



Office in a box

As companies come to rely increasingly on computers, **office machines** need to be up to the job. We set out to find the ultimate small business PC.

Last month we invited the manufacturers to provide their ultimate home system. This month we wanted to see what their ultimate small business PCs looked like. We asked 14 top vendors to supply us with a machine that would be capable of performing all the standard office functions such as word processing, numerical analysis, sending and receiving email and creating presentations. We left the choice of processor open, but specified a minimum of 128MB of RAM and a 17in monitor.

We asked for a modem and a network card to be included, as we thought it would be useful for a small business to have both options, because many will have their own LAN but not all will have Internet access via it. In this situation, the use of a modem becomes necessary and, depending on the number of users in the business, may even be more economical. Most of the machines submitted were around the £1,000 mark, so to find out what the best small-business PC is read on...

Ratings

- ★★★★★ Highly recommended
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

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• PCs tested by Jason Jenkins and David Eade.
Reviewed by Jason Jenkins

Atlas Meridian 450

In contrast to the majority of vendors, Atlas has chosen an AMD solution. The Meridian 450 is built around the lowest clocked processor on test, a K6-III 450, a fact that helps to explain its lower position on the SYSmark table. This does not mean that it would be a slow machine in an office environment, but it does offer less value for money than others here.

The inside looks a bit of a mess. Cables have been brought from the

power unit to the motherboard in front of the processor, just above the AGP card, rather than around the sides of the case. A ribbon cable stretches from its socket on the motherboard across the memory slots. As with the Hi-Grade machine, an opening for another fan is present at the rear of the case but no fan is present. The extra fan is located at the base of the case

below the impressively large 18GB WD hard drive.

Atlas has splashed out on a Hitachi DVD drive, however, and the motion compensation on the Atrrend TNT2 graphics card will let you watch DVDs at your leisure. A Zip 100 is also present. External connectivity is provided by an Accord 56K modem that, like all the modems in this test, supports the latest V.90 standard.

The popular Creative SoundBlaster 128 makes an appearance, and the basic speakers will provide

decent enough sound. The 17in ADI MicroScan E55 monitor is a solid choice with BNC as well as D-SUB connectors on the rear. Lotus SmartSuite Millennium is included and a three-year on-site warranty adds significant value.

PCW DETAILS

Price £1,263.13 (£1,075 ex VAT)

Contact Atlas 0181 532 6515

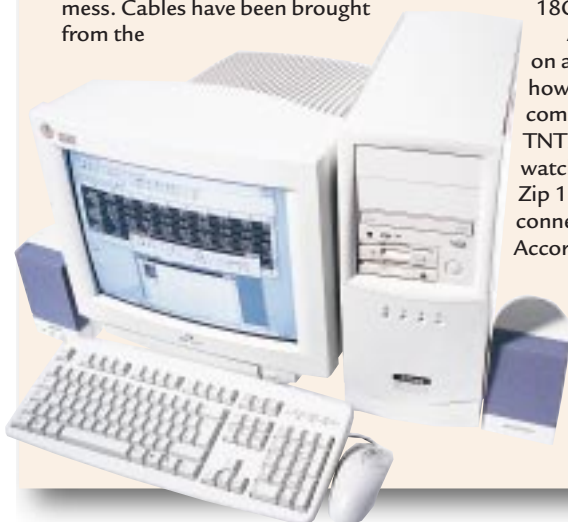
www.atlasplc.com

Good points Three-year warranty, Zip 100 drive

Bad points Slower processor, messy build quality

Conclusion A fair system but there are better deals available here

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



Big Red Mercury 450

Big Red has supplied us with a half-decent machine, but it's not really appropriate for this group test. One reason for this is the unnecessarily gimmicky Logitech radio keyboard and mouse. A Pentium III 450MHz chip is supported by a single 128MB DIMM – leaving an impressive three DIMM slots free.

There are no on-board peripherals, with the Diamond modem, Realtek network card and Creative Audio PCI 128 in the PCI slots,

leaving two PCI and one shared slot free for future expansion. Internal presentation is good, with cables grouped and tied very tidily at a sensible length with only one rogue wire slightly too long for the processor fan. An extra fan is mounted directly under the hard disk to draw heat away from it. One annoying feature of the case is the front door that does not fold back flush with the PC but pokes out annoyingly.

Big Red has opted for an LS-120 drive to provide backup. This drive has the advantage of supporting media 120MB superdisks while still reading existing floppies. A good network backup would also be necessary, with a massive 25GB IBM hard disk taking care of data storage.

The 17in Viewsonic E771 monitor is far from the best in this test. It initially looked awful as Big Red had not set it up correctly, and after we downloaded the correct driver it did not improve greatly.

Once set up the display was disappointing with a harsh image and certainly couldn't do justice to the nVidia Riva TNT2-based graphics card coupled with it. The office productivity suite is Lotus SmartSuite Millennium, which can handle the majority of tasks.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Big Red 08700 711 117

www.bigred.co.uk

Good points LS-120 drive included

Bad points Cordless keyboard and mouse, monitor

Conclusion Big Red needs to go back to the drawing board and think more small business and less home system

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



Carrera Octan M550

Carrera has opted for the fastest processor on test. The Athlon 550MHz really packs a punch and explains why this PC has come top of our SYSmark league table. However, in an ultimate small business PC group test, speed isn't everything, and the money spent on this fast processor could have been better used on extras such as a Zip drive or CD-RW. That said, build quality is excellent, with the processor amply cooled by two processor fans



and the system fan. Cables are lovingly tied out of the way of the motherboard slots and expansion bays, making upgrading simple. Carrera has even made sure that the CD audio cable goes round the edge of the case rather than straight across the middle.

Carrera is one of the few manufacturers not to put a card in the shared slot. The 128MB of memory is contained in one DIMM, leaving two slots free for expansion. There's no removable storage, which is a little disappointing, but there's always a possibility that one of the other machines on the network has this covered. The lack of extra drives means that there are more bays free than in other systems: four 5.25in and one 3.5in should see you through several upgrades.

The Hansol monitor is a fairly standard shadow mask model that would serve most small businesses adequately. A Vortex soundcard, Realtek

network card, E-Tech modem and Lotus SmartSuite Millennium will provide all the office functionality you could need, while the 14GB hard disk should keep most offices happy. Carrera has rounded the package off with a two-year on-site warranty.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Carrera 0181 307 2800
www.carrera.co.uk

Good points Fast processor, good build quality, two-year on-site warranty

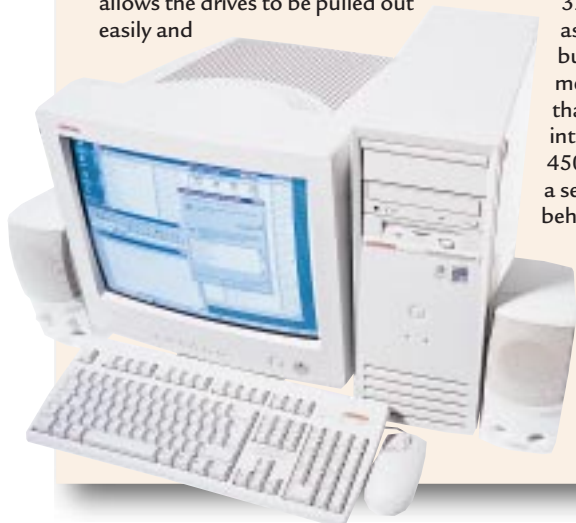
Bad points No removable storage

Conclusion A solid and very fast machine, although there are more rounded systems on test

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

Compaq Prosignia 330

Compaq is the world's largest PC manufacturer and has built its reputation on producing high quality office machines. Considering this, the Prosignia is disappointing, although it does have some useful features. The case is unique and very ingenious, it can be either a desktop or a tower. A large green clip on the inside of the case secures the CD-ROM, floppy disk and hard disk. When lifted it allows the drives to be pulled out easily and



repositioned so that you can turn the case and still access the drives. This is a good idea, but there was a problem with our machine in that it was not as stable as the other cases when in the tower position, wobbling slightly.

Build quality was not all we expected from Compaq. Surprisingly there are no DIMM slots free with the 128MB of RAM made up from one 64MB and two 32MB DIMMs. Cables are not as tidy as in other units, with a bundle tied in front of the memory slots and ribbon cables that are too long for their intended use. The Pentium III 450's heat sink is enormous with a secondary fan placed directly behind it to assist with cooling. This slower processor helps explain its lower SYSmark result.

The 9.1GB IBM Deskstar hard drive is the smallest here. Meanwhile, a SoundBlaster Audio PCI 64V takes up a PCI slot, with a

Compaq modem and network card rounding off the configuration. The Compaq S700 shadow-mask monitor produces a decent image and has a good OSD, although it's not an outstanding example. Overall, the Prosignia doesn't offer the best value for money, indicating that Compaq is better suited to high-volume corporate clients.

PCW DETAILS

Price £1,090.40 (£925 ex VAT)

Contact Compaq
www.compaq.co.uk

Good points The case can be a desktop or a tower

Bad points Unexciting specification

Conclusion Adequate as far as it goes, but we were looking for more

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

Dell Dimension T500



Dell's core market has always been PCs for business, and its years of experience have paid off here. This machine is very well stacked for the price. The main difference is the inclusion not only of a Toshiba DVD drive but a Sony CD-RW as well. The CD-RW software detects the presence of a recordable disc correctly and lets you use Windows Explorer to copy and delete files.

Build quality is generally good, with cables tied neatly out of the way. The case employs Dell's processor cooling system where an extra fan is placed just below the system fan and a plastic funnel is used to guide the air over the CPU. The 128MB of memory is contained in a single DIMM, leaving two other slots free. The 13.6GB IBM hard drive is mounted vertically underneath the drive bays, freeing up a single internal 3.5in bay. There are two further 3.5in external bays free.

The 17in Dell-branded shadow-mask monitor is adequate for everyday

office needs but it doesn't excel. Display is even and reasonably clear, but the surface is fairly reflective. The US Robotics modem will connect you to the Internet if your LAN, supported by the 3Com Etherlink 10/100 card, does not have Internet connectivity. On the whole, Dell has put together an excellent package.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Dell 0870 152 4850

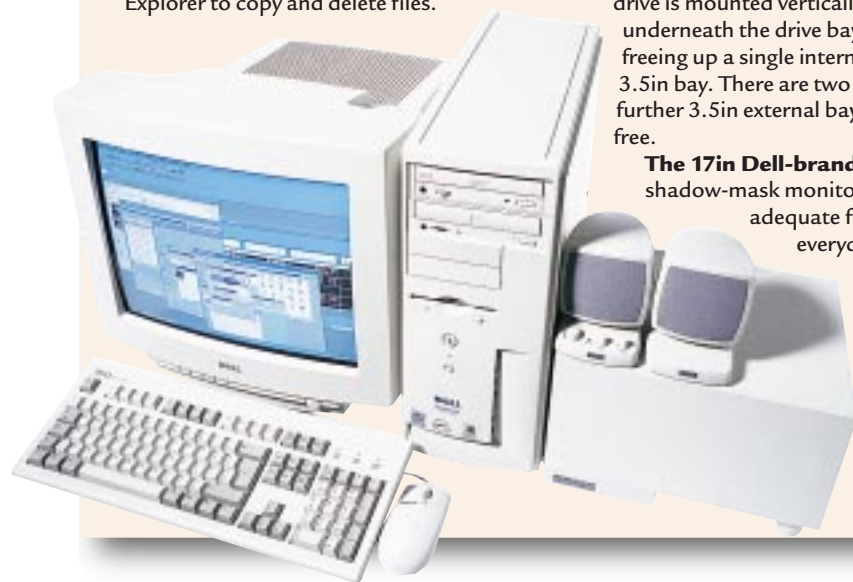
www.dell.co.uk

Good points DVD and CD-RW are both included

Bad points Monitor could be better

Conclusion A well stacked system that is excellent value

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



Elonex ProSentia

Elonex has presented us with one of the few desktop cases, a design that is definitely suited to the task of a small-business machine. One drawback of the desktop case is that it restricts the number of slots that are available for upgrading – only one shared slot is free for future cards. There is also only one 3.5in internal bay free. Once the case is off, you can remove the floppy, CD-ROM and 13GB hard drive by squeezing two clips that secure them at the front, then simply pull them out.

Elonex has maximised the number of free slots by opting for onboard sound in the form of a Creative

SoundBlaster

Audio PCI 64V chip. This is more than adequate for an office machine, and we found it surprising that more manufacturers had not opted for onboard sound in this instance. The remaining slots are occupied by solid, reliable components: a US Robotics V.90 modem and an Intel 10/100 network adaptor.

The 17in monitor is a fairly standard shadow-mask model with an even display, but it's not quite as crisp and sharp as other 17in models in this test.

The real bonus of this system is the bundled software – the Holy Grail that is Microsoft's Office 2000.

However, it appears that its inclusion has been at the expense of features we have seen in other systems. Other manufacturers have included items such as Zip drives, DVD drives and CD-RWs, that Elonex has chosen to ignore. That said, many small businesses would be happy with a spec which includes Microsoft Office.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Elonex 0171 452 4444

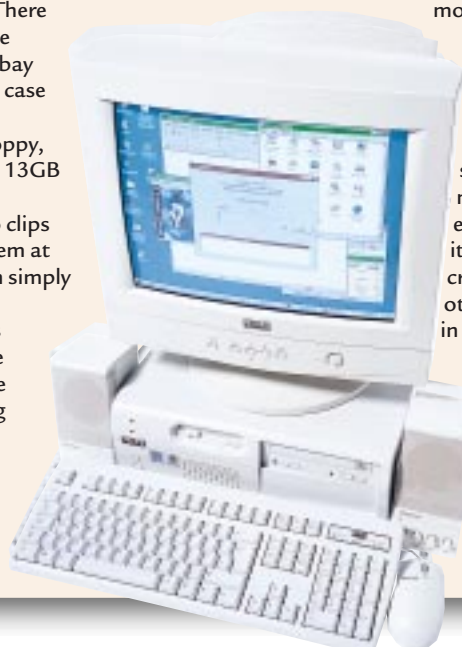
www.elonex.co.uk

Good points Microsoft Office 2000 included, desktop case

Bad points Not as fully featured as other machines here

Conclusion A decent machine as far as it goes

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



Evesham Vale Athlon TNT2

Evesham has presented us with a system that would honour the desk of any small business. Build quality is up to the company's usual high standards, with the cables completely wrapped with plastic ties to keep them out of the way and looking tidy. The familiar Athlon-compatible MSI motherboard allows plenty of room for future expansion, with two ISA slots and two PCI slots free. Two of the DIMM slots are free for those

hungry for more memory. The TNT2 card may seem a bit excessive for an office machine, but combined with the Athlon it certainly helps to keep the performance up. The Athlon 500MHz processor has 128MB of RAM to support it along with an impressive 20GB Maxtor hard disk.

The 17in Mag monitor is adequate, although the display looked slightly blurred to us. The OSD, however, is excellent, with the easy-to-use dial control giving quick access to all of the image adjustments. There is no DVD-ROM in this machine – not something that you might think of as a problem, but if software starts to move to a DVD format, as is promised by several software firms, you'll be forced to upgrade.

The Iomega Zip 100 is a useful and popular choice, its large user base makes it ideal for file transfer. The Key Tronic

Ergoforce keyboard is a true joy to type on. A Diamond SupraExpress 56K modem and an Intel Pro 10/100 card will provide you with solid connectivity. The office suite included with the package is Lotus SmartSuite Millennium, which is more than up to the job.

PCW DETAILS

Price £1,232.58 (£1,049 ex VAT)

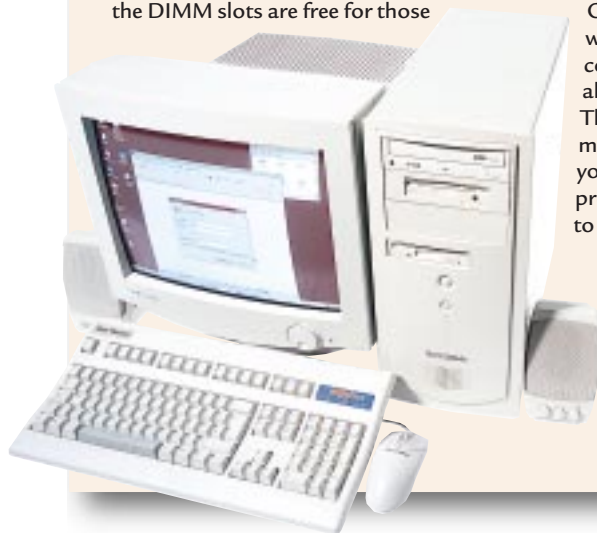
Contact Evesham 0800 038 0800
www.evesham.com

Good points Lovingly built, good specification

Bad points Monitor could be better

Conclusion An impressive small business machine – a better monitor could have won Evesham an award

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



Gateway GP7-500

Gateway was one of two manufacturers to supply us with a space-saving desktop case, the only size that will fit onto many people's desks. The most striking feature was the monitor: the 17in aperture grille tube displays a bright and crisp picture. Unfortunately the monitor has an annoying OSD, as it's only possible to navigate through the long menus in one direction.

Build quality is fair, with Gateway making a valiant attempt at using all of the space in the case to its best effect. The design of the case means that there is only one 3.5in external bay, forcing the company to use a 5.25in bay for the Zip 100 drive. A plastic funnel channels air

from the system fan to the processor, which has a very large heat sink to assist cooling. One problem is the position of the Gateway Telepath PCI modem. It has been positioned in the single shared slot, ignoring the three free dedicated PCI slots. It may not seem vital to have a

soundcard in an office machine, but considering how little one costs we would like to have seen one.

The Quantum hard drive provides 13GB of storage and the 3Com Etherlink 10/100 network card is there for your network if you have one.

The bundled Microsoft Worksuite 99 includes Works

4.5 and Word 97, which is unfortunately only patched to SR-1 level. A 16MB version of the Rage Fury provides graphics together with solid Direct 3D and OpenGL support. All in all a fair machine but one that is simply not as well stacked as others in this group test.

PCW DETAILS

Price £1,160.90 (£988 ex VAT)

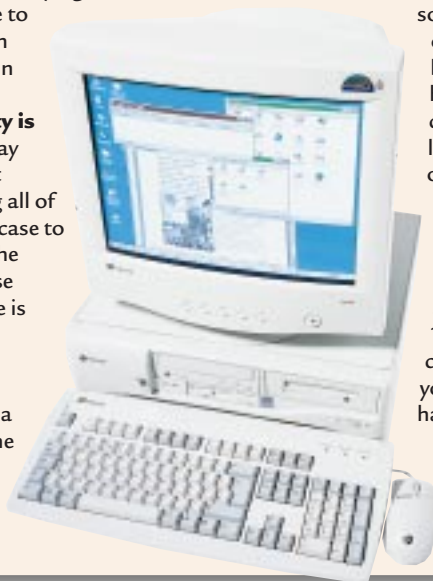
Contact Gateway 0800 55 2000
www.gateway.co.uk

Good points Decent monitor and desktop case

Bad points Lack of soundcard a cheap omission

Conclusion A good machine suited to the task but other manufacturers are giving you more for your money

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



Hi-Grade Ultis PVIII

Hi-Grade has made a fair attempt to provide us with an ultimate small business machine, but the Ultis falls just wide of the mark. A 500MHz Pentium III, a Zip 100 and 128MB of RAM is a good start, but quality problems pull the machine down. Hi-Grade has opted for a large 19in Sampo shadow mask monitor. Unfortunately this was not set up properly on arrival and would not

refresh higher than 60Hz. After loading the correct drivers, we were not overly impressed with the display. Although it wasn't terrible, it couldn't show the 32MB TNT2 graphics card off to its full potential.

Inside the case, build quality was average. The proximity of the system fan to the processor forced one bunch of cables to be brought directly in front of the CPU.

Another bunch was tied in front of the memory slots. The case has an opening for a fan at the rear, but no fan in front of it, creating an opening for dust. However, an extra fan has been placed at the base of the unit to circulate the air. The case allows for a fair bit of expansion – two external 5.25in bays are free and an internal 3.5in bay is available if you manage to fill up the 14GB IBM hard disk. Most of the other components are fairly standard – a CD-ROM

(no DVD or CD-RW as in some of the other machines), an SMC 10/100 network card, an Accord 56K modem and a SoundBlaster Audio PCI 128 soundcard. Lotus SmartSuite Millennium rounds off the package to get the system working from day one.

PCW DETAILS

Price £1,263.13 (£1,075 ex VAT)
Contact Hi-Grade 0181 532 6100
www.higrade.com

Good points Some good component choices

Bad points Inside could be tidier, monitor doesn't really cut the mustard

Conclusion Not a bad effort but it doesn't stand out in this company

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



Dedication's what you need

As you probably already know, a small Windows network provides a great way for you to share files between PCs. What you may not have thought of is using the network to provide printer sharing as well. This allows people to print to a remote printer just as if it was connected directly to their machine, and removes the hassle of having to copy files onto a single machine with a printer connected. It also means that you only need to install a single printer in the office, ultimately saving money.

There are two methods that can be employed to achieve printer sharing. The first and most obvious solution is to use the standard File and Print sharing under a Windows network, which allows other people to get quick access to a printer connected to a single machine. This solution isn't without its major drawbacks, however, as the ability to print lies solely in the hands of the person operating the PC connected to the printer. Should they choose to reboot, or should their machine crash,

no-one else in the office will be able to print anything. Needless to say, only when this PC is powered up can people gain access to its printer. Life's not a bed of roses for the poor owner of the designated printer machine either. Should you send a large print job through to the printer, then it's going to be this PC that has to sit there dealing with it, which can mean severe performance degradation. This kind of performance loss is even more likely to make the user reboot his machine, destroying your print job.

By far the best approach in a situation like this is either to get yourself



▲ **NETWORKING YOUR PRINTER CAN SERIOUSLY ENHANCE YOUR PRODUCTIVITY**

a printer which can take a network card, or get a dedicated print server for as little as £50. The extra outlay will be well worth your while, and the benefits are immediately visible. No longer are your print jobs held to the mercy of a PC's reliability, and as long as the printer has power then all the users on the network can print to their heart's content. Not

only this, but you can put the printer wherever you want in the office, rather than being tied to one person's desk.

If you're serious about your IT productivity in a small business environment, a network printer solution really is a necessity.

DAVID LUDLOW

Mesh Professional 500B



Mesh has clearly thought long and hard about the intended use of this machine and the effort has paid off. What really stands out is the Taxan Ergovision 755 TCO99 monitor. This aperture grille display is excellent: crisp, bright and vivid. A powered USB hub sits in the base, with four downstream ports and one upstream port, enabling you to daisy chain

USB devices. It even manages a refresh rate of 75Hz at its maximum resolution of 1,600 x 1,200. The only downside is the captive video cable.

The Pentium III 500MHz is the most popular processor in this test, and its high SYSmark score shows that it can cope with any office applications. The Asus

motherboard is unusual in that it features three ISA slots. Connectivity comes in the form of a Diamond SupraExpress V.90 modem and an Intel Pro 100 NIC. The 13GB Western Digital hard drive should provide ample room for office documents and applications for some time to come.

Graphics acceleration is provided by a Matrox Millennium G400 dual head, perhaps slightly over the top in a small business PC, but combined with the Taxan monitor it produces a

lovely image. The dual monitor support could also be useful in the office. For small backup jobs and a quick way to transport larger files, a Zip 100 is included. Sound is handled by a Creative Audio PCI 128 and a pair of Teac speakers, while a two-year on-site warranty rounds off the bundle and helps win Mesh the Editor's Choice.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Mesh 0208 208 4706
www.meshplc.co.uk

Good points Excellent monitor and build quality, two-year on-site warranty

Bad points None to speak of

Conclusion An excellent machine that lives up to its claim to be an ultimate small business PC

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



Panrix Avenia



Panrix has built its small business machine around the swift Athlon 500 processor and the 16MB Matrox Millennium G400, which helps to explain the machine's high benchmark scores. Build quality is good: cables have been tied and positioned well out of the way of the processor, memory slots and expansion bays. The Slot A-equipped MSI motherboard leaves little to chance, with more ISA slots than most. Nothing is onboard, but even

after the Creative SoundBlaster Audio PCI 128, Diamond SupraExpress modem and Intel Pro 100 network card have been accounted for, there is still one PCI, one ISA and one shared slot free.

The Zip 100 and floppy drives occupy the two 3.5in bays, leaving only one 5.25in bay for expansion. This has forced Panrix to mount the 13.6GB IBM hard drive vertically against the side of the case. Panrix has also opted for a DVD-ROM drive in place of a CD-ROM, adding some future-proofing. The Matrox's motion compensation and Athlon 500 mean that you can watch DVDs with no dropped frames if you choose. You also have the ability to load any DVD software that will be released. The 17in Hitachi CM650ET monitor is adequate. The shadow mask tube displays a sharp image with vivid colours, although it is fairly reflective as you might expect. The Panrix-branded

keyboard is fairly standard and comfortable to type with, the only unusual feature being the curve in the base to fit in with the larger space bar. Lotus SmartSuite Millennium comes bundled allowing you to perform most of the standard office functions with ease.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Panrix 0113 244 4958
www.panrix.com

Good points DVD and Zip 100 drive included

Bad points The monitor could have been better

Conclusion A fast and well specified office workhorse that's up to any task

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



Polar Panache P3-500

The core of the Polar is an Intel Pentium III clocked at 500MHz. Build quality is good, with cables neatly tied together out of the way. The side of the mini-tower case is secured with a thumbscrew that allows it to be removed easily. The only fault with the case is the cut-out in the rear, designed to be an opening for a second fan – there is no fan present, and this could reduce the amount of air flow. This case is

slightly unusual in that it has sacrificed free 5.25in bays for free 3.5in bays, a factor to bear in mind if you are considering upgrading the basic spec. It does, however, have an unused rack for mounting a hard drive vertically at the front. Although, with a 25GB IBM drive, you are unlikely to need this though.

Polar has pushed the boat out on the spec of this machine and opted for a DVD-ROM and a CD-RW. The CD-RW allows you to archive material to media that cannot be overwritten – useful if you ever need to produce an accurate record of your files in court.

The 16MB Matrox Millennium G400 graphics card supports motion compensation during DVD playback and helps display a sharp image on the 17in Hansol monitor. The shadow mask tube is fairly good, with an easy-to-use, fold-out OSD. The RPTI network card was the only

one to feature a standard RJ45 and a BNC connector, useful if you have only two machines and don't want to buy a hub. Finally, a Diamond SupraExpress V.90 modem takes care of dial-up access.

The Panache is a well-stacked machine, but it's a bit more expensive than some competitors.

PCW DETAILS

Price £1,291 32 (£1,099 ex VAT)

Contact Polar 0161 482 7000

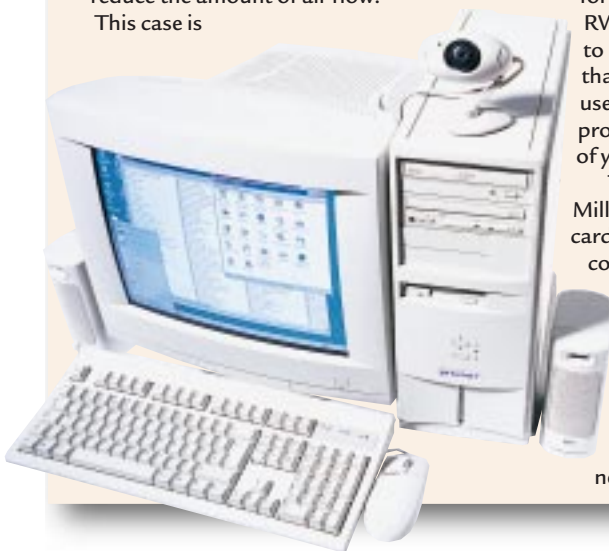
www.polartechnology.com

Good points CD-RW and DVD drive

Bad points A bit expensive

Conclusion A great office system, but more expensive than some

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



Serving up an ace

Even in a small network you shouldn't overlook the possibility of installing a Windows NT server. At first glance the extra outlay may seem to be a prohibitive step, after all, what can one additional machine really offer? However, the benefits are immense, and too numerous by far to list in this one small box, but there are several main points which should be explained.

Backup is probably the most important issue here. Sure, with a few networked Windows 98 machines you could just fit a tape drive into one machine, install some backup software, and then get users to create a single directory on their PC which you back up at set intervals. This approach works fine so long as your users realise that they need to leave their PCs turned on in order for this to work, and that you remember to leave the PC with the tape drive turned on.

Take a server on the other hand, and create user directories on that, and immediately you have created a single

point for backups to be done. And as the server can just be left powered on all the time, information is always accessible. Now all that's left to do is to put the tape drive in the server, and schedule your backups to work on the local user directories.

A small server can offer more than this, both now and in the long term, with many applications actually needing a server in order to work correctly. Think of the Internet and email. Both are great facilities, and in this day and age can be useful tools for a small company, providing cheap communication. The problem that you are likely to have is in providing access for all members in your company to these services. A server can quite happily help you out here, with software already available to make all of this possible.



▲ A SERVER CAN HELP YOU SQUARE UP TO THE TASK OF CENTRALISING OFFICE COMMUNICATIONS AND BACKING UP YOUR DATA

Installing an email package such as NT mail would allow your server to collect emails from your ISP and pass them on to your local users. The server could also serve as a proxy server to your ISP, and then everybody on the network would be able to use the Internet at the same time. Of course,

you can buy additional hardware which will perform much the same job, but at the end of the day you are getting something with a lot more functionality.

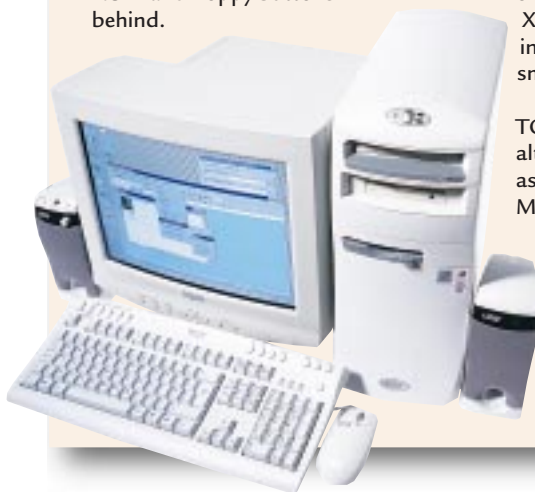
Don't ignore the ability to use a server to host additional software, such as a fax server, and you'll soon come to realise that centralising certain tasks around a server is one of the best steps that you can take when building a small-business network.

DAVID LUDLOW

Tiny Office Powerhouse

Tiny has built a fairly good machine, based on a 500MHz PIII and 128MB of RAM. This is the first time we have seen the new Tiny case, and it is certainly an improvement. There's more access room, which helps to keep the inside tidy and leaves more scope for upgrading.

Unfortunately, Tiny has insisted on covering the floppy and CD-ROM with extra covers. The covers have buttons on them that, when pushed, push the actual CD-ROM and floppy buttons behind.



This means that, annoyingly, you have to give the buttons a hard shove to get them to operate.

Inside the case, build quality is generally good, the one fault being that cables are positioned in front of the processor, when they could easily have been routed around it. **The inclusion** of a DVD-ROM and a Zip drive is a bonus. If you want to watch DVD movies, then Tiny has done a licensing deal with ATi allowing it to ship the latest version of its excellent DVD player. The fast Xentor TNT2 Ultra graphics card includes motion compensation for smooth DVD playback.

The Taxan Ergovision 750 TCO95 17in monitor was excellent, although the display was not quite as good as the Taxan shipped with Mesh's system. This aperture grille display is crisp and sharp with an easy-to-use OSD. An Intel 10/100 NIC and a 56K modem keep the comms bases covered, while the 20GB hard disk offers amazing storage capacity.

This machine sits a clear

£200 above the others in this test, making it difficult to recommend it over the others on offer here. Having said that, however, it does come bundled with the Professional version of Microsoft Office 2000 and may, therefore, still appeal to some.

PCW DETAILS

Price £1,408.83 (£1,199 ex VAT)

Contact Tiny 01293 821 555
www.tiny.com

Good points Well built, good monitor

Bad points Comparatively poor value

Conclusion A promising machine that is let down by its price

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

Viglen Homepro P3-500 DWR

Viglen has given us a sensible specification that is well-suited to the job of a small business machine. Build quality is good with components situated to get the most out of the case. Cables have been neatly tied around the processor and out of the way of the memory slots and system fan outlet.

The combination of a 500MHz Pentium III and 128MB of RAM is a popular specification this month, producing a system that is more than a match for any office



task. Viglen has opted for a 16MB Matrox Millennium G400 graphics card combined with a good rebadged ADI E55 17in shadow mask monitor. The resulting image is clear and crisp. The Pioneer DVD-ROM drive will allow you to read DVD software or while away your office lunch hour watching movies. A Panasonic LS-120 drive isn't the best removable storage option, but it does let you use standard floppies as well as the 120MB SuperDisks.

There's plenty of room for storage as Viglen has chosen a massive 20GB Western Digital hard drive. Only one PCI slot remains unused on the MSI motherboard, although you may find it difficult to install some cards in it as the heat sink on the graphics card protrudes slightly into the PCI slot below.

Two ISA slots are free, with the shared slot taken by the Creative SoundBlaster audio PCI 128 sound card. The US Robotics V.90 modem and Intel Pro 100 network card provide solid

communication.

The keyboard is slightly unusual in that the keys feel slightly rough as though it is unfinished, making it uncomfortable to type on. Microsoft Works Suite 99 is a decent enough office bundle, although there are better packages on offer from the competition.

PCW DETAILS

Price £1,173.82 (£999 ex VAT)

Contact Viglen 0181 758 7000
www.viglen.co.uk

Good points Well built, large hard drive, LS-120 drive

Bad points A better office suite could have been bundled

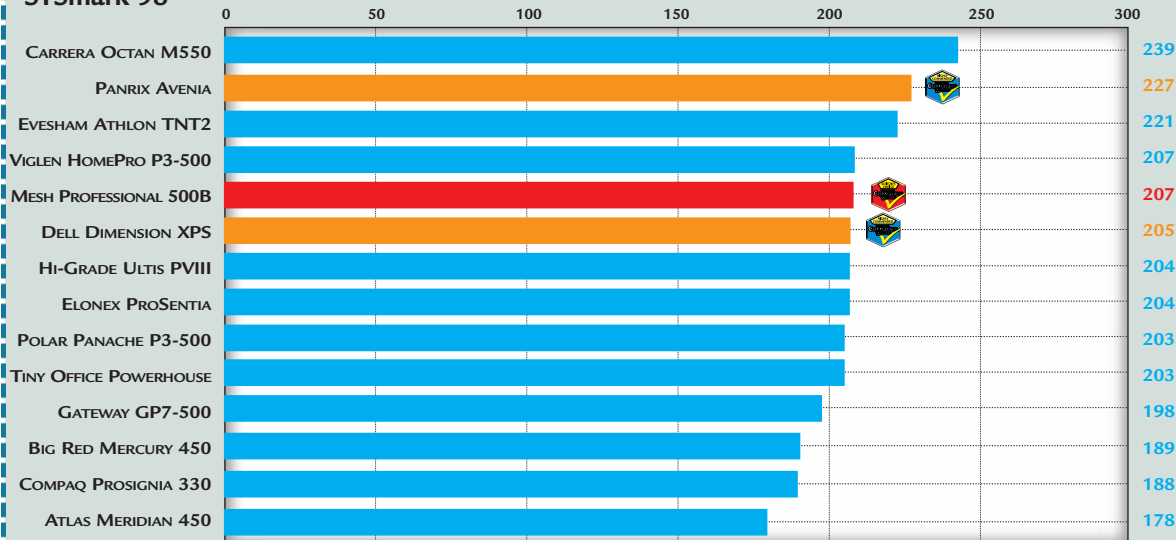
Conclusion A good machine that just misses out on an award this month

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

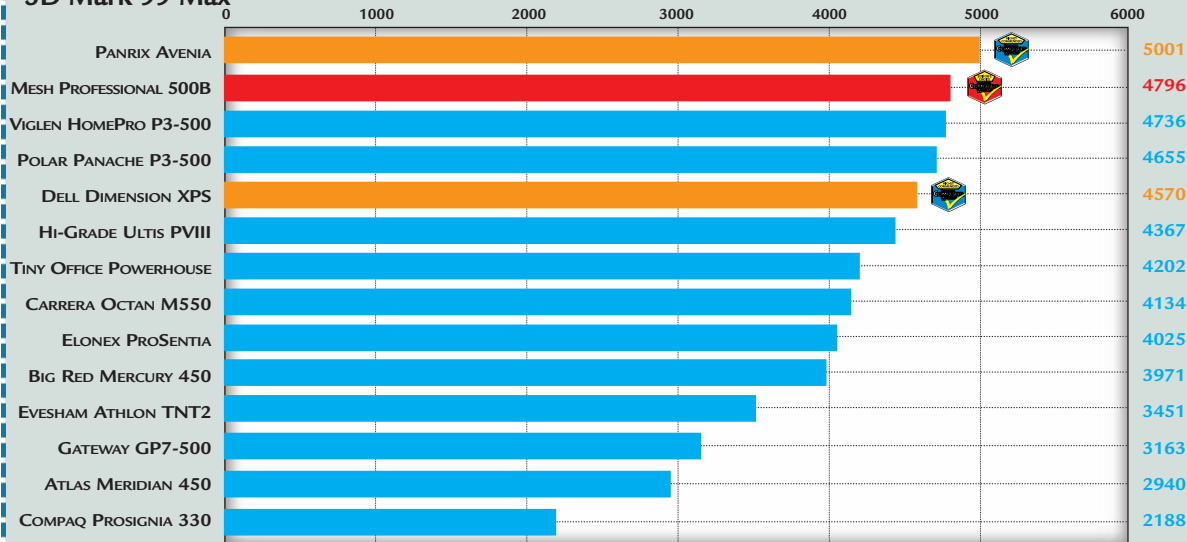
PCW Labs Report



SYSmark 98



3D Mark 99 Max



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 quality, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping. All tests are performed at 1,024x768 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 comparable. See www.3dmark.com.

Table of features



MANUFACTURER	ATLAS	BIG RED	CARRERA	COMPAQ	DELL	ELONEX
MODEL NAME	MERIDIAN 450	MERCURY 450	OCTAN M550	PROSIGNIA 330	DIMENSION XPS T500	PROSENTIA
Price ex VAT (inc VAT)	£1,075 (£1,263.13)	£999 (£1,173.82)	£999 (£1,173.82)	£925 (£1,090.40)	£999 (£1,173.82)	£999 (£1,173.82)
Telephone	0181 532 6515	08700 711 117	0181 307 2800	0845 270 4000	0870 152 4850	0171 452 4444
Fax	0181 532 6517	08700 733 337	0181 307 2857	0845 270 4100	01344 723 695	0171 452 6422
URL	www.atlasplc.com	www.bigred.co.uk	www.carrera.co.uk	www.compaq.co.uk	www.dell.co.uk	www.elonex.co.uk
HARDWARE SPECS						
Processor	AMD K6 III 450	Pentium III 450	Athlon 550	Pentium III 450	Pentium III 500	Pentium III 500
RAM/Type	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM
Occupied RAM slots/Spare RAM Slots	1/3	1/3	1/2	3/0	1/2	1/2
Maximum memory in this configuration	896MB	768MB	640MB	128MB	640MB	640MB
Maximum memory supported by motherboard	1GB	1GB	768MB	768MB	768MB	768MB
Hard Disk (manufacturer + model)	Western Digital 18000	IBM Deskstar	Maxtor	IBM Deskstar	IBM Deskstar	Fujitsu MPD3113AH
HD size/interface	18GB/EIDE	25GB/EIDE	14GB/EIDE	9.1GB/EIDE	13.6GB/EIDE	13.7GB EIDE
Storage Drive model and manufacturer	Panasonic Zip	LS-120	None	None	Sony CRX-100e CDRW	None
Size of storage drive media	100MB	120MB	N/A	N/A	650MB	N/A
Storage drive interface	EIDE	EIDE	N/A	N/A	EIDE	N/A
MOTHERBOARD COMPONENTS						
Motherboard Manufacturer	TMC	Asus	MSI	Compaq	Intel	MSI
L2 Cache	256K	512K	512K	512K	512K	512K
No of 3.5/5.25in bays	2/3	3/4	3/4	2/3	3/2	3/1
No of free 3.5/5.25in bays	1/2	1/3	1/3	1/2	2/0	1/0
No of PCI/ISA/shared slots	6/0/0	5/0/1	4/1/1	3/1/1	4/0/1	2/0/1
No of free PCI/ISA/shared slots	3/0/0	2/0/1	1/1/1	1/1/0	1/0/1	0/0/1
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	2/2/1/2
MULTIMEDIA						
CD-ROM manufacturer/model	Hitachi DVD GD-2500	Actima 40x	Panasonic	Compaq CRD 8322B	Toshiba SD-1212	Acer
CD-ROM speed/interface	32/EIDE	40/EIDE	32/EIDE	40/EIDE	32/EIDE	40/EIDE
Sound card manufacturer	Creative	Creative	Aureal	Creative	Turtle Beach	Creative
Sound card model	SoundBlaster 128	SoundBlaster 128	Vortex 320 Voice PCI	SoundBlaster 64V	Montego II	SoundBlaster 64V
Speakers (manufacturer + model)	Samsung	None	Altec Lansing ACS43	None	Altec Lansing ACS340	Creative SBS20
Graphics card manufacturer and model	Atrend TNT2 32MB	Riva TNT2 32MB	Maxigamer Cougar TNT2	STB Velocity 4400	3dfx Voodoo 3 3000	Riva TNT2
Chipset	Riva TNT2	Riva TNT2	Riva TNT2	Riva TNT	Voodoo 3	Riva TNT2
RAM/Max RAM and type	32MB/32MB/SDRAM	32MB/32MB/SDRAM	32MB/32MB/SDRAM	16MB/16MB/SDRAM	16MB/16MB/SDRAM	32MB/32MB/SDRAM
Graphics card interface	AGP	AGP	AGP	AGP	AGP	AGP
Monitor manufacturer/model	ADI E55	Viewsonic E771	HANSOL 710a	Compaq S700	Dell M770	Elonex MN044
Monitor size/Max viewable diagonal	17in/16in	17in/16in	17in/16in	17in/16in	17in/16in	17in/16in
Max resolution and refresh	1,600x1,200/ 75Hz	1,280x1,024/66Hz	1,280x1,024/60Hz	1,280x1,024/60Hz	1,280x1,024/60Hz	1,280x1,024/60Hz
OTHER INFORMATION						
Modem manufacturer and model	Accord 56K	Diamond V.90	E-tech 56K	Compaq 56K PCI modem	US Robotics V.90	US Robotics 56K
Highest supported modem standard	V.90	V.90	V.90	V.90	V.90	V.90
Misc hardware	Dlink network card 550CT	Realtek RTL8139 10/100	Realtek RTL8139 10/100	Compaq nc3120 Ethernet	3Com 3C905 NIC	Intel 10/100 network card
Bundled software	Lotus SmartSuite	Lotus SmartSuite	Lotus SmartSuite	Microsoft Office 2000 SBE	Worksuite 99 Cinemaster DVD Solution McAfee AV Trial Version	Microsoft Office 2000 std
Standard warranty	3 yrs on-site	1yr on-site	2 yrs on-site	1 yr on-site + 2yrs RTB	1 yr on-site + 2yrs RTB	1 yr on-site + 2 yrs RTB
Warranty options		3 yrs on-site	3 yrs on-site	3 yrs on-site	3 yrs on-site	Extensions available
Technical support tel no	0181 532 6199	08700 722 227	0181 307 2830	Not supplied	0870 908 0800	0181 452 6666
Sales hours	Mon-Sat 9-5.30	Mon-Fri 9-6	Mon-Fri 9-6. Sat 10-4	N/A	Mon-Fri 8-8 Sat 9-6 Sun 10-5	Mon-Fri 8.30-6.30 Sat 9-1.30
Technical support hours	Mon-Sat 9 - 5.30	Mon-Fri 9.00 - 6.00	Mon-Fri 9-6 Sat 10-4	N/A	Mon-Fri 8-8	Mon-Fri 8-8 Sat 9-1.30

							
EVESHAM	GATEWAY	HI-GRADE	MESH	PANRIX	POLAR	TINY	VIGLEN
ATHLON TNT2	GP7-500	ULTIS PVIII	PROFESSIONAL 500B	AVENIA	PANACHE P3-500	OFFICE POWERHOUSE	HOMEPRO P3-500DWR
£1,049 (£1,232.58)	£988 (£1,160.90)	£1,075 (£1,263.13)	£999 (£1,173.83)	£999 (£1,173.83)	£1,099 (£1,291.33)	£1,199 (£1,408.83)	£999 (£1,173.83)
0800 038 0800	0800 552 000	0181 532 6100	0208 208 4706	0113 244 4958	0161 482 7000	01293 821 555	0181 758 7000
01386 769795	00 353 1 803200	0181 532 6101	0208 208 4793	0113 244 4962	0161 4827007	01293 782 663	0181 758 7080
www.evesham.com	www.gateway.com/uk	www.higrade.com	www.meshplc.co.uk	www.panrix.com	www.polartechology.com	www.tiny.com	www.viglen.co.uk
HARDWARE SPECS							
Athlon 500	Pentium III 500	Pentium III 500	Pentium III 500	Athlon 500	Pentium III 500	Pentium III 500	Pentium III 500
128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM	128MB/SDRAM
1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
640MB	640MB	640MB	640MB	640MB	640MB	640MB	640MB
768MB	768MB	768MB	768MB	768MB	768MB	768GB	768MB
Maxtor 5120	Quantum Ultra ATA	IBM Deskstar	Western Digital WDAC31300	IBM Deskstar	IBM Deskstar	Western Digital	Western Digital WD205BA
20GB/EIDE	13.2GB/EIDE	14GB/EIDE	13GB/EIDE	13.5GB/ EIDE	25GB/EIDE	20.5GB/EIDE	20GB/EIDE
lomega Zip	lomega Zip	Panasonic Zip	lomega Zip	lomega Zip	CD-RW Mitsumi CR-2801TE	lomega Zip	Panasonic LS-120
100MB	100MB	100MB	100MB	100MB	640MB	100MB	120MB
EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE
MOTHERBOARD COMPONENTS							
MSI	Intel	Asus	Asus	MSI	EpoX	MSI	MSI
512K	512K	512K	512K	512K	512K	512K	512K
4/3	3/2	4/3	4/3	2/2	4/2	3/3	4/2
2/2	1/0	1/2	1/2	0/1	2/0	1/1	2/1
5/2/1	4/0/1	3/2/1	3/2/1	4/1/1	4/1/1	3/2/1	3/2/1
3/2/1	3/0/0	1/2/0	1/2 0	1/1/1	1/1/1	1/2/0	1/2/0
2/2/1/2	2/2/1/2	2/2/1/2	2/ 2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
MULTIMEDIA							
Samsung SC140	LG	Asustek CD-S400	Pioneer DVD-113	Toshiba DVD SD-M1212	Toshiba DVD SDM1212	Panasonic DVD SR8584	Pioneer DVD 113
40/EIDE	40/EIDE	40/EIDE	32/EIDE	32/EIDE	32/EIDE	32/EIDE	32/EIDE
Creative	None	Creative	Creative	Creative	Adonics	Yamaha	Creative
SoundBlaster 64V	N/A	SoundBlaster 128	SoundBlaster 128	SoundBlaster 128	SB16 Comp PCI	DS-XG	SoundBlaster 128
ZYFI OEMs	None	Samsung SMS-7841	Teac Powermax 80	Genius Fantasia SP-G10	None	Tiny CPR-50	ADI clip-on speakers
Chaintech Desp. R160	ATi Rage 128	A-Trend TNT2 32MB	Matrox G400 Dualhead	Matrox G400	Matrox G400	Guillemot Maxigamer Xen.	Matrox G400
Riva TNT2	Rage 128	Riva TNT2	G400	G400	G400	Riva TNT2	G400
32MB/32MB/SDRAM	16MB/16MB/SDRAM	32MB/32MB/SDRAM	16MB/16MB/SGRAM	16MB/16MB/SGRAM	16MB/16MB/SGRAM	16MB/16MB/SDRAM	16MB/16MB/SGRAM
AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP
Mg Innovation 177EV	Gateway VX700	Sampo 812R	Taxan 755 TCO99	Hitachi CM650ET	Hansol B17BL	Taxan 750 TCO 95	ADI E55
17in/16in	17in/15.9in	19in/18in	17in/16in	17in/16in	17in/16in	17in/16in	17in/16in
1,600x1,200/60Hz	1,600x1,200/65Hz	1,600x1,200/75Hz	1,600x1,200/85Hz	1,280x1,024/75Hz	1,600x1,200/66Hz	1,600x1,200/65Hz	1,280x1,024/65Hz
OTHER INFORMATION							
Diamond SupraExpress	Telepath Pro 56K	Accord 56K	Diamond SupraExpress	Diamond SupraExpress	Diamond SupraExpress	Etech K56 Flex	3Com winmodem
V.90	V.90	V.90	V.90	V.90	V.90	V.90	V.90
Intel Pro 10/100 NIC	US Robotics 10/100	SMC 10/100 network card	Intel Pro 10/100 Pro	Intel Pro 100 M. adaptor	RPTI Ethernet adaptor	Intel 10/100 network card	Intel Pro 100+ M. adaptor
Lotus SmartSuite	Lotus SmartSuite	Lotus SmartSuite	Corel WordPerfect Office 2000	Lotus SmartSuite	Lotus SmartSuite	MS Office 2000 Pro	MS Works Suite 99
2 yrs on-site	1 yr on-site + 2 yrs RTB	3 yrs on site	2 yrs on-site	1 yr on-site + 2 yrs RTB	3 yrs RTB	1 yr on-site	1 yr RTB (carriage paid)
3 years on-site	3 yrs on site		3 yrs on-site		1 yr on-site	5 yrs on-site	3 yrs on-site
0800 496 4636	0113 244 4948	0181 532 6199	0208 208 4795	0113 244 4948	0161 482 7044	0870 1699699	0181 758 7050
Mon-Fri 9-7 Sat 9-5.30	Mon-Fri 9.30-5.30	Mon-Fri 9-9	Mon-Fri 9-6 Sat 10-4	Mon-Fri 9.30-5.30	Mon-Fri 9-6 Sat 10-1	Mon-Fri 9-5.40	Mon-Fri 9-5.30 Sat 9-1
Sun 10-4	Sat 10-4		Sun 10-2	Sat 10-4			
Mon-Sat 9-5.30	Mon-Fri 9.30-5.30 Sat 10-4	Mon-Fri 9-9	Mon-Fri 9-5.30	Mon-Fri 9.30-5.30 Sat 10-4	Mon-Fri- 9-6. 10-1	Mon-Fri 9-5.30	Mon-Fri 9- 5.30 Sat 9-1

Editor's Choice

Buying a PC for your office is always a daunting prospect, but many of the machines here would be well up to the task. We were generally impressed by the systems that we saw from most of the manufacturers. Many of them submitted machines that surpassed the standard grey boxes of old. A Zip 100 was the most popular storage drive, enabling you to transport larger files while ensuring the maximum possible compatibility. Some of the manufacturers even stretched to a CD-RW demonstrating that larger-capacity storage is now more affordable than ever.

When it came to giving out awards, we found ourselves agonising over small value for money issues such as the bundled software and the inclusion of a separate storage drive. While we were in the process of writing this group test, a sharp rise in the price of memory affected all the manufacturers' costs. It was interesting to note that some chose to absorb this extra overhead while others decided to pass it on to the consumer. However, we are hoping that RAM won't stay at this inflated level for much longer.

➔ **Our Editor's Choice** this month goes, once again, to Mesh. The Professional 500B is an excellent machine, designed with a small business in mind. Not only has Mesh included a fast 500MHz Pentium III processor and 128MB of RAM, but it has also thrown in a lot of

► **MESH PRODUCED THE BUILT-TO-THRILL PROFESSIONAL 500B WHICH PIPPED THE REST TO THE POST WITH ITS GREAT MONITOR**

extras, such as a DVD-ROM drive and a dual-head Matrox graphics card. A two-year on-site warranty will provide you with some peace of mind in case something goes wrong. The real bonus, though, is the gorgeous Taxan 755 TCO99 monitor, a display that you will have no problem looking at all day.

➔ **Our first highly commended** award goes to Dell's Dimension XPS T500. This is an extremely well-stacked machine. A Pentium III 500, 128MB of RAM and a CD-RW represent excellent value for money at just £999 excluding VAT. A three-year warranty (with the first year on-site) is a welcome addition to the spec. Dell lost out

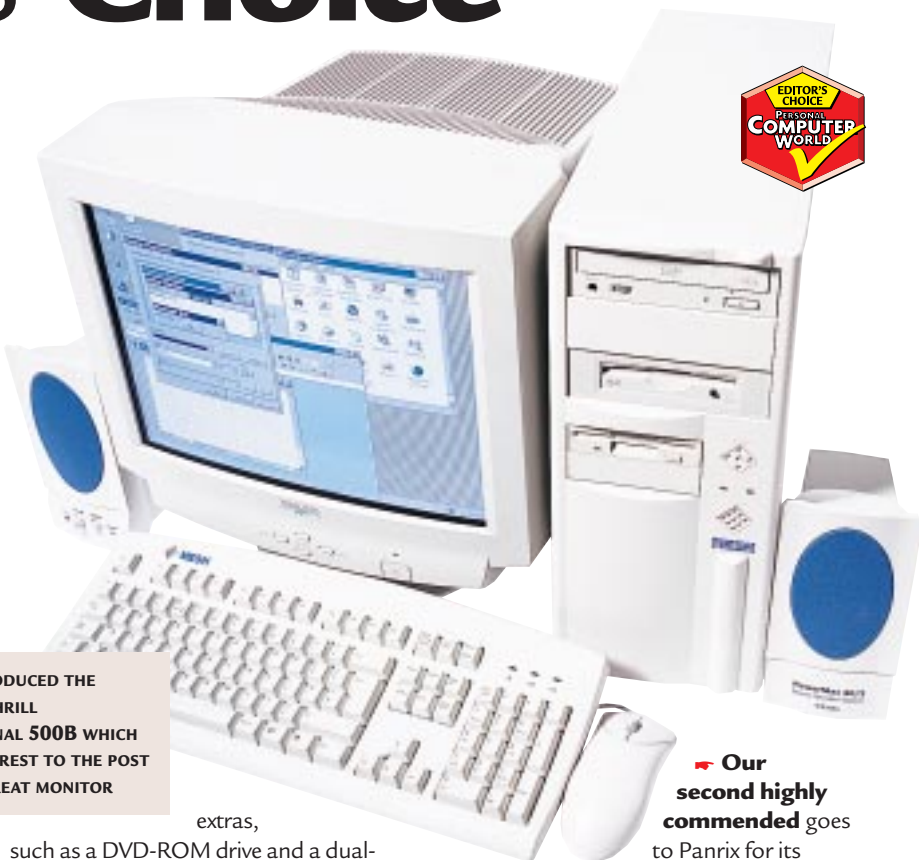
to Mesh as we felt that a better monitor would be slightly more desirable for businesses than a CD-RW, but it is an excellent system.

▲ **PANRIX SAW OFF MOST OF THE COMPETITION WITH THE AVENIA**

processor that outperformed the Pentium III 500MHz processors on our SYSmark 98 benchmark by a clear 20 points. This, combined with a three-year warranty and Lotus SmartSuite Millennium, makes the Panrix a deserving winner in this hard-fought group test. □

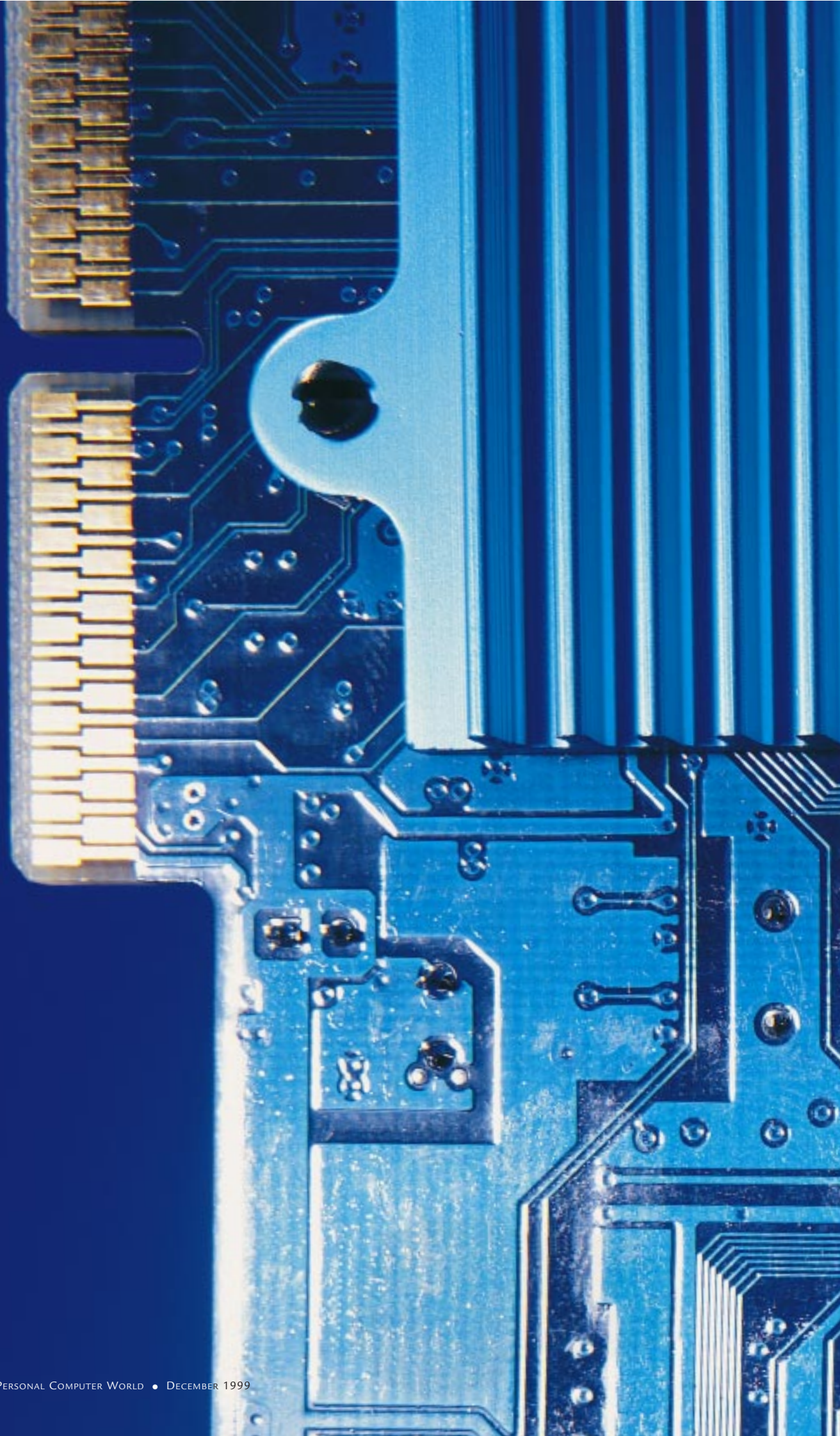
➔ **Our second highly commended** goes

to Panrix for its Avenia, which just stole it away from the remaining competition. Panrix built its machine around a 500MHz Athlon



▼ **DELL, WITH ITS KNOWLEDGE OF THE BUSINESS MARKET, HAS COME UP WITH A DELECTABLE MACHINE**





Luck of the draw

It's easy to get **dealt a bad hand** when buying a graphics card, so PCW is pleased to introduce a little risk management...

There's been a lot of activity on the graphics cards front recently, with faster chipsets from the likes of nVidia and Matrox as well as takeovers and acquisitions such as S3 with Diamond and 3dfx with STB. There's also been a major change in the graphics subsystem infrastructure with new motherboard chipsets, like Intel's 820 design, flaunting the much talked about AGP 4x interface. With all these factors in mind, PCW decided it was time to test the latest and greatest cards available on the hottest technology around.

AGP 4x promises increased graphics performance by doubling the transfer rate of the bus from 528MB/sec up to a whopping 1056MB/sec, according to Intel's figures.

To enable us to put the cards through their paces properly, we borrowed an AGP 4x equipped 820 chipset motherboard, coupled with a 600MHz Pentium III running at 133MHz. We

also used 128MB of RAMBUS memory.

To see what the cards output really looked like, we connected this all up to a 19in Mitsubishi 900u monitor. So, if you want to know which cards are hot and if AGP 4x really does deliver that performance boost you've been holding out for, read on.

Ratings

- ★★★★★ Highly recommended
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

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• Tested and reviewed by Riyad Emeran, Will Head and Jason Jenkins

3dfx Voodoo3 2000

This is the baby of the Voodoo3 family, with a core clock speed of only 143MHz and a 300MHz RAMDAC. Like the other cards in the range, the 2000 supports both Direct3D and OpenGL as well as GLide. GLide is 3dfx's proprietary

3D standard, and there was a time when all 3D games were coded in GLide first, and then ported to other standards. During this period, it was vital to have a 3dfx-based card if you wanted to play the latest games. Now, however, GLide is rarely seen.

As with all of the Voodoo3 cards, the 2000 is struggling to keep up with the competition, only just managing a score over 30fps (frames per second) in Quake II at 1,024x768. There's 16MB of SDRAM on-board, which seems a little inadequate compared to all the 32MB cards on test. However, there is one thing that makes the Voodoo3 2000 worth

considering – the price. At just £69 (ex VAT) it's an affordable solution for someone upgrading to 3D gaming. Don't expect the best performance available, but what you do get is worth the asking price.

PCW DETAILS

★★★★

Price £81.07 (£69 ex VAT)

Contact Dabs Direct
0800 138 5142

www.3dfx.com

Good points Very affordable

Bad points Not the best performer

Conclusion A good budget 2D/3D video card

3dfx Voodoo3 3000

The middle offering in 3dfx's Voodoo3 range was once the most sought after graphics card around. But since the market moves at such an incredible pace, it didn't take long for something better and faster to come along.

The core clock frequency is 166MHz, and the 350MHz RAMDAC allows for an impressive 75Hz refresh rate at a 2D resolution of 2,046x1,536, with 16.7 million colours. However, you're limited to 65,000 colours in a 3D environment.

Also, there's only 16MB of

SDRAM on board, which could be a problem if a game starts to shift very large textures.

In terms of performance, the Voodoo3 3000 is starting to look a bit tired – the frame rates in Quake II and III were nothing to write home about, and the lack of 32bit colour support meant it

couldn't run a number of the tests.

However, with a price of only £89 (ex VAT), it's fairly cheap and a better all-rounder than the VideoLogic Neon 250.

PCW DETAILS

★★★

Price £104.57 (£89 ex VAT)

Contact Dabs Direct
0800 138 5142

www.3dfx.com

Good points Reasonable performance for the price

Bad points Can't run high-colour depths in 3D

Conclusion A once great card, now eclipsed by its peers

3dfx Voodoo3 3500 TV

The Voodoo3 3500 TV is quite a versatile card – as well as being a 2D/3D graphics accelerator, it also has a built-in TV tuner and a full array of video-editing

features. The card ships with a separate box that has inputs and outputs for left and right audio, composite video and S-Video. This allows you to capture audio and video from a variety of sources and edit it or store it on your PC. You can also output edited video back to VHS, to get the final cut of your holiday movies.

Unfortunately, the 3500 TV suffers from many of the same problems as the other Voodoo3 cards, one of which is the lack of 32bit colour support in 3D. Even though the 3500 TV runs at an increased core speed of 183MHz compared to the 166MHz of the 3000, it still can't compete with

much of the competition when it comes to raw power. That said, the performance is still good enough to play the latest crop of 3D games, and if you're after a TV tuner and video editing features it's worth a look.

PCW DETAILS

★★★★★

Price £186.82 (£159 ex VAT)

Contact Dabs Direct 0800 138 5142

www.3dfx.com

Good points Great bundle with TV tuner

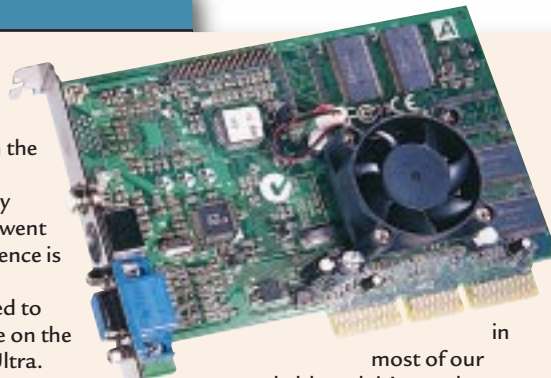
Bad points No 32bit colour

Conclusion An excellent feature set for the budding video editor

AOpen PA3000 Plus

This card uses a main chip from nVidia – the Riva TNT2 Model 64 – which is positioned between the value and the performance markets. There weren't many details on the chip when we went to press, but the main difference is that this version has a 64bit memory interface as opposed to the 128bit memory interface on the standard TNT2 and TNT2 Ultra.

Overall, this card is fairly good value – in addition to the standard D-SUB connector, it has S-Video and composite connectors. For only £75 (ex VAT), it is a fair compromise between performance and functionality. It sits roughly mid-table



in most of our tests and although it's not the fastest card for the price it is a better all-round performer. The card's 32MB of on-board memory helped it complete our higher resolution tests.

An on-chip fan keeps heat to a minimum, which may seem excessive,

but if you want to over-clock it using the supplied utility, you'll want as much cooling as you can get. Unfortunately, a software DVD player is not bundled with the card.

PCW DETAILS

★★★★

Price £88.13 (£75 ex VAT)

Contact First Hardware
01296 505101

www.aopen.nl

Good points S-Video and composite ports

Bad points There are faster cards here

Conclusion A fair compromise between speed and value

AOpen PA3020

It is interesting to see the difference between a TNT2 and a TNT2 Ultra chip. This card has the latter, and it certainly gives it a performance boost over the AOpen PA3000 Plus. We tested the 32MB version of



this card, but AOpen also produces a 16MB version for £47 less (ex VAT). The fact that this is an AGP 4x board has not helped it in the performance stakes – it consistently lost out to Creative's TNT2 Ultra card. The board supports all the usual TNT2 features, such as 32bit colour in 3D games and 24bit Z buffer. The card also has composite and S-Video out-ports.

AOpen has included a clock-tuning facility as part of its standard drivers. This useful utility lets you run the chip and the memory faster than the standard levels. This is done at your own risk, although the fan will try to help keep the build up of heat

at a tolerable level. Although this is a fairly fast card, it's only slightly cheaper than the award-winning Matrox Millennium G400 Max.

PCW DETAILS

★★★★

Price £175.08 (£149 ex VAT)

Contact First Hardware
01296 505101

www.aopen.nl

Good points Fast chip, S-Video and composite connectors

Bad points No DVD player

Conclusion Overall it's a good card, but it doesn't offer anything more than Creative's cheaper TNT2 Ultra board

Asus AGP-V3800 Deluxe

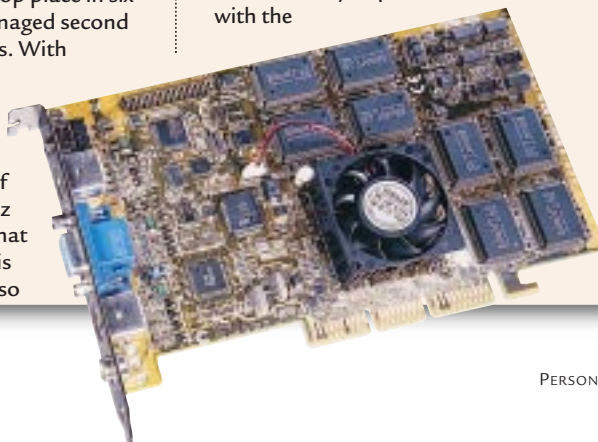


Asus is best known for its high-quality motherboards, but this nVidia Riva TNT2 Ultra-based graphics card shows that the company is capable of turning its hand to more than one market.

The V3800 Deluxe is an incredibly fast card – it grabbed top place in six of the 11 tests and managed second position in three others. With performance like this, you'll be able to get the most out of any 3D game.

The card's 32MB of SGRAM and a 300MHz RAMDAC make sure that almost any resolution is within your reach. It also

has an array of extra ports. There are composite and S-Video out-ports as well as a connector for an external TV tuner box (sold separately). A pair of bundled 3D glasses are supposed to create a virtual reality environment for you to play your games in, but we weren't overly impressed with the



effect. However, we were pleasantly surprised to find that Asus had also supplied S-Video and composite video cables in the box.

3D glasses aside, the Asus is still a great card – especially if you are looking for raw graphics power.

PCW DETAILS

★★★★★

Price £197.40 (£168 ex VAT)

Contact Micro Direct 01612 484 848

www.asus.com

Good points A very fast performer

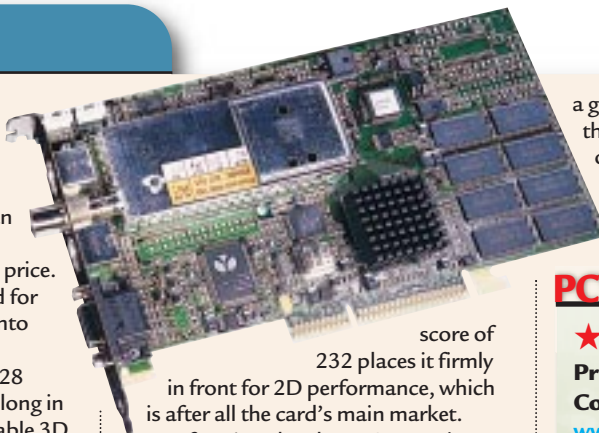
Bad points Relatively expensive

Conclusion A very fast card with a couple of interesting features

ATi All-in-Wonder 128

Combining 3D acceleration, a TV tuner, video in and out, MPEG hardware assistance and a wealth of accessories is no mean feat and ATi should be commended for doing it at this price. The All-in-Wonder is a godsend for those wanting to dip their toe into the world of video editing.

This card utilises the Rage128 chipset which, although a little long in the tooth, still provides reasonable 3D performance at lower resolutions (27.2fps running Quake III at 1,024x768 16bit). If you increase the resolution however, the All-in-Wonder does start to struggle. Its SYSmark



score of 232 places it firmly in front for 2D performance, which is after all the card's main market.

If you're a hard core 3D gaming fan, then this card won't be able to deliver the results you desire. However, if you'd rather have a DVD player, TV tuner and the ability to create your own movies, then the All-in-Wonder is

a good choice. If it weren't for the fact that other companies were getting in on the act (such as 3dfx with the Voodoo3 3500 TV) then ATi would have this specialist market sewn up.

PCW DETAILS

★★★★★

Price £158.63 (£135 ex VAT)

Contact Dabs Direct 0800 138 5142

www.ati.com

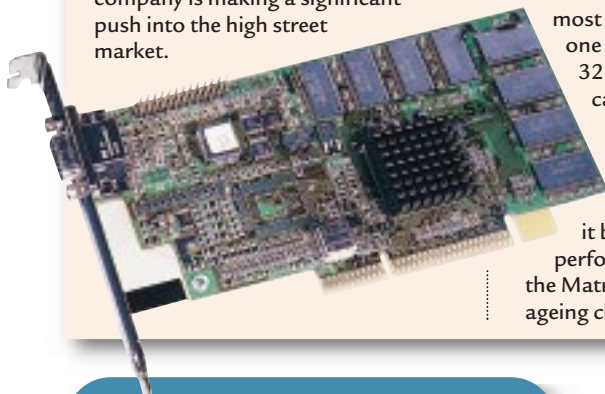
Good points TV tuner, Hardware MPEG assistance

Bad points Poor 3D performance

Conclusion Good feature set, but the 3D performance lets this card down

ATi Rage Fury 16MB

ATi has made a success of designing and marketing its own graphics cards over a number of years, and the vast majority of its income is derived from bulk sales to OEMs. With this card, however, the company is making a significant push into the high street market.



This version is based on the Rage 128 GL chipset, a chip that was fairly good in its day, but is near retirement now. In a market where just a few months can mean your technology is out of date, this year old chip simply cannot deliver the same speed as most of the others on test. It was one of the first cards to support 32bit colour in 3D and it still can – albeit slowly.

The 16MB of SDRAM on this card means it could not run some of the higher resolution tests. Although it boasts excellent 2D performance, finishing just behind the Matrox cards in our tests, but its ageing chipset meant that it couldn't

deliver on 3D and it was beaten by the newer contenders.

Despite being one of the cheapest cards here, we would recommend saving for a bit longer and buying one of the award winners.

PCW DETAILS

★★★

Price £72.85 (£62 ex VAT)

Contact Dabs Direct 0800 138 5142

www.ati.com

Good points Low cost

Bad points Outdated chipset

Conclusion Not a card that stands out amongst its competitors

ATi Rage Fury 32MB TV-Out

This is definitely the better of the two Fury cards, although we wouldn't recommend buying it for its 3D speed. Based on the Rage 128 GL with a RAMDAC of 250MHz, this 32MB SDRAM card at least managed to complete all of the performance tests. The Rage 128 GL broke new ground when it shipped with 32MB of memory, but now this is common place.

The board has both S-Video and composite connectors. These enable you to send the video signal to your television, although the resolution you'll be able to run at will be severely limited. The Rage

128 GL chip includes iDCT hardware acceleration, which will take the load away from your processor when you're playing DVD movies. Combined with the excellent ATi DVD player (which uses the Cinemaster engine), it yields excellent MPEG2



playback results. If you want to watch DVDs on your TV using your PC as the player, then this is a cheap way of doing it, but it might be worth waiting for the release of the Rage Fury Pro in the New Year.

PCW DETAILS

★★★★★

Price £111.63 (£95 ex VAT)

Contact Dabs Direct 0800 138 5142

www.ati.com

Good points S-video and composite connectors

Bad points Poor 3D performance

Conclusion A good buy a few months ago, but a bit outdated now

Creative 3D Blaster Riva TNT2 Ultra

Of the two Creative cards in our test, the Riva TNT2 Ultra offers better performance, but with a price to match. Put together a TNT2 Ultra processor, 32MB of SDRAM and a 300MHz RAMDAC and you have a card that can easily handle 1,024x786 32bit colour with a refresh rate up to 170Hz, and when pushed up to 1,600x1200 32bit colour it can still maintain a respectable 85Hz.

In the box you'll find an MPEG-2 player, a copy of Psygnosis' Rollcage and Rage's Expendable, as well as Sonnetech's Colorific and 3Deep colour and screen optimisation

tools. For those who want to enjoy gaming on a big-screen TV there is also an S-Video TV out-port, complete with a composite converter cable.

Unfortunately you don't get the future proofing of AGP 4x, but you do get a card that will still take some time to show its age.



On OpenGL performance it was consistently near the top of the group with a similar story in Direct3D. It may not be quite as fast as the Asus and Guillemot, but considering the price it's worth a look.

PCW DETAILS

★★★★★

Price £151.58 (£129 ex VAT)

Contact Dabs Direct 0800 138 5142

www.creative.com

Good points Good 3D performance and TV out

Bad points No AGP 4x support

Conclusion Good performance for the price

Creative 3D Blaster Savage4

Creative's Savage4 is an entry-level budget option. While the Savage4 can't really compete with the other cards in the test, for just under £70 including VAT you wouldn't expect it to. Creative has opted for S3's Savage4 Pro along with 32MB of SDRAM and a

300MHz RAMDAC. As with the more expensive TNT2 Ultra Creative card, you'll find Sonnetech's Colorific and 3Deep optimisation software to help adjust the colour and display more accurately, but not the bundled games.

In terms of performance, the Creative Savage4 came last in all of the 16bit colour Direct3D and OpenGL tests. Moving onto 32bit colour did not improve matters, with only those cards unable to perform in that colour depth doing worse.

If you're into gaming, then you'll only be disappointed by this card, but as it is the cheapest in the tests you can't really expect tremendous performance. If you're

not that interested in 32bit colour 3D then you could have a Voodoo3 2000 for £10 more. And even if you do want 32bit colour 3D, considering its poor frame rates, this isn't the card to choose.

PCW DETAILS

★

Price £69.33 (£59 ex VAT)

Contact Dabs Direct 0800 138 5142

www.creative.com

Good points A cheap 3D option

Bad points Doesn't really cut it when compared with the competition

Conclusion You're better off spending £10 more on the Voodoo3 2000



Diamond Stealth III S540

The Stealth III S540 is Diamond's budget option utilising the Savage4 Pro+ chipset from S3, the company which recently merged with Diamond. The card features 32MB of SDRAM, a 300MHz RAMDAC and AGP 4x capability, which is selected by changing a few jumpers on the card. The card offers performance in keeping with its price range – it does not excel at 2D or 3D graphics, but you can't expect lightning performance in the budget arena.

The Stealth offers hardware DVD acceleration and S3's texture compression. The results did reflect

the card's price, but it still managed to score 1,213 3DMarks when faced with 1,280 x 1,024 in 32bit colour. Quake III tests showed a playable 31.6fps at 1,024x768 in 16bit colour, but this fell significantly as the colour depth and resolution were increased.

The Stealth is a basic no-nonsense card without all the bells and whistles seen on the more expensive models, but the Voodoo3 2000 offers better performance if you're happy with 16bit colour.

PCW DETAILS

★★

Price £92.83 (£79 ex VAT)

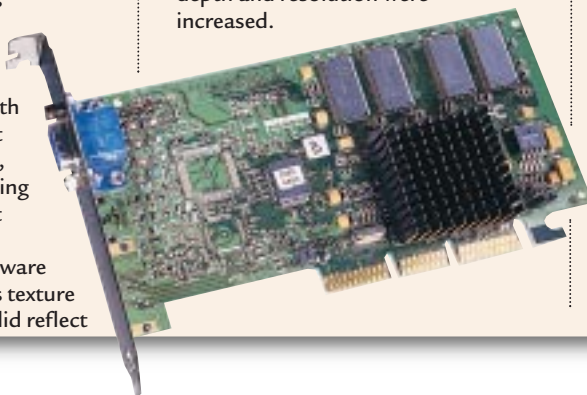
Contact Dabs Direct 0800 138 5142

www.diamondmm.com

Good points AGP 4x future proofing

Bad points Not up to serious gaming

Conclusion If you're on a budget the Voodoo3 2000 is a better bet



Diamond Stealth III S540 Xtreme

The Stealth III S540 Xtreme is the latest addition to the S540 family and should be available in the shops by the time you read this. The Xtreme has all the features of the normal model (AGP 4x, 32MB of SDRAM, 300MHz RAMDAC) but everything clocks in that little bit higher. The speed hasn't been upped so much that a fan is necessary to stop things melting, but there is a noticeable performance increase.

Your extra £10 (ex VAT) will buy you eight more frames per second in Quake III at 1,024x768 16bit, resulting in a frame rate of 39.4. Direct3D also sees a significant

increase, with the Xtreme scoring 3,805 3DMarks compared to 3,036 for the basic model. You'll not find anything more in the box than the standard model, but considering the price difference you wouldn't expect to. If you've already decided to purchase a Stealth III S540 card, then – unless your

budget is really tight – you may as well opt for the Xtreme version. We saw an increase in all areas except 2D where it scored less, but this isn't likely to affect real-world use to a great extent.

PCW DETAILS

★★★★

Price £104.58 (£89 ex VAT)

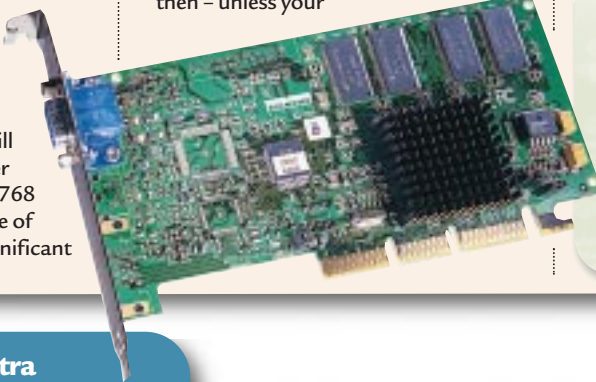
Contact Simply 0181 498 2100

www.diamondmm.com

Good points Good performance increase for the price

Bad points Still not one of the faster movers in the group

Conclusion It's never going to be a die-hard gamer's number one choice, but the price reflects that



Diamond Viper V770 Ultra

The Viper V770 Ultra, utilising nVidia's Riva TNT2 Ultra chipset, is definitely the over achieving member of the Diamond family – although its future is very much in doubt due to S3's recent acquisition of Diamond. The card packs in 32MB of

SDRAM, a 300MHz RAMDAC and an AGP 4x interface.

Its 2D performance saw the Viper sitting in the middle of the group, with a similar situation exhibited as we moved onto Direct3D testing at 16bit colour. Increasing the colour depth to 32bit drew better scores from the card, placing it further up the field. The best results were seen during OpenGL performance, with the Viper consistently sitting within the top five cards.

The Viper aims to provide raw power and doesn't supply extra features, such as additional outputs or TV tuners. In the box you'll find two full games (Superbike World Championship and Wild Metal

Country) as well as a software DVD player and Diamond's InControl Tools. On the whole, the Viper offers good performance, but there are better options available in the same price range.

PCW DETAILS

★★★★★

Price £163.33 (£139 ex VAT)

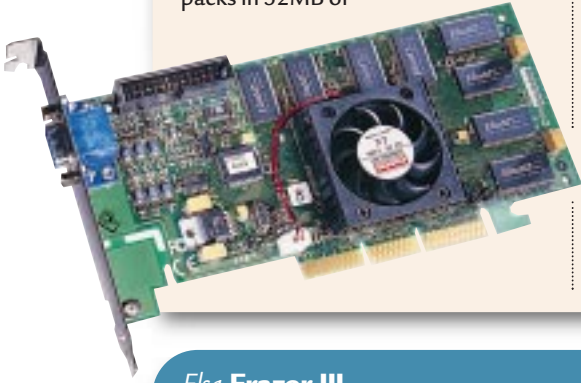
Contact Simply 0181 498 2100

www.diamondmm.com

Good points Good OpenGL performance

Bad points Not many features for the price

Conclusion Good if you like Quake and don't care about additional outputs



Elsa Erazor III

This board is a bit of a variation on the TNT2 theme. In addition to the standard features, there is a video out-port to which you attach a cable with a whole host of connectors on it. The cable has one S-Video out, one S-Video in, two composite video in and one composite video out. This is a welcome addition to the basic spec seen in most of the cards in this group test, although it's not cheap.

This card has 32MB RAM with a RAMDAC of 300MHz. There is no fan on the chip, but a large heat sink is attached which should keep it

sufficiently cool.

This card supports AGP 4x which will help it cope with the larger textures that are expected to feature in forthcoming games. The maximum 2D resolution is 1,920x1,440 in 16bit colour, refreshing at 75Hz.

If you are a fan of gimmicks, you

can buy a version of the card that has special glasses to give a 3D effect.

For a standard TNT2 card, it did fairly well in our performance evaluation, finishing slightly above the middle of the table in the majority of the tests.

PCW DETAILS

★★★★

Price £164.99 (£140.42 ex VAT)

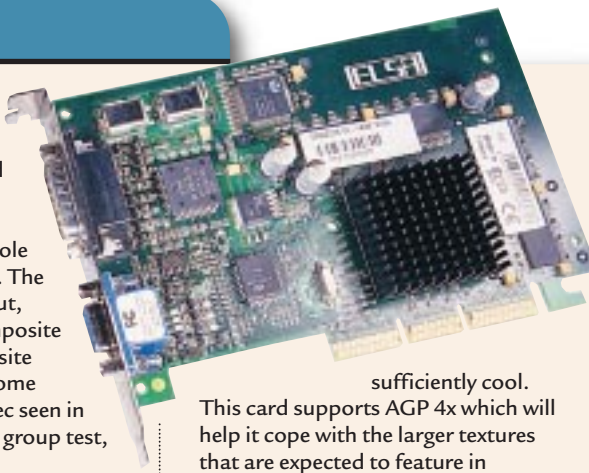
Contact Force 2 01844 261 872

www.elsa.com

Good points Lots of video ports

Bad points Not as fast as others here

Conclusion A good card with some useful extras



The Future of Graphics Cards

As graphics cards **put pressure on** a PC's CPU, Riyadh Emeran looks at efforts to take the strain.

The question that used to annoy PC users the world over was: 'Why does a game on a £100 console look better and play faster than a game on a £2,000 PC?' The answer, however, was obvious, – dedicated hardware. The problem with the PC was that it had to be able to handle everything from spreadsheets to arcade games. Consoles, on the other hand, were produced with just one purpose in mind – playing games. So every aspect of the system hardware was configured to this end.

It wasn't long before hardware manufacturers realised that the CPU in a PC alone was not powerful enough to produce the sort of games that users craved, and from this realisation the first batch of 3D graphics cards was born.

Of course there were a lot of teething problems. At first every graphics card manufacturer wanted to promote its own proprietary method of 3D acceleration, which just served to confuse the public. It wasn't until Microsoft managed to iron most of the bugs out of its Direct3D standard that we started to see real

movement in 3D graphic acceleration.

However, there was a time when we thought that a good 3D accelerator card could improve the performance of a slow PC. Unfortunately, as the graphics cards have become faster, the need for fast processors to complement them has become increasingly important. Although the latest batch of 3D cards take a huge load off the CPU, they can only process data as fast as the CPU can send it. This means that if a very fast card is coupled with a slower processor, it will sit around twiddling its thumbs

waiting for the CPU to send it the geometry information. Also, the fact that the CPU is having to take care of the geometry calculation means that it has less processing power to use on other aspects of the game.

Thankfully this situation is about to change, thanks to the latest graphics chipset from nVidia – the GeForce 256. Cards sporting this new chipset will have the advantage of what nVidia is calling a graphics processing unit or GPU, making the graphics card



▲ THE HIGH POLYGON COUNTS ACHIEVABLE WITH THE GEFORCE 256 ALLOW FOR VERY LIFE-LIKE IMAGES

almost solely responsible for what the

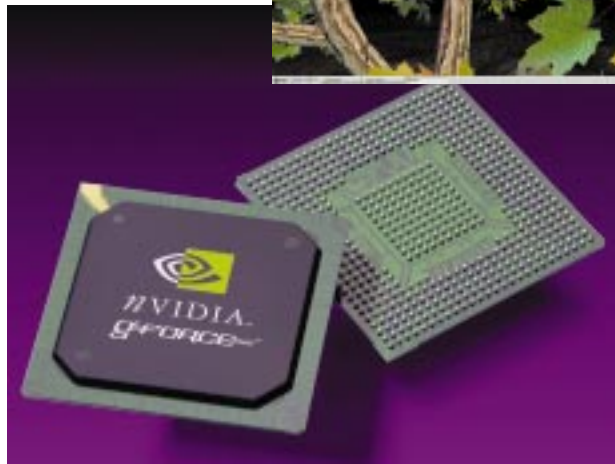
user sees on the screen when playing a 3D game.

The GeForce 256 is the first graphics chip to include transform and lighting (T&L) engines in its core design. T&L engines take a huge amount of load away from the CPU since the geometry calculation is performed locally, leaving it free to concentrate on other things. The GeForce 256 also incorporates S3's texture compression, allowing huge textures to be squeezed to a manageable size, improving the image quality without a loss of speed. Strangely, nVidia has chosen not to include hardware environment bump mapping on the chip, leaving the Matrox G400 as the only card supporting this DirectX feature.

It's impressive that nVidia is so far ahead of the competition with the GeForce 256, but as with any piece of hardware, it's only as good as the software that runs on it. Unfortunately, there's no software that supports T&L yet, partly due to the fact that DirectX7 is required. Even the 3DMark benchmarking suite doesn't support T&L yet.

That said, T&L is definitely the future of 3D graphics cards, so don't be surprised if every new card released supports this feature.

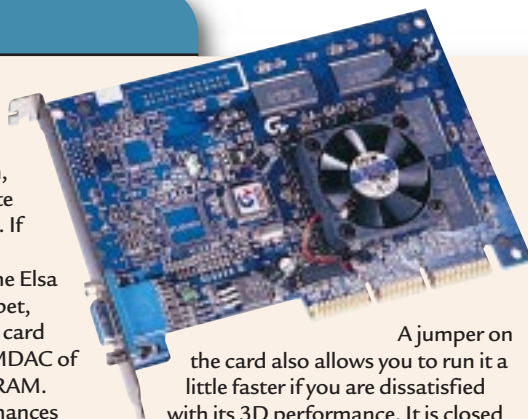
▼ IN FUTURE, DETAILED TEXTURES AND COMPLEX LIGHTING ARRANGEMENTS CAN BE HANDLED BY THE GRAPHICS CARD ALONE



Gigabyte GA-660

Gigabyte has sent us a fairly basic TNT2 card. It simply has a standard D-SUB connection, with no S-Video or composite ports as seen on other cards. If you're after a multitude of different connectors, then the Elsa Erazor III would be a better bet, although you pay for it. This card has the standard TNT2 RAMDAC of 300MHz along with 32MB RAM.

Gigabyte has taken no chances with the card overheating, and has put a fan on the chip to keep it cool. It will also support newer motherboards with AGP 4x, although there's little advantage in that at the moment.



A jumper on the card also allows you to run it a little faster if you are dissatisfied with its 3D performance. It is closed by default but Gigabyte claims opening it results in a performance increase. You do this at your own risk, though, as the increased heat generated may shorten its life.

However, this may not be necessary as it was the best standard TNT2 in terms of 3D performance, gaining a place in the upper half of the graphs in most tests.

PCW DETAILS

★★★★★

Price £123.38 (£105 ex VAT)

Contact Dabs Direct 0800 138 5142

www.gigabyte.com.tw

Good points Decent 3D performance and turbo option

Bad points No S-Video or composite connections

Conclusion A good value gamers card, but not quite as fully featured as some others

Guillemot Maxi Gamer Xentor 32



French company Guillemot has presented us with a card based on the Riva TNT2 Ultra chipset, which nVidia designed with gaming firmly in mind. This particular version of the chip has a RAMDAC of 300MHz, and the 32MB of



RAM runs at a fast 183MHz. This gives the chip a good performance boost, putting the card at the top of the table in the lower resolution tests.

A separate fan is present on the chip to help deal with heat dissipation. Unlike some of the other cards, this one only supports AGP 2x, although we saw little improvement with 4x. There is an S-Video port that will enable you to watch DVDs on your television and the Xing DVD player comes packaged in the box – a fair quality player but not quite as good as ATI's. The Maxi Gamer Xentor 32 includes motion compensation and will play DVDs smoothly. A maximum resolution of 2,048 x 1,536 with 65,000 colours at

60Hz is possible in 2D, although the Matrox G400 Max can achieve this resolution in 16.7m colours at 85Hz. Overall a card with whopping 3D performance, but not quite as fully featured as the Matrox G400 Max.

PCW DETAILS

★★★★★

Price £186.83 (£159 ex VAT)

Contact Guillemot 0181 686 5600

www.guillemot.com

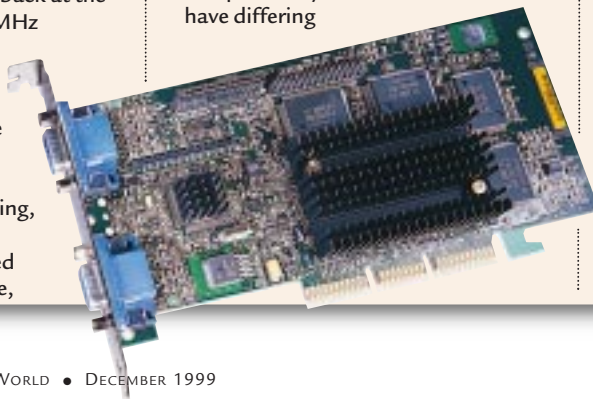
Good points Good 3D performance, S-video port

Bad points No AGP 4x support

Conclusion A good all-rounder, well worth buying but not quite as good as the Matrox

Matrox Millennium G400

Matrox changed the face of graphics card technology when it released the original Millennium card. Since then we've seen the Millennium II, the Millennium G200 and now the Millennium G400. This latest card has definitely put Matrox back at the cutting edge. With a 300MHz RAMDAC and 32MB of SGRAM the G400 has quite a formidable specification. It is also the first graphics chip to incorporate hardware environment bump mapping, for impressive 3D environments with reduced polygon counts. Of course,



games have to be specifically coded to take advantage of this feature, but Matrox assured us that there is a lot of software already in the pipeline.

Another unique feature is the dual-head capability. This allows the card to drive two monitors independently. You can even have differing

refresh rates on each of the displays.

Performance is good, but not as good as its big brother the G400 Max. That said, you're not likely to be disappointed with this card and the saving of £30 could be a real issue.

PCW DETAILS

★★★★★

Price £135.12 (£115 ex VAT)

Contact Dabs Direct 0800 138 5142

www.matrox.com/mga

Good points Good features/price ratio

Bad points Not quite as fast as its big brother

Conclusion A great all-round card, definitely worth considering

Matrox Millennium G400 Max



Matrox has taken its G400 chipset to a new level with the Millennium G400 Max. Although it shares much of the architecture with the standard Millennium G400, its performance scores show that it's a much faster card. It's hard to tell what's been improved on the Max, since Matrox won't disclose the speed of the processor or the on-board memory. However, the fact that the Max has a fan to cool the heatsink and the standard G400 doesn't, indicates that the processor is running significantly faster. The other improvement is a

faster RAMDAC, running at 360MHz instead of 300MHz. This allows the Max to maintain a steady 85Hz refresh rate at the ludicrously high resolution of 2,048 x 1,536. The Max also shares the dual head technology of the standard G400, making it very versatile.

In performance terms, the Max

produced excellent results, topping the chart in the 2D SYSmark test. 3D performance was also first rate, especially at high colour depths. But it's not just about raw power, the G400 Max also has a great feature set and a strong pedigree.

PCW DETAILS

★★★★★

Price £170.37 (£145 ex VAT)

Contact Dabs Direct 0800 138 5142

www.matrox.com

Good points Fast and feature packed

Bad points None to speak of

Conclusion The best 2D/3D graphics card you can buy



Number Nine SR9

Number Nine has moved away from using its own chips on its graphics cards and has decided to use the S3 Savage4 Pro chip with a 300MHz RAMDAC for the SR9 32MB card. The card has a maximum resolution of 1,600x1,200 in 32bit colour, which isn't that high by today's standards.

While it's not the worst performer in the tests, the Number Nine card did sit near the back of the pack, managing only 13.1fps running Quake II at 1,600 x 1,200 with 16bit textures. Direct3D performance was a little better, running at 1,280x1,024 in 32bit colour, producing a result of 1,310 3DMarks.

As with Creative's cards, you'll find bundled copies of Sonnetech's Colorific and 3Deep image adjustment tools, and the version we received also featured the optional digital video connector for use with an LCD flat panel display.

The advantage of this connector is that rather than converting a digital signal into an analog one and back

again at the LCD panel, the signal is kept digital all the way, providing better quality. As to the question of whether this connector becomes the standard, only time will tell.

PCW DETAILS

★★★

Price £78.73 (£67 ex VAT)

Contact Micro Computer Systems 0181 810 7785

www.nine.com

Good points Digital LCD connector

Bad points Not the best performer on the block

Conclusion The digital connector is a plus, but you'll have to wait for a flat panel that supports it



VideoLogic Neon 250

VideoLogic used to be a force to be reckoned with in the graphics card market, but it's been very quiet of late. The Neon 250 uses the PowerVR 2 chip that's currently seeing a lot of action in the new Sega Dreamcast console.

The original PowerVR chip was a bit of a disappointment and was eclipsed by the original 3dfx Voodoo chipset. Unfortunately for VideoLogic, this latest incarnation of the PowerVR chip hasn't improved the situation.

The card has 32MB of SDRAM and a 250MHz RAMDAC. The latter is a little disappointing since most of the competition runs at a minimum of 300MHz.

To be fair, its performance under OpenGL produced fairly decent frame rates in Quake II and III running at 1,024 x 768. However, the Direct3D performance was a different story, with the Neon languishing at the bottom of the 3DMark tables along with cards that are over a year old.

The only point in the Neon's favour is its price, at £99 ex VAT it's one of the cheaper cards on test, but for £15 more you could have a Matrox G400, and the difference is worth it.

PCW DETAILS

★★

Price £116.32 (£99 ex VAT)

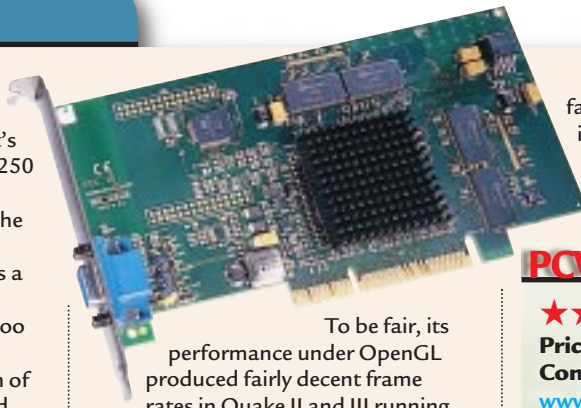
Contact Dabs Direct 0800 138 5142

www.videologic.com

Good points Relatively cheap

Bad points Very poor Direct3D performance

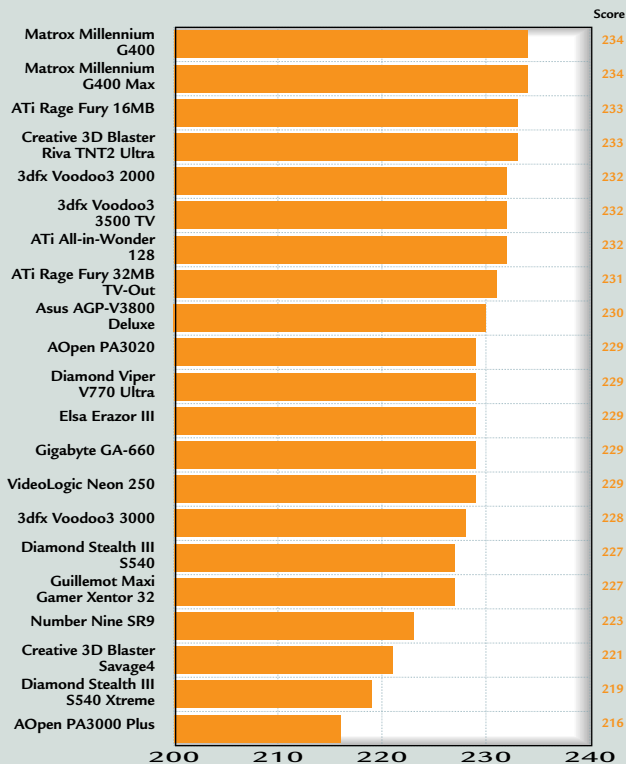
Conclusion Fairly affordable, but the Neon can't match the competition



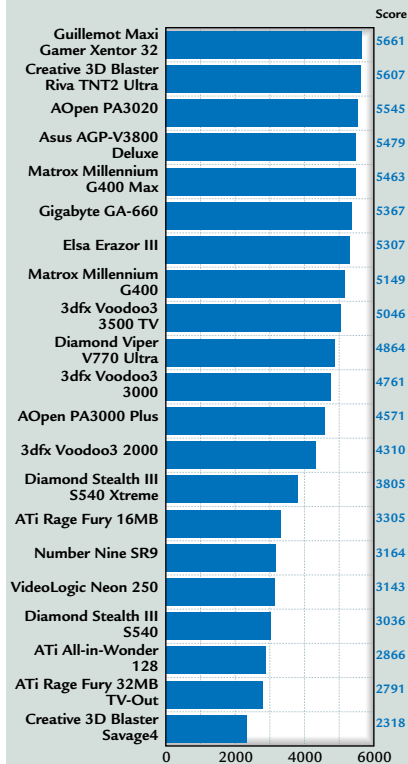
PCW Labs Report



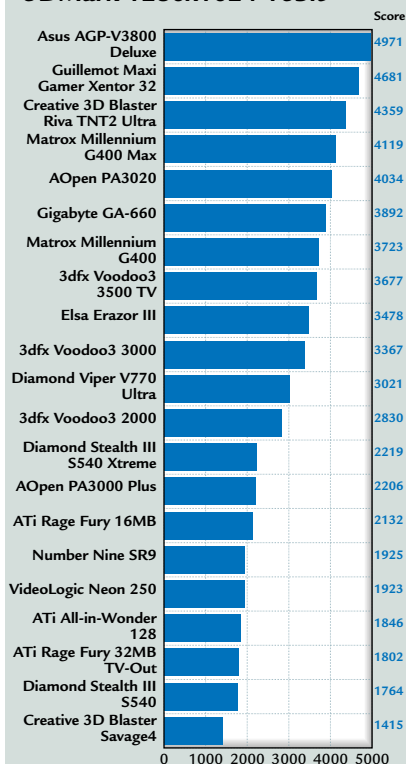
SYSmark



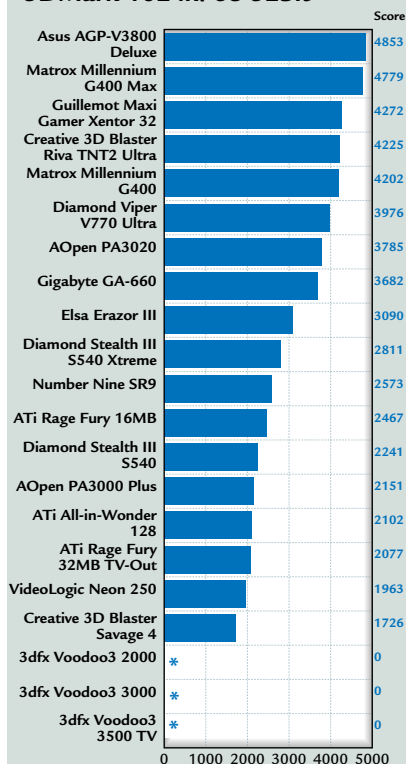
3DMark 1024x768 16bit



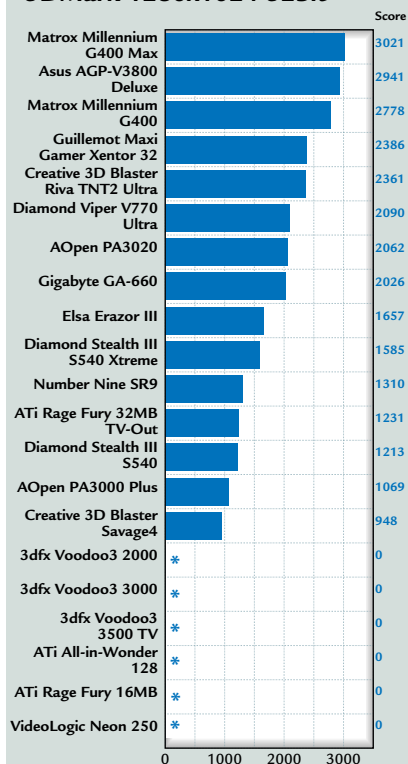
3DMark 1280x1024 16bit



3DMark 1024x768 32bit



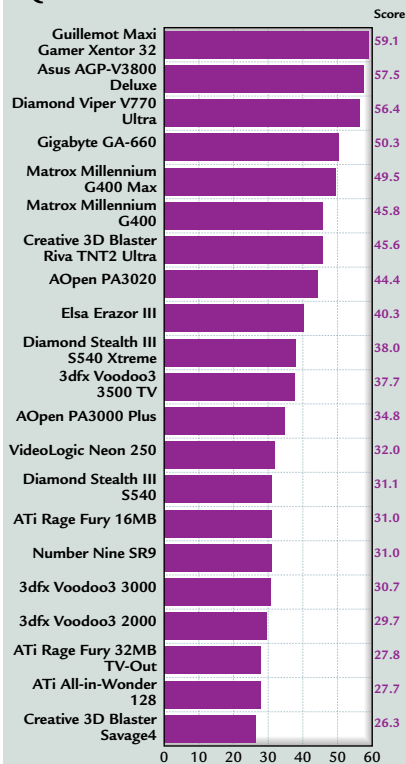
3DMark 1280x1024 32bit



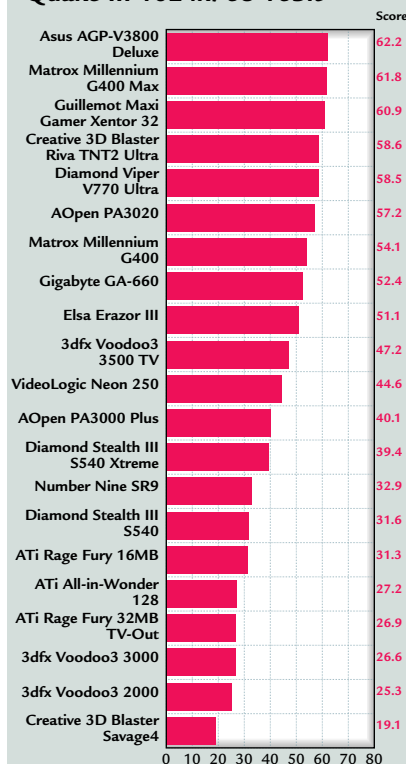


All scores in frames per second.
* Would not run test

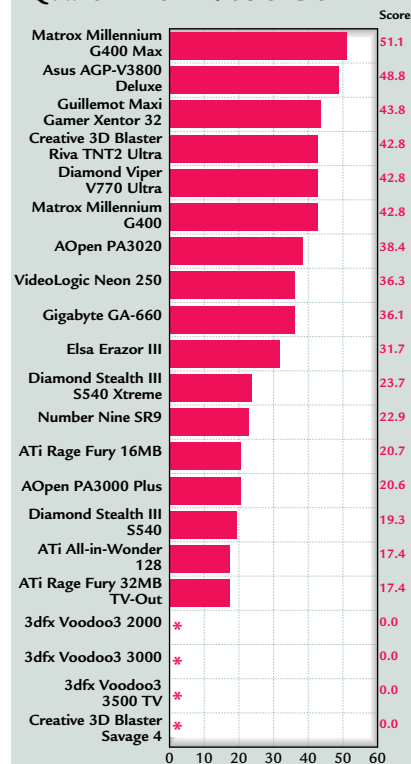
Quake II 1024x768 16bit



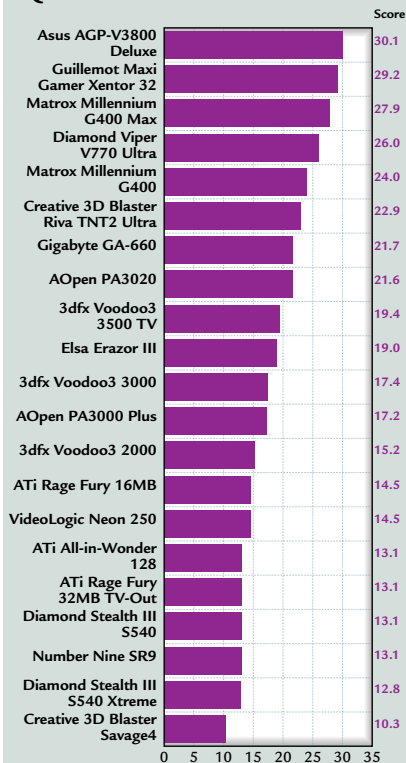
Quake III 1024x768 16bit



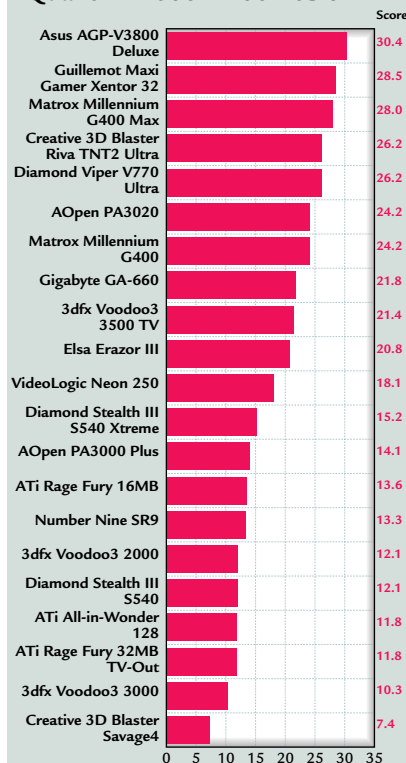
Quake III 1024x768 32bit



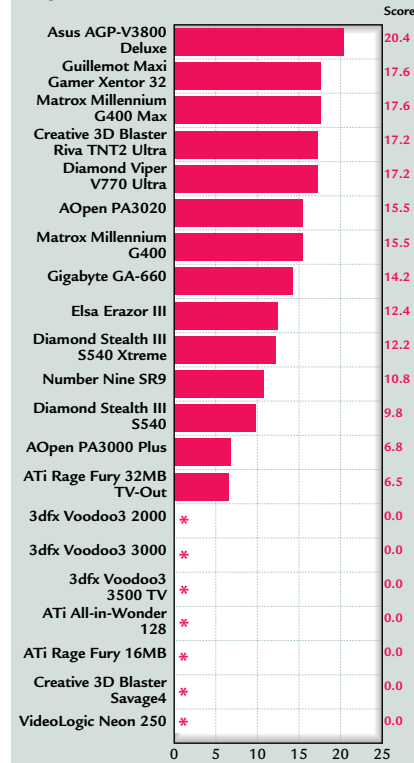
Quake II 1600x1200 16bit



Quake III 1600x1200 16bit



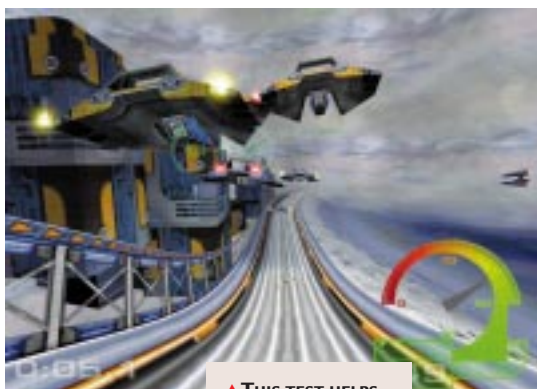
Quake III 1600x1200 32bit



How we did the tests

It's hard work putting graphics cards through their paces. Another round of **Quake III** anyone?

The needs of every user are different and this makes it very difficult to put together a comprehensive benchmark test. Some may place more emphasis on 2D performance – with the ability to play a few 3D games a bonus. Others are willing to sacrifice 2D performance to



▲ THIS TEST HELPS CALCULATE THE CARDS' FRAME RATE BY RUNNING A FUTURISTIC RACING GAME

get the best gaming platform possible, at whatever price. Even if this is true, then they may have certain games in mind, which further complicates matters.

With these issues in mind, we put together the following combination of tests: SYSmark98, 3DMark99 Max, Quake II crusher demo and Quake III demo 2.

SYSmark98

SYSmark measures the time it takes a PC to perform tasks in 14 common office and content-creation applications. 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, XingMPEG Encoder 2.1.

In terms of graphics performance, the most difference is likely to be seen by the content-creation applications as opposed to the office productivity

programs. The whole test takes a couple of hours to run and at the end an overall score is supplied, with higher numbers meaning better results.

3DMark99 Max

3DMark99 Max is an instruction-set optimised version of 3DMark99 from Futuremark Corporation, which tests the 3D capabilities of PCs. It uses a Real World DirectX 6.1 3D game engine to produce one result from a balanced testing methodology that includes image quality, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping. For standalone

reviews and group tests, we usually perform all tests at 1,024x768 resolution in 16bit colour depth with the test suites set to loop three times. In addition to this, to push the cards that little bit harder we also ran the tests at 1,024x768 32bit colour, 1,280x1,024 16bit colour and 1,280x1,024 32bit, if those modes were supported by the card. Once again, the higher the score, the better the result.

Quake II

Not one of the newest games around, but it gives a good overview of OpenGL performance. Testing cards with Quake II consists of running a recorded game on the test system and getting a final frames per second (fps) score at the end. The higher the score the better, with an fps of 20 or higher providing visibly smooth playback. There are a number of demos available, and we opted for the crusher demo (available for download from www.voodooextreme.com/3Fingers/files/crusher.zip) which will really put any card through its paces. To run the test, place the file crusher.dm2 in the quake2/baseq2/demos directory.

Bring up the console and type:

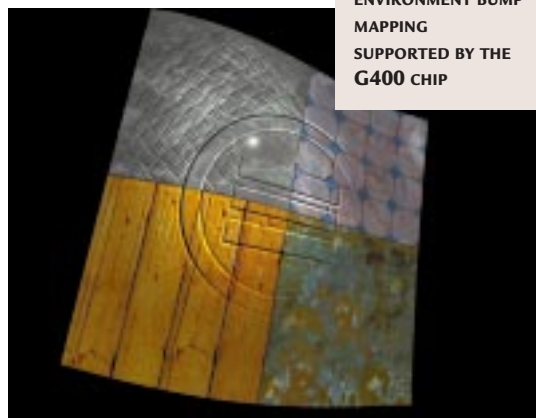
```
s_init sound 0
snd_restart
timedemo 1
map crusher.dm2
```

We ran the demo at a resolution of 1,024x768 to start with and then also at 1,600x1,200, both with 16bit textures enabled.

Quake III

Quake III has not been released yet, but when it is – it's going to be big. With this in mind, we downloaded the latest Quake III test (version 1.08 available from www.quake3arena.com/q3test/win32.html) and set about testing in a similar manner to Quake II. A couple of demos are already built in to the Quake III test, and we opted for demo 2 which puts a greater demand on the graphics subsystem due to it being staged in an open area with no walls. To run the test you need to bring up the console and enter the following commands:

▼ THIS TESTS EMBOSSED BUMP MAPPING, BUT NOT THE HARDWARE ENVIRONMENT BUMP MAPPING SUPPORTED BY THE G400 CHIP



```
timedemo 1
demo q3demo2
```

After the demo has finished, bringing up the console again will display the overall fps score. We ran the test four times for each card at 1,024x768 and 1,600x1,200 resolutions in both 16bit and 32bit colour and texture modes. To run the Quake III test successfully, you'll also need a copy of GLSetup, which is available from www.glsetup.com.



Table of features	Voodoo3 2000	Voodoo3 3000	Voodoo3 3500 TV	PA3000 PLUS	PA3020	AGP-V3800 DELUXE	ALL-IN-1 WUNDER 128	RAGE FURY 16MB	RAGE FURY 32MB TV-OUT	3D BLASTER RIVA TNT2 ULTRA
MANUFACTURER	3dfx	3dfx	3dfx	AOPEN	AOPEN	ASUS	ATI	ATI	ATI	CREATIVE
Price inc VAT (ex VAT)	£81.07 (£69 ex VAT)	£104.57 (£89 ex VAT)	£186.82 (£159 ex VAT)	£88.13 (£75 ex VAT)	£175.08 (£149 ex VAT)	£197.40 (£168 ex VAT)	£158.63 (£135 ex VAT)	£72.85 (£62 ex VAT)	£111.63 (£95 ex VAT)	£151.58 (£129 ex VAT)
Contact	Dabs Direct	Dabs Direct	Dabs Direct	First Hardware	First Hardware	Micro Direct	Dabs Direct	Dabs Direct	Dabs Direct	Dabs Direct
Telephone Number	0800 138 5142	0800 138 5142	0800 138 5142	01296 505101	01296 505101	0161 248 4848	0800 138 5142	0800 138 5142	0800 138 5142	0800 138 5142
Website	www.3dfx.com	www.3dfx.com	www.3dfx.com	www.aopen.nl	www.aopen.nl	www.asus.com	www.ati.com	www.ati.com	www.ati.com	www.creative.com
ESSENTIALS										
Chipset	Voodoo3	Voodoo3	Voodoo3	Riva TNT2 64	Riva TNT2 Ultra	Riva TNT2 Ultra	Rage 128	Rage 128	Rage 128	Riva TNT2 Ultra
RAMDAC frequency	300MHz	350MHz	350MHz	300MHz	300MHz	300MHz	250MHz	250MHz	250MHz	300MHz
Interface	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP
Memory/ Type	16MB/SDRAM	16MB/SDRAM	16MB/SDRAM	32MB/SDRAM	32MB/SGRAM	32MB/SGRAM	16MB/SDRAM	16MB/SDRAM	32MB/SDRAM	32MB/SDRAM
Memory Frequency	143MHz	166MHz	183MHz	125MHz	150MHz	150MHz	103MHz	90MHz	90MHz	182MHz
Hardware MPEG-2 assist	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Software DVD player	✓	✓	✓	✗	✗	✗ (optional)	✓	✓	✓	✓
Composite output	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗
S-Video output	✗	✓	✓	✓	✓	✓	✓	✗	✓	✓
Other	N/A	N/A	TV tuner, audio in/out, composite in/out, S-Video in/out	N/A	N/A	S-Video out, composite out, 3D glasses	S-Video in/out, composite in/out, TV tuner	N/A	S-Video out, composite out	N/A
2D REFRESH RATES PER RESOLUTION (Hz)										
1024x768	120	120	120	150	150	170	180	180	180	170
1152x864	120	120	120	120	120	150	160	160	160	150
1280x1024	100	100	100	100	100	120	125	125	125	150
1600x1200	85	85	85	80	85	85	85	85	85	100
Max res & refresh rate	2046x1536/60	2046x1536/75	2046x1536/75	1920x1200/75	1920x1200/75	2048x1536/60	1920x1200/76	1920x1200/76	1920x1200/76	1920x1440/60
2D MAXIMUM COLOURS PER RESOLUTION										
1024x768	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m
1152x864	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m
1280x1024	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m
1600x1200	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m	16.7m
3D SUPPORT										
Alpha blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Anisotropic filtering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Embossed bump mapping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hardware environment bump mapping	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Anti-aliasing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bilinear filtering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trilinear filtering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gouraud shading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bilinear mip-mapping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fogging	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Perspective correction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transparency (colour & alpha)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z buffering bit depth	16bit	16bit	16bit	24bit	24bit	24bit	32bit	32bit	32bit	24bit
DRIVERS SUPPLIED										
Windows 95/98	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Windows NT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Direct3D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OpenGL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GLide	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗



3D BLASTER SAVAGE4	STEALTH III S540	STEALTH III S540 XTREME	VIPER V770 ULTRA	ERAZOR III	GA-660	MAXI GAMER XENTOR 32	MILLENIUM G400	MILLENIUM G400 MAX	SR9	NEON 250
CREATIVE	DIAMOND	DIAMOND	DIAMOND	ELSA	GIGABYTE	GUILLEMOT	MATROX	MATROX	NUMBER 9	VIDEOLOGIC
£69.33 (£59 ex VAT)	£92.83 (£79 ex VAT)	£104.58 (£89 ex VAT)	£163.33 (£139 ex VAT)	£164.99 (£140.42 ex VAT)	£123.38 (£105 ex VAT)	£186.83 (£159 ex VAT)	£135.13 (£115 ex VAT)	£170.38 (£145 ex VAT)	£123.38 (£105 ex VAT)	£116.33 (£99 ex VAT)
Dabs Direct	Dabs Direct	Simply	Simply	Force2	Dabs Direct	Guillemot	Dabs Direct	Dabs Direct	Microtech	Dabs Direct
0800 138 5142	0800 138 5142	0181 498 2100	0181 498 2100	01844 261 872	0800 138 5142	0181 686 5600	0800 138 5142	0800 138 5142	0181 810 7785	0800 138 5142
www.creative.com	www.diamondmm.com	www.diamondmm.com	www.diamondmm.com	www.elsa.com	www.gigabyte.com.tw	www.guillemot.com	www.matrox.com	www.matrox.com	www.nine.com	www.video logic.com
Savage4 Pro	Savage4 Pro+	Savage4 Xtreme	Riva TNT2 Ultra	Riva TNT2	Riva TNT2	Riva TNT2 Ultra	Matrox G400	Matrox G400	Savage4	Power VRT
300MHz	300MHz	300MHz	300MHz	300MHz	300MHz	300MHz	300MHz	360MHz	300MHz	250MHz
AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP	AGP
32MB/SDRAM	32MB/SDRAM	32MB/SDRAM	32MB/SDRAM	32MB/SDRAM	32MB/SDRAM	32MB/SDRAM	32MB/SGRAM	32MB/SGRAM	32MB/SDRAM	32MB/SDRAM
125MHz	143MHz	166MHz	183MHz	140MHz	167MHz	183MHz	Not supplied	Not supplied	125MHz	125MHz
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
✗	✗	✗	✗	✓	✗	✓	✗	✗	✗	✗
✗	✗	✗	✗	✓	✗	✓	✗	✗	✗	✗
N/A	N/A	N/A	N/A	S-Video out, composite out	N/A	N/A	Dual head	Dual head	Digital flat panel connector	N/A
120	120	120	120	200	200	200	160	160	130	120
100	120	120	120	160	170	150	140	140	85	100
85	120	120	120	120	150	120	120	120	85	85
85	85	85	85	90	120	85	100	100	60	60
1920x1200/60	1920x1440/60	1920x1440/60	2048x1536/60	1920x1440/75	2048x1536/60	2048x1536/60	2048x1536/70	2048x1536/85	1920x1440/60	1920x1440/60
16.7m	16.7m	16.7m	16.7m	16.7	16.7	16.7m	16.7m	16.7m	16.7m	16.7m
16.7m	16.7m	16.7m	16.7m	16.7	16.7	16.7m	16.7m	16.7m	16.7m	16.7m
16.7m	16.7m	16.7m	16.7m	16.7	16.7	16.7m	16.7m	16.7m	16.7m	16.7m
16.7m	16.7m	16.7m	16.7m	16.7	65K	16.7m	16.7m	16.7m	16.7m	16.7m
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32bit	24bit	24bit	32bit	24bit	24bit	24bit	32bit	32bit	32bit	32bit
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

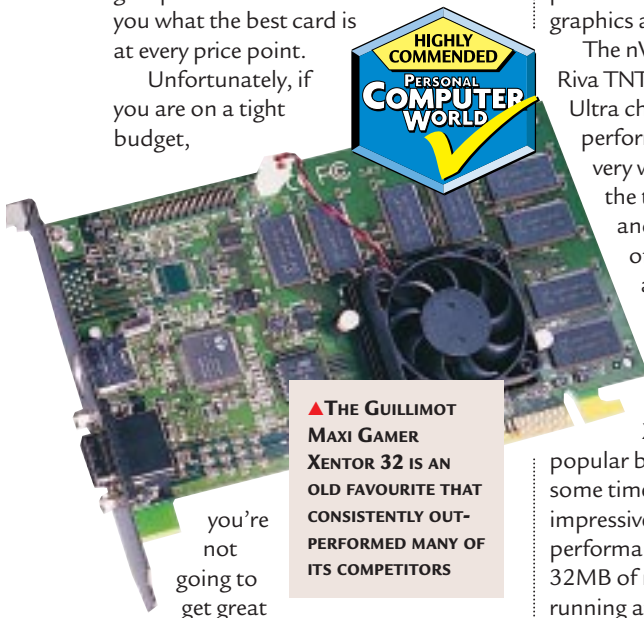
Editor's choice

The graphics card market is **frantically expanding**, so we help you avoid the wooden spoon brigade.

With a massive 21 cards on test, picking winners wasn't the easiest of tasks, which is why we put each of them through such a rigorous set of tests. The differences between graphics cards in 2D applications is pretty minimal these days, you're not likely to see much differential between any of them in real world use. It's when it comes down to 3D performance that the pack starts to separate, with huge differences in performance between the front runners and the wooden spoon brigade.

As with most purchases you have to ask yourself two very important questions, what do you want to do? and how much do you want to pay? These two questions are equally important, since there's no point deciding you want the best 3D performance available if you only have a budget of £50. Ultimately, you'll have to make a compromise between the two, and throughout this group test we have tried to tell you what the best card is at every price point.

Unfortunately, if you are on a tight budget,



▲ **THE GUILLIMOT MAXI GAMER XENTOR 32 IS AN OLD FAVOURITE THAT CONSISTENTLY OUTPERFORMED MANY OF ITS COMPETITORS**

3D performance, and our advice would be to save up a bit more money before you buy. However, if you're really desperate to play some 3D games and are strapped for cash, the 3dfx Voodoo3 2000 might be worth a look. It wasn't good enough to walk away with an award, but if you're after decent performance at a bargain price it's worth considering.

Demonstrating a stunning return to form, Matrox has grabbed the Editor's Choice award. The Millennium G400 Max has a formidable array of features including a dual-head facility for supporting two monitors simultaneously. There's 32Mb of on-board memory and a ridiculously-high 360MHz RAMDAC, making sure that a flicker-free refresh rate is achievable, no matter what the resolution. Performance is superb in both 2D and 3D environments and the G400 chipset is the only one to support hardware environment bump mapping. If you're looking for the pinnacle of PC graphics acceleration, this is it.

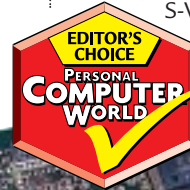
The nVidia Riva TNT2 Ultra chipset performed very well in the tests, and both

of the highly commended awards go to boards based on this chip.

The first goes to the Guillimot Maxi Gamer Xentor 32. This has been a

popular board with PC integrators for some time now, due to its impressive performance. There's 32MB of memory running at a frequency of 183MHz, while the RAMDAC runs at 300MHz. This card was never far from the top in any of the tests and it also has a TV-out connector, in case you want to play DVD movies on your television. It only supports AGP 2x, but we saw no improvement using AGP 4x-equipped cards.

The second Highly Commended award goes to Asus for its AGP-V3800 deluxe. Again putting the TNT2 Ultra to good use, this card is very fast. It also has S-Video and



▲ **THE MATROX MILLENNIUM G400 MAX CONTAINS THE G400 CHIPSET, WHICH IS THE ONLY ONE TO SUPPORT HARDWARE ENVIRONMENT BUMPING**

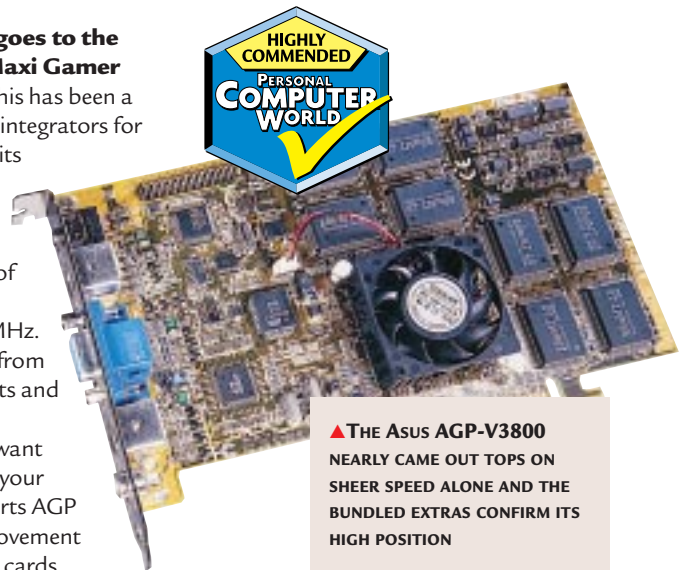
composite video outputs. Asus has even supplied the cables for both video out ports. To round things off there's a pair of 3D glasses, compatible with two bundled games. They may not be to everyone's taste, but they add value

to an already good package.

Finally we'd like to thank Carrera,

Panrix and Polar for supplying us with the equipment needed to perform this group test.

If you're looking for the pinnacle of PC graphics acceleration, this is it

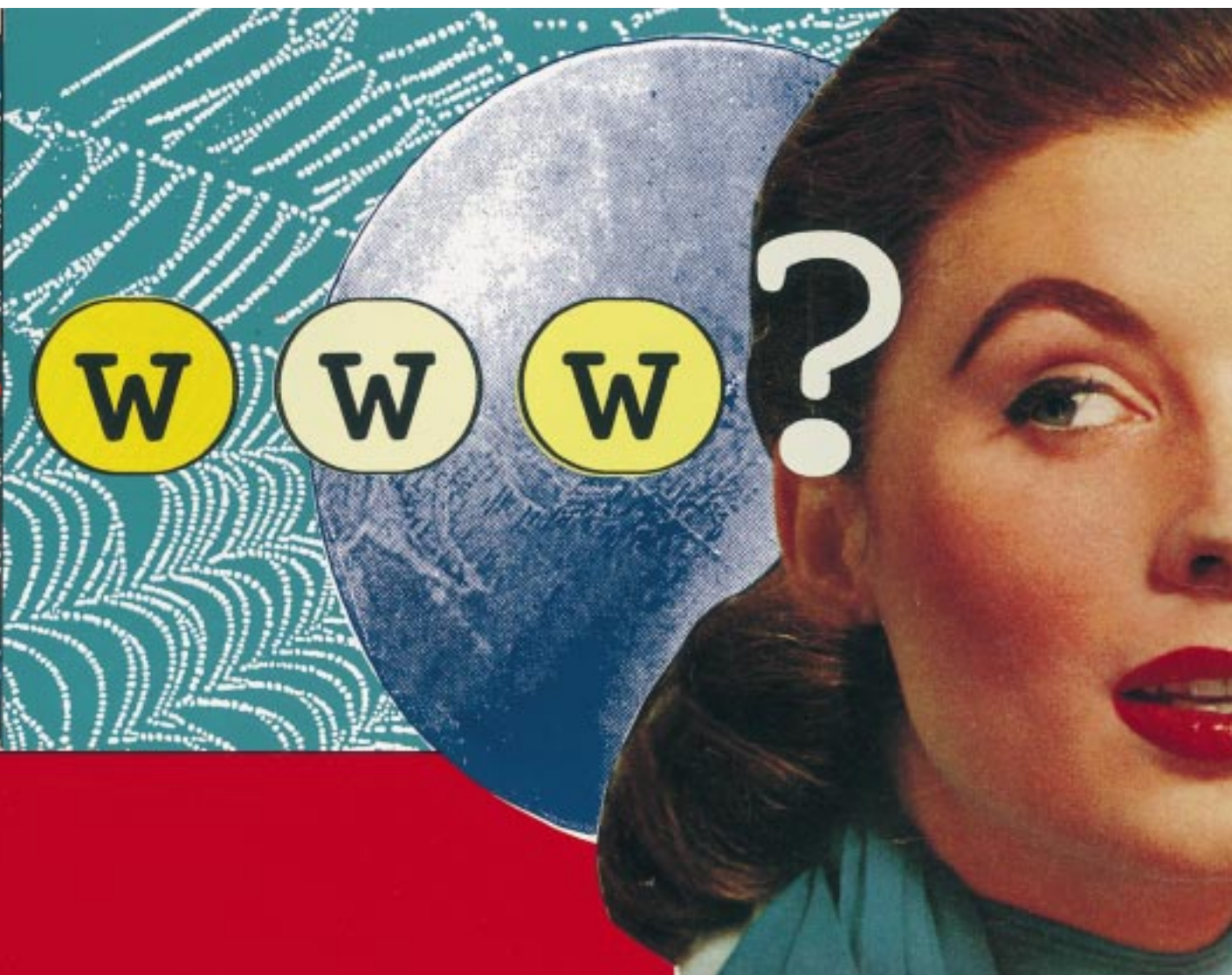


▲ **THE ASUS AGP-V3800 NEARLY CAME OUT TOPS ON SHEER SPEED ALONE AND THE BUNDLED EXTRAS CONFIRM ITS HIGH POSITION**



Spinning your web

These days **everyone who's anyone** has a website, from showing off their baby pics to selling goods around the world. Nik Rawlinson tests the software available to help you build your own.



With the recent burst of free ISPs, it's more important than ever for businesses and some home users to have a credible presence on the net. It won't be long before businesses without websites are like shops without storefronts, and while home pages used to be a novelty, they're rapidly becoming the norm for thousands of home users nationwide.

Probably the only businesses that won't be glad to hear that it's no longer necessary to hire a web design consultancy are the consultancies themselves. A plethora of WYSIWYG packages are filling the market, and with every day that passes the choice becomes more difficult to make. Bearing that in mind, we have split the products reviewed here into two categories, defined by their target users. First, we look at the heavier business packages, then we move on to

small-office and home-user options.

Of course, that's not to say the home user will be unable to use high-end packages and vice versa, but the cost implications of database integration, chat forum wizards and suchlike often puts them out of their reach. Likewise, large organisations may be able to make good use of the home and small-office applications.

We also take a look at perhaps the most important aspect of your online identity – a memorable web address. Without an easily remembered URL, your site could soon become an online wilderness. What you need is a domain of your own. We lift the lid on these new-age designer labels and tell you how to get your own.

The important question to ask is whether you would rather shop online with an organisation that has a domain of its own or one whose web address includes the name of a free ISP.

Contents

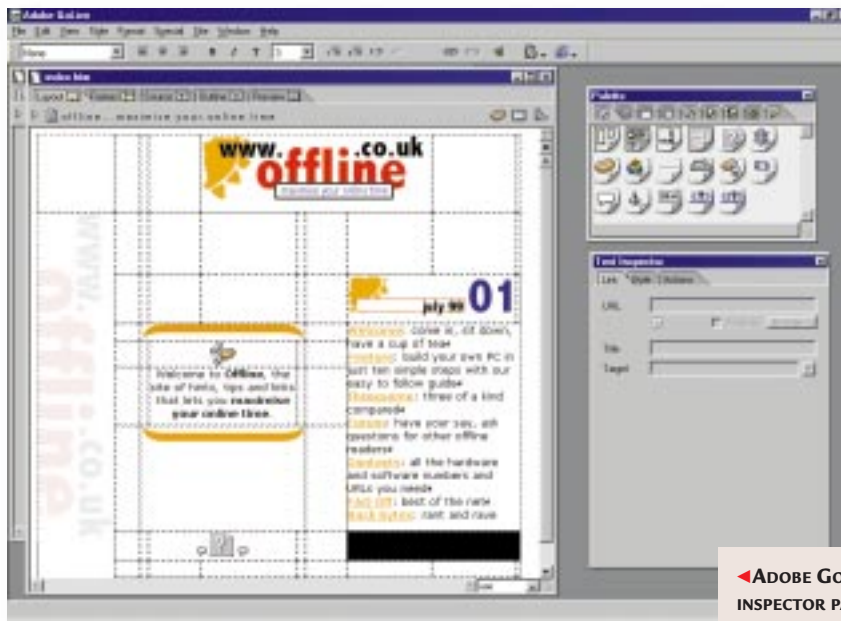
- 202 High-end business users:**
 Adobe GoLive 4
 Microsoft FrontPage 2000
 Macromedia Dreamweaver 2
 Allaire HomeSite 4
- 205 Home and small-office users:**
 SoftQuad HoTMetaL Pro 5
 Adobe PageMill 3
 Claris HomePage 3
 Web Page Construction Kit 5
 Symantec VisualPage 2
- 210** Table of features
- 211** Registering a domain name
- 212** Editor's Choice

Ratings

- ★★★★★ **Highly recommended**
- ★★★★ **Great buy**
- ★★★ **Good buy**
- ★★ **Shop around**
- ★ **Not recommended**

High-end business users

Websites now serve as the **shop window for businesses**, so choosing the right package is vital.



◀ **ADOBE GoLive's INSPECTOR PALETTE ALLOWS YOU TO MAKE CHANGES IN A SINGLE LOCATION**

Business users are perhaps the most demanding group of web authors. They require reliable code with good cross-browser compatibility, to ensure that none of their customers will have trouble accessing their online presence. They also frequently require more complex functions, such as database integration, discussion forums and the ability to edit sites from more than one geographic location. These sorts of functions don't come cheap, so while they may come in useful for the smaller business user or high-end home author, they are usually restricted to this business-oriented market.

Adobe GoLive 4

Familiar to Mac users as GoLive CyberStudio, this industry leader has not benefited from its transition to the PC platform. It has a clean, uncluttered interface but does not enjoy the award-winning Adobe interface of Photoshop, Illustrator and InDesign.

Entire sites can be imported from the hard drive or by FTP, so it is easy to work on an evolving presence from multiple geographic locations. QuickTime editing functions are also included, and you can add effects to the QuickTime filters track. You can also add an HREF track so that links within a movie will auto-load

within a browser frame when the movie reaches a certain point. If you're thinking of making an online training video, this is an indispensable feature.

An externally referenced JavaScript library means you will not find yourself opening every page with a particular JavaScript element to make a change – just change it once within the library copy and the change will ripple down through every page where it is used.

We found that when previewing some table-based pages, GoLive disregarded table width tags, fouling up our layout. However, it had no problem displaying the same page correctly in layout mode.

The Inspector palette, similar to the one in Macromedia Dreamweaver, allows you to make changes in a single screen location, rather than having to hunt around for variable boxes.

Perhaps the most serious flaw in GoLive lies in its frame-handling abilities. For a start, you can't apply frames within the layout mode – you have to be in the exclusive frame mode. Second, if you drag one pre-defined frameset into another, it seems to invoke another random and contrary split to the frame

into which you are dragging, and applies your new frameset to just one of the two new frames. It's then up to you to manually destroy the surplus frame. However, the Undo function doesn't apply to frames, so one wrong move and you'll have to start again. The program also has difficulty resizing frames on a percentage basis. Strangely, four frames set to take up 25 per cent of the screen height each will occupy less space than one frame occupying 100 per cent of the screen height.

Table handling is also clumsy. To select multiple cells, they must each be clicked individually. You cannot select a whole column or row, or drag-select across multiple cells. The table inspector has a tab that allows you to alter the attributes of a whole row but not a column. While this makes it easy to create header cells, it does nothing for users who want to make a price list with products left-justified in column one and prices right-justified in column two.

GoLive makes it easy to generate cookies to write to and from the user's PC, and Head Actions can be called at a variety of points within a script rather than just when the page has finished loading. Actions can be initiated on page unloading, for example, by selecting the option from a dropdown menu, which makes it easy to set it to write cookies

without any difficult coding. With literally just two clicks, you can have floating alert boxes popping up within your viewer's browser windows.

Perhaps the most serious flaw in GoLive lies in its frame-handling abilities

Microsoft FrontPage 2000

FrontPage is difficult to place. On the one hand, it appeals to a home audience because a cut-down version can be downloaded for free and it's bundled with the Premium edition of Office 2000. On the other, its sophisticated extensions and database integration facilities make it ideal for the high-end business user. Web folders make it easy to edit a site located on a remote server

without downloading it to a local drive first, so this is one of the premium packages for maintaining sites from multiple geographical locations.

Users of earlier versions of the package may have found the distinction between the Explorer (site maintenance) and Editor (page design) modules irritating. They have now been merged into a single application, giving the package a more unified and robust feel. Themes are infinitely customisable and all theme elements can be modified to meet users' precise personal needs. The format painter can also be used to 'paint' DHTML attributes from one page element onto another. Many web authors opt to avoid DHTML due to possible browser incompatibility, but FrontPage can substitute any DHTML

can access certain defined areas of your new site.

Microsoft has done much to improve on the clumsy feel of earlier versions and it has largely paid off. The engineers in Redmond could do with taking a second look at Dreamweaver, though, to see how a truly powerful and intuitive web-authoring tool should work.

Macromedia Dreamweaver 2

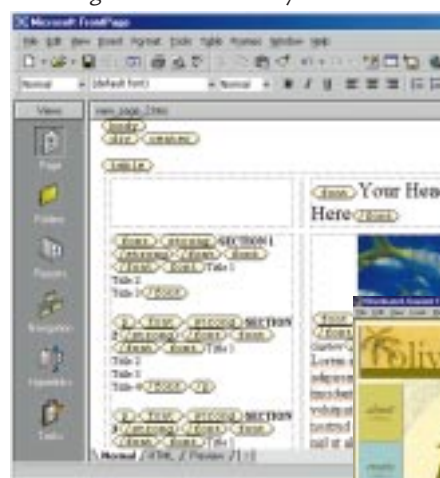
For ease of use alone, Dreamweaver casts a long shadow across every other package here. The attractive interface is clean and uncluttered, although it will seem rather squashed on



▼ THE EXPLORER AND EDITOR MODULES IN FRONTPAGE HAVE NOW BEEN MERGED

an 800x600 screen. The pages of every palette are tabbed and can be individually undocked, while

the Property Inspector is context-sensitive and will tailor itself to contain



for equivalent coding that will work in older browsers.

Another change designed to bring traditionalists into the Microsoft fold is the ability to structure HTML to match a sample page that you load. Users of Dreamweaver, therefore, can now use FrontPage and be sure that the HTML will be written using a familiar layout.

Inserting a form area simultaneously dumps Submit and Reset buttons onto the page, so you don't forget them before you save your page. Radio buttons are automatically associated with one another, which saves time when setting up option fields.

The now familiar chat room extension has been supplemented with database extensions for reading and even writing to a server-based database through the browser. This allows you to set up a registration process whereby user details will be automatically written to the database and only registered users

▲ DREAMWEAVER COMES TOP FOR EASE OF USE, WITH ITEMS BEING PLACED USING A POINTER

attribute fields for whichever page element you have selected.

Generating hyperlinks, selecting files and importing images are simple matters of dragging an elasticised pointer from an input box to the relevant file in a directory view. The pointer snaps back, taking the file with it.

Pages can be laid out in table or layer mode. Layers will work only in version 4 and above of Netscape Navigator and Internet Explorer, so if you choose to use this more flexible method, Dreamweaver will convert to table layout at the click of a button. To make layers even easier to

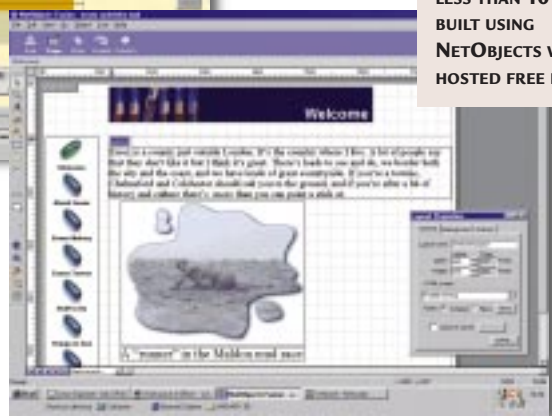
position, a tracing image can be loaded that will sit behind your workspace, showing through like an onion skin. This is not saved along with your finished page so it will not be seen by your audience.

Dreamweaver's table handling abilities easily outperform those in GoLive. Entire columns can be cut and pasted from one section to another and table data can be sorted, just like a spreadsheet. Styles and fonts are grouped for cross-platform compatibility, so selecting Arial will actually write 'Arial, Helvetica, sans-serif' into your code, to make sure your work looks the same whether your audience is browsing on a PC or Mac.

Pages can be based on user-defined templates. A change made to the template will ripple through all pages based on that template. New templates can be applied to existing pages. They will replace any already in existence and incorporate the existing page content. This allows dramatic changes to be made to multiple pages instantly, such as colour changes that match new corporate identities.

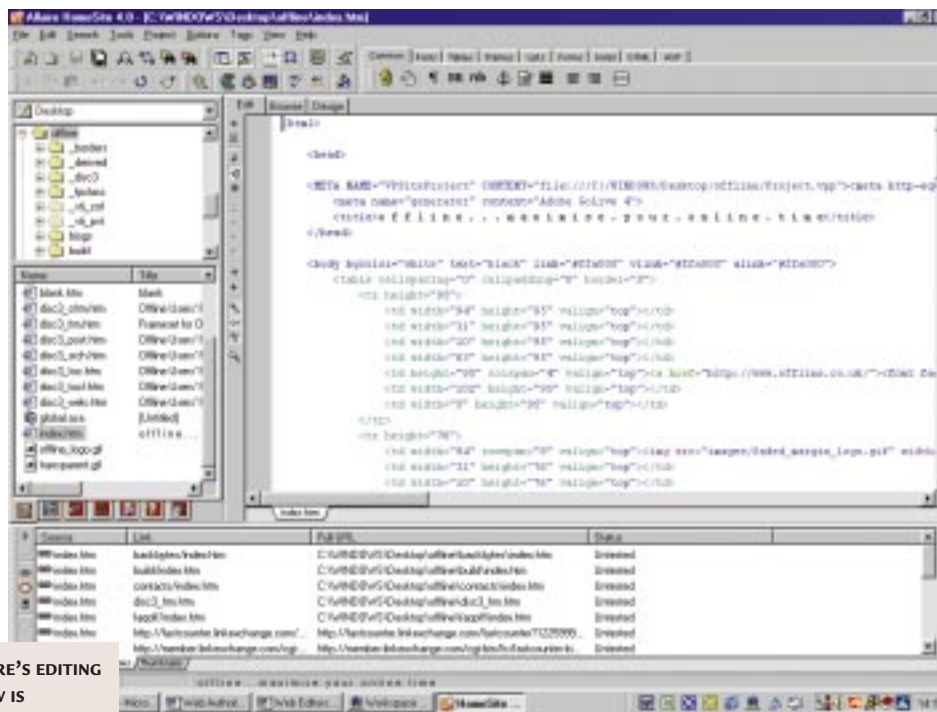
Dreamweaver has no raw code-editing tools, but it comes with a copy of Allaire HomeSite. The two are so closely integrated that seamless HTML round-tripping is the norm, and any changes applied in one package will be applied simultaneously to the code loaded into the other.

▼ A SHOP SELLING LESS THAN 10 ITEMS BUILT USING NETOBJECTS WILL BE HOSTED FREE BY ICAT



NetObjects Fusion 4

For some time, Fusion has been the editor of choice for professional web authors, but the competition is now snapping at its heels. Version 4 uses the same unique picture-handling conventions as its predecessor. Depending on how you handle the frame, a picture will be either stretched



▶ **ALLAIRE'S EDITING WINDOW IS CHARACTER-BASED BUT THE PROGRAM INCLUDES TOOLBARS**

(as is more often the case) or cropped. Users of version 3 will find the interface familiar and easy to use.

Version 4, however, has a wider range of thematic styles. They are far more business-like, quite useable, and even include rollover images so you no longer have to grapple with JavaScript. As ever, Fusion works fast: add a page to your site structure and all other pages will have index graphics added to link to the new page, while banners will be redrawn and customised.

Work in progress is automatically compacted and sites are saved as a whole rather than page by page. Even before you've finished, you have a fully working site so you can preview your work in progress.

Generating image maps is also a breeze – simply define a

target area and a list of existing pages will pop up, waiting for you to select the appropriate link.

Ecommerce components can be dragged and dropped into the workspace and if your shop has 10 or fewer items on sale, it will be hosted for free by iCat, which will handle all transactions and credit your takings to your own card. You can also incorporate IBM HotMedia components, for a more interactive shop with zoomable images and 3D objects.

Tables are handled well. Cells can be

resized by dragging the borders of each cell or the markers that appear in the toolbar, just as in Word. Merging and splitting cells is also easy – just select a number of cells and right-click for the manipulation menu. A spell-check and word count are also welcome features.

Allaire HomeSite 4



HomeSite is aimed at those dedicated users who prefer to code by hand, but will also appeal to visual site designers who want to learn more about editing raw HTML. While the editing window is unashamedly character-based, the interface includes draggable image thumbnails and extensive toolbars that

give the feel of a visual editing package. The code-validation module is also

thorough, even issuing warnings about use of the Font tag: HomeSite warns that this could become obsolete in the future and that you should consider switching to style sheets.

The Codesweeper will tidy up your HTML and you can specify the way it handles each of the tags it comes across on an individual basis. All open documents are piled on top of one another and accessed by clicking on tabs at the foot of the main editing window.

The snippets palette is a real time-saver: lines or whole sections of frequently

used code can be deposited here and dropped at specific places within your pages with a right-click. It also benefits from multiple levels of undo.

Tables and frames can be generated either on a tags-at-a-time basis, by filling out an attribute form that defines every part of the table or by using the wizards provided. Forms are generated through a series of attribute palettes, because it would not be possible to build a wizard to handle anything so complex. Unfortunately, this means that attributes such as radio buttons are not automatically associated, making this aspect of HomeSite somewhat less user-friendly for inexperienced users. This, however, was our only gripe.

HomeSite 4 features an excellent JavaScript wizard,

giving instant, code-free access to a range of scripts for frame-busting, background colour transitions and dropdown URL selection menus.

PCW DETAILS

★★★★

Adobe GoLive 4

Price £229.13 (£195 ex VAT)

Contact Adobe 0131 458 6842

www.adobe.co.uk

★★★★★

Microsoft FrontPage 2000

Price £119 (£101.28 ex VAT)

Contact Microsoft 0345 002000

www.microsoft.com

★★★★★

Macromedia Dreamweaver 2

Price £269.08 (£229 ex VAT), upgrade for £116.33 (£99 ex VAT)

Contact Computers Unlimited 0181 358 5857

www.macromedia.com

★★★★★

NetObjects Fusion 4

Price Full product £233.83 (£199 ex VAT), upgrade £81.08 (£69 ex VAT)

Contact NetObjects 01753 705077

www.netobjects.com

★★★★★

Allaire HomeSite 4

Price £88.13 (£75 ex VAT)

Contact Allaire 01638 569600

www.allaire.com

Home and small office

Users with less emphasis on big business still need a web editor to be a **good all-round package**.



rather than wrapping the text. Our formatting was then lost.

Form handling, on the other hand, is excellent: simply select the form element you require from

the Forms menu. Radio buttons are automatically linked to build up an alternatives list and generating a dropdown list box is a simple matter of entering your menu options on a form.

HoTMetal is dictatorial in its loading of existing documents. If they were created outside HoTMetal, you must agree to every single alteration it wants to make to your existing coding or it will refuse to load it. On a more positive note, it includes spell-checking functions and will even gauge how accessible your page is across a variety of browsers and for users with disabilities. It copes well when importing table data from Excel and has a first-class instruction manual and on-disc reference.

Adobe PageMill 3

If you're an Adobe addict, we'd recommend PageMill above GoLive. Not only is it cheaper, but it has a well-



established user base and is a joy to use. The interface is friendly and lets you edit raw HTML. It copes well with importing



Excel data and its conversion of Word documents

to web pages is second to none. In fact, it did this so well that we had to check the raw HTML before believing it really had performed a translation.

Framesets can be generated by splitting the existing screen area or by dragging margins into your workspace with the mouse. This gives you precise control over frame sizes. If you then

Mid-range users are spoilt for choice when it comes to web-authoring software. While they may find home-user packages limiting, there are plenty of alternatives. The software in this section is slightly more friendly than that aimed at large corporate users, while many of those high-end packages in the business category contain features that they will also find useful.

SoftQuad HoTMetal Pro 5

HoTMetal's success is largely down to its 'tags-on' view, which mixes a mainly text-based interface with a series of tags that do their best to hide any complicated coding. This serves two purposes. First, it makes the package more attractive to first-time web authors, and second, each tag encompasses a range of properties that can be quickly identified and altered. Tags-on functionality is now incorporated into FrontPage 2000, so if this is your only reason for following the SoftQuad road, consider your options carefully.

HoTMetal is slow to work with compared to the other packages reviewed here. The Undo function is also slow, because it undoes viewing changes in addition to formatting and typing.

So, switching from tags mode to WYSIWYG adds another step to the Undo list, which you have to cycle through even when you have made no physical alteration to your page. We found the WYSIWYG mode difficult to work with, too. Although the tags have been removed from view, they are still present within the document, so

it's difficult to know exactly where you are placing your text and you can end up typing on the wrong side of a font tag.

We couldn't get table cell contents to align to the top of a cell, no matter how many times we set the attributes on a whole-table basis through the Attribute Inspector. Another table quirk is the inability to select multiple cells. Formatting therefore has to be applied to the table as a whole, or to each cell on an individual basis. Similarly, HoTMetal had trouble maintaining cell widths. Although we set our desired width by dragging the cell divider, the software widened cells when we typed long strings

rather than wrapping the text. Our formatting was then lost. Form handling, on the other hand, is excellent: simply select the form element you require from the Forms menu. Radio buttons are automatically linked to build up an alternatives list and generating a dropdown list box is a simple matter of entering your menu options on a form. HoTMetal is dictatorial in its loading of existing documents. If they were created outside HoTMetal, you must agree to every single alteration it wants to make to your existing coding or it will refuse to load it. On a more positive note, it includes spell-checking functions and will even gauge how accessible your page is across a variety of browsers and for users with disabilities. It copes well when importing table data from Excel and has a first-class instruction manual and on-disc reference.

create a hyperlink in one of your documents and right-click it, you get a small map of your frameset. You then click the appropriate frame to indicate the link destination. If you want to create a link to your current page on another open window, click on the icon next to your current window's title bar and drag it to the link destination in your other document, and it's done. With no typing or coding, your link is in place.

The Inspector panel is very powerful. Dragging an image onto the Inspector's background square tiles the image as wallpaper, while the pasteboard allows you to drag an image from one page onto the board and then off the board onto another page. This dramatically shortens your working time.

Form creation is similarly well thought out. Once you have a form element on the page, you can CTRL-drag it to another location to copy it. In this way, forms can be

generated in seconds and CTRL-dragged radio buttons will automatically be associated with each other, eliminating the need for hand coding or alterations through the Inspector. Field lengths are extended simply by dragging the right-hand border of the element container.

We tried hard, but we couldn't find anything to complain about when it came to PageMill.

Clariss HomePage 3

Coming from the home of FileMaker, it's not surprising that HomePage enjoys good integration with this industry-leading database, making it easy to publish dynamically-updated databases on the web. Your pages must be hosted on a server running FileMaker 4, but if you wanted to do the same through FrontPage, you'd need a server with FrontPage extensions.

Tables are handled well and HomePage allows you to select multiple cells by clicking on one corner of your range and then Shift-clicking on the opposite

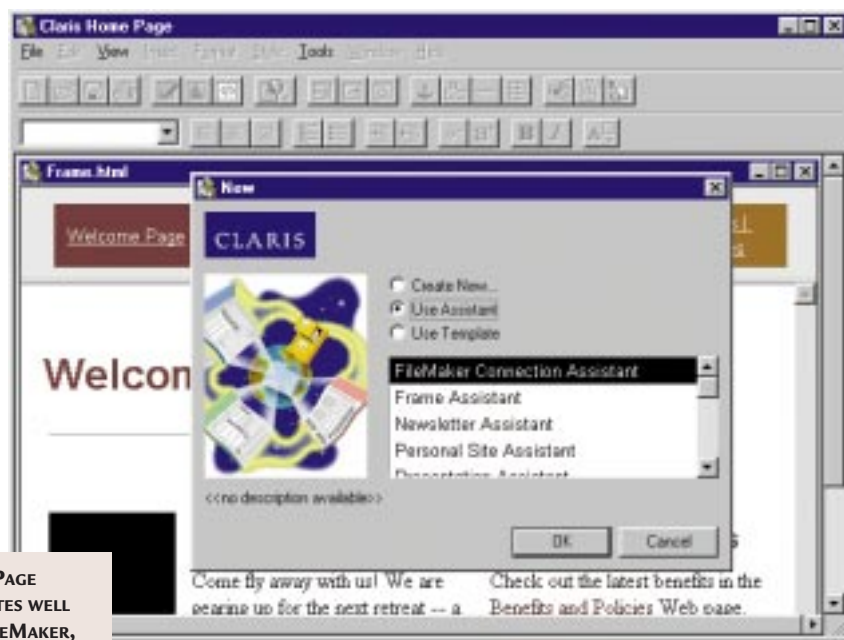
► **HOME PAGE**
INTEGRATES WELL
WITH **FILEMAKER**,
CLARIS' DATABASE
OFFERING

corner. You can merge cells by selecting one and dragging its border into any number of neighbouring cells in any direction at once.

Links are created by highlighting the link keyword and clicking the link editor. You can then type in the hyperlink destination. Although HomePage offers no specific validated link creation like FrontPage, it will check the validity of links internal to the site. It also includes a library of animations, bullets, banners and clip art that can be dragged and dropped into your documents. Images can be easily resized by dragging the corners of the holder frame. Holding Shift at the same time maintains the image proportions.

Frameset creation is straightforward and functional, but by no means as

intuitive as the PageMill method. A frames page must be generated from the File menu and the frames it contains can



be subdivided from the toolbar or resized by dragging the borders. Unlike PageMill, you cannot edit the pages within your frames – the frame editing page is for editing frames alone. Nor does HomePage name your frames, you are expected to do this yourself from the Object Properties dialog.

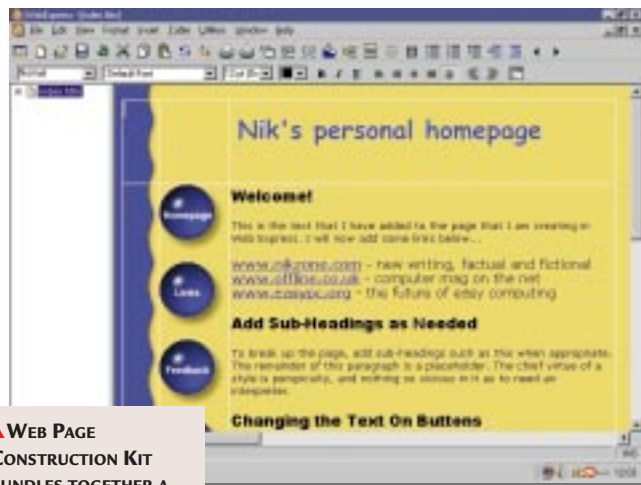
Forms are handled well, and radio button sets are automatically associated within a form area. As soon as a form element is added to the page, a Properties dialog box appears so that you can tailor it to your needs. One neat touch is the way that text on a button can be amended simply by clicking on it and retyping.

Web Page Construction Kit 5 Deluxe

This is actually a bundle of three pieces of software and three electronic books, which makes it excellent value for money.

Pages can be created on an individual or site basis and built from scratch or based on a theme. Be warned, though, that basing them on a theme means all the pages in the site will look the same – there is no option to slip in a page that differs. The themes are all fairly generic and although you can make minor modifications, such as the text on your image buttons, it's obvious they've been software generated.

All functions are accessed from the toolbar, which brings up a series of palettes for changing variables, making this a good choice for the first-time user. We were also impressed by the form handling functions. A range of ready-made customisable forms is available for



► **WEB PAGE**
CONSTRUCTION KIT
BUNDLES TOGETHER A
LOT OF SOFTWARE,
MAKING IT GOOD VALUE
FOR MONEY

gathering information, including one that's set up to include a field for credit card details. Another useful form creates a pull-down menu that allows site visitors to jump immediately to a selected page rather than following your site navigation. Assuming your ISP allows you to run your own CGI scripts from its servers, the Construction Kit will write the necessary script and drop it in the appropriate location within your web space to get the form working.

However, you can't view raw HTML directly. To do this, the Construction Kit

Also included is NEC Auraline, an easy-to-use package for creating presentations that can be used within PowerPoint or, with the inclusion of a small Java applet, a web browser.

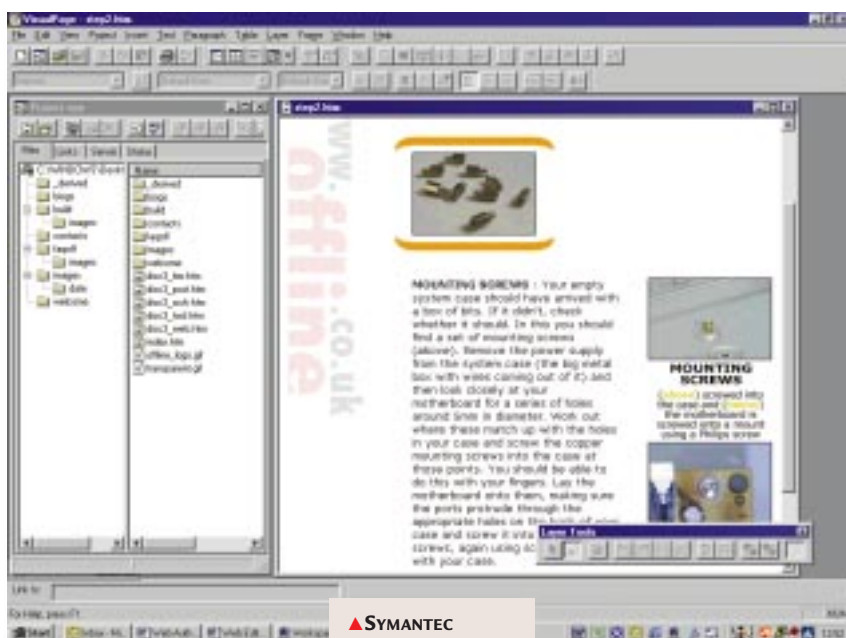
Symantec VisualPage 2

The first problem with VisualPage is that if you define a new page based on frames, the program assumes that you want a vertical split with two columns. If not, you have to split one of your columns horizontally before deleting the

FrontPage, but it is in line with most other packages and does allow you to set every attribute in one hit. One problem that we encountered with tables, though, was its quirky handling of cell merges. We selected a 2x2 square of cells within a large grid and asked VisualPage to merge them into one. On many occasions, it actually merged the two right-hand cells and the two cells to the right of these, leaving the two left-most cells of our initial square untouched.

VisualPage 2 has a layer mode, but it is time-consuming to use. You cannot create layers from scratch, but must first generate your page in standard mode and then transform selected elements to layers so that they can be moved around. We found this more of a hindrance to speedy layout than a help.

Another poorly thought out feature is the new project wizard, which is used to establish new sites. It requires you to specify a site folder but offers no way of creating a new folder, even if you have specified that you are creating a new site from scratch. The only option is to cancel out of the wizard, create the folder through Windows Explorer and start the wizard again.



▲ SYMANTEC
VISUALPAGE 2
INCLUDES A LAYER
MODE BUT IT IS
TIME-CONSUMING

has to shell out to an external text editor specified by the user during installation. It's not possible to round-trip the code, either, so once amended, it must be reloaded before you'll see the effect.

Frames were another minor niggle. They're easy enough to create, but after dropping a page into a frame, we found it difficult to do anything to the frame properties.

Bundled with the package is WebPainter 2, a simple graphics and animation editing kit that will suit most users' basic needs. The interface features a lot of floating workspaces and toolbars, but it makes short work of generating animated gifs and even features onion skinning, where the previous or next frame in your production can be made visible beneath your current workspace to help you line up your frame elements. Packages without onion skinning frequently generate unsteady animations, so from a practical point of view, this is a necessity more than a luxury.

second vertical frame. A simple question box could have solved this. All frame properties are set in a dialog

box, but this does not include a browse button for defining the content – you have to remember this and enter the address yourself.

The extensive toolbars are well ordered and allow you to do everything from changing your edit mode to inserting a Java applet with a single click. The raw-code mode is easy to use and if the standard colours used don't suit your needs, they can be changed.

Fonts are arranged in groups, so selecting Arial Group will format your text as Arial, Helvetica for cross-platform compatibility. Changing font sizes is easy: two buttons on the toolbar take care of stepping up and down through the sizes. VisualPage 2 also features a spell checker, but unfortunately only one level of undo.

Creating a table is a matter of filling in a dialog palette. It's not as intuitive as the Word-style table creation of

PCW DETAILS

★★★★

SoftQuad HoTMetal Pro 5

Price £116.33 (£99 ex VAT)

Contact SoftQuad 0181 387 4110

www.softquad.co.uk

★★★★★

Adobe PageMill 3

Price £92.83 (£79 ex VAT)

Contact Adobe 0131 458 6842

www.adobe.co.uk

★★★★

Claris HomePage 3

Price £82.24 (£69.99 ex VAT)

Contact FileMaker 0845 603 9100

www.filemaker.co.uk

★★★★★

Web Page Construction Kit 5 Deluxe

Price £49.99 (£42.54 ex VAT)

Contact MediaGold 0171 372 9762

www.mediagold.com

★★★★

Symantec VisualPage 2

Price £62 (£52.77 ex VAT)

Contact Symantec 0171 616 5600

www.symantec.co.uk

Registering a domain

If you're reading this near a radio, flick it on and tune to a commercial station. Don't read any more of this page until you've listened to the next set of adverts...

Done that? Good. So, of the five or six ads you've just heard, how many had phone numbers you remember and could scribble on the top of this page right now? Probably not more than two. So now you can see it's only the simple, easily-remembered numbers that are effective. The same is true of web addresses. It's all very well getting 20MB of free space with your ISP account, but if it has an address as long as a thesis, it'll soon be forgotten and probably ignored.

Sticking with the phone number analogy, if someone has the memorable number you want, there's very little you can do about it. Once it's gone it's gone for good, and if you're not prepared to pay big

money you might as well forget it. The same is usually the case with Internet domain names. Unscrupulous users are cashing in on this by cyber-squatting – registering a domain they know someone else will want for the sole purpose of selling it back to them at a higher price later. Although some corporates have taken registrants to court to try to win back the names they see as rightfully theirs, the law is decidedly grey in this area. An attempt has been made to look at the legal history of such cases, and more details can be found at www.patents.com/pubs/jmls.sht.

This piece was written at the beginning of September and on the day it was completed, 10,372,304 domains had been registered worldwide, of which 6,410,871 were .com domains and 372,684 ended with a more



▲ NETWORK SOLUTIONS DEALS WITH THE REGISTRATION OF ALL .COM, .NET AND .ORG URLS
▼ NOMINET HANDLES REQUESTS FOR ALL WEBSITES ENDING IN .UK

the few memorable names that remain going at a rate of several thousand every week, you can see why it's so important to get the name you want before someone else gets there first. In fact, there's a good chance the name you're after has already gone. So, before you finish reading, check out Nominet at www.nic.uk if you're looking for a domain ending .uk or go to www.networksolutions.com for a .com, .net or .org address.

If your name is already registered, we can do nothing but commiserate. You could, of course, try a variant, such as hyphenating, pluralising or adding some extra letters or numbers to your name, but otherwise you're going to have to think of an alternative. Once you've found one you're happy with, it's time to bag it. You could do this directly through the naming authority on one of

the two addresses mentioned above, but as it's highly unlikely you'll be a member of either (unless

you're very rich), it'll be cheaper to do it through someone who is. For a list of members of Nominet, the UK naming authority, check out www.nic.uk/members.html and follow one of the links. Almost all of these will be able to register a .com, .net or .org address for you too.

As with most things, you would do well to shop around. The cost of .com, .net and .org addresses currently runs to \$70 a pop (£48), while .uk addresses have just been reduced to £5 each. Anything on top of that is profit for the agent through which you are registering, so check whether it includes web space and email forwarding. If it doesn't, you may be able to find a better deal elsewhere.

For a more technical overview of the domain registration process, how it works and how it is organised, check out some of the links at <http://207.238.20.162/dns.htm>.

Editor's Choice

Ease of use and a good **selection of features** combine to make the best tools.

Most people have a set idea of how web authoring should be done and fall into one of two camps – text-based or WYSIWYG. For the former, the editor of choice was traditionally Windows Notepad, and if you spend long enough on the net you'll probably even come across some sites with a 'Created with Notepad' button at the foot, boasting the author's talents. The vast majority of users, however, would rather never see a single line of code, and the WYSIWYG editors that form the majority of packages on the market make this possible. Web authoring has advanced further than visual application programming in this respect.

Another important consideration is whether you will need any of the extra features offered by the more expensive authoring tools. NetObjects Fusion 4, for example, is a good buy for users generating ecommerce sites, but may be too expensive and too powerful for a small business or home user. Likewise, Microsoft FrontPage 2000 includes a range of powerful features such as



▲ **DREAMWEAVER** ALLOWS YOU TO GENERATE PRECISELY LAID-OUT PAGES QUICKLY AND EASILY

➔ **With this in mind**, we have picked two products to receive Editor's Choice gongs – one from the high-end business category and the other from the small-business or home-user category. Before we do, however, we award Allaire HomeSite a Highly Commended accolade. This editor now incorporates a WYSIWYG mode, but stays true to its text-based roots to appeal to the extensive base of users who prefer to edit their HTML in the raw. Its authors have worked hard to incorporate many of the features of a visual package, such as toolbars and attribute palettes, without alienating a dedicated audience that has little alternative. Although HoTMetaL tries to bridge the gap between visual and code-based scripting with its tags-on view, we feel that HomeSite's no-nonsense, clutter-free coding window deserves recognition.

➔ **The first of our** Editor's Choice awards, then, goes home for the second year running with Macromedia for Dreamweaver 2. It may not include some of the features of FrontPage, but it is a far more polished product and is both

quicker and easier to use. Dreamweaver works equally well in table and layer mode, allowing you to generate precisely laid-out pages, while in the background it writes clean, well-organised code. Its round-tripping interaction with the bundled Allaire HomeSite lets you look behind the scenes to keep a close eye on your code, while the intuitive, all-encompassing Property Inspector is not matched by any other context-sensitive palette on the market.

➔ **Our second** Editor's Choice award goes to Adobe, but for PageMill rather than its newer package, GoLive. PageMill has always been easy to use and users who have tried other visual web-authoring tools will not fail to be amazed at just how

versatile it is. Put quite simply, if you can imagine doing something in any particular way, you can bet the PageMill authors imagined it too and included that as an option. The getting-started guide is alarmingly slim, but you soon realise Adobe could easily have got away with leaving it out of the box altogether, and besides, there are more than 200 pages of electronic reference on the installation CD.



▲ **PAGEMILL'S** STRENGTH LIES IN IT BEING INCREDIBLY VERSATILE AND EASY TO USE

database integration and chat forum wizards, but if you take advantage of

these features you are forced to choose a host that supports FrontPage extensions, which is usually a chargeable extra. You'll also be tied to using FrontPage exclusively as its upload protocol is written to interact specifically with servers that have extensions installed.

Users will not fail to be amazed at just how versatile PageMill is