Turbo PCs

AMD and Intel are vying for the top spot in the high-end PC arena and home power users are weighing up the options. We put 11 top-of-the-range machines through their paces.

Our group test this month has a slightly unusual flavour. Flick through the next few pages and you'll see that some manufacturers have submitted more than one PC. This is because, with AMD's renewed vigour as a contender for the crown of fastest CPU manufacturer, more and more people looking to splash out on a high-end PC are wondering just which route they should go down to achieve the best performance as well as the best value – Intel or AMD.

We thought it best not to tie manufacturers' hands by setting a price point for this month's test, instead giving them other criteria. We decided to target home power users. So as well as browsing the web and using standard office apps, they'd also want to play graphically demanding games and perhaps do some home video editing with their machines. So we asked for high-end machines, featuring the fastest Intel or AMD processors the vendors could supply. To enable video editing and serious 3D gaming out of the box, a graphics card with at least 16MB of RAM, plus video capture capabilities was required. If no video capture was available on their card of choice, a dedicated capture card had to be present instead. To be consistent with high-end CPUs and graphics we also stipulated that the machines should sport at least 128MB of RAM, a minimum of 22GB of hard disk storage, a backup drive – we left it to the vendors to decide what sort – and at least a 17in monitor. Finally, we allowed them to submit two machines if they wished, one with an Intel and one with an AMD processor.

The result was an interesting mix of powerful machines, although one processor manufacturer was the clear favourite among the manufacturers – read on to see which one.

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Ratings

★★★★★ **EXCELLENT**
★★★★ **VERY GOOD**
★★★ **AVERAGE**
★★ **BELOW AVERAGE**
★ **POOR**

Big Red **Phantom K7/700**

Big Red has been around for a while, but it's only recently that its machines have been red by name and red by nature. But the translucent cherry case isn't just a pretty face – it's also easy to get into via the side access panel, which simply unclips without requiring a screwdriver.

Inside the Phantom lurks a 700MHz Athlon processor, which is not the fastest chip in this test in terms of clock speed. Big Red has supplied some worthwhile peripherals though, such as the Teac PowerMax 1000 speakers. When playing a DVD through the SB Live! Player 1024's digital output these give you a true Dolby Digital AC3 setup, including centre speaker for dialogue.

Graphics and video capability haven't been skimped, with 3dfx's Voodoo3 3500TV graphics card. The card can capture its TV signal or an external video input and encode it into MPEG2 format in real time. It includes a VCR-like recording applet and competent video-editing application.

Keyboard and mouse are the chic Logitech cordless variety. They work perfectly, and lefties will appreciate the symmetrical mouse. A Mitsubishi Diamond Pro 900u monitor, with its 19in Diamondtron NF aperture-grille screen, gives a vibrant picture.

The processor sits in a Gigabyte GA-7IX motherboard. One of three DIMM holds 128MB of memory. There are two PCI, one ISA and one shared slot free. A 27GB IBM Deskstar hard disk occupies one 3.5in internal drive bay, leaving one free. As with all but one of our entrants, the Phantom's backup device is a CD-RW drive, a JVC unit, leaving one 5.25in bay free.

Among its higher-clocked rivals, the Phantom ranked fairly low in the speed stakes, coming second to last in the SYSmark table and just under halfway in the 3DMark tests. It is well put together, but there's better value elsewhere.

PCW DETAILS

Price £2,349 (£1,999 ex VAT)
Contact Big Red 08700 711 117
www.bigred.co.uk
Good points *Pretty looks, good supporting components*
Bad points *Relatively slow, not the best value for money*
Conclusion *A good PC by any measure, but not the best*

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

Carrera **Octan M750**

The Octan M750 features a 750MHz Athlon processor, the fastest standard version currently available. Backing this up is a single 128MB SDRAM DIMM, and a whopping 34.2GB IBM Deskstar 34GXP hard drive, with 7,200rpm spindle speed and a 2MB on-board data buffer. An LG CD-RW drive provides backup, while Panasonic takes care of DVDs.

If you're looking for a video-editing solution, look elsewhere: the Octan has no video capture ability. What it does have is Guillemot's 3D Prophet graphics card featuring nVidia's GeForce 256 chipset. Other manufacturers have supplied GeForce cards, but only Carrera managed to include the new variant with DDR (double data-rate) RAM. There's also a digital flat panel output, although the PC we saw was equipped with an LG

Studioworks 910SC monitor. This 19in shadow mask unit doesn't stand up to the sharper, more vibrant flat screen, aperture-grilled units from some other manufacturers, but it costs less.

Internal construction is neat, with IDE cables flat-routed and power cables bundled and tied, with spare power connectors brought out to the free drive bays – there are two front-panel 5.25in bays and one 3.5in. Occupying two of the four PCI slots are a SoundBlaster Live! Value and a generic 56K modem. The SoundBlaster drives a set of Altec Lansing ACS54 speakers, with four satellites and a sub-woofer. Those looking to fill the drive bays and free expansion slots will appreciate an extra cooling fan at the bottom front of the case.

SYSmark performance was extremely good, with its score of 292 just a few per cent away from the top of the league. 3DMarks were disappointing, but since 3DMark99 Max doesn't support the GeForce's hardware transform and lighting capability, this is slightly misleading.

PCW DETAILS

Price £2,100 (£1,787 ex VAT)
Contact Carrera Technology 020 8307 2800
www.carrera.co.uk
Good points *GeForce DDR graphics, 750MHz processor, capacious hard drive*
Bad points *Rather average monitor, no video capture capability*
Conclusion *This relatively stripped-down machine gives high performance for a low price. A good base for expansion, although we'd prefer a better monitor*

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

Evesham Vale **Athlon 750**

This is an expensive machine, but you get a lot more than just a fast processor. Like Big Red's system, the most obvious peripheral is the huge speaker system, VideoLogic's DigiTheatre, with four satellites, sub and centre dialogue speaker for proper Dolby Digital reproduction. Unfortunately you'll have to shell out extra for a digital I/O daughter card to expand the SoundBlaster Live! Value if you want Dolby Digital.

The Guillemot 3D Prophet graphics card is one of the fastest around, but doesn't have a video input. To compensate, Evesham has included Miro's superb Studio DC10 Plus capture card which captures MJPEG video and includes an excellent editing application. The 3D Prophet drives a 19in Taxan ErgoVision 980 monitor that gives a very sharp picture via its Diamondtron NF flat screen tube, plus side-mounted USB ports. It's not quite as sharp as Mitsubishi's 900u. Backup is in the form of an LG 8024B CD-RW drive.

Internal build is good, with all cables tidied with spiral-wrap, although this does slightly obscure the two free DIMM sockets – the third is occupied by a 128MB SDRAM DIMM. This is the only system with a Maxtor hard disk: a DiamondMax Plus 6800 27.3GB model, boasting 7,200rpm spindle speed and a 2MB data buffer, sits in one of the four 3.5in bays. Software is Lotus SmartSuite Millennium. Evesham has certainly hit on a good blend of components, since the PC romps home with fastest scores in both SYSmark and 3DMark. The quality components don't come cheap, but if it's a great all-round high-end performer you're after, this is a good bet.

PCW DETAILS

Price *£2,466 (£2,099 ex VAT)*
Contact *Evesham Micros 0800 0380800 www.evesham.com*
Good points *Exceedingly fast, great components*
Bad points *SB Live! Value can't take full advantage of speakers' AC3 input; expensive*
Conclusion *A super-fast system, perfect for games or more serious processor and graphics-intensive work. Other systems are cheaper but the Evesham still represents good value*

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

Processor technology in development

Computing technology never stands still for long. The 750MHz Athlon and 733MHz Pentium III may be the newest processors on the market, but their respective makers are already designing the next generations of CPUs. In the case of Intel's newest baby, the Itanium (formerly codenamed Merced), prototypes are already with developers and system integrators.

Itanium is the first processor designed around Intel's IA-64 architecture. It's not, however, the first 64bit processor – Sun's UltraSparc and DEC's (now Compaq's) Alpha are both 64bit. But IA-64 also encompasses other design developments, notably EPIC (explicitly parallel instruction computing), in which code is heavily optimised at compile time to allow enhanced parallel execution. The first Itaniums will ship in mid-2000, but they'll be high-end CPUs destined for servers. The technology will no doubt filter down to the mainstream eventually, just as the Pentium Pro's P6 core in the Pentium II.

AMD is following suit with a rival technology. Whereas IA-64 abandons the x86 instruction set, AMD's Sledgehammer CPU will extend it. Its x86-64 instruction set allows for greater compatibility and allegedly faster execution of IA-32 applications. But this could lead to compromises in 64bit operation compared to Intel's clean-break technology – AMD's press release calls x86 'inelegant'.

Causing a minor stir earlier this year was the E2K design from Russian company Elbrus. Fully x86-compatible, and fabricated using a 0.18micron process, it's intended to run at 1.2GHz and the company claims that it will outperform Itanium. The stumbling block, however, is that Itanium is already a reality but the E2K exists only in simulations. The development team has had experience with design and realisation of high-performance processors for the Russian military in the past, so the E2K is being taken at least semi-seriously, but it's unlikely to cause Intel too many sleepless nights.

Elbrus is currently looking for a company to stump up the required £37.5m for development of the design that it claims could be delivered in three years. See www.elbrus.ru.

Another dark horse is Transmeta's Crusoe processor. There's currently precious little information, but all is due to be revealed to the world on 19 January. One of the patents filed by the company details a processor allegedly able to run x86 applications in emulation mode, faster than a native x86-based processor. See the company's website at www.transmeta.com for a tantalising secret message.

Despite all the ground-breaking technology in development, however, for the time being advances at consumer level will be characterised by incremental improvements in clock speeds, cache speeds and fabbing processes.

Mesh **Matrix 750 Pro**

The fourth Athlon-based PC in this test comes from Mesh, although it also sent an Intel-based machine (see below). The Matrix 750 sports a 750MHz Athlon, plus 128MB of RAM in a single SDRAM DIMM. In this company the IBM Deskstar 22GXP hard disk, while fast, looks a little on the small side with its 22GB capacity.

Graphics are handled by a Matrox Millennium G400 with DualHead output – a good card, but it has no video capture facility and there's no standalone card to compensate. Output from the Millennium goes to a Taxan ErgoVision 980, with an excellent Diamondtron NF flat screen.

The Asus K7-M motherboard has an AMR (audio modem riser) slot, made redundant by the presence of a SoundBlaster Live! Player 1024 and PCI 56K modem, but Mesh has thoughtfully made use of the AMR slot's spare blanking plate by fitting two extra USB ports, for a total of four, plus there are another four on the monitor. The SoundBlaster feeds a set of Labtec

LCS-2514 speakers that are good but not in the same league as those supplied with the Evesham or Big Red machines.

Internal layout is extremely neat, with the two free PCI and one shared slot, plus Slot A and two free DIMM sockets all easy to access. The only potential pitfall is the rather thick audio cable from the SoundBlaster that could make installing a card in the adjacent slot a little tricky. Hardly a major flaw though.

On the software front, Corel WordPerfect Office provides all the office applications you'll need. In the speed stakes, the Matrix 750 gives a reasonable account of itself, although the Millennium G400 is not the fastest card around these days, so the 3DMark score is a little low.

Despite this, the Matrix 750 has the best overall price-performance ratio, making it one to consider if

you're not bothered about the lack of video capture.

PCW DETAILS

Price *£2,114 (£1,799 ex VAT)*
Contact *020 8208 4706*
www.meshplc.co.uk
Good points *Fast, good value, well built, high-quality monitor*
Bad points *No video capture, relatively small hard disk*
Conclusion *A fine machine for those not into video editing*

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

Mesh **Pegasus 733**

The first machine based on an Intel processor, and the second entrant from Mesh, the Pegasus 733 sports a 733MHz Pentium III CPU. This is the newest and fastest Intel processor currently available, with 256KB of full-speed Level 2 cache on die.

Most of the components are identical to those of its cousin the Matrix 750. At the core is 128MB of SDRAM, an IBM Deskstar 22GB hard drive and Matrox Millennium G400 DualHead graphics card. There's also a Pioneer DVD-ROM drive and Philips CD-RW, standing out by virtue of its gold disc tray.

One difference is the monitor, a Taxan Ergovision 755, one of only two 17in units this month. It provides a great picture at 1,024 x 768, but at 1,280 x 1,024 with a 75Hz refresh rate it was hard to correct

geometry distortions, and things are too small at this resolution, whereas most 19in units handle it fairly easily.

Being a Slot 1 processor, the Pegasus also has a different motherboard to the Matrix 750 – a Tyan S1854. This has both Slot 1 and Socket 370 CPU connectors, but isn't a dual-processor board. There are no dedicated ISA slots, but there is one shared slot and five dedicated PCI, three of which are free.

Ancillary components and software are identical to the Matrix 750.

It's very interesting to note that the Pegasus 733 manages to outstrip the

Matrix 750 in both SYSmark and 3DMark tests, showing that Intel certainly isn't out of the running yet, although we suspect that this is down to the initial problem with supporting AMD chipsets rather than the CPUs themselves.

PCW DETAILS

Price *£1,761 (£1,499 ex VAT)*
Contact *Mesh 020 8208 4706*
www.meshplc.co.uk
Good points *Faster than its AMD-based counterpart, and cheaper too…*
Bad points *…but the monitor is lower quality, and there's no video capture facility*
Conclusion *The fact that the Pegasus is the cheapest machine here, and one of the fastest, shows that AMD isn't having things all its own way*

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

Panrix **Magnum 750**

The Magnum 750 is the first machine this month to sport a significant hardware addition – a Promise FastTrak 66 RAID controller. Attached to the controller and configured as a RAID 0 striped set are two 28.5GB Seagate Barracuda hard drives. This gives a total storage capacity of 57GB, plus extremely fast data throughput. Aside from the RAID array, the Magnum is the only PC with 256MB of RAM made up by two 128MB DIMMs fitted to its MicroStar 6167 motherboard.

A CD-RW drive from AOpen hides behind the front fold-back flap of the stylish case. The latter gives easy access to internals via its slide-off side panel.

Graphics are handled by a Guillemot 3D Prophet GeForce 256-based card, while video capture is dealt with by a Hauppage WinTV card with remote control – not such a good solution as a Miro DC10 Plus, but still worthwhile. For video editing an MGI VideoWave is supplied in a software bundle that includes Lotus SmartSuite Millennium.

The 3D Prophet drives a Mitsubishi Diamond Pro 900u 19in monitor that gives superb picture quality, and a USB hub. Running at a resolution of 1,280 x 1,024 is easy with this display.

In the SYSmark benchmarks, the Magnum comes joint fourth alongside the Mesh Matrix 750, and the 3DMark score was second only to Evesham. These benchmarks don't really stress the potential of the RAID array, however, and this PC is likely to be more suitable than either of those for capturing high-res video.

The downside of the RAID array is, of course, the effect on the Magnum's price. It's the most expensive machine here, but for the money you get a very capable system.

PCW DETAILS

Price £2,814 (£2,395 ex VAT)
Contact Panrix 01132 444958
www.panrix.com
Good points *Loads of RAM, RAID array, 750MHz processor, great monitor*
Bad points *Expensive, could do with a better capture card*
Conclusion *If you really need RAID plus the absolute fastest processor, the Magnum is your machine. But if you just want RAID, consider the Polar machines too*

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

Polar **Professional Athlon 700**

The trend toward the wonders of RAID continues with Polar's PC that, like the Panrix, has two hard drives connected to a Promise RAID controller and configured as a striped set. The two IBM Deskstar 25GP drives give a capacity of 50GB. These spin at 5,400rpm compared to the 7,200rpm of the Seagate Barracudas in the Panrix, although they have four times the cache at 2MB apiece.

The 700MHz Athlon processor is accompanied by a single 128MB DIMM, leaving two sockets free on the Gigabyte motherboard. The board also has four PCI, one shared and one ISA slot. All four of the PCI slots are occupied by the RAID controller, Ensoniq AudioPCI sound card, Conexant PCI modem and 10Base2/10BaseT network card.

The Polar's graphics are handled by an Asus V3800 Ultra Deluxe, which is based on nVidia's TNT2 Ultra chipset. The card also has a TV tuner and video capture facilities, and a pair of 3D LCD glasses are included that serve to give you a headache as well as producing a rather dodgy stereoscopic effect with Direct3D and OpenGL applications. The capture software included with the card, Asus Live, performs capture only – there are no editing facilities and no standalone video-editing application. No office suite is supplied either. The V3800 does, however, drive a lovely Mitsubishi Diamond Pro 900u monitor. Logitech's swish cordless keyboard and mouse provide for input, both working perfectly via radio link.

With its 700MHz processor, the Polar was never destined to win the bench-mark shoot-out, but it comes at the top of the 700MHz systems in SYSmark, beating a 733 PIII in the process, and gives a respectable 5,192 in 3DMark.

PCW DETAILS

Price £2,349 (£1,999 ex VAT)
Contact Polar Technology 0800 138 1238
www.polartechnology.co.uk
Good points *RAID controller for less than Panrix, network adaptor, monitor*
Bad points *Average sound card, relatively slow processor, good but not absolutely cutting-edge graphics, no software to speak of*
Conclusion *A good machine, but it doesn't really sparkle*

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

Polar **Professional PIII 700**

The second of Polar's entrants this month also has a 700MHz processor, this time a Pentium III. It's the only system with an all-Intel CPU subsystem, with an Intel CC820 motherboard, populated by the Intel 820 chipset. The CC820 supports most of the 820 chipset's features, including 133MHz FSB (front side bus) and AGP 4x. Unfortunately, neither the CPU nor the graphics card can take advantage of them, but the potential is there.

The CC820 doesn't support 133MHz SDRAM, or the much faster RDRAM, so the Professional PIII 700 is fitted with a single 128MB standard PC100 DIMM. There's only one spare DIMM socket available for future upgrades, unlike the majority of boards in the other systems. The CC820 also has that slightly odd AMR (audio modem riser) slot that, not surprisingly, is left unused, with a PCI Diamond Supra modem and Ensoniq AudioPCI sound card present instead.

This PC is identical to Polar's Athlon 700, including the 50GB RAID array and the Asus V3800 Ultra Deluxe attached to a Mitsubishi Diamond Pro 900u monitor. Other peripherals include Pioneer DVD-ROM, Wearnes CD-RW drive and a PCI network card complete with BNC T-piece for instant connection to a thin Ethernet network. There's just one PCI slot free and no dedicated ISA or shared slots.

One thing both Polar machines lacked was a setup guide or system manual. This is hardly likely to be a problem for the target market, but you may want to bear it in mind.

The PIII 700 with its standard 100MHz system bus can't stand up against equivalently-clocked Athlons with their two-cycles-per-clock bus, and consequently this machine's performance is significantly slower than the Athlon 700. And considering that it's exactly the same price, we can't recommend it.

PCW DETAILS

Price *£2,349 (£1,999 ex VAT)*
Contact *Polar Technology 0800 138 1238*
www.polartechnology.co.uk
Good points *RAID controller, network adaptor, monitor*
Bad points *The slowest machine in the application benchmarks, plus all the bad points of Polar's Athlon system*
Conclusion *AMD is a better choice for a 700MHz system*

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

What is RAID?

Some of the PCs we've looked at this month have a novel feature: they have two hard disks in a RAID array. RAID stands for Redundant Array of Independent (or inexpensive) Disks, and can achieve three different effects – increased data security, increased hard disk performance, or a mixture of both.

To implement a RAID array, specific hardware is required – you can't simply attach two hard drives to a standard system, at least not if the system is running Windows 95/98 or NT Workstation. Traditionally the preserve of heavily-loaded servers, Promise's FastTrak 66 card is the first widely-available RAID controller for EIDE drives.

The two most common RAID types are striping (known as Level 0) and mirroring (known as Level 1).

Striping
Striping, the configuration sported by machines in this group test, increases disk throughput by dividing read and write operations between the available drives. If there are two drives in a Level 0 array, then when a write operation occurs, 50 per cent of the data goes to one drive, and 50 per cent goes to the other. The two write operations happen simultaneously, so the whole thing takes only half as long as the equivalent operation would take using a single drive. The same thing happens in reverse during a read operation.

Not only is a dual-drive RAID array up to twice as fast as a single drive, the full capacity of both drives is available, so two 25GB drives in a Level 0 array are presented by the controller card as a single 50GB volume to the host system.

Mirroring
The second common type of RAID array, mirroring, simply involves sending all data to both drives. This means that the array as a whole has the same capacity as the smallest drive, and the performance of the slowest drive, so it makes sense to use identical drives. In the event of one drive failing, however, the hardware will seamlessly switch to exclusive use of the other with no data loss. It's worth noting that the Promise card

also supports striping plus mirroring with four drives: here each pair of drives forms a two-drive Level 0 array, with one pair mirroring the other, and in the event of one drive failing the remaining good pair continues to operate as a Level 0 array.

A third RAID level, striping with parity (Level 5), is supported by more expensive controllers and also by Windows NT Server in software. This requires three or more drives. Data is striped as with a Level 0 array, but additional error correction data is also included. This gives increased performance, plus if one drive fails the system can reconstruct the data from the error correction information in the remaining drives.

SMC Infinite AV Editor

SMC's PC comes in the same style case as Big Red's system, the only difference being the colour. As with the Big Red, the side panel is removed simply by unclipping it. Inside is a 700MHz Athlon and 128MB of SDRAM, serviced by an IBM Deskstar 22GXP 22GB hard disk.

Dominating the front of the PC is the SoundBlaster Live! Platinum's Live Drive II, with connectors for S/PDIF and optical in and out, line in, MIDI in and out, microphone in with level control and headphone output jack with volume.

SMC has eschewed CD-RW in favour of an OnStream DI30 tape drive. This is a commendable move, enabling system backup plus scheduled incremental backup on its 30GB tapes using the Echo software supplied.

The 17in monitor, an Iiyama Vision Master Pro 410 with Diamondtron NF flat screen, has good focus, but intensity regulation isn't up to scratch, with screen brightness varying when switching between applications.

Video editing comes courtesy of a Matrox Marvel G400-TV graphics card. This has 16MB of SGRAM, compared to the 32MB of most cards here, but includes TV tuner and it captures MJPEG video using a breakout box. Avid Cinema is the editing app, which is easy to use.

Cursor control comes from the new variety of Microsoft Intellimouse, with optical sensing – it works well at any angle, on any surface and doesn't get clogged with muck.

Considering its 700MHz processor, the AV Editor achieves a remarkably good performance in the application benchmarks, although the Marvel G400 doesn't do it many favours with 3DMark. As a video and audio-editing solution, however, SMC's Infinite AV Editor is a well though-out machine at a fair price.

PCW DETAILS

Price £2,056 (£1,750 ex VAT)
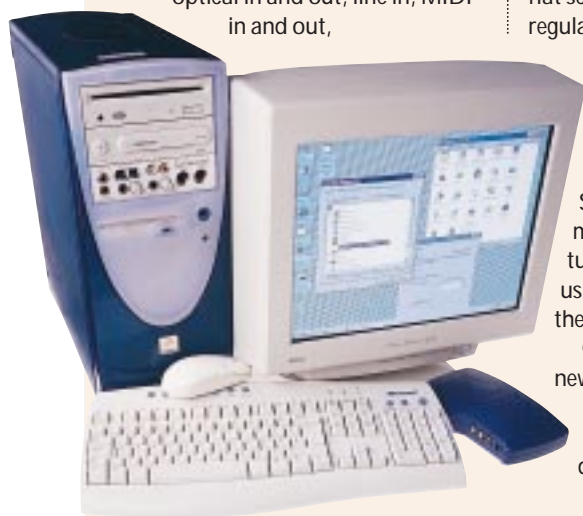**Contact** SMC 01753 550 333
www.smc-computers.co.uk
Good points *Sound card, backup drive, optical mouse, good component balance*
Bad points *Graphics card not so good for 3D games, not the largest hard drive*
Conclusion *A respectable machine with no dud components and fair speed*

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

One CPU or two?

In the last year or so, clock speeds for production processors have been spiralling upwards ever faster. To achieve these speeds, Intel and AMD have moved from 0.35micron fabrication processes, down to 0.25 for Pentium II, Pentium III and K6 processors, and now down to 0.18microns for the new Coppermine Pentium IIIs and Athlons above 700MHz. In the process, they've spent billions of dollars on silicon fabrication plants.

But there is another route to faster processing that's a lot cheaper: instead of using one processor in a system and increasing the speed ever more, you simply use two, and split computing tasks between them. On the face of it, given that it's possible to use two processors, it may seem insane to keep using one. Unfortunately, there are a few spanners in the works when it comes to SMP (symmetrical multi-processing).

The first stumbling block is that Windows 95 and 98 don't support it. A system with dual processors will run 95/98 fine, but will simply ignore one CPU. To make use of twin processors, you need to be running Windows NT or Linux, or BEOS. Second, using two processors won't magically make your applications run twice as fast. Windows NT and Linux applications need to be specifically multi-threaded, and most aren't.

This is a bit of a vicious circle: most application developers don't write multi-threaded apps because most people don't have multiple processors, so most PC manufacturers don't bother selling dual-processor systems. In general, only higher-end professional applications, for instance Photoshop and 3D rendering packages such as LightWave, make use of multi-threading.

Whichever applications you run, however, dual processors are a boon if you often find yourself multi-tasking, since individual applications can be assigned to different processors by NT to balance the load. In this way, you can let your video-editing package churn through a complicated edit sequence in the background and carry on with your other work as normal, at full speed.

With the arrival of Windows 2000, things could change for the better on the applications front. If, as Microsoft would like, Win2000 – which is in fact Windows NT5 – starts to replace Win98 on users' desktops, the increased customer base will give developers more of an incentive to write their applications multi-threaded.

Games developers may even start taking advantage of the possibilities that dual processing could offer. In fact, one company had already produced an SMP-capable game: id software's Quake III Arena has been optimised by programming supremo John Carmack to make use of multiple CPUs. MicroProse's MechWarrior 3 was originally slated to support it too, but the feature didn't make it into the final game.

Systemax **Athlon Pro 750**

The first of two Systemax machines has a 750MHz Athlon, with 128MB of SDRAM and an IBM Deskstar 34GXP 34.2GB hard drive. These are housed in a large, full-tower case that has two front-panel 5.25 bays, one internal and two 3.5in bays free, plus stacks of room to get to the CPU and two free DIMM sockets. The graphics card is a Matrox Millennium G400 MAX Dual Head, driving the Mitsubishi Diamond Pro 900u.

The quality components don't stop there – there's a SoundBlaster Live! Platinum with front-mounted Live Drive II connector bay, connected to a set of Cambridge Soundworks Desktop Theatre 5.1 speakers, with Dolby Digital capability. Other manufacturers have provided Miro's Studio DC10 Plus or a Hauppage WinTV card to compensate for a lack of video capture, but the Systemax has both.

External peripherals also include Microsoft's wobbletastic Sidewinder Force Feedback Pro joystick, and Logitech's groovy cordless mouse and keyboard, the latter featuring shortcut

keys for IE, email client and so on. To top it all off, Microsoft Office 2000 SBE is also included.

It's not all a bed of roses though – despite the Gigabyte motherboard having a free PCI slot, the digital DIN connector for the SoundBlaster occupies the slot's blanking plate, leaving just an ISA slot free. Also, the internal wiring is rather loosely bundled and not up to the standard of some of the others.

Despite the excellent components the system had some problems where out-and-out performance was concerned, particularly in the 3DMark tests, where it scored a relatively low 4,361, although its SYSmark score was a more respectable 283.

Overall the system packs an amazing number of very high-quality components and peripherals, making its price more than justified. If you want the last word in performance, particularly where graphics are concerned, this machine won't quite fit the bill, but otherwise it's a great system that'll last for ages.

PCW DETAILS

Price *£2,760 (£2,349 ex VAT)*
Contact *Simply Computers*
0870 729 7366 *www.simply.co.uk*
Good points *Stuffed to the gills with top-notch peripherals*
Bad points *Performance doesn't live up to what we'd expect, given its specifications*
Conclusion *Extremely good value, despite the high price tag*

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

Systemax **Pro 733**

Systemax's machines are identical in specification aside from their CPUs and motherboards. Inside the Pro 733 is a 733MHz Pentium III, nestling in a SuperMicro PIII SCD motherboard, which features Intel's 820 chipset. Not all the 820 chipset's features are supported by the board, in particular the system is fitted with a single standard 128MB SDRAM DIMM, running at 100MHz, rather than RAMBUS RDRAM. Unlike most motherboards,

however, the SuperMicro supports up to 1GB of RAM, a figure that may be common before long.

The components are housed in the same full-tower case as its AMD-based brethren, with the same IBM 22GB Deskstar hard disk and G400 MAX graphics card. The front panel houses a Pioneer DVD-ROM drive plus AOpen CD-RW drive, and the Creative Live! Drive audio I/O bay for the Sound-Blaster Live! Platinum, with two front-panel 5.25in bays left free. There are also three 3.5in bays, with one nestling at the top of the case above the power supply. A benefit of the SuperMicro motherboard over the Gigabyte one in the Athlon machine, is an unused AMR slot.

The SoundBlaster's digital DIN connector can be fitted into the spare blanking plate rather than blocking a valuable PCI slot, so there's a spare PCI connector. This is just as well, since there are no shared or dedicated ISA slots on the board.

As far as performance goes, it's

not too surprising that the 733MHz PIII doesn't do as well as the 750MHz Athlon in the SYSmark benchmarks. The pairing of Intel and Matrox seems to benefit the 3DMark score, however, with the Pro 733 managing a healthy third place.

PCW DETAILS

Price *£2,760 (£2,349 ex VAT)*
Contact *Simply Computers*
0870 729 7366
www.simply.co.uk
Good Points *Better graphics performance than the Systemax's Athlon system, with all the superb components*
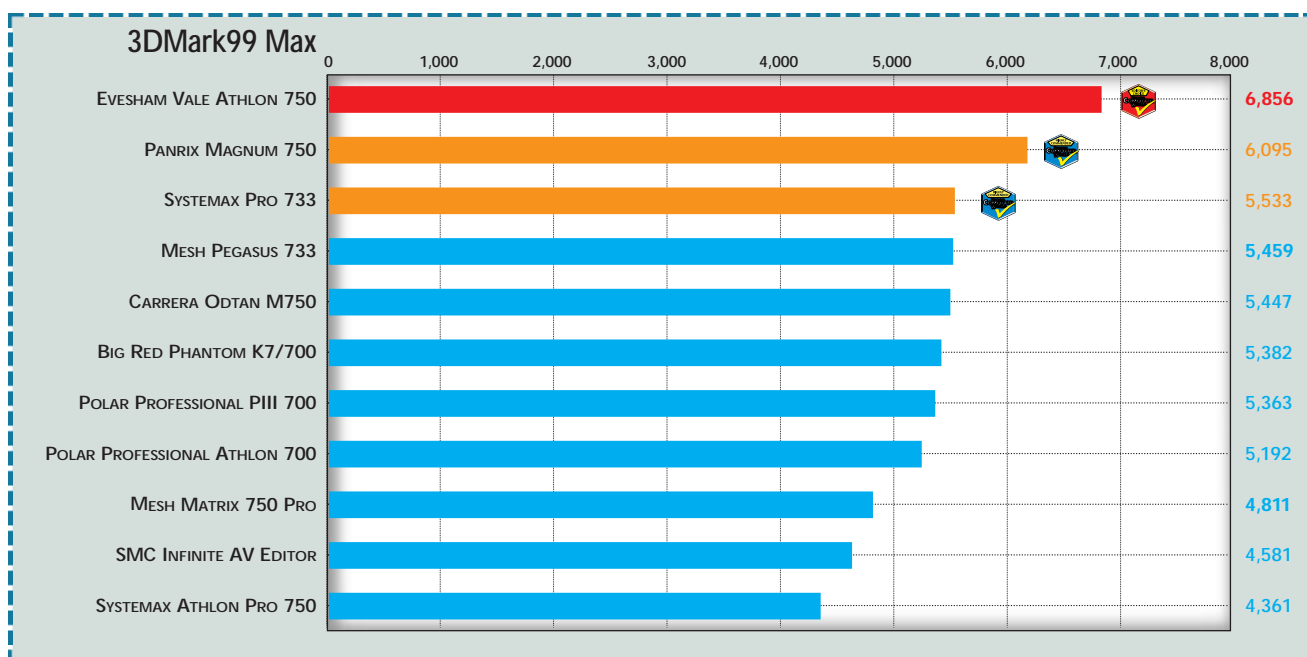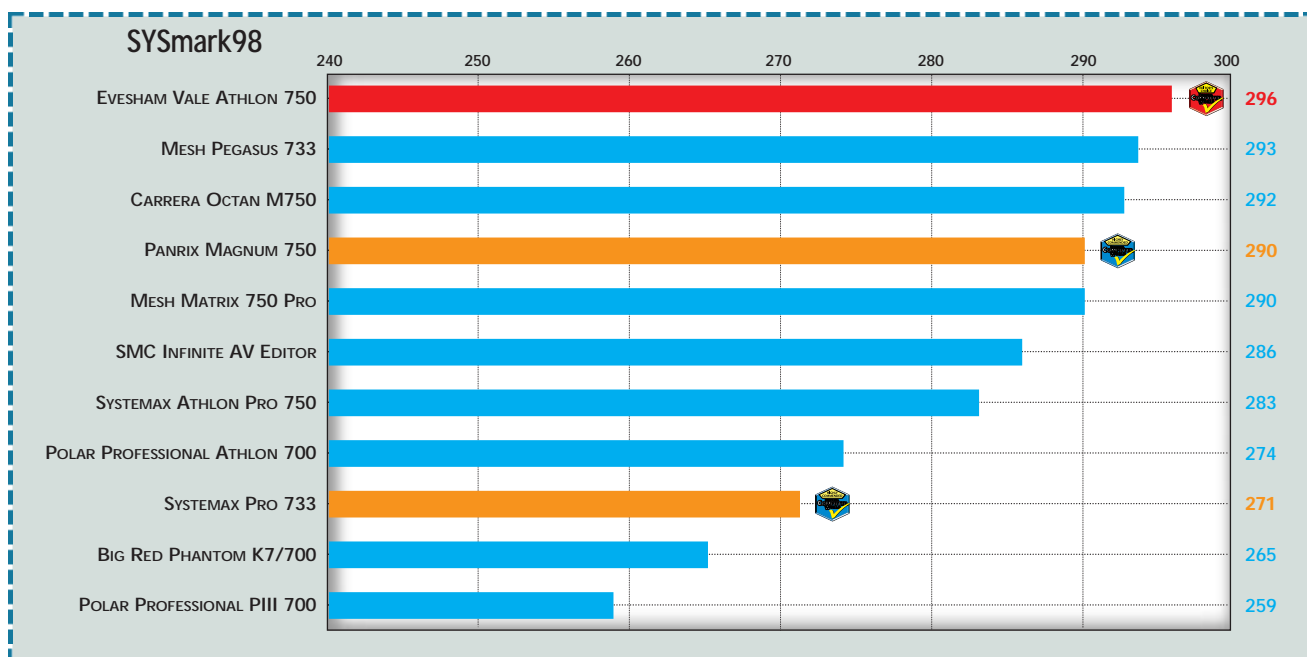**Bad points** *Lower applications benchmark score*
Conclusion *Like its cousin, this system is great value for money*

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

PCW Labs Report

SYSmark98

	Score
EVESHAM VALE ATHLON 750	296
MESH PEGASUS 733	293
CARRERA OCTAN M750	292
PANRIX MAGNUM 750	290
MESH MATRIX 750 PRO	290
SMC INFINITE AV EDITOR	286
SYSTEMAX ATHLON PRO 750	283
POLAR PROFESSIONAL ATHLON 700	274
SYSTEMAX PRO 733	271
BIG RED PHANTOM K7/700	265
POLAR PROFESSIONAL PIII 700	259

3DMark99 Max

	Score
EVESHAM VALE ATHLON 750	6,856
PANRIX MAGNUM 750	6,095
SYSTEMAX PRO 733	5,533
MESH PEGASUS 733	5,459
CARRERA ODTAN M750	5,447
BIG RED PHANTOM K7/700	5,382
POLAR PROFESSIONAL PIII 700	5,363
POLAR PROFESSIONAL ATHLON 700	5,192
MESH MATRIX 750 PRO	4,811
SMC INFINITE AV EDITOR	4,581
SYSTEMAX ATHLON PRO 750	4,361

How we did the tests

■ **SYSmark measures** the time it takes a PC to perform tasks in 14 common office and content-creation apps. Each test is run three times to ensure consistency. Tests include:

☞ **Office productivity:** CorelDraw 8, Excel 97, NaturallySpeaking 2.02, Netscape Communicator 4.05, OmniPage Pro 8.0, Paradox 8, PowerPoint 97 and Word 97.

☞ **Content creation:** MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Photoshop 4.01, Adobe Premiere 4.2, and XingMPEG Encoder 2.1.

■ **3DMark99 Max** is an instruction-set optimised version of 3DMark99 from Futuremark Corporation, which tests the 3D capabilities of PCs. When applicable, the suite of tests will draw on AMD's 3DNow! or Intel's KNI instruction sets. It uses a Real World DirectX 6.1 3D game engine to produce one result from a balanced testing methodology that includes image quali-ty, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping. All tests are performed at 1,024 x 768 resolution in 16bit colour depth with the test suites set to loop three times. The higher the score, the better the result. However, due to the implementation of instruction-set optimisation, the results from the original 3DMark99 and the Max version are not compara-ble. See www.3dmark.com.

Table of features

Manufacturer	Big Red	Carrera	Evesham Vale	Mesh	Mesh	
Model	**Phantom K7/700**	**Octan M750**	**Athlon 750**	**Matrix 750 Pro**	**Pegasus 733**	
Price (ex VAT)	£2,349 (£1,999)	£2,100 (£1,787)	£2,466 (£2,099)	£2,114 (£1,799)	£1,761 (£1,499)	
Telephone	08700 711 117	0208 307 2800	0800 038 0800	0208 208 4706	0208 208 4706	
Fax	08700 733 337	0208 307 2857	08707 299795	0208 208 4493	0208 208 4493	
URL	www.bigred.co.uk	www.carrera.co.uk	www.evesham.com	www.meshplc.co.uk	www.meshplc.co.uk	
Hardware specs						
Processor	Athlon 700MHz	Athlon 750MHz	Athlon 750MHz	Athlon 750MHz	Pentium III 733MHz	
RAM/type	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	
Occupied/spare RAM slots	1/2	1/2	1/2	1/2	1/2	
Max memory of configuration	640MB	640MB	640MB	640MB	640MB	
Max m/board-supported mem	768MB	768MB	768MB	768MB	768MB	
HD (manuf & model)	IBM Deskstar 34GXP	IBM Deskstar 34GXP	Maxtor DiamondMax Plus 6800	IBM Deskstar 22GXP	IBM Deskstar 22GXP	
HD size/interface	27.3GB/EIDE	34.2GB/EIDE	27.3GB/EIDE	22GB/EIDE	22GB/EIDE	
Storage drive model/manuf	JVC XR-W4082	LG CED-8024B	LG CD-RW 8024B	Philips PCA460RW	Philips PCA460RW	
Storage drive size/interface	650MB/EIDE	650MB/EIDE	650MB/EIDE	650MB/EIDE	650MB/EIDE	
Motherboard components						
Motherboard manufacturer	Gigabyte	Asus	MicroStar	Asus	Tyan	
Model/chipset	GA-7IX/AMD 750	K7-M/	MS6167/AMD750 AMD751+VIA VT82C686A	K7-M/	S1854/VIA Apollo Pro 133A AMD751+VIA VT82C686A	
L2 cache	512KB on CPU	512KB on CPU	512KB on CPU	512KB on CPU	256KB on CPU	
Expansion and I/O						
3.5/5.25in bays	3/3	3/4	4/3	4/3	4/3	
Free 3.5/5.25in bays	1/1	1/2	2/1	2/1	2/1	
PCI/ISA/shared slots	4/1/1	4/0/1	4/1/1	4/0/1	5/0/1	
Free PCI/ISA/shared slots	2/1/1	2/0/1	1/1/1	2/0/1	3/0/1	
USB/serial/parallel/PS2	2/2/1/2	2/2/1/2	2/2/1/2	4/2/1/2	2/2/1/2	
Multimedia						
DVD-ROM manufacturer	Pioneer DVD-103	Panasonic SR-8584A	Pioneer DVD-114	Pioneer DVD-114	Pioneer DVD-114	
DVD-ROM speed/interface	6x/EIDE	6x/EIDE	10x/EIDE	10x/EIDE	10x/EIDE	
Sound card manufacturer	Creative	Creative	Creative	Creative	Creative	
Sound card model	SoundBlaster Live! Player 1024	SoundBlaster Live! Value	SoundBlaster Live! Value	SoundBlaster Live! Player 1024	SoundBlaster Live! Player 1024	
Speakers (manufacturer & model)	TEAC PowerMax 1000	Altec Lansing ACS54	VideoLogic DigiTheatre	Labtec LCS-2514 Audio/FX	Labtec LCS-2514 Audio/FX	
Graphics card (manufacturer & model)	3dfx Voodoo3 3500TV	Guillemot 3D Prophet	Guillemot 3D Prophet DDR-DVI	Matrox Millennium G400	Matrox Millennium G400 Dual Head	
Graphics chipset	3dfx Voodoo3	nVidia GeForce 256	nVidia GeForce 256	Matrox G400	Matrox G400	
Graphics RAM/type	16MB/SDRAM	32MB/DDR SGRAM	32MB/SDRAM	32MB/SGRAM	32MB/SGRAM	
Graphics card interface	AGP	AGP	AGP	AGP	AGP	
Monitor maker & model	Mitsubishi Diamond Pro 900u	LG Studioworks 910SC	Taxan ErgoVision 980TCO99	Taxan ErgoVision 980TCO99	Taxan ErgoVision 755TCO99	
Monitor size/viewable diagonal	19in/18in	19in/18in	19in/18in	19in/18in	17in/16.1in	
Max resolution/refresh	1,600x1,200/75Hz	1,600x1200/75Hz	1,600x1,200/75Hz	1,600x1,200/85Hz	1,600x1,200/75Hz	
Other Information						
Modem maker & model	Diamond Supra 56K	Rockwell 56K	Diamond Supra 56K	Diamond Supra 56K	Diamond Supra 56K	
Misc hardware	None	None	miroVideo StudioDC10 Plus video capture card	None	None	
Bundled software	Lotus SmartSuite Millennium	Lotus SmartSuite Millennium	Lotus SmartSuite Millennium	WordPerfect Office 2000	WordPerfect Office 2000	
Standard warranty	1yr on-site	2yr on-site	2yr on-site	1yr on-site + 2yr RTB	1yr on-site + 2yr RTB	

	PANRIX	POLAR	POLAR	SMC	SYSTEMAX	SYSTEMAX
	MAGNUM 750	**PROF ATHLON 700**	**PROF PIII 700**	**INFINITE AV EDITOR**	**ATHLON PRO 750**	**PRO 733**
	£2,814 (£2,395)	£2,349 (£1,999)	£2,349 (£1,999)	£2,056 (£1,750)	£2,760 (£2,349)	£2,760 (£2,349)
	01132 444 958	0800 138 1238	0800 138 1238	01753 550 333	0870 729 7366	0870 729 7366
	01132 444 962	0161 482 7007	0161 482 7007	01753 524 443	0870 727 4002	0870 727 4002
	www.panrix.com	www.polartechnology.com	www.polartechnology.com	www.smc-computers.co.uk	www.simply.co.uk	www.simply.co.uk
	Athlon 750MHz	Athlon 700MHz	Pentium III 700MHz	Athlon 700MHz	Athlon 750MHz	Pentium III 733MHz
	256MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM
	2/1	1/2	1/1	1/2	1/2	1/1
	512MB	640MB	384MB	384MB	640MB	384MB
	768MB	768MB	512MB	768MB	768MB	1GB
	2xSeagate Barracuda ST328040A	Two IBM Deskstar 25GP	Two IBM Deskstar 25GP	IBM Deskstar 22GXP	IBM Deskstar 34GXP	IBM Deskstar 34GXP
	57GB total/EIDE RAID	50GB total/EIDE RAID	50GB total/EIDE RAID	22GB/EIDE	34.2GB/EIDE	34.2GB/EIDE
	AOpen CRW9624	Wearnes CDRW-622	Wearnes CDRW-622	OnStream DI30	AOpen CRW9624	AOpen CRW9624
	650MB/EIDE	650MB/EIDE	650MB/EIDE	15GB (30GB compressed)/EIDE	650MB/EIDE	650MB/EIDE
	MicroStar	Gigabyte	Intel	Gigabyte	Gigabyte	SuperMicro
	MS6167/AMD750	GA-7IX/AMD 750	CC820/Intel i820	GA-7IX/AMD 750	GA-7IX/AMD 750	PIII SCD/Intel 820
	512KB on CPU	512KB on CPU	256KB on CPU	512KB on CPU	512KB on CPU	256KB on CPU
	4/3	5/2	5/2	3/3	5/5	5/5
	1/1	2/0	2/0	1/0	3/2	3/2
	4/1/1	4/1/1	5/0/0	4/1/1	4/1/1	5/0/0
	1/0/1	0/1/1	1/0/0	2/1/1	0/1/0	1/0/0
	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
	AOpen DVD-1040 PRO	Pioneer AO4SZ	Pioneer AO4SZ	Pioneer DVD-104	Pioneer DVD-104	Pioneer DVD-104
	10x/EIDE	10x/EIDE	10x/EIDE	10x/EIDE	10x/EIDE	10x/EIDE
	Creative	Creative	Creative	Creative	Creative	Creative
	SoundBlaster Live! Player 1024	Ensoniq AudioPCI	Ensoniq AudioPCI	SoundBlaster Live! Platinum	SoundBlaster Live! Platinum	SoundBlaster Live! Platinum
	PCWorks FourPointSurround FPS1000	Yamaha YST-M20 + YST-MSW5	Yamaha YST-M20 + YST-MSW5	Philips MMS10	Cambridge SoundWorks Desktop Theatre 5.1	Cambridge SoundWorks Desktop Theatre 5.1
	Guillemot 3D Prophet Dual Head	Asus V3800 Ultra Deluxe	Asus V3800 Ultra Deluxe	Matrox Marvel G400-TV	Matrox Millennium G400 MAX Dual Head	Matrox Millennium G400 MAX Dua Head
	nVidia GeForce 256	nVidia Riva TNT2 Ultra	nVidia Riva TNT2 Ultra	Matrox G400	Matrox G400MAX	Matrox G400MAX
	32MB/SDRAM	32MB/SGRAM	32MB/SGRAM	16MB/SGRAM	32MB/SGRAM	32MB/SGRAM
	AGP	AGP	AGP	AGP	AGP	AGP
	Diamond Pro 900u	Diamond Pro 900u	Diamond Pro 900u	Iiyama Vision Master Pro 410	Diamond Pro 900u	Diamond Pro 900u
	19in/18in	19in/18in	19in/18in	17in/15.9in	19in/18in	19in/18in
	1,600x1,200/75Hz	1,600x1,200/75Hz	1,600x1,200/75Hz	1,600x1,200/75Hz	1,600x1,200/75Hz	1,600x1,200/75Hz
	Diamond Supra 56K	Conexant HCF V.90	Conexant HCF V.90	Diamond Supra 56K	Rockwell 56K	Rockwell 56K
	Hauppage WinTV	PCI 10Base2/10BaseT NIC	PCI 10Base2/10BaseT NIC	None	miroVideo Studio DC10 Plus	miroVideo Studio DC10 Plus
	Promise FastTrak 66 RAID controller	Promise FastTrak 66 RAID controller	Promise FastTrak 66 RAID controller		Hauppage WinTV MS Sidewinder F/F Pro	Hauppage WinTV MS Sidewinder F/F Pro
	Ultrapack Vol 3 inc SmartSuite Millennium & MGI VideoWave	None	None	None	MS Office 2000 SBE	MS Office 2000 SBE
	1yr on-site + 2yr RTB	3yr on-site	3yr on-site	1yr on-site	3yr on-site	3yr on-site

Editor's **Choice**

A short time ago, it would have been unthinkable that, given the choice, most manufacturers would supply AMD rather than Intel processors in machines submitted for a group test. But that's just what happened this month. Of the manufacturers that submitted only one PC, none chose to send a Pentium III: the Athlon was the CPU of choice. Of the 11 machines, just three were Pentium IIIs. The reasons may not be entirely down to performance. Rumours abound of Intel struggling with its yield – the amount of working CPU cores it can produce – to the extent that there are almost none available at the time of writing. But this is good news for AMD: the advanced K7 core in the Athlon can be clocked to high speeds more easily than the venerable P6 core in the Pentium III.

Processors aside, we were encouraged by the standard of the machines we received, with not a bad one among them. But we were a little disappointed that not all the manufacturers

relatively high price of media compared to normal CD-RS. These problems are no longer present, making CD-RW a good choice. We were surprised not to see any DVD-RAM drives, however, since its higher capacity would make it an ideal form of backup for video projects.

☞ The overall award for **Editor's Choice** has to go to Evesham. The Athlon 750 packs the fastest processor around, plus the fastest graphics chipset, allied to a superb video-capture solution and a great monitor. Other machines sported similar components, but the Evesham had the right balance, plus it easily outstripped the competition in both sets of benchmark tests.

☞ We also decided to hand out two **Highly Commended** accolades, the first going to Panrix for a machine that, while not as fast as the Evesham in our benchmarks, boasts an Athlon 750 with 256MB of RAM and a massive 57GB RAID hard disk array, making it a machine

that'll last a long while before you have to start thinking about upgrades.

Finally, Systemax has to get an award for its Pro 733 machine, stuffed as it was with top-of-the-range components from head to toe and turning in a good overall benchmark performance. As well as all the hardware, it was the only system to come with Microsoft Office 2000 SBE, resulting in a superb all-round machine for any task. And when the time comes to add new devices or upgrade, the capacious tower case gives enough room inside to make the job easy, as well as providing free bays for extra drives.

followed our specifications – we specifically requested video capture of some sort, but Carrera and Mesh failed to deliver on this score, precluding them from winning an award despite submitting competent systems.

It's interesting to note the increasing popularity of CD-RW drives as a form of backup: every machine bar the SMC had one. Originally CD-RW was hampered by the fact that few standard CD-ROM drives could read the discs, and the

EVESHAM'S ATHLON 750 EASILY OUTSTRIPPED THE COMPETITION IN OUR BENCHMARKS

PANRIX'S SYSTEM OFFERS A MASSIVE 57GB RAID HARD DISK ARRAY

SYSTEMAX'S PRO 733 IS A SUPERB ALL-ROUND MACHINE