



# Pentium III

Intel launched the Pentium III (formerly 'Katmai') with much fanfare. It is positioned as the company's next high-end offering, knocking the 450MHz Pentium II off the top spot for desktop PCs. With the introduction of the Pentium III, Intel's product strategy is clear. Its budget Celerons compete in the same segment as processors from AMD and Cyrix, providing good performance at a low cost. The Pentium II will now become Intel's mid-range CPU and will continue to dominate the £1000-£1300 segment of the market.

The Pentium III will enter the low-volume premium arena. It will also find its way into the low-end workstation and server market, as some of the new features of the Pentium III make it more appealing to workstation and server manufacturers than the Pentium II. The Pentium III will debut in 450MHz and 500MHz clock speeds. It is currently manufactured using a 0.25 micron process. Later this year, Intel will introduce faster Pentium IIIs manufactured using a smaller 0.18 process.

## Contents

- 123** All about KNI
- 124** Carrera Maxima
- 124** Dan Dantum 3 500/S
- 127** EveshamVale Platinum
- 127** Panrix Fusion SCSI 500
- 128** Tiny Power Performance 500
- 128** Editor's Choice

♦ Tested and reviewed by Ajith Ram

## Ratings

- ★★★★★ Buy while stocks last
- ★★★★★ Great buy
- ★★★★ Good buy
- ★★★ Shop around
- ★ Not recommended

# EVERYTHING THERE IS TO KNOW ABOUT KNI

**T**he newly released Pentium III boasts some new features that differentiate it from its predecessor. It has 70 new instructions intended to provide a performance boost in a number of applications.

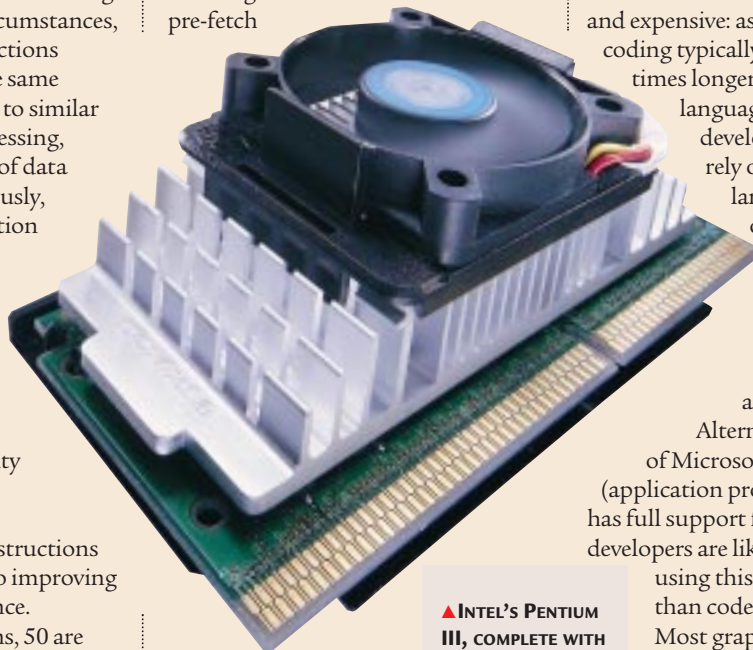
The Katmai New Instructions, or KNI, are similar to the MMX instructions in the PII. Both MMX and KNI operate on the same SIMD (Single Instruction, Multiple Data-stream) principle. For most of its working life, a CPU performs the same job many times over and SIMD takes advantage of this fact. In normal circumstances, the CPU processes instructions sequentially, applying the same instruction over and over to similar data types. In SIMD processing, identical or similar types of data are processed simultaneously, applying just one instruction to multiple sets of data. This parallel processing leads to a significant leap in performance. MMX applied SIMD processing to integer or whole numbers. Now, KNI brings the same ability to process more complex floating-point numbers. However, the new KNI instructions are not solely dedicated to improving floating-point performance. Of the 70 new instructions, 50 are dedicated to improving single-precision floating-point performance, while another 12 instructions enhance integer calculations. The last eight instructions enhance data cacheing.

**Floating point (FP)** performance is critical for some applications like games which depend on the CPU to perform most of the geometry calculations. With its new floating-point instructions, KNI can give overall performance a significant boost.

FP is also important for activities like real-time MPEG/MP3 encoding. Currently, MPEG encoding has to be done using task-specific hardware because the FP performance of previous CPUs has not been good enough. KNI has the potential to change that. A Pentium III running at 500MHz has a FP throughput of

2Gflops (two billion operations per second) and Intel claims this is sufficient to do real-time video and audio encoding and decoding.

**As we've said**, eight instructions help with cacheing data. Memory latency, or the delay in retrieving data from memory, is one of the greatest bottlenecks to CPU performance. The average CPU spends a lot of time waiting for the required data to arrive from system RAM. KNI's data cacheing instructions are able to pre-fetch



▲ **INTEL'S PENTIUM III, COMPLETE WITH ITS ENORMOUS HEAT SINK**

new data while the CPU is occupied, allowing a more regular flow of data between the system RAM and CPU cache. This could again boost performance, particularly when more than one CPU is used.

**The new KNI** instruction set has some welcome differences from its MMX counterpart. MMX uses the same registers as the integer unit of the CPU, which prevents both MMX and integer units being used simultaneously. Switching between the two results in a lot of lost clock cycles. KNI avoids this problem by using a new set of registers, so both KNI and the floating-point units can function in parallel. But using the new registers is not without its problems. To access them, the CPU has to enter a

new state of operation. The last time Intel introduced a new processor state was in the 386 CPU over six years ago.

**Unlike the normal** floating-point unit, the KNI instruction set does not function automatically, so applications have to be specifically written or modified to take advantage of KNI. There are two main ways to do this. The most efficient way to access the Katmai instructions is to code the application in pure assembly language, but this is extremely time consuming and expensive: assembly language

coding typically takes two to three times longer than any advanced language. Therefore, most developers are likely to rely on tried and tested languages like C

or C++, even though this sharply reduces the overall efficiency of the application and its performance.

Alternatively, version 6.1 of Microsoft's DirectX API (application programming interface) has full support for KNI. Most games developers are likely to access KNI using this popular API rather than code in assembly language. Most graphics cards already have optimised drivers for DirectX 6, so games using KNI should have little trouble running on these cards.

**A KNI patch** for Windows 98 is available from Intel. Windows 2000 will support the new instructions by default. There is no patch for Windows 95 users.

**The introduction of** Intel's KNI draws inevitable comparisons with AMD's older 3D Now! technology. KNI and 3D Now! have an identical maximum throughput of 2Gflops. Because 3D Now! arrived early last year, more applications currently support AMD's technology than KNI. But this is likely to change soon: developers cannot afford to ignore the world's largest CPU manufacturer.



# Carrera Maxima



The Carrera Maxima is built around a 500MHz Pentium III, cooled by a large heat sink and fan. It has 128Mb of RAM on a single DIMM slot, leaving two slots free for upgrading. The large 10Gb hard drive has been partitioned into two drives, which will help to save on disk space when large files are used. The Maxima uses a Rage 128 graphics card from ATi, one of the most powerful graphics cards available. It supports full 32-bit colour and MPEG-2



decoding, so the 5X Creative Labs DVD can be used without a separate hardware decoder. The Carrera system also has an LS-120 drive which is compatible with floppy disks. Like the Dan PC [below], audio is handled by the versatile SoundBlaster Live!, also from Creative Labs. Capable of handling up to 512 voices, it has high-fidelity and reduces CPU usage. A 56K modem occupies the PCI slot next to it. This leaves two PCI and three ISA slots free for upgrading. Initially, the Maxima had trouble booting up: we tracked down the problem to a loose DIMM module. Otherwise, the system posed no problems. Its interior is very spacious thanks to its excellent build quality. With a

rating of 1788, the Maxima is one of the fastest PCs we have seen.

**To top off an excellent system,** Carrera has included a 19in LG monitor. It supports a maximum resolution of 1600x1200 at 70Hz. Picture quality is excellent, and the controls are responsive and easy to access.

## PCW DETAILS

**Price** £2,055.08 (£1,749 ex VAT)

**Contact** Carrera 0171 830 0586  
[www.carrera.co.uk](http://www.carrera.co.uk)

**Good Points** Excellent build quality. High-performance, powerful graphics card. Large monitor.

**Bad Points** Had trouble booting up first time.

**Conclusion** A power user's dream system.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

# Dan Dantum 3 500/S

The Dantum 3 sports a 450MHz version of the Pentium III. This new processor is backwards compatible with BX motherboards, so Dan has chosen an Asus P2B board with the BX chipset. It has two PCI and two ISA slots free, for easy upgradeability. As befitting a PC with a Pentium III, Dan has chosen to include a massive 14.1Gb hard drive. There is also an LS-120 drive which can read ordinary floppies. A Creative Labs DVD ROM, the latest 5X version, sits immediately above the LS-120 and is connected to a Dxr2 MPEG decoder card which sits on the first PCI slot. This ensures the best decoding performance, rather than relying on



the main CPU. There are even two DVD games included. The main graphics card is the 8Mb Millennium G200 from Matrox. An excellent choice for a high-performance system, it is capable of good 2D and 3D acceleration. Its drivers are fully DirectX 6 compliant and a beta OpenGL ICD (international code designator) is available. The choice of sound card reflects the high quality of the Dan system — Creative Labs' new SoundBlaster Live! is the most powerful on the market. In addition to its excellent fidelity, its CPU utilisation is also very low. The 128Mb of RAM occupies a single DIMM slot, leaving two free for upgrading. The system's build quality is

excellent. With the wires and IDE cables tucked away, components are well ventilated and easy to access.

**Oddly for such a high-end system,** Dan has included a modest 15in CTX monitor. It is capable of a maximum resolution of 1024x768 at 70Hz and its image quality is very good.

## PCW DETAILS

**Price** £2,162 (£1,840 ex VAT)

**Contact** Dan 0181 830 1100  
[www.dan.co.uk](http://www.dan.co.uk)

**Good Points** Excellent build quality. High-performance, good-quality components.

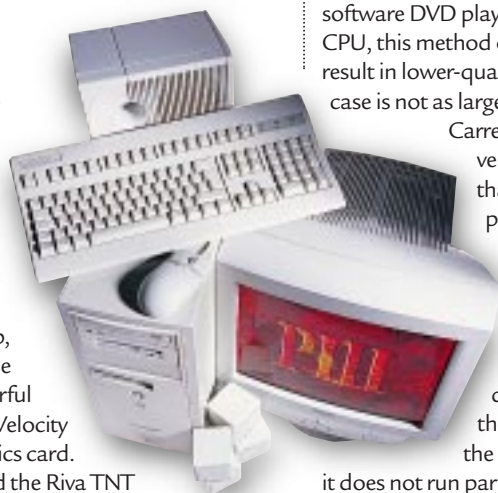
**Bad Points** Small monitor. Expensive.

**Conclusion** A good configuration worth considering.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

# EveshamVale Platinum

**S**upporting a 500MHz Pentium III, the EveshamVale Platinum TNT Live! 500 has 128Mb of RAM in a single slot. This leaves three DIMM, two PCI and three ISA slots free for upgrading. The Evesham system covers all bases with both Iomega Zip and LS-120 drives, the latter providing backwards compatibility with floppy drives. The Platinum also has a large 9.1Gb hard drive. This PC achieved the highest 3D Mark result in this group, primarily due to the powerful 16Mb STB Velocity 4400 graphics card. Built around the Riva TNT



chipset, it supports 32-bit colour, DirectX and OpenGL. Audio is handled by Creative Labs' SoundBlaster Live! This card's DSP (digital signal processor) is as powerful as a Pentium 133; hence it is able to handle most of the processing without involving the CPU. Evesham has included a 2X DVD drive but there is no dedicated MPEG decoder and the user must make do with a software DVD player. Despite the powerful CPU, this method of DVD playback could result in lower-quality images. The ATX case is not as large as the Panrix and

Carrera systems yet ventilation is more than adequate. This is particularly important since the STB graphics card runs very hot. The heat sink around the Pentium III is slightly different from that of the Pentium II. Despite the CPU's high clock speed, it does not run particularly hot.

**Evesham has included** the 19in Taxan Ergovision monitor with the Platinum. It supports a maximum resolution of 1280x1024 at 70Hz. Image quality is good, but not as sharp as the Iiyama Vision Master Pro 450. Its controls are easier to access, though.

## PCW DETAILS

**Price** £1,937.58 (£1,649 ex VAT)

**Contact** Evesham Micros  
0800 496 0800

[www.evesham.co.uk](http://www.evesham.co.uk)

**Good Points** Good components. Decent performance. Large monitor.

**Bad Points** No hardware DVD decoding.

**Conclusion** A system with an interesting configuration, but not exceptional.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

# Panrix Fusion SCSI 500



**P**anrix has a reputation for building quality PCs. The Fusion SCSI 500, based around a 500MHz Pentium III, does nothing to spoil that reputation. The CPU sits on an Asus P2B motherboard with a BX chipset and has four DIMM slots, one of which is occupied by the 128Mb RAM module. The graphics card is the Diamond Viper 550 based around the Riva TNT chipset. Like the ATI's Rage 128 chip, it supports full 32-bit colour and has 16Mb of SDRAM. Panrix has included a 2X DVD ROM and, wisely, a Hollywood Realmagic MPEG-2 decoder. Since the



main graphics card does not have DVD support, this hardware decoder is absolutely necessary in order to display the best picture quality. The sound card is Creative Labs' SoundBlaster Live!, a popular choice in this group; powerful, and a welcome companion to the MPEG-2 card.

Interestingly, this system has on-board SCSI but it is not used by any of the components. The 9Gb UDMA hard drive occupies one of the 3.5in bays, leaving another one free. A single PCI and two ISA slots are also free. Like Evesham, Panrix has chosen to include both LS-120 and Iomega Zip drives. A moderately large ATX case has three fans that help to keep the interior adequately ventilated.

With a 3D Mark score of 1677 and a SYSMark rating of 214, the Fusion is an outstanding performer.

**Although very heavy**, the 19in Iiyama Vision Master Pro 450 is an excellent monitor with a very flat screen. Possessing excellent image quality, it supports a maximum resolution of 1600x1200 at 70Hz. However, its pushbutton controls are not the easiest to get to grips with.

## PCW DETAILS

**Price** £2,696.63 (£2,295 ex VAT)

**Contact** Panrix 0113 244 4958  
[www.panrix.co.uk](http://www.panrix.co.uk)

**Good Points** Excellent components. Top-notch performance. High-quality monitor. On-board SCSI.

**Bad Points** None

**Conclusion** A well-built, high-performance system.

<b>Build Quality</b>	★★★★★
<b>Performance</b>	★★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★★

# Tiny Power Performance 500

**T**iny has an impressive reputation on the high street for building good-quality PCs. The Power Performance 500, with its 500MHz Pentium III, is aimed primarily at the gaming and multimedia market. It has a whopping 256Mb of RAM in two DIMM modules, with one slot free for upgrading. The BX motherboard also has two PCI and three ISA slots free. A 9Gb hard drive occupies one of the 3.5in bays. Interestingly on a games PC, Tiny has chosen Creative Labs' Banshee graphics card. Housing 3Dfx's latest chipset, this is a good games performer. But it's not quite cutting edge technology, as it doesn't support 32-bit colour. There is a DVD

ROM, although Tiny has not included a hardware MPEG-2 decoder. Since the main graphics card does not support motion compensation, software DVD playback could result in lost frames and reduced image quality.

**The Yamaha Waveforce XG** sound card is an excellent choice for a games system. Utilising Sensaura's technology, it produces 3D audio from just two speakers. Tiny has chosen a relatively small ATX case but the

interior is adequately ventilated. Build quality is very good, and all components are easy to access.

For a PC with a 500MHz Pentium III, the

Tiny's SYSMark score of 192 is distinctly average. Its 3D Mark score of 1526 is much better. The 19in Taxan Ergovision monitor is a good companion to this multimedia PC. With controls that are easy to access, it can support a maximum resolution of 1280x1024 at 70Hz. Image quality is excellent.

## PCW DETAILS

**Price** £2,113.83 (£1,799 ex VAT)

**Contact** Tiny 01293 821555

[www.tiny.co.uk](http://www.tiny.co.uk)

**Good Points** Decent build quality. Good software bundle. Large monitor.

**Bad Points** No hardware DVD decoding. Mediocre performance.

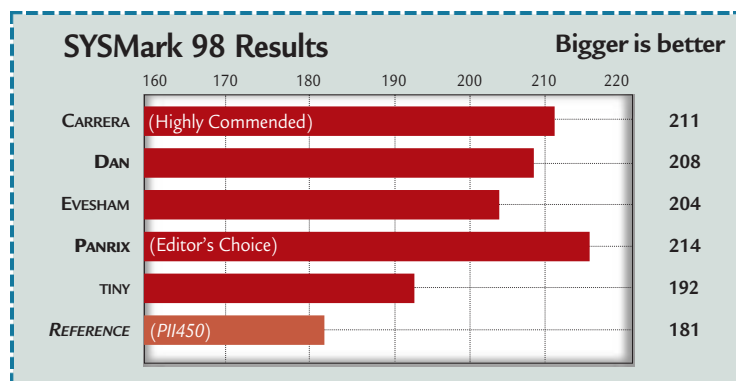
**Conclusion** A system that is not quite as good as the rest.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## Editor's Choice

**T**he Pentium III débuts at 450MHz and 500MHz clock speeds.

But despite the inclusion of the new instructions, at 450MHz its performance is virtually identical to that of a Pentium II of the same speed. Clearly, applications must be specifically written to take advantage of the new instructions. At the time of going to press, there were no such applications. Therefore, our current SYSMark test, which uses widely available applications, is unable to take advantage of KNI. The results are not misleading, however, as the average user using an unoptimised legacy application is likely to see only the same marginal performance increase. Intel claims that KNI can give a two-fold increase in performance, but this can be achieved only if the applications used are coded in Assembly (see p123). Since most developers are unlikely to opt for this



method, users can realistically expect to see only a 20 to 60 percent increase. Both our SYSMark 98 and 3D Mark 99 benchmarks are currently being updated and optimised to take advantage of KNI. As soon as Pentium III optimised apps become available, these benchmarks will reflect the new CPU's capability.

➤ **All five Pentium III systems** in this group have one common quality: they

are all extremely well built. The Carrera and Panrix systems, however, are in a class of their own. Both come with high-speed DVD and LS-120 drives. Panrix even added an Iomega Zip drive and theirs is the only PC

here to have a SCSI controller. Also, both systems have hardware support for DVD decoding. The SYSMark scores of the Panrix and Carrera PCs are also the highest here. ➤ The **Panrix Fusion SCSI 500** wins our **Editor's Choice** award for its scorching performance, high-quality components and decent construction. The **Carrera Maxima**, which has much the same qualities, is **Highly Commended**.