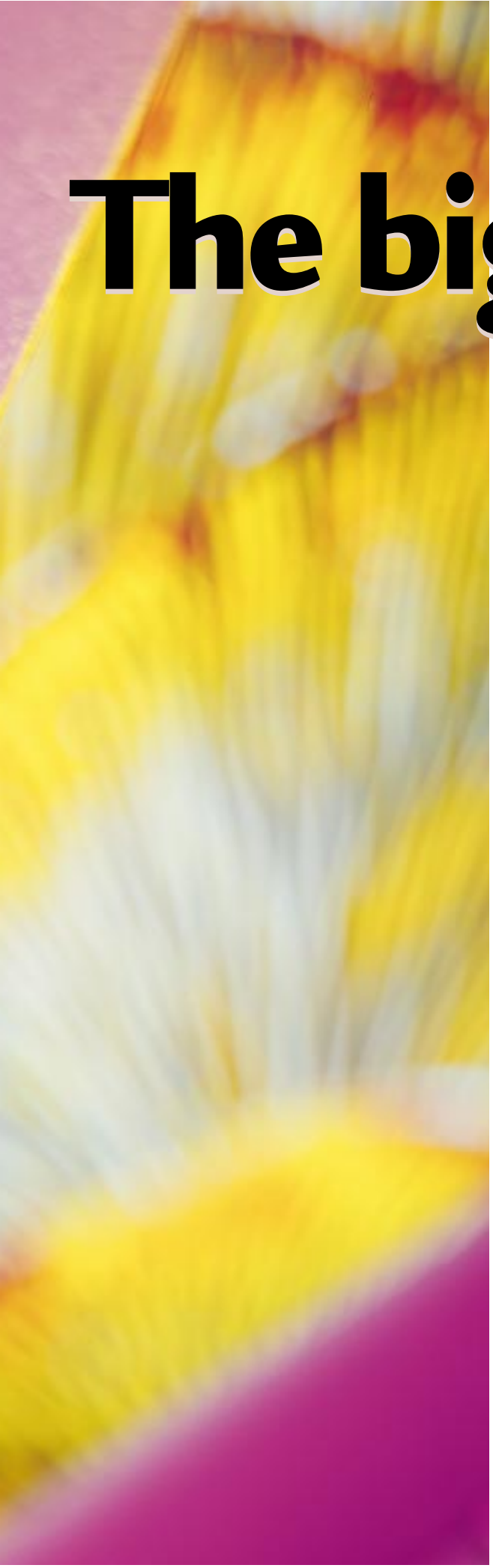


The big top ten

As far as this PCs group test was concerned, expense was no object. Letting the bank balance bear the full brunt of our extravagance, we treated ourselves by specifying the best hardware available to take an in-depth look at some of the first 450MHz Pentium II-based machines from ten of the biggest names in PCs.

What could better complement one of these fast processors than a generous bundle of memory? With RAM prices falling all the time, we opted for 128Mb; enough to run even the most demanding applications we could throw at it. Installing Windows NT 4.0 as our operating system, we were looking fairly and squarely at the business market and so asked our suppliers to include large hard drives of at least 4.5Gb. In many cases they came up trumps with SCSI-based systems, so be sure to keep an eye on our BAPCo test scores to see if paying the little extra that this super-fast interface will set you back really does pay off in terms of performance. And just in case you are worried about data loss, we asked for some kind of removable drive to be added for backup, with a capacity of 1Gb or over.

PCs of this spec could easily be used for graphical applications, and so a 19in monitor seemed particularly suitable as in many instances, coupled with an 8Mb graphics card, it would allow us to run resolutions as high as 1600x1200. The pay-off, in the form of a slight reduction in the amount of free disk space left at our disposal, seemed a small price to pay.

The PCs we received were subjected to our usual rigorous PCW Labs testing procedure, scaling their performance against a suite of commonly-used business applications, each designed to tax the power of every component.

Contents

PCs tested and reviewed by Nik Rawlinson and Paul Trueman.

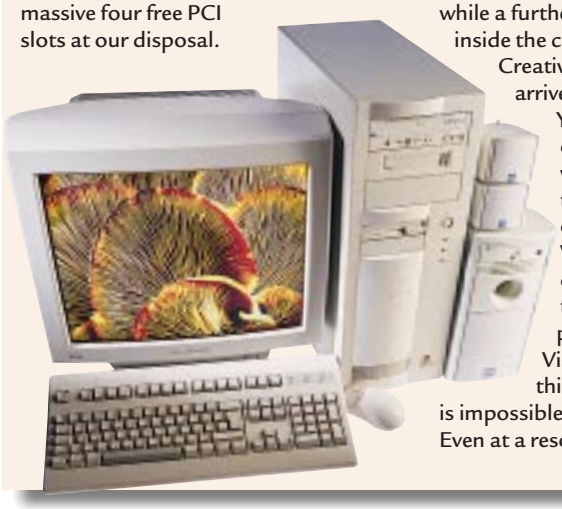
Ratings

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

Armari MBX-450 Workstation

HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

The dual-processor ASUS motherboard in the Armari offers a useful upgrade path for power users. Its 9.1Gb Seagate Cheetah SCSI hard drive was backed up by a single 128Mb SDRAM DIMM. A further three free memory slots would allow us to increase our installed memory to 512Mb without replacing what was already installed.
The Adaptec SCSI controller chips are onboard, leaving one free ISA and a massive four free PCI slots at our disposal.



Unfortunately, one of the PCI slots was obscured by a badly-strung SCSI cable, and we were also disappointed that accessing the free memory slots was difficult, due to the hard-drive cabling obscuring them.
Mass backup storage was catered for by both a Travan tape drive offering space for up to 8Gb of compressed data, and a CD writer. One each of 5.25in and 3.5in drive bays remained free externally, while a further 3.5in bay was left vacant inside the case. Sound was driven by a Creative Labs AWE 64 card and arrived courtesy of a set of Yamaha YST-MS25 speakers comprising a large sub-woofer and two smaller tweeters for a total output of 25W.
We were not surprised that one of the best images in this group test was that produced by the Iiyama Vision Master 450. Although this monitor may look dated, it is impossible to fault its performance. Even at a resolution of 160 x1200 there was no discernible flicker, and even small characters on the screen remained easily readable. Screen regulation was perfect while, when running our tests, all guns lined up to present synchronised red, green and blue test patterns and the ten primary colours test demonstrated uniform fading scales.

PCW DETAILS

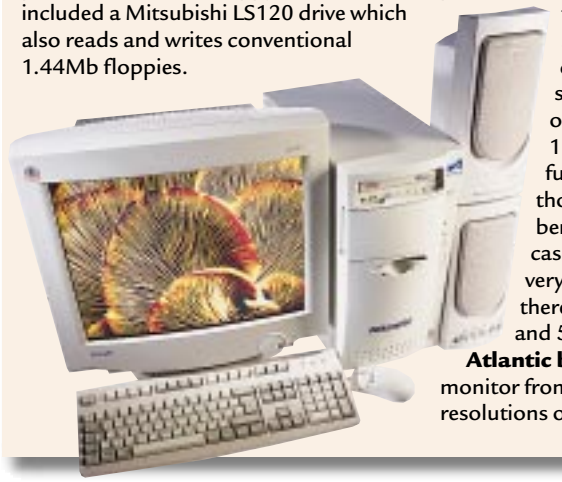
Price *£3,406.33 (£2,899 ex VAT)*
Contact *Armari 0181 810 7441*
www.armari.com
Good Points *Dual-processor motherboard. Potential for 512Mb RAM. CD-ROM writer. Monitor.*
Bad Points *Difficult to access memory slots. Badly-positioned SCSI cable.*
Conclusion *One of the best.*

Build Quality	★★★★
Performance	★★★★★
Value for Money	★★
Overall Rating	★★★★

Atlantic Proteus 450LVD

EDITOR'S CHOICE
PERSONAL COMPUTER WORLD

The majority of PCs we see for review have approximately the same configuration. But there are always a few that stand out. The PC we received from Atlantic was one such machine: it was packed to the rafters with toys to delight the tech-head. A CD-RW drive from Traxdata, should you wish to write information to CD, and a DVD drive from Creative Labs. And, whereas other manufacturers had gone for the prehistoric 1.44Mb floppy, Atlantic had included a Mitsubishi LS120 drive which also reads and writes conventional 1.44Mb floppies.



The LS120 and DVD drives both used IDE connections, with the CD-RW using an Ultra Wide SCSI connection and the 9Gb Seagate hard drive using the latest LVD SCSI 2 interface. Both were hooked up to an Adaptec SCSI controller, taking up one of the four PCI slots.
Both ISA slots were filled: one with Creative Labs' AWE 64, the other with a Cheyenne K56Flex modem using the Rockwell chip. Atlantic also scored points for its choice of graphics card — the Millenium G200 from Matrox. This 2D/3D card comes with 8Mb as standard but there is space on the card to upgrade to 16Mb, ensuring that it is future-proof. However, we thought the machine would benefit from a larger tower case, as the components are all very closely fitted, although there are still spare single 3.5in and 5.25in bays.
Atlantic bundled a 19in DJ800 monitor from Mag, capable of resolutions of up to 1600x1200. The DJ800 could support that resolution at a decent refresh rate of 70Hz, although some sensitive eyes will still be able to detect flicker. The DJ800 uses the excellent, user-friendly, dial OSD, perfect for being able to makequick changes to the display.

PCW DETAILS

Price *£2,936.33 (£2,499 ex VAT)*
Contact *Atlantic Systems 0990 134725*
www.atlanticsystems.com/sys/
Good Points *Packed full of high-end gadgets...*
Bad Points *...“packed” is the operative word.*
Conclusion *A smashing piece of kit.*

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★★★
Overall Rating	★★★★

Compaq Deskpro EP Series 6450

Compaq was unable to supply a SCSI hard drive and opted instead for a 9.5Gb Maxtor IDE device. Only 20 percent of the drive had been partitioned, wasting space and leaving it up to users to struggle with partitioning themselves. The interior was fairly messy, with cabling obscuring the two free memory slots, and the 128Mb RAM had been installed into the Compaq motherboard on a single module.

We were disappointed with the quality of the Titan PV3 sound card, but the internal speaker which it drove was of high quality and did away with the need for external units. The excellent keyboard and mouse were comfortable in use for extended periods throughout our tests.
The case had enough rubber feet to be used as either a mini-tower or a desktop unit, but with only one free external 5.25in and one internal 3.5in bay we were disappointed that this machine suffered from the usual "desktop" problem of limited expansion opportunities. Removing the drives was facilitated through the inclusion of a quick-release mechanism. Three free PCI slots complemented the free shared slot, but all dedicated ISA slots were filled. The PC itself was built around an Intel 443BX chipset.
The monitor, a Compaq V90, provided an excellent image. Screen uniformity and fine image detail could not be faulted, although in line with many other monitors, slight moiré was evident on a fine-line test pattern. However, it did have a problem with displaying a greyscale image of 256 intensity levels. The image should have stretched right across the screen but was instead bordered by two vertical bars, about an inch wide, on each edge. It received its signal from an AGP Matrox Millenium G200 with 8Mb SGRAM onboard — a card that is ubiquitous in machines of this specification.

PCW DETAILS

Price *£2,328.75 (£2,050 ex VAT)*
Contact *Compaq 0845 270 4000*
www.compaq.co.uk
Good Points *Good internal speaker. Rotatable case.*
Bad Points *Hard-drive partitioning. Messy interior.*
Conclusion *Worth consideration, but as there are limited expansion opportunities you may outgrow it*

Build Quality	★★★
Performance	★★★
Value for Money	★★★★
Overall Rating	★★★

Dan Dantum II/WSU

With a full tower case this PC was a behemoth of a machine, offering an impressive three free external 5.25in bays, one free external 3.5in bay and two free internal 3.5in bays, making this case suitable to house a network server.
The installed Seagate Cheetah SCSI hard drive stretched to 9.1Gb of storage and was backed up by a Travan drive for data security. The SuperMicro dual-processor motherboard, as well as offering ample opportunity for increasing the processing power, incorporated onboard SCSI to keep three of the PCI slots free.

The Dan's file-server potential was confirmed through the inclusion of four memory slots on the motherboard, of which three remained vacant. There was 128Mb pre-installed, allowing us to increase the total installation to 512Mb without making any replacements. Both a 56K modem and a 3Com Fast Etherlink XL 10/100Mb TX network card ensured that whatever the situation, this PC was ready and waiting to be hooked up to the outside world. Sound was catered for by an AWE 64.
The Dan-branded CTX monitor performed well, with a maximum non-interlaced refresh rate of 75Hz at 1280x1024. With good screen uniformity across the image surface it showed no evidence of defocusing, blooming or halos when bright white images on a black background were compared with greyer equivalents (this is evidence of a sharp picture). But, like the Compaq's, this monitor had trouble filling the whole width of the screen with a 256-level greyscale fade, and instead filled the vertical inch or so of gap to the left and right of the picture with black bars. The display was driven by a Matrox Millenium G200 with 8Mb onboard.

PCW DETAILS

Price *£2,986.85 (£2,542 ex VAT)*
Contact *Dan 0181 830 1100*
www.dan.co.uk
Good Points *Loads of expansion room. Server potential.*
Bad Points *Problem with 256 greyscale intensity monitor test*
Conclusion *Good machine, but a full tower case may be a little large for some.*

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★
Overall Rating	★★★

Dell Workstation 410

Despite the considerable amount of hardware inside this PC, Dell had not opted for a giant case as had some manufacturers. Consequently, there was not the same accessibility that we saw in towers like the Evesham. On the flip side, you won't have a desk Goliath that blocks out the sun.

Whereas in larger cases we saw the bulky power unit positioned above and away from the motherboard, allowing total access, the Dell configuration placed the power unit over the top part of the motherboard, the DIMM slots and onboard SCSI connections for the CD-ROM and 12Gb Sony tape drives. Rather than having to unscrew the power unit to get access to the motherboard, as with less well-designed PCs, Dell has designed its power unit so that it flips out on a hinge and stays there, suspended high enough over the motherboard so that we could get a good look at the insides of the machine.

The AGP slot was taken up with Diamond's 2D/3D 8Mb Permedia2 card. Because the SCSI was onboard, it left all five PCI slots free for further possible expansion. There was a single consolatory ISA slot, too.

Network access is provided via the 3Com network interface card, and the 8.5Gb Quantum SCSI hard drive was backed up by a Sony SDT9000 tape drive which takes 12Gb tapes.

The monitor was one of Dell's own, the D1226H, capable of resolutions up to 1600x1200 pixels. This 19in monitor provided excellent focus across the 17.9in of viewable area and could easily support a resolution of 85Hz at a resolution of 1024x768, with little discernible loss of sharpness.

HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

PCW DETAILS

Price *£3,983 (£3,390 ex VAT)*
Contact *Dell 0870 907 3335*
www.euro.dell.com
Good Points *Lots of data storage available, as well as hardware expansion space.*
Bad Points *If it had been a little quicker, it would have been even more impressive.*
Conclusion *Worth consideration, but as with the Compaq, it has limited expansion opportunities.*

Build Quality	★★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★★

Evesham Micros Platinum SE

The case that Evesham had chosen for its PC caused gasps in our labs when taken out of the box; it was the size of a small (rectangular) child. Admittedly, Evesham has kitted out the PC most impressively, but unfortunately such largesse has also extended to the tower case. This monster was cavernous: even with a floppy drive, DVD-ROM, Iomega 2Gb Jaz drive and removable 8.5Gb hard drive taking up lodgings, there was still an impressively generous amount of room left over. But our gripes about the size apart, Evesham has put together an impressive bundle.

In terms of hardware generosity, it beats most of the other PCs we saw in this group test. There is a quite frightening number of drive bays on this PC: six for 5.25in drives (two free) and three 3.5in bays (all free). Quite obviously, expansion is not going to be a problem in this machine.

The slots were filled with some impressive kit. There was the Millenium G200 graphics card from Matrox, a 56K modem using the Rockwell chip, and Creative Labs' AWE 64 sound card, leaving no ISA slots but four PCI slots free. Bearing in mind the relatively free rein we had given the companies in this group test, it was surprising that more had not chosen to fit DVD drives, and it was good to see both a DVD drive as well as kit like the 2Gb Jaz drive, with its Narrow SCSI interface.

Evesham scored extra points for bundling the excellent Ergovision 975 19in monitor from Taxan. With an impressive viewable area of 18in, the Ergovision was capable of a refresh rate of 60Hz at 1600x1200.

PCW DETAILS

Price *£3,053.83 (£2,599 ex VAT)*
Contact *Evesham Micros 01386 769600*
www.evesham.com
Good Points *Ideal for a user who needs to expand their machine.*
Bad Points *Too big to sit on a desk and perhaps too big to fit underneath.*
Conclusion *A gargantuan PC, full of impressive kit.*

Build Quality	★★★★
Performance	★★
Value for Money	★★★★
Overall Rating	★★★

Hewlett-Packard Kayak XA-S PC

At the other end of the spatial spectrum to the huge Evesham box is the dinky Kayak XA Workstation from HP, a company which prides itself on the scalability of its workstations, made to make life bearable for IT managers. The exact benefits of this model are questionable, with the labyrinthine layout of the components. The box is as long as the motherboard and slightly wider, while the drive bays are suspended inches above the motherboard. With one free 5.25in bay and two free 3.5in bays, there is some room for expansion, but getting to the motherboard to connect any new drives looks tricky. A large metal skeleton hangs over the motherboard, holding the drives, and this is definitely not the machine for the user who likes to tweak and fiddle.

In the end we were able to get to the DIMM slots, but the process is not so swift and painless as HP would have you imagine. Power and IDE connections have to be pulled out, as well as various plastic covers inside the PC. Although the design to remove the cover of the PC is beautifully simple, it is not a simple process, attempting to unplug power connections and then having to put it all back together again.

Although there are high-end Kayaks available, we seemed to have received rather a neutered version. Instead of the SCSI connections, tape storage, DVDs and CD-RW we saw in other machines in this group test, the Kayak had just a conventional IDE CD-ROM and floppy drive. HP had also fitted the 2D Productiva G100 card from Matrox, and an Ethernet card.

HP surprised us with its huge 1100 21in monitor (big enough for any user). This is an excellent monitor, with vibrant colours and refresh rates that remained healthy even at a maximum resolution of 1600x1200. The OSD was excellent, with sensitive, user-friendly controls. However, this mammoth monitor has a price to match its size.

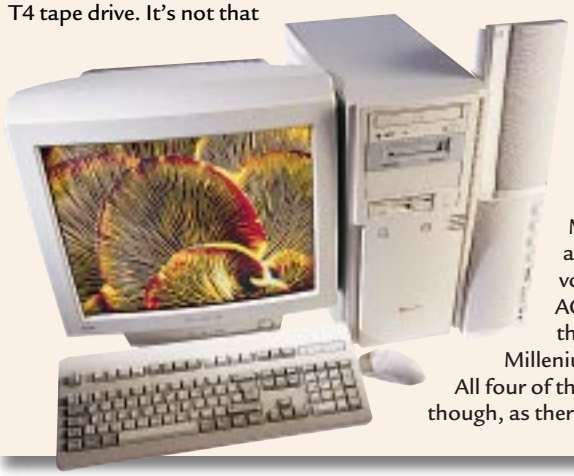
PCW DETAILS

Price *£4,177.13 (£3,555 ex VAT)*
Contact *Hewlett-Packard 0990 474747*
www.hp.com/go/kayak
Good Points *Some nice design touches, plus the HP brand.*
Bad Points *Skimpy hardware. Fiddly when trying to look inside.*
Conclusion *Offers few reasons for buying one, compared to the competition.*

Build Quality	★★★
Performance	★★★
Value for Money	★★
Overall Rating	★★

Hi-Grade Axion PV2 450

Our first impression on opening up the Hi-Grade case can be summed up in one word — wires. Loads of the blighters. We were initially confused by the jumble of leads and surprised that the Hi-Grade engineers hadn't made more of an attempt to bunch them up. The individual wires from the IBM SCSI hard drive were draped over the Matrox graphics card and the ribbon cable that daisy-chained the CD-ROM to the Hewlett-Packard SureStore T4 tape drive. It's not that we appreciate neatness *per se*; more that the wires obscure the motherboard and hardware. This will make your life harder should you wish to upgrade your RAM, or any other component.



There wasn't that much room for expansion in this PC compared to some others we saw. There was only one spare 5.25in bay and one spare 3.5in bay, with the hard drive filling the other 3.5in bay, suspended out a few inches from the other drives over the motherboard. If you wanted to access your RAM, you would need to detach the 3.5in bays first, to get at them. Two of the four PCI slots were taken up, one with a 3Com 10/1000 Fast Etherlink Network card. More unusually, there was a PCI sound card — the 64-voice Aureal Vortex. The AGP slot was taken up with the excellent 2D/3D Millenium G200 from Matrox. All four of the PCI slots could be used, though, as there was sufficient space between them, and the two (empty) ISA slots mean that they don't share a backplate.

Hi-Grade had included the Iiyama VisionMaster 450 with its PC. This is an excellent 19in monitor with sharp focus and vibrant colours. Should you wish, it is capable of displaying 1600x1200 at a healthy 75Hz. The VisionMaster has one of the best OSDs we have seen.

PCW DETAILS

Price *£2,579.13 (£2,195 ex VAT)*
Contact *Hi-Grade 0181 532 6100*
www.higrade.com
Good Points *Excellent graphics and audio cards.*
Bad Points *Little room for expansion.*
Conclusion *If you never want to open it to tweak, you won't mind the Hi-Grade.*

Build Quality	★★★
Performance	★★★
Value for Money	★★★★
Overall Rating	★★★

Mesh Elite 450DS19

Mesh was one of the few companies which managed to fulfil our wish for a dual-processor-capable motherboard, giving ample opportunity for users seeking the ultimate power machine to improve upon the single 450MHz Pentium II at a later date. Three free memory slots supplemented the 128Mb RAM, making 512Mb RAM a possibility even if we chose not to remove what had already been installed.

Adaptec SCSI chips resided on the motherboard, keeping one ISA and three PCI slots free. Two external drive bays, one 3.5in and another 5.25in, were also vacant, offering the opportunity for modest expansion in this area. An enormous IBM SCSI hard drive of 18Gb was partitioned into a 4Gb system drive and a 14Gb storage area. External connectivity, meanwhile, was catered for by an Intel Ether Express Pro 10/100 card but networking protocols had not been installed. A 4Gb HP SuperStore Travan drive would ensure we could back up our vital data. Sound arrived with the aid of a budget SoundBlaster (the Vibra 16) and a set of Yamaha YST-M20 speakers. The mouse and keyboard were both of high quality and comfortable to use throughout our tests.

The monitor achieved an almost flicker-free refresh rate of 70Hz at a stunning 1920x1200 resolution, which would certainly make this setting suitable for short-term use, if not for everyday applications. Driven by a Diamond Fire GL1000 Pro graphics card, it had 8Mb of memory to call on to produce a well-regulated image with a uniform intensity across the whole of its surface. The only slight complaint we had was that magenta tones faded slightly faster than the other nine primary monitor test colours, but this is not something that would be discernible in everyday use.

PCW DETAILS

Price *£2,970.40 (£2,528 ex VAT)*
Contact *Mesh 0181 452 1111*
www.meshplc.co.uk
Good Points *Dual-processor motherboard. Potential for 512Mb memory.*
Bad Points *Only modest drive-increase potential.*
Conclusion *A nice machine, but nothing special.*

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★
Overall Rating	★★★

Viglen BizPro 450KS

The potential for expansion in this machine was adequate, with two free PCI and two free ISA slots complementing one internal and one external free 3.5in bay. Unfortunately, though, it would be very difficult to use any of the free PCI slots as components on the AGP graphics card, and a PCI SCSI interface card intruded into their spaces. The 64-bit 128Mb SDRAM had been supplied as a single module, leaving a further two slots vacant and enabling us to expand our allocation to a maximum of 384Mb without replacing what was already installed.

The hard drive was a speedy Seagate Cheetah Ultra 2 SCSI device with a 9.1Gb capacity and an average seek time of just 5.2ms, while backup storage was catered for by a SCSI Travan tape drive, giving a maximum of 8Gb compressed storage.

This was a pleasant PC to use, with a comfortable, responsive keyboard and an attractive, contoured case that was surprisingly compact considering the expansion opportunities it offered.

Rather than being supplied onboard, as is sometimes the case, sound was provided by an Aureal Vortex Audio card and arrived through a Yamaha speaker set with a large sub-woofer and satellite tweeters.

The Viglen-branded CTX 19in monitor with an 18in viewable diagonal was excellent, with an 85Hz refresh rate at 1280x1024 resolution. The extensive OSD allowed for fine-tuning and colour-temperature adjustments. Although colour registration was perfect and there was no streaking or ghosting, it did demonstrate slight moiré on all test patterns. Driven by an AGP Matrox Millenium G200 card with 8Mb of SGRAM, we could, if we chose, increase this to a maximum of 16Mb.

PCW DETAILS

Price *£2,172 (£1,849 ex VAT)*
Contact *Viglen 0181 758 7000*
www.viglen.co.uk
Good Points *Expansion potential.*
Bad Points *Cluttering of expansion slots. Moiré on monitor test patterns.*
Conclusion *Good, all-round machine.*

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★

A preview of Intel Katmai

The replacement for the Pentium offers vastly improved 3D performance; but will it be enough?

Katmai, the replacement for the Pentium II, will surface in Q1 of 1999, running at a clock speed of 450MHz or 500MHz. Intel is targeting it at the enthusiast and high-end mainstream performance categories. The extra speed will allow it to offer a small performance advantage over Pentium II on typical PC applications, and a large advantage on applications that use the multimedia extensions known as Katmai New Instructions.

Katmai is more than a faster processor. It signals the convergence of new chipsets, DRAM technology, a graphics bus, MMX instruction set, graphics components and a faster system bus. It will be a P6 derivative, initially produced on a 0.25 micron process, and is expected to provide up to 512Kb of L2 cache. It is believed that it will stick with a 64-bit CPU bus and rely on deeper pipelining capabilities to take advantage of wider buses and encourage the use of multiprocessing systems. There will be 70 new single-instruction multiple-data (SIMD) floating-point instructions to accelerate 3D processing. Intel's current MMX instruction set is based on SIMD integer data types, and while this is useful for presenting certain audio, video and 2D images, it provides less precision and range for 3D geometry processing. Graphics performance will be further boosted by the 4X Accelerated Graphics Bus, which will increase the available bandwidth between the graphics controller and main memory from 528Mbps to 1Gbps.

Intel is targeting Katmai at the enthusiast and the high end

Katmai and 3D

Although Katmai's main claim to fame is vastly improved 3D performance, some have claimed that it still won't be enough. The debate centres on the geometry front-end of Katmai's 3D pipeline where transforms and lighting are calculated. Normally, 3D geometry and lighting (a component of primitive triangle calculation) are the exclusive preserve of the CPU, but our group-test findings confirm what graphics chip vendors have been saying: that the CPU has topped-out its ability to churn out more triangles at a rate that can keep up with the latest 3D processors.

▲ BREATHE MORE LIFE INTO YOUR PC WITH KATMAI

By the time Katmai is released, new graphics accelerators which include geometry and lighting hardware are expected to be available from the likes of S3, 3DLabs, 3Dfx Interactive and perhaps Nvidia. The chip vendors argue that Katmai will be too expensive for the basic domestic PC and a separate geometry engine is a cheaper and faster solution. They allege that the best the first generation of Katmai will offer is a "maximised Voodoo2 class of subsystem" and won't offer significant 3D performance advantages — perhaps at best, a 60 percent improvement in the front-end of the geometry stage, according to 3DLabs. This is a marginal gain, considering that today's most advanced 3D processor chips can handle about four times as many triangles as the processor can send. That they maintain this deficiency is down to the inherent weakness of a general-purpose CPU, even one with the vector-processing capabilities of Katmai, in processing more triangles. Geometry processing inevitably means many exceptions, and a hardware geometry engine, by contrast, is more adept at handling those exceptions because it has dedicated transistors assigned for the task. Intel counters this by maintaining that a balanced system keeps the transform-and-lighting burden in the CPU and that the floating-point-intensive Katmai instruction set should erase any doubt that the CPU can handle those functions. It has downplayed the naysayers' approach as expensive and unnecessary for most systems.

The vast majority of 3D development is directed naturally towards games software, and Intel is hoping to woo 3D-game developers to optimise their software for what it considers to be the premier PC platform for 1999. Such a system would include the 100MHz 440BX chipset, the i740 3D graphics processor and a Katmai processor running at 500MHz. Intel is devoting lots of resources to providing decent compilers and development tools, something it didn't quite deliver for MMX two years ago. Later this year, Microsoft will provide a version of Direct3D 6.0 with a .DLL file that will take advantage of SIMD floating-point instructions on the microprocessor, both Intel's Katmai and the separate instructions being developed by AMD, Cyrix and IDT.

Table of features





Manufacturer	Armari	Atlantic Systems	Compaq	Dan Technology	Dell
Model Name	**MBX-450 Workstation**	**Proteus 450LVD**	**DeskPro EP Series 6450**	**Dantum II/WSU**	**Precision Workstn 410**
Price (ex VAT)	£2,899	£2,499	£2,050	£2,542	£3,390
Price (inc VAT)	£3,406.33	£2,936.33	£2,328.75	£2,986.85	£3,983
Telephone	0181 810 7441	0990 134725	0845 270 4000	0181 830 1100	0870 9073335
Fax	0181 810 8846	01639 821300	0845 270 4700	0181 830 1122	01344 723715
Web address	www.armari.com	www.atlanticsystem.com/sys/	www.compaq.co.uk	www.dan.co.uk	www.euro.dell.com
Hardware Specs					
Processor	Intel PII 450	Intel PII 450	Intel PII 450	Intel PII 450	Intel PII 450
RAM/Type/No of DIMMs	128Mb / SDRAM / 1	128Mb / SDRAM / 2	128Mb / SDRAM / 1	128Mb / SDRAM / 1	128Mb / SDRAM / 1
Hard disk	Seagate Cheetah	Seagate Cheetah	Maxtor	Seagate ST39102LW	Quantum 8.5Gb
Size/interface	9.1Gb, Ultra2 SCSI	9.1Gb / Ultra2 SCSI	10Gb / Ultra ATA	9.1Gb / LVD Ultra2 SCSI	8.5Gb Ultra2Wide LVD
Storage drive	Seagate Hornet 8 Travan	LS-120 Superdisk	N/A	Seagate Tapestore T8000	Seagate
Size of storage drive media	8Gb	120Mb	N/A	4Gb / 8Gb	3.5 X 1
Storage drive interface	IDE	IDE	N/A	SCSI	SCSI
Motherboard Components					
Motherboard manufacturer	ASUS	Intel	Compaq	Supermicro	Dell/Intel
Model/Chipset	P2B-DS / 440BX	SE440BX / 440BX	Intel 443BX	P6DGU / Intel 440GX	BX440
L2 Cache	512K	512Kb	512Kb	512K	512kb
No of free 3.5/5.25in bays	1 / 1	2 / 1	1 / 1	1 / 4	3 / 2
AGP slot	1	1	1	1	1
No of free PCI/ISA/shared slots	4 / 1 / 0	2 / 0 / 0	3 / 0 / 1	3 / 0 / 0	3 / 1 / 1
No of USB/Serial/Parallel/PS2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
Multimedia					
CD-ROM	Plextor CD Writer	Traxdata CD and DVD-ROM	Compaq	Teac 32S	NEC
CD-ROM speed/interface	4/12 MAX / SCSI	2x/2x/6x / SCSI	32 x / IDE	32x / SCSI	16/32 SCSI
Sound card manufacturer	Creative Labs	Creative Labs	Compaq	Creative Labs	Crystal
Sound card model	AWE64 Value	AWE64	16-bit Premier Sound	AWE64 OEM	4237B SRS 3D
Speakers	Yamaha YST-MS25	Generic 300W speakers	Internal	Dan Hi Fi	Altec Lansing (optional)
Graphics card	Matrox Millennium G200	Matrox Millennium G200	Matrox Millennium G200	Matrox Millennium G200	Integraph Intense 3D Pro
RAM/Max RAM and type	16Mb / 16Mb SGRAM	8Mb / 16Mb SGRAM	8Mb / 16Mb SGRAM	8Mb / 16Mb SGRAM	16Mb / 16Mb SGRAM
Graphics card interface	AGP	AGP	AGP	AGP 6P	AGP
Monitor /size	Iiyama Vision Master 450/19in	MAG DJ-800 / 19in	Compaq P75 / 17in	CTX / VL950 / 19in	Dell (Trinitron) 17in
Max refresh rate at 1,024 x 768	120Hz	105Hz	85Hz	113Hz	85Hz
Max refresh rate at 1,200 x 1,024	94Hz	80Hz	85Hz	85Hz	85Hz
Max refresh rate at 1,200 x 1,600	80Hz	69Hz	75Hz	75Hz	60Hz
Other Information					
Modem	Diamond Supra Exprs PCI	Generic	N/A	Pace 56/V90 Internal Voice	Optional
Modem speed	56.6Kbps	56Kbps	N/A	56Kbps	Optional
Misc hardware	N/A	Headset and microphone	N/A	3Com 3C905 10/100 Ether	Adaptec U2W RAIDPORT
Bundled software	Windows NT4	Windows NT4	Windows NT4	Windows NT4	Windows NT & 95
		Lotus SmartSuite 97		Quicken 6.0 SE	
		Corel Draw Suite , AntiVirus,		Lotus SmartSuite 97	
		IBM Via Voice,			
		Pipex Dial			
Standard warranty	1yr OSM	1yr collect & rtn, parts & lab	3yr parts & replacement	1yr OSM	3 yrs (2-yr RTB)
		4yr RTB labour	(1st yr OSM)		1yr next business day
Warranty options	Up to 3yr OSM	5yr parts & lab, OSM	3yr OSM,	N/A	UK - 1yr, (4hr +£75)
			next business day OSM		to 3yr (4 hr +£210)
Tech support tel no	0181 810 6491	01639 823030	0845 2704000	0181 830 1100	01344 724730

Table of features



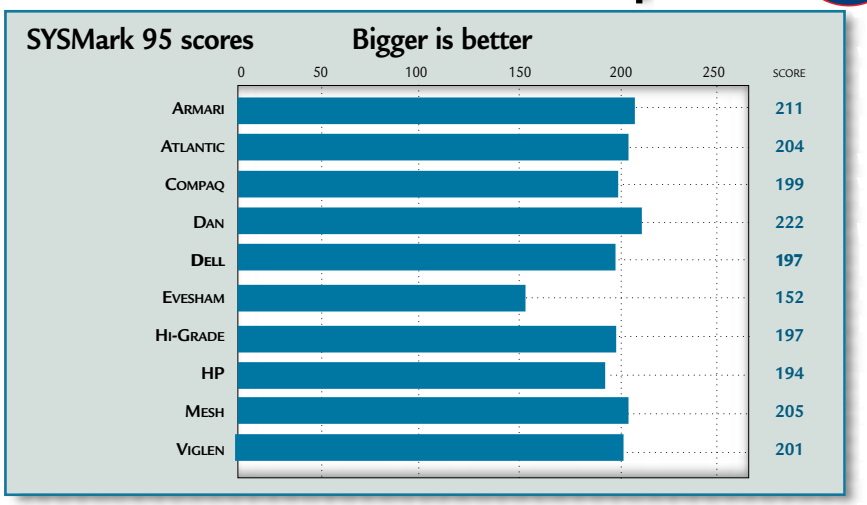


Manufacturer	Evesham	Hewlett-Packard	Hi-Grade Computers	Mesh	Viglen
Model Name	**Vale Platinum SE**	**Kayak XA-S**	**Axion PV2 450**	**Elite 450DS19**	**Viglen BizPro 450ks**
Price (ex VAT)	£2,599	£2,300 (sys) + £1,255 (mon)	£2,195	£2,528	£1,849
Price (inc VAT)	£3,053.83	£4,177.13	£2,579.13	£2,970.40	£2,172
Telephone	01386 769600	0990 474747	0181 532 6100	0181 208 4706	0181 758 7000
Fax	01386 769795	0141 420 2595	0181 532 6101	0181 208 4493	0181 758 7080
Web address	www.evesham.com	www.hp.com/go/kayak	www.higrade.com	www.meshplc.co.uk	www.viglen.co.uk
Hardware Specs					
Processor	Intel PII 450	Intel PII 450	Pentium II 450	Intel PII 450	Intel Pentium II 450
RAM/type/no, of DIMMs	128Mb / SDRAM / 1	64Mb / SDRAM / 2	128Mb / SDRAM / 1	128Mb / SDRAM / 1	128Mb / SDRAM / 1
Hard disk	Cheetah Ultra2	Seagate Medalist 6530	IBM	IBM Ultra Wide SCSI	Seagate 9Gb SCSI
Size / interface	9Gb / SCSI LVD	6.4Gb	9GB Ultra 2 SCSI	18.8Gb / UltraWide SCSI	9Gb / SCSI
Storage drive	Jazz / Iomega	N/A	HP 4000i	HP Travan	HP Travan T4000
Size of storage drive media	2Gb	N/A	4 Gb	4Gb	8Gb
Storage drive interface	SCSI	N/A	SCSI	SCSI	SCSI
Motherboard Components					
Motherboard manufacturer	Chaintech	Hewlett-Packard	ASUS	ASUS	Viglen OEM
Model/chipset	6BTML / Intel 82440BX	HP XA-S / Intel 440BX	P2B-DS / Intel BX	P2B-DS / Intel 440BX	Vig 69 / (Intel AL440BX)
L2 Cache	512Kb	512Kb	On Processor 512K	512Kb	CPU 512K
No of free 3.5/5.25in bays	4 / 2	1 / 2	0 / 1	1 / 1	2 (I internal) / 1
AGP slot	1	1	1	1	1
No. of free PCI/ISA/shared slots	4 / 1 / 1	2 / 1 / 0	2 / 2 / 1	3 / 1 / 0	3 / 1 / 1
No. of USB/Serial/Parallel/PS2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
Multimedia					
CD-ROM	Panasonic SR8582-B	Hitachi CDR	Teac	Teac	Panasonic CR586
CD-ROM speed/interface	20xCD, 2xDVD / ATAPI	32x / IDE	32x / SCSI	32x / SCSI	32X ATAPI EIDE
Sound card manufacturer	Creative Labs	HP (Integrated)	Genius	Creative Labs	Mutiwve 3D PCI wve tble
Sound card model	AWE64 Value	SB Pro compatible	Genius 3D 64 PCI	Sound Blaster Vibra 16	3D PCI wave table Aureal
Speakers	Yamaha YSTMS25	N/A	N/A	Yamaha YST-M20 DSP	Yamaha M25 + subwoofer
Graphics card	Matrox Millennium G200	Matrox Productiva G200	Matrox Millennium G200	Diamond Fire GL 1000	Matrox Millennium G200
RAM/Max RAM and type	8Mb / 16Mb SGRAM	8Mb / 16Mb SGRAM	8Mb / 8Mb SGRAM	8Mb / 8Mb SGRAM	8Mb / 16Mb SGRAM
Graphics card interface	AGP	AGP	AGP	AGP	AGP
Monitor /size	Taxan / TCO975 / 19in	HP / P1100 / 21in	Iiyama VisionMaster 450/19in	ADI / 6P / 19in	Viglen OEM Envy 19D
Max refresh rate at 1,024 x 768	117Hz	129Hz	120Hz	120Hz	100Hz
Max refresh rate at 1,200 x 1,024	88Hz	98Hz	94 Hz	85Hz	85Hz
Max refresh rate at 1,200 x 1,600	75Hz	85Hz	80 Hz	75Hz	75Hz
Other Information					
Modem	Vale 56K internal	N/A	N/A	N/A	Viglen OEM 56K ISA
Modem speed	56Kbps	N/A	N/A	N/A	56Kbps
Misc hardware	Ultra2 SCSI contrllr onboard	Network adapter card	3COM 3C905 TP NIC	Intel Eth Exprss Pro 10/100	
Bundled software	N/A	Windows NT4,	Lotus SmartSuite 97	Windows NT4	Microsoft Intellimouse
		HP TopTools,	IBM World Book,	Lotus SmartSuite 97	Windows NT 4.0
		HP Maxilife,	VoiceType		
		Adobe Acrobat			
		McAfee VirusScan			
Standard Warranty	2yr OSM +	1yr OSM, 2yr parts	1yr on site (next day)	3yr RTB parts/labour	12 mths collect and return
	lifetime tech support				
Warranty Options	Optional 3rd yr OSM	Extended warranty	N/A	1yr OSM £49	Upgradable to 4 hr OSM
				+ other options	
Tech support tel no	Available when purchased	0990 474747	0181 532 6199	0181 208 4795	0181 758 7053

Why Windows NT and not 95?

What makes Windows NT different to Windows 95 and 98? Although they look similar, there are actually a number of differences. To begin with, unlike 95, NT controls hardware directly without using the system's BIOS. This is a secure technique but it makes NT particular about hardware. Microsoft even provides a list of compatible hardware at www.microsoft.com. You must be sure your hardware is properly configured and has no internal address conflicts: unlike 95, NT does not support plug-and-play (although NT5 will), so it cannot automatically detect or change settings. As a result, if something is not set up properly, the system could lock up. NT suffers from poor, or even non-existent, device drivers. The specialised Backup facility lets you save information to your local tape drive and the Performance Monitor enables you to monitor the performance of all computers on your network. Disk Administrator lets you view and configure the partitions on your hard drive, dispensing with the need for third-party applications when running Windows 95. With User Manager, you can manage security for a network of NT computers, creating accounts and user rights. Event Viewer keeps track of significant occurrences in a program, or in the system, of which you need to be aware.

PCW Labs Report



How we did the tests

The SYSmark tests we run on every PC in the group test is provided by BAPCo (Business Applications Performance Corporation). The tests measure the speed of the PC running a series of eight common office applications. We measure the time taken by the PC to perform a variety of tasks in each application and each test is performed three times to ensure the results are consistent. The performance depends on a number of factors: processor speed, RAM, graphics card and disk I/O. As the tests are based on business software packages, the results reflect how the PC will perform in a real-world situation. The better the score, the longer the bar on the graph. More information about the BAPCo suite of tests can be found at www.bapco.com.

Although Windows 95 and NT are compatible and will run many of the same applications, there are a fundamental differences between the two. The most basic is the way in which it writes files to disk. Whereas Windows 95 uses the outdated FAT (File Allocation Table) convention, NT4 instead employs NT File System, allowing longer filenames based on Unicode characters. Active Directory will form the backbone of NT5 upon release, including support for the Domain Name System (DNS) and standard protocols like HTTP to make networks, the internet and the file system integrate closer than before. It will also support an extended set of graphics handling commands, allowing the use of many games currently only available to Windows 95 / 98 users. Because of these differences, our tests for Windows 9x and Windows NT are written specifically to suit each OS.

NTFS is a very secure file system which, because of the space it uses, is not recommended for disks under 400Mb. It works well on large drives, though, because of the efficient way in which it handles files. There may be a performance issue involved in the choice of FAT or NTFS under NT 4.0, with some PC manufacturers claiming that the former gives better performance, albeit at the cost of reduced security. Monitors are scrutinised using Display Mate for Windows and tested at a number of resolutions and colour depths.

Editor's Choice

We get down to the business of choosing the best of a very fine bunch.

A wide variety of prices, specifications and approaches were employed by our suppliers in building these machines. While many opted for SCSI drive connections, others followed the less impressive IDE route. Some took our spec to be purely business-orientated and so did not include speakers or, in many cases, even bundled software. Some, like Evesham and Dan, had used large cases to allow for the maximum upgradability, but the likes of Dell and HP had instead opted for much smaller models, suitable for smaller offices or home environments. In a business situation, most IS departments would be likely to favour the latter approach as there is little need for more peripherals and drives in a purely business machine.

THE ATLANTIC PROTEUS 450LVD

Although the top five performers in our BAPCo tests were all SCSI-based machines, the margin between the fastest of these and the first-placed IDE PC was a mere 23 points. SCSI does not always pay off, we found, with Evesham's SCSI machine coming at the bottom of the list, making us wonder whether this "super-fast" technology is actually worth the little extra you often have to pay. It has long been an established fact that a powerful graphics card plays a large part in enhancing the performance of a PC, and four of the five fastest machines reviewed here incorporated the brand new Matrox Millennium G200, which wins a Highly Commended award in this month's graphics card group test [p190]. It is important, therefore, to consider the components of the PC as a whole rather than as individual parts, because a single slow component can slow down the performance of an otherwise impressive machine.

▲THE ARMARI MBX-450 WORKSTATION

The one manufacturer which impressed us the most overall, and is thus our Editor's Choice, is **Atlantic**. Its **Proteus 450 LVD** is a well-specced machine with every PC gadget you could hope for, including a large, fast hard drive, a CD-RW drive and, looking to the future, DVD-ROM. Rather than a standard floppy drive Atlantic had opted to replace it with an LS-120 offering 120Mb of instantly accessible backup storage which can be used as a conventional drive. The AWE 64 sound card and 300W speakers provided for excellent sound reproduction, while the 19in MAG monitor attained an impressive refresh rate at very high resolutions. Even the generous software bundle did not raise the price of this breathtaking system above the £2,500 mark (before tax).

The Armari MBX-450 Workstation is Highly Commended. This sturdy machine performed well in our tests and, complemented by the excellent Iiyama Vision Master 450, it

The Atlantic Proteus 450LVD is a well-specced machine with every PC gadget you could hope for

was easy on the eye. The dual-processor-capable motherboard (although, at our request, not implemented in this model) offers an impressive upgrade path for power users.

Dell's Dantum II/WSU is also Highly Commended. Although not particularly fast, its innovative design enables easy access to the interior, allowing you to upgrade the standard configuration and take advantage of the five free PCI slots, facilitated by the inclusion of onboard SCSI.

▲THE DELL DANTUM II/WSU