, reducing the projected performance from 15.5 SPECint95 to 13.1 SPECint95 (base). Similarly, floating-point performance slipped from 25 SPECfp95 (base) to 20.0.

The company still expects the PA-8200 to reach and even exceed its original clock speed and performance targets, but not until later this year. In the meantime, Digital says its new 600-MHz 21164, due to ship next month, will deliver 17 SPECint95 (base). Although the PA-8200's projected performance exceeds that of all microprocessors shipping today, it appears the new chip will leave HP continuing to stare at Digital's tailpipes. —*L.G.*

Sega Developing SH-4 System

Sources indicate that Sega is developing a follow-on to its Saturn video-game platform (see MPR 5/30/95, p. 15) tentatively called the Sega 64. The system would use a single 200-MHz SH-4 processor to replace the expensive conglomeration of two 28-MHz SH-2 (7604) CPUs and one 20-MHz SH-1 (7032) chip. In addition to its much faster clock speed, Hitachi's SH-4 includes an enhanced floating-point unit with special 3D geometry instructions (see MPR 10/28/96, p. 32) that would be ideal for a 3D game machine.

Although previous game systems from Sega and others have all used proprietary software interfaces, the Sega 64 is said to be based on Microsoft's Windows CE operating system, which has already been ported to Hitachi's SH family. Version 2.0 of WinCE will support a subset of Microsoft's DirectX APIs, allowing games written for Windows 95 to be ported relatively easily to the new platform.

Like Saturn, the Sega 64 is likely to include a CD-ROM drive. If the new system is designed properly, a PC game vendor could produce a single CD-ROM with both Windows 95 and Sega 64 versions of its software, attracting ISV support and simplifying software distribution.

The Sega 64 is also rumored to include a built-in modem, for multiplayer gaming. A modem plug-in is currently available for Saturn, but it sells for $149 and has proved unpopular in the market. The SH-4 has enough horsepower to provide a soft modem, reducing the cost of the modem enough to make it a standard feature. With a modem and WinCE both available on the unit, it would be trivial to offer a Web browser as well, giving Sega 64 users access to the Internet with essentially no upfront cost.

With WinCE 2.0 and the SH-4 both due to ship in volume in 1H98, we expect a summer 1998 launch for the Sega 64, in time to build momentum for the Christmas 1998 selling season. Initial software development can be done under Windows 95, and beta systems could be available by the end of this year, so a significant number of titles could be ready at the launch date.

Sega won the race with Nintendo to get its next-generation system to market, as Saturn began shipping in May 1995. But since its debut late last year, the Nintendo 64 has run rings around Saturn. With the manufacturing cost of the complex Saturn being much higher than that of the simpler Nintendo system, Sega has suffered as competitive pressures have pushed the price of its box down to $149.

The new system should offer performance similar to, or perhaps even better than, that of the Nintendo 64, allowing Sega to provide the same type of realistic 3D animation that Nintendo has today. Abolishing Saturn's dual-processor model and moving to DirectX will greatly simplify the programming model for the new system and should attract many PC games to the Sega 64. As a low-cost Web device, the unit will compete with WebTV and similar products.

The system could allow Sega to regain some of the market share lost to the Nintendo 64 and provide a boost for Hitachi's SH family. Unit sales of the SH chips could actually fall, however, since one SH-4 will replace three of the older processors. Without this changeover, however, the SH family could fade as quickly as Nintendo eclipses Saturn. —*L.G.*

National to Enter Pentium-Compatible Market

National Semiconductor is developing a Pentium-class microprocessor for embedded applications, to be released late this year. The new device, which is not the rumored N7, will be be aimed at midrange embedded systems such as network computers, terminals, and embedded PCs.

The new chip builds on National's work with its embedded NS486 chips (see MPR 9/11/95, p. 1). Those devices were developed internally, with technology licensed from IIT (now 8×8), and feature a modified 486 CPU core with on-chip peripherals. We believe the new device will follow a similar path, providing some PC compatibility but emphasizing on-chip integration. The chip will probably not have an FPU, for example, but may include a DRAM controller and other system logic. The chip will feature a new x86 core offering much better performance than the current 33-MHz part.

The new chip will reportedly sell for about $30 in volume, far cheaper than any current Pentium-class device and even less expensive than some 486 chips. To support such a low price, the chip will probably have about the same 30-mm^2 die size as the 0.65-micron NS486 but use a more advanced 0.35-micron process. The reality may show that, like Centaur's C6, this new chip is little more than a fast 486

with some tweaks. Even so, its integrated logic may make it a very good value for embedded designers attracted by x86 compatibility. —*J.T.*

MSP Dies, Mfast Reborn, Equator Rises

Two new companies are developing products for the emerging media-processor market: Equator Technologies and Hot Chips & Salsas. Both are in the early stages of development and unwilling to discuss their plans, but sources have provided some information. On the down side, Samsung has canceled its troubled MSP program.

IBM's plans to develop its own high-end media processor, known as Mfast (see MPR 12/4/95, p. 1), were canceled last year, but chief architect Gerald Pechanek left IBM to continue developing his ideas. His new company, playfully dubbed Hot Chips & Salsas (Research Triangle Park, N.C.), now includes many of the engineers from the old Mfast team.

The original Mfast featured a mesh of twenty 32-bit processors. In a 0.35-micron process, the chip was expected to sustain 10 billion operations per second, still well in excess of the performance of any other announced media processor. The new company would not comment on its schedule, but a 1998 delivery date seems reasonable, at which point a 0.25-micron process could be used to achieve even better performance.

Equator (*www.equator.com*) was founded in 1990 by John O'Donnell, who had been VP of Engineering at Multiflow, an unsuccessful pioneer of VLIW technology (see MPR 2/14/94, p. 18). Equator become the custodian of Multiflow's highly regarded compiler technology, which several major processor vendors have since licensed.

Equator recently received a significant amount of venture capital and has been hiring engineers with audio, video, and PC-design experience. Software is being developed at the company's new headquarters in Seattle, while a hardware-design team is being formed in Silicon Valley. We believe the company is developing a media processor for the PC market, with product availability sometime in 1998.

Samsung's MSP effort was launched with great fanfare last summer (see MPR 8/26/96, p. 1), but the company had problems delivering on its aggressive plans. With the market momentum for media processors slowing, Samsung decided to pull the plug. Chromatic continues to be the biggest proponent of media processors for PCs and hopes its Mpact 2 will garner some big design wins this fall. If that company can blaze a trail, newcomers like Equator and Hot Chips & Salsas may have an easier time gaining sales. —*L.G.*

Cyrix Loses Sound Blaster Suit

Quick action by a federal judge has resolved most of the issues in a lawsuit filed by Creative Labs regarding Cyrix's MediaGX processor. Cyrix rolled out its integrated x86 chip (see MPR 3/10/97, p. 1) claiming the processor and its associated system-logic chip could provide Sound Blaster–compatible audio functions.

Creative, the originator and owner of the Sound Blaster technology, took exception to this claim, noting that a few old DOS-based games do not operate properly on MediaGX systems. Cyrix admitted its chips do not implement a few rarely used Sound Blaster features and thus are not 100% compatible. Creative was also upset that Cyrix had posted a Sound Blaster applet on its Web site for public consumption.

The processor vendor has agreed to abide by court rulings that it remove the applet and stop referring to its part as Sound Blaster–compatible. Cyrix continues unrestricted shipments of its MediaGX processor, however, and no financial sanctions apply.

One issue of the case remains pending. Windows 95 identifies a MediaGX system as having a Sound Blaster card, as this is the default status when no other audio card is detected. Although Creative considers this a violation, the identification problem is apparently in Windows 95, not the MediaGX chip. A Cyrix spokesperson expects a ruling on this issue within days and is confident that the court will not grant an injunction against Cyrix.

With the PC market moving away from the ISA bus to either PCI sound chips (see MPR 3/31/97, p. 13) or software-based audio, the number of solutions that are almost, but not quite, compatible with the ISA-based Sound Blaster design is likely to increase. We believe this lawsuit represents a warning shot from Creative, indicating the company does not want its trademark used for designs that are not fully compatible. This effort may, however, simply accelerate the irrelevance of Sound Blaster in the modern PC market. —*L.G.*

Lucent to ARM Its DSPs

To no one's great surprise, ARM has signed another licensee. This time, the new member of this growing club is Lucent Technologies' Microelectronics Group, which will add the ARM7TDMI core to its standard-cell ASIC library.

Lucent, recently spun off from AT&T, is strong in communications and signal-processing applications; it will first use the ARM core in chips for digital cellular telephones and high-end modems. Work has already begun on these chips, and the company expects to ship its first ARM-based devices in 4Q97.

Interestingly, Lucent did not acquire rights to ARM's recently announced Piccolo digital-signal-processing module (see MPR 11/18/96, p. 17). The company intends to combine one or more of its own DSP cores with the ARM7 to provide signal-processing capability. Lucent did not provide details on the way it will combine these cores; instead of using a tightly coupled design like Piccolo, new chips may include the two cores with some minimal on-chip communication, as in Motorola's 68356. If ARM develops synthesizable versions of its cores, as we expect, Lucent could also integrate the integer and DSP cores through synthesis. —*J.T.*