

Intel Ships OverDrive Processors

By Michael Slater

Nine months after it began promoting the technology, Intel has formally announced its first OverDrive processor, previously known by the code name P23T. The OverDrive processor operates internally at twice the clock rate of the system into which it is installed. Initially, it will be marketed primarily to owners of 486SX systems, since most of these systems have a "vacancy" socket ready and waiting for this device.

These devices use the same silicon as the 486DX2 processor (see *μPR* 3/4/92, p. 19) in a package with a slightly different pinout. The pinout matches that defined by the 487SX, which adds an alignment pin, an "upgrade present" pin, and has one pin assignment arbitrarily changed to make it incompatible with the standard 486DX pinout. The OverDrive processor effectively obsoletes the 487SX, since it provides much higher performance at a slightly higher price.

The biggest difference between the 486DX2 and the OverDrive processor is the sales channel: the DX2 is an OEM product, while the OverDrive processor is an end-user upgrade, to be sold through retail channels.

Intel has announced two versions of the OverDrive processor: one for 16- and 20-MHz systems, and another for 25-MHz systems. Confusingly, OverDrive processors are rated by the clock rate of the system they plug into, while DX2 processors are rated by their internal clock rate. Thus, a 25-MHz OverDrive is the same (except for the pinout and heat sink) as a 486DX2-50.

The performance boost provided by an OverDrive processor is highly variable, depending on the application's cache performance. On trivial benchmarks such as Landmark, it provides a 100% performance increase; other small benchmarks, such as Dhrystone, show a 90–95% increase. Application-level performance is typically boosted 40–70%, according to Intel's benchmarks. In a 25-MHz system with a 64-Kbyte external cache, SPECmark89 performance was increased 66%, from

8.8 to 14.6 (21.3 SPECint89, 11.3 SPECfp89).

Because the CPU core is running at twice the clock rate of a standard 486 processor, the OverDrive processor has higher bus utilization and is therefore more sensitive to memory system performance. Thus, a system with a fast DRAM system and a second-level cache will benefit more from an OverDrive processor than will a system without cache or with a slow DRAM system.

Later this year, Intel plans to introduce OverDrive processors for 486DX systems. Intel hopes to convince makers of 486DX systems to include an OverDrive socket, which will allow the same OverDrive processors to be used in 486SX and 486DX systems. In this context, the only new device needed is a 33-MHz OverDrive processor. Intel does not plan to offer an OverDrive processor for 50-MHz systems.

Intel also plans to market OverDrive processors for 486DX systems that don't have an OverDrive socket. In this case, the 486DX must be removed and replaced with the OverDrive processor. If this sounds a lot like a 486DX2, it is: Intel will market the DX2 (with a heat sink added) as an OverDrive processor in the retail channel.

In 1993, Intel plans to introduce an OverDrive processor for 486DX2 systems, based on the P5 processor core. Unfortunately, the P5-based OverDrive processor, code named P24T, will use an extended pinout, so systems with today's OverDrive socket will not be able to use it. The P24T pinout adds an additional row of pins around the standard OverDrive socket. Most of these pins are used for power and ground, but seven pins are reserved for signals to support write-back caches. Intel is providing 486DX2 system makers with specifications for these signals so they can include the extended OverDrive socket, but this information has not been publicly released. The extended socket can accommodate today's OverDrive processor as well as the P24T.

Considerable confusion is likely to result from the use of the term OverDrive to refer to chips with three different pinouts. Today's OverDrive chip uses one pinout; the P5-based OverDrive chip (intended as an upgrade for 486DX2 systems) will use another; and the OverDrive for 486DX systems will use yet another (the standard 486DX pinout).

With the increasingly competitive x86 processor market, Intel must be thrilled at the prospect of selling more than one processor per system. Users should be happy as well, since OverDrive processors give them a low-cost upgrade path. The only downside is for system makers, who may be unhappy to find that they no longer get to sell CPU upgrades and that users may hold on to their computers longer. ♦

Price & Availability

The OverDrive processor for 16- and 20-MHz systems has a suggested list price (quantity one) of \$549, while the 25-MHz version lists for \$699. Both versions are available now. OverDrive processors for 486DX systems at 25- and 33-MHz are promised by the end of the year. For more information, call 800/538-3373 and ask for literature package DW. For information via fax, call 800/525-3019 or 503/629-7576.