REVIEWS

contents

The end is nigh for today's PC

Jason Jenkins
SENIOR STAFF WRITER

Many have predicted the end, but few could say for sure when it would come. Now we have a better idea. The Internet TV we have reviewed on page 85 doesn't mark the end of the road for the PC as we know it, but it brings us one step closer.

The PC market has seen astronomical growth over the past few years, fuelled by consumers. They have been buying PCs for three main reasons: to use programs like Word, Excel and PowerPoint, to play games and, crucially, to access the Internet. To do all three, however, has meant that consumers had to buy a machine with components many times more powerful than those used to put men on the moon. This type of machine is often fantastically expensive and no sooner has it been bought, than the tremendously powerful components start to look less impressive as new ones are brought to market, instantly wiping a third off your investment.

And, of course, the story never ended there – configuration problems, crashes, lost data, reinstallations: you name it, and every PC will experience it at some stage in its lifetime.

Games consoles have been around for donkey's years, but now more homes than ever play host to one. And with the upcoming launch of the Playstation 2, together with the ever-expanding reach of the Dreamcast, that trend is set to continue. Consoles don't have the same problems as PCs. They are cheaper to buy and they just work – put a disc into a console and you'll be playing games in no time. Try and do the same thing on a PC and you'll probably be downloading new drivers for the next half hour before you can start.

The Internet TV we had in our offices, and other products like it, will remove the need to buy a PC specifically to access the Internet. Like consoles, Internet TVs are true plug-and-browse devices, with no system hangs, reboots or corruptions. Admittedly, the Internet is not currently designed to be viewed on your average television, but as surely as there are now pages optimised for viewing on a mobile phone, more and more sites and content will be changed to accommodate the lower resolution of a telly.

So, if you don't need a PC to play games or browse the Internet, what do you need one for? This is the question most PC manufacturers are asking themselves. They've done some predictions and their figures make gloomy reading for them. But it would be wrong to write off the humble PC just yet. What we will see over the coming months and years is the PC becoming much more of a specialist device, rather than a consumer 'must have' item. This is why PC vendors are starting to diversify. High-end workstations, video-editing machines and professional-standard music PCs are being sold by an increasing base of manufacturers in an attempt to protect themselves when their core market – consumers buying a PC for surfing the Internet, gaming and wordsmithing – collapses.

The PC will become much more of a specialist device, rather than a consumer 'must have' item

The era of the PC as an all-encompassing consumer device is coming to an end, and a good thing it is too. Despite hardware and software designers' best efforts, the PC is still not a consumer-friendly plug-and-play device, and it never will be. The sooner we get to the stage where accessing the Internet is as simple as plugging in a new television, the faster the promised social and economic benefits of the Internet will become evident.

ratings

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

Panrix Fusion SCSI 933

The first dual-FC-PGA system is impressive – and a 22in screen is thrown in for good measure.

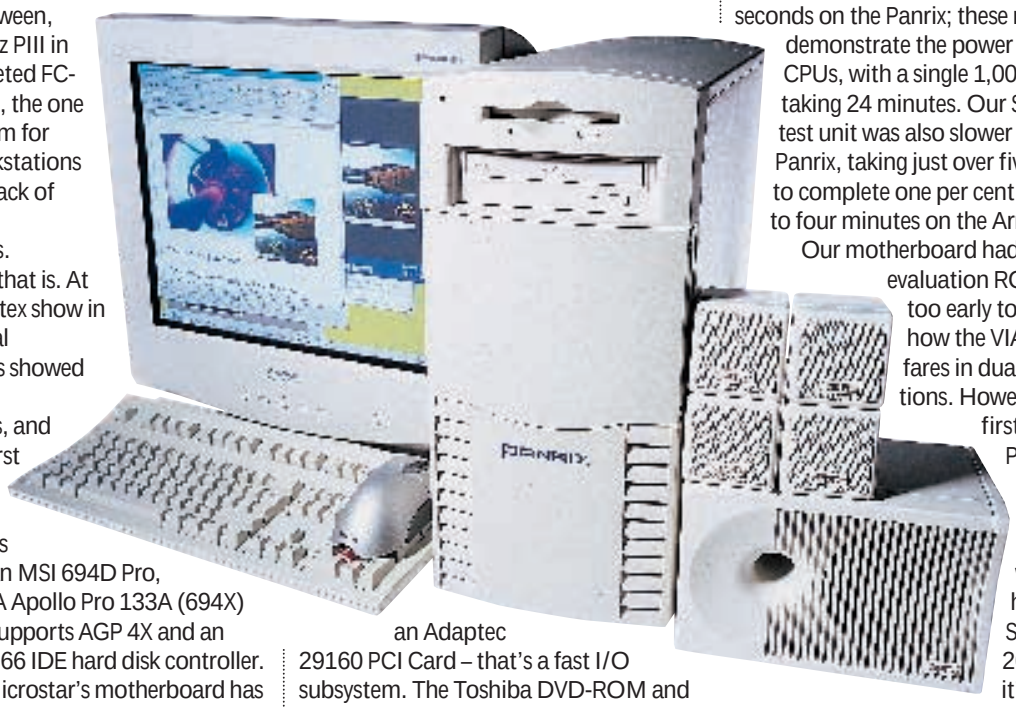
Over the past few months we've tested several interesting dual-processor systems, but all have had one thing in common: they employ Slot 1 Intel CPUs. While there's essentially no performance difference between, say, a 933MHz PIII in Slot 1 or socketed FC-PGA housings, the one crucial problem for high-end workstations has been the lack of dual-FC-PGA motherboards.

Until now that is. At June's Computex show in Taiwan, several manufacturers showed dual-FC-PGA motherboards, and Panrix is the first to build us a system with one. Panrix has plumped for an MSI 694D Pro, based on a VIA Apollo Pro 133A (694X) chipset. This supports AGP 4X and an UltraDMA33/66 IDE hard disk controller. In addition, Microstar's motherboard has four DIMM slots housing up to 2GB of SDRAM, and enthusiasts will welcome 11 overclocked FSB (front-side bus) speeds between 133MHz and 200MHz. Versions of the motherboard are available with a 1394 (FireWire) controller, and a Promise UltraDMA100 controller, which can talk to an additional four IDE drives.

At the business end, Panrix has fitted a pair of speedy Intel Pentium III 933MHz FC-PGA CPUs and a pair of 128MB PC133 DIMMs; that's a total of 256MB, and two spare memory slots. Graphics are supplied by a Hercules 3D Prophet, based on the supremely quick nVidia GeForce 2 GTS chipset, with an impressive 64MB of DDR memory. The card features TV output via an S-Video socket with composite converter, and a DVI digital display connector, along with the conventional analog VGA port.

Complementing the graphics card is a good 22in Mitsubishi Diamond Plus 200 monitor with a perfectly flat Diamondtron NF aperture-grille tube with a 51cm/20in viewable diagonal. With a maximum horizontal scanning frequency of 108KHz, it'll handle impressive non-interlaced resolutions up to 1,800 x 1,440 at 72Hz. There's also a pair of 15-pin VGA ports and a USB upstream port to control the monitor.

On the storage front, as the system name suggests, Panrix has fitted a SCSI hard disk: a Quantum Atlas 10K 18WLS 10,000rpm Ultra160 drive, connected to



an Adaptec 29160 PCI Card – that's a fast I/O subsystem. The Toshiba DVD-ROM and HP 9100 CD-RW drives are, however, connected to the secondary IDE channel on the motherboard. The case can also accommodate a pair of 3.5in and one 5.25in drives, and Panrix has installed two extra cooling fans along with a 300w power supply.

The system also features an Ethernet card, an internal 56K PCI modem, and a Creative Labs SoundBlaster Live 1024 Player card; a Cambridge SoundWorks PCWorks FourPoint Surround speaker system is also included. This leaves the system as supplied with only one free PCI and an unused CNR slot but, to be fair, virtually all bases are covered.

As befits a dual-CPU system, Panrix has installed Windows 2000, and it scored an impressive 200 in SYSmark 2000 – compare this to last month's Armari dual-933 system that mustered a score of 189. Both systems featured a pair of 933MHz Pentium III processors, 256MB of RAM and GeForce 2 GTS graphics cards, but the Armari used an UltraDMA66 hard disk and 840 chipset talking to expensive PC800 RDRAM, compared to the Panrix's Ultra160 SCSI hard disk and a VIA chipset with PC133 SDRAM.

In Quake III, the Panrix won, with a score of 115fps compared to the Armari's 107fps, although its graphics card had double the memory. The Armari was fractionally faster in our 3D Studio Max test, taking 14 minutes to render our test frame compared to 14 minutes 10 seconds on the Panrix; these results demonstrate the power of dual CPUs, with a single 1,000MHz PIII taking 24 minutes. Our Seti@home test unit was also slower on the Panrix, taking just over five minutes to complete one per cent, compared to four minutes on the Armari.

Our motherboard had an evaluation ROM, so it's too early to conclude how the VIA chipset fares in dual configurations. However, as the first dual-FC-PGA system we've tested, coupled with a very high SYSmark 2000 score, it's an impressive start. By employing SDRAM, Panrix's system is cheaper than Armari's while additionally boasting Ultra160 SCSI and a 22in monitor – it may not match the build quality of Armari's workstation, but all in all it's an impressive and capable system.

GORDON LAING

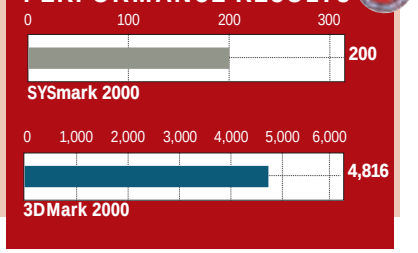
DETAILS

★★★★★

RECOMMENDED Personal Computer World

PRICE £3,871.63 (£3,295 ex VAT)
CONTACT Panrix: 0113 244 4958
www.panrix.com
PROS Very quick. First dual FC-PGA system
CONS None to speak of
OVERALL A very impressive performer, proving you don't need RDRAM

PERFORMANCE RESULTS



Mesh Matrix GT Ultra

If you need a 1GHz Athlon system this PC has the speed you need but check the motherboard.

AMD beat Intel to a 1GHz processor by a whisker, but the processor had slower, off-die cache. This gave the old Athlon a large performance bottleneck compared to the 1GHz Pentium III with full speed, on-die cache. Last month we took a look at the new Athlon (codenamed Thunderbird) designed to address this problem, and this month Mesh has submitted a system with that processor clocked at 1GHz. This features 256KB of on-die Level 2 cache, and with the Athlon's impressive architecture, should be able to give the equivalent Pentium III (still in short supply) a run for its money.

The 1GHz processor inside this machine is Socket A, and is produced using 0.18micron process technology – there can be no doubting that this is AMD's flagship product at the moment. There is a problem with this form factor, though – motherboards. It's the same problem that has dogged the company for years – there are simply not enough Socket A boards out there at the moment. They will come, sure, but for now end users and system integrators have a severely limited choice.

This explains why Mesh has given us a seemingly crazy choice of board – an MSI 6340, which is a Micro ATX model. There is no way a system costing over £2,000 should come with a Micro ATX board, especially as it is mounted in a full-size ATX case. Mesh knows this, and promises to have a full-size ATX board available when the system ships. Given the current situation, it is unable to commit to a certain model, except to say that it will be based on VIA's KT133 chipset. This means the board will have support for PC133 SDRAM, AGP 4x and UltraDMA 66. On the machine sent in for review, only one PCI and one memory slot are free, together with the solitary CNR.

A whopping 256MB of PC133 SDRAM is supplied, all on one stick. If you are paying for the extra processing speed, you might as well opt for more than 128MB of memory, so it's good to see it here. A huge 60GB hard drive sits in one of the internal bays – it is one of the 7,200rpm drives from IBM's new Deskstar range (see page109). The bay it is housed in has been turned sideways and by pinching a clip, you can quickly and easily pull it out.

A Philips eight-speed write, four-speed rewrite, 32-speed read CD-RW drive is supplied, together with Nero Burning ROM version 5, to help you create your CDs. Should you wish to copy on the fly, you can use the Pioneer DVD drive, a DVD115. InterVideo DVD is provided so that you can watch films. A 56K PCI modem is present too.

Sound comes from an OEM version of Creative's SoundBlaster Live 1024, with coloured connectors as opposed to the golden ones sported by the retail version. This card did not have a CD-SPDIF connector, which is something of a cheap omission for a machine of this price. You can listen to the sound it generates using the Labtec LCS-2514 speakers, which consist of four satellite speakers and a subwoofer.

The monitor is the excellent Mitsubishi Diamond Plus 91. This 19in model uses a Diamondtron NF screen to generate an excellent image, and is a good choice for a machine in this price range.

The amazingly fast Hercules 3D Prophet II, with 64MB of DDR memory, provides the image and 3D acceleration. This GeForce II GTS card is reviewed on page 99, and it really give this system a kick in the 3D stakes.

Speaking of performance, this machine is pretty fast, Interestingly, on our SYSmark 2000 benchmark it scored one point less than the Dell 1GHz Pentium III featured in our June issue, but in 3D it really took off. Our Quake III time demo was completed with an average frame rate per second of 104.6 – so if you have a bottomless wallet and are looking for an ultimate games machine, then this could fit the bill. We also ran our test 3D rendering scene using 3D Studio Max. This took 23 minutes 9 seconds to render, slower than the Panrix dual-Pentium III 933 PC reviewed opposite, proving that two processors are better than one when it comes to this kind of operation.

This machine shows off the potential of the 1GHz new Athlon well, and it's good to see that AMD has caught up with Intel on the performance front. Because we could not properly evaluate the motherboard this system will finally ship with, together the fact that it is a tad on the pricey side, we could not award the full five stars. If you are one of the few that needs a 1GHz processor, then this well-built PC could be the one for you, albeit with a bit of further research first.

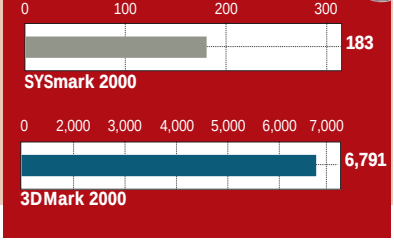
JASON JENKINS

DETAILS

★★★★

PRICE £2,583.83 (£2,199 ex VAT)
CONTACT Mesh 020 8208 4706
www.meshcomputers.com
PROS Speedy system; good monitor, hard drive and lots of memory
CONS A little pricey, no CD SPDIF connector
OVERALL Worth consideration if you check which motherboard it will ship with first

PERFORMANCE RESULTS



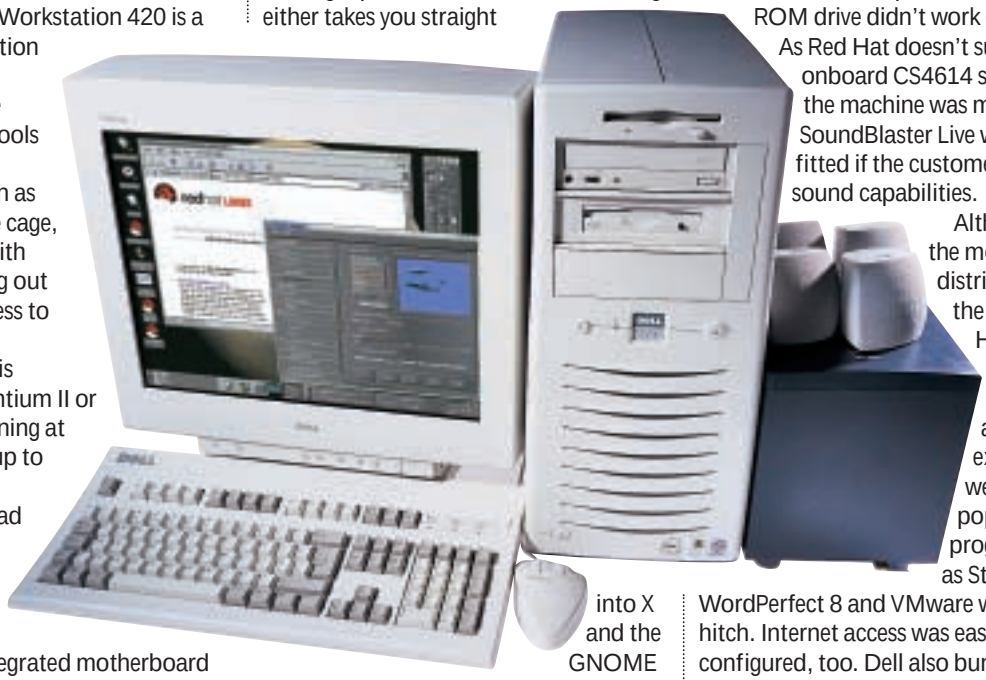
EXCLUSIVE

Dell Precision 420

Linux's growing popularity gets a boost as Dell entrusts its latest high-end workstation to the OS.

A sure sign of Linux's growing popularity is that vendors are starting to offer it as a pre-installed OS. Until recently, this has largely been confined to specialist Linux system builders such as Penguin Computing, Digital Networks UK or the large US company VA Linux Computing. Now, though, mainstream corporate vendors are starting to preload Linux and Dell is one of the first to deliver.

The Precision Workstation 420 is a high-end workstation system. The midi-tower case can be opened without tools and internal components, such as the PSU and drive cage, can be released with latches and swung out on hinges for access to the i840-based motherboard. This supports dual Pentium II or III processors running at up to 1GHz and up to four RIMMs; the review machine had two 64MB modules for 128MB of dual-channel RDRAM.



The highly-integrated motherboard includes Cirrus Logic sound, 3Com Fast Ethernet and Adaptec Ultra2 Wide LVD SCSI controllers. The only expansion card fitted is a Diamond nVidia TNT2 32MB graphics adaptor driving a flat-screen 19in Dell UltraScan Trinitron monitor, leaving the four 32bit PCI slots and one PCI/RAID port free.

Internal components include an 866MHz Pentium III with a 133MHz front-side bus (FSB) and full-core-speed 256KB secondary cache, an 18GB Quantum Atlas Ultra2 SCSI hard disk, LiteOn 48-speed ATAPI CD and an ATAPI Iomega Zip250 drive.

It is certainly a powerful and expandable high-end workstation with very few corners cut. However, all-SCSI storage might be more preferable and the 3D card, while ideal for gamers, is somewhat wasted in business use. However, the real interest lies in the operating system installed: RedHat Linux 6.1. (Since this machine was supplied, Dell has upgraded this to Red Hat 6.2.) When appropriately configured with a GUI desktop, Linux isn't much harder to use than Windows or any other graphical OS; the hardest part is often getting it installed. Buying a pre-configured system is therefore attractive, as the vendor does this for you, but what matters is how well the job is done.

The system boots into the Linux loader, LILO, offering a choice of kernels – the default multiprocessor one and one for single-processor machines. Choosing either takes you straight into X and the GNOME login screen. There's only one pre-configured user account, root, with no password. Logging in as root reveals a standard GNOME default desktop, but with Dell-logo wallpaper. The installation is largely a default Red Hat one with some minor tweaks, such as the AfterStep window manager offered as an alternative to Enlightenment.

Most of the system's hardware was correctly configured. XFree86 was correctly set up for the graphics card with a default resolution of 1,024 x 768, the SCSI controller, Ethernet, Zip and CD-ROM devices were all configured, and TCP/IP was set to auto configure itself using DHCP. Red Hat's linuxconf tool made it easy to check and adjust the various parameters, and a Dell directory of drivers and basic documentation was provided on the hard disk to accompany a slim paper manual introducing Red Hat Linux.

One area where Linux is more complex than Windows is disk partitioning. Dell has chosen sensible settings: a 20MB boot partition close to the start of the drive, a 5GB (root) partition, 2GB home and 10GB usr volumes, plus 128MB of swap space (larger for machines with more memory).

There were some niggles, though. The mount point for the Zip drive was created as a symbolic link instead of a directory, which had to be corrected before the Zip drive could be used, and the GNOME desktop icon for the CD-ROM drive didn't work correctly. As Red Hat doesn't support the onboard CS4614 sound chip, the machine was mute; a SoundBlaster Live will be fitted if the customer requests sound capabilities.

Although it's the most popular distribution in the US, Red Hat is quite spartan, with few added extras, but we tried popular programs such as StarOffice, WordPerfect 8 and VMware without a hitch. Internet access was easily configured, too. Dell also bundles 90 days' free phone and email support through LinuxCare alongside the three-year on-site warranty.

The system has some teething problems, although they aren't critical and as shipped it was usable – but they would require some Linux expertise to repair. Once these are smoothed out, though, this will be an excellent high-specification Linux workstation.

LIAM PROVEN

DETAILS

★★★★

PRICE £3,053.83 (£2,599 ex VAT)
CONTACT Dell 0870 152 4699
www.dell.co.uk
PROS Well-built, high-specification hardware; reasonable Linux configuration
CONS Some rough edges to Linux configuration; no sound support; no ISA slots
OVERALL A good first try. Dell's inexperience with Linux shows, but the problems are minor and the hardware is excellent

Sharp PC-AX10

An ultra-slim, lightweight notebook with an exceptional screen and power to die for.

The days when notebook computers were the sole domain of high-flying executives with company gold cards are long gone. That said, portable PCs still cost significantly more than their stationary counterparts and if it's a top-performing ultra-portable that takes your fancy then prepare to say goodbye to a fair wad of cash.

With a lightweight, ultra-slim design (the unit measures just 268 x 223 x 28mm) and metallic blue casing, Sharp's latest model caused quite a stir when it landed on the *PCW* testing tables. However, looks and diminutive stature alone do not a great machine make, so it's just as well it proved more than capable in our bench tests as well.

The Sharp makes good use of a 500MHz Mobile Pentium III processor coupled with 64MB of RAM, and can be further expanded to 192MB of RAM. The chip's 256KB Level 2 cache, coupled with a decent clock speed, means it can ship data around swiftly and, because the it's designed for mobile use, it does this incredibly efficiently. No wonder the machine managed to notch up a score of 90 in our SYSmark 2000 test. Although we have seen 500MHz notebooks turn in scores over 100, it's a more than respectable tally, and the unit had no problem running several office applications at once.

An onboard Rage Mobility M chip with 4MB of memory takes care of graphics, with sound handled by a chip from Crystal. Both a mono-speaker and microphone are built into the casing.

The screen is one of the most important parts of a notebook and, thankfully, TFT screens have come along in leaps and bounds in recent years. They can now be constructed more efficiently with fewer components making for thinner, brighter panels and Sharp's 12.1in screen is as good as they come. It proved capable of displaying a stable, clear image at the optimal 1,024 x 768 resolution with not a dead pixel in sight. This is one machine we'd be happy to use on a daily basis even over our desktop PC without fear of eye strain. The anti-glare, low-reflection technology (AGLR) proved effective – even in direct sunlight we could make out an image.

Unfortunately, anti-glare isn't a phrase you could easily apply to the keyboard. The decision to use purple keys and black legends isn't the wisest of design choices, however it's a minor quibble as the keyboard itself is responsive and the touchpad is equally good. Inside the machine there's a 12GB hard drive, which should be more than adequate for most users, and a 56K fax modem and network card to get you connected to the Internet or your network. Although the unit ships with Windows 98, all the relevant Windows 2000 drivers are included, so if you want the Sharp to integrate with your office environment you'll have no problems.

Expansion and connectivity are likely to be important whether you're using the notebook as your main or mobile PC. Luckily, it scores well. With two USB ports and two Mini-USB ports, connecting the latest peripherals won't be a problem and there are also connectors to hook up a monitor, plus stereo and digital audio outputs and an external microphone input. Modem and network connections are present and correct and synchronising with your PDA won't be a problem as there's an infra-red port. The unit ships with a separate floppy drive that attaches via a Mini-USB connection and there's also a separate 24-speed CD-ROM, but given the price tag we would prefer to see a DVD-ROM drive.

Battery life is crucial but, unfortunately, that's where the price for a top processor and an excellent screen is paid. A standard battery gives a rather stingy 1.3 hours of normal operation, although you can always shell out on an optional high-capacity battery or add a cell to the second battery compartment. There's a button-activated battery level indicator on the front of the case.

The Sharp is a top performer by today's standards and well worth a look for those who like the styling.

RICHARD MCPARTLAND

DETAILS

★★★★

PRICE £2,109.13 (£1,795 ex VAT)
CONTACT Sharp 0800 262 958
www.sharp.co.uk
PROS Powerful, good-looking machine; excellent quality screen
CONS Garish keyboard; no DVD-ROM drive; battery life using standard cells could be better
OVERALL If you are after a capable ultra-portable machine with an exceptional screen that will meet your needs for some time to come, the Sharp comes highly recommended but battery life seems a little low

PERFORMANCE RESULTS

SYSmark 2000

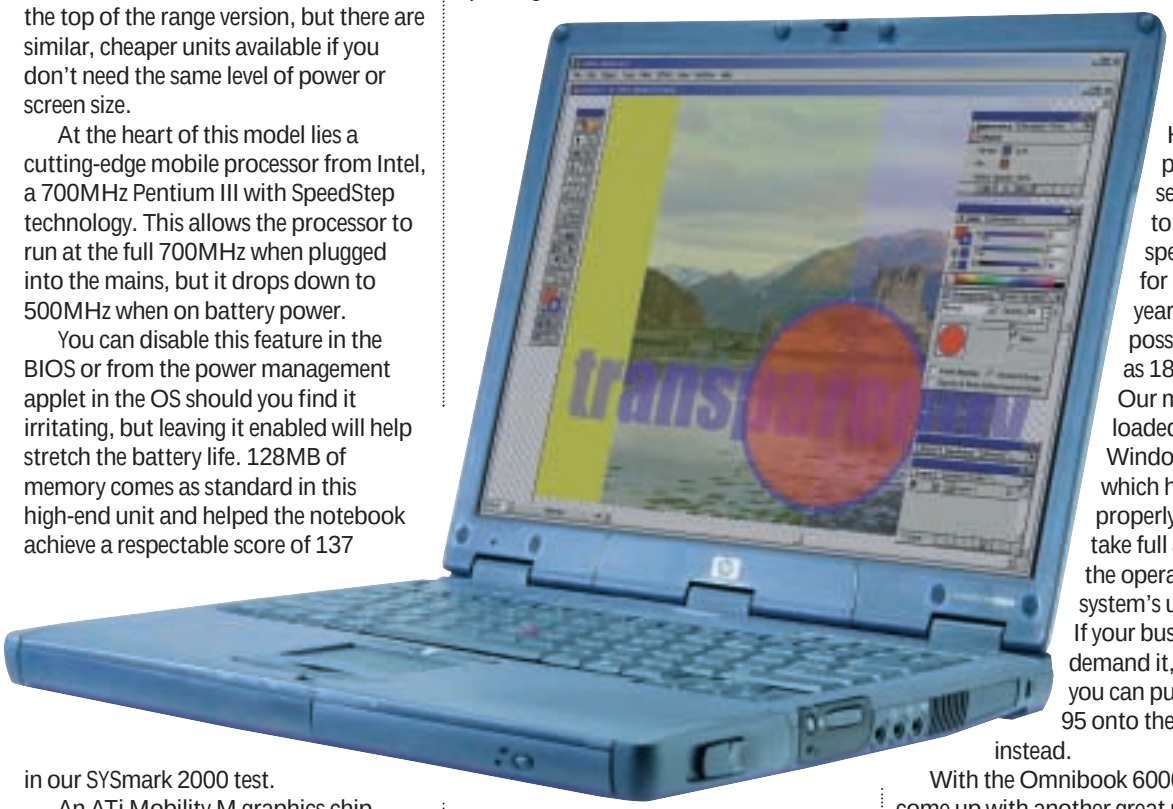
HP Omnibook 6000

Stylish corporate notebook including a V.90 modem, network card and the prospect of a long life.

The ever-present Hewlett-Packard (HP) has updated its corporate notebook range and improved on an already well-designed product. The Omnibook 6000 model reviewed here is the top of the range version, but there are similar, cheaper units available if you don't need the same level of power or screen size.

At the heart of this model lies a cutting-edge mobile processor from Intel, a 700MHz Pentium III with SpeedStep technology. This allows the processor to run at the full 700MHz when plugged into the mains, but it drops down to 500MHz when on battery power.

You can disable this feature in the BIOS or from the power management applet in the OS should you find it irritating, but leaving it enabled will help stretch the battery life. 128MB of memory comes as standard in this high-end unit and helped the notebook achieve a respectable score of 137 in our SYSmark 2000 test.



An ATi Mobility M graphics chip supplies the image on the 15in TFT display. This has 8MB of video memory and supports MPEG-2 hardware acceleration. A D-SUB output at the back means you could use the chip to drive two displays – the Omnibook's and an external monitor. The 15in TFT display itself is good – the whole thing looks bright and even, with no dark patches and the viewing angle is wider than on many notebooks we've seen.

The native resolution is 1,024 x 768 but 1,280 x 1,024 would have been better. One small drawback, though, is the fact that the screen does not fold down flat against the desk (useful for one-to-one presentations).

The keyboard is fairly good – it's very easy to type on, and HP has made sure that most of the keys are in similar positions to a standard QWERTY desktop keyboard. One thing that irritated us was the small return key – it is very easy to hit the backslash key above it instead. It's a matter of personal taste, though, and the keys are solid to use, with good travel.

As in the previous incarnation, HP has included both a trackpoint and a touchpad. Each of these has its own set of buttons, with the uppermost set sporting a new scroll button.

As this notebook is aimed at corporate users, it's good to see both a V.90 modem and network ports integrated into the chassis, with the ports placed on the left-hand side towards the screen. Next to this is the PC Card slot, with room for one Type III or two Type II cards.

On the other side is a handy rocker control to increase or decrease the speaker's volume, and there's also a mute button to silence the speaker with a single touch. The standard headphone out, microphone in and line out ports are situated next to this, together with an infra-red port. Single PS/2, USB, serial, parallel and docking connectors adorn the rear.

A single drive bay at the front can house the supplied DVD or floppy and a software decoder is provided for those who plan to watch films. Should you want to use both drives at the same time, you'll have to use a special cable that, in contrast to the previous generation of the Omnibook, HP has elected to supply. We would have preferred the DVD to be situated on the side as, when the notebook is perched on your lap, it's very easy to accidentally knock the button and trigger the opening mechanism.

On the corporate side, one of the biggest draws is the promise of a long product life. HP has promised to sell this model to the same specification for at least one year, and possibly as long as 18 months. Our model came loaded with Windows 2000, which had been properly set up to take full advantage of the operating system's use of ACPI. If your business needs demand it, however, you can put Windows 95 onto the hard drive instead.

With the Omnibook 6000, HP has come up with another great product. It's more stylish than previous incarnations, and it has a good feature set. There are a few minor points we would like to see addressed in future versions, but for corporate customers this is definitely worth a look.

JASON JENKINS

DETAILS

★★★★

PRICE £3,641.33 (£3,099 ex VAT)
CONTACT Hewlett-Packard 0990 474 747
www.hp.com/uk
PROS Fast mover; good screen and keyboard; DVD; stylish; choice of operating systems
CONS Small return key; DVD mounted at the front; only 1,024 x 768 resolution
OVERALL A great little product that will look good in the boardroom as well as appealing to IT managers

PERFORMANCE RESULTS

Gateway Solo 9300XL

This highly-specced desktop replacement is a well-priced successor to the 9300LS.

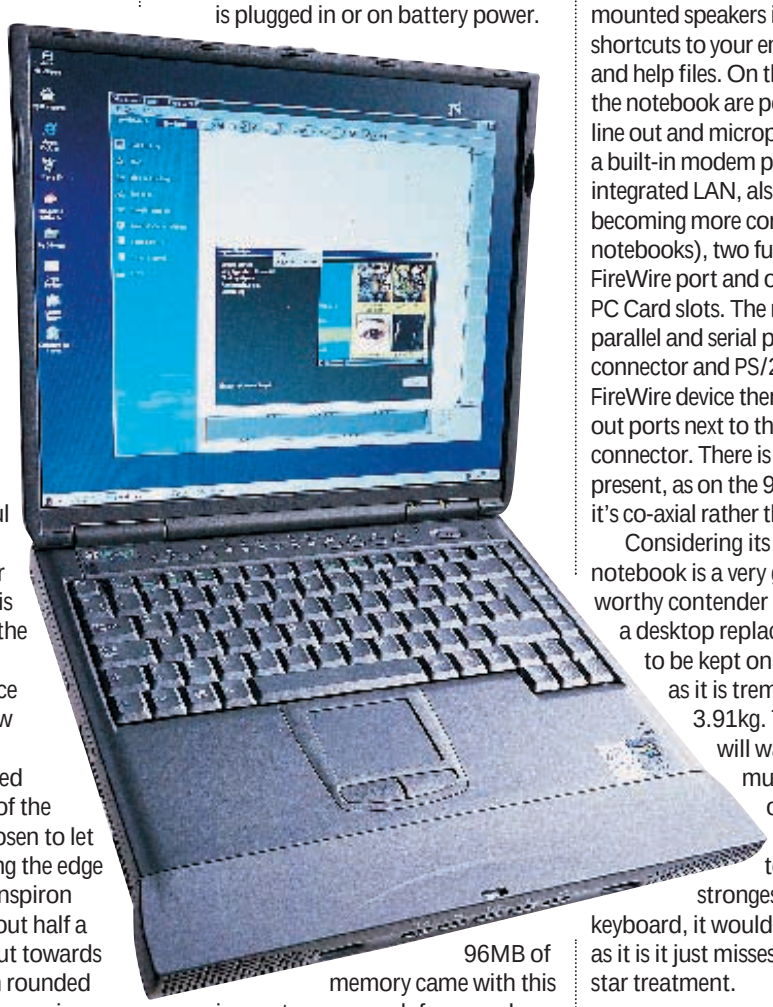
We first looked approvingly at Gateway's new 9300 solo range in our notebook group test in April, but the company hasn't sat on its laurels since then. This new desktop replacement, the Solo 9300XL, is based on our April Editor's Choice, the Solo 9300LS, but boasts improved specs.

The new feature that is most immediately apparent is the larger screen. The original has been boosted to a 15.7in TFT, with a native resolution of 1,280 x 1,024. It is exceptionally bright and clear, and there are no dead pixels evident. With this higher resolution, we were able to have multiple windows open without cluttering the screen – a useful feature, especially if you are considering abandoning your traditional desktop PC for this model. We found that using the screen at this resolution took some getting used to, but once we'd used the system for a few hours, it seemed normal.

The larger screen has forced Gateway to increase the size of the unit, and it has wisely not chosen to let the screen drastically overhang the edge of the system, as with Dell's Inspiron 7500. The screen juts out about half a centimetre along the sides, but towards the front the edges have been rounded outwards, so that when the screen is closed it lies flush. The effect of this is that you simply do not notice the small overhang.

Unfortunately, though, Gateway has not made full use of the increased form factor in the keyboard and touchpad. The keyboard is smaller than it should be. It covers just over half of the available surface area, leaving a lot of wasted space. We felt that the keyboard should have been made larger, or at least moved towards the front of the unit slightly. As it is, when typing, you have to reach over quite a lot of wasted space. This doesn't make for the most comfortable typing experience, and it is made worse by the fact that the touchpad buttons are fairly small compared to the acres of space around it.

The basic hardware specs are impressive. There is a 700MHz Pentium III inside this box. This is one of the latest processor to use Intel's SpeedStep technology, allowing it to run at two different speeds depending on whether it is plugged in or on battery power.



96MB of memory came with this review system – enough for everyday use, but as we are starting to see the arrival of 128MB as standard on new notebooks, it is beginning to look a little stingy. 32MB is soldered onto the board, and 64MB is present in one slot, leaving one free for expansion. Graphics are supplied by an 8MB ATi Mobility-P that help the screen achieve its high resolution. It also supplies good-quality hardware decoding for the Torisan DVD-U824 drive. This is located at the left-hand side of the notebook, and Gateway has been sensible enough to include a floppy drive next to it for good measure.

What this notebook lacks in ergonomic perfection, though, it more than makes up for in added features. At the front are four dedicated buttons to start, stop and skip through your DVD or CD, and there is also a lock button to prevent them being pressed accidentally. Above the keyboard are more dedicated buttons, this time for volume control (with one button reserved for muting the front-mounted speakers in one touch), and shortcuts to your email program, browser and help files. On the right-hand side of the notebook are ports for headphones, line out and microphone in. Next to this is a built-in modem port (there's no integrated LAN, also a feature that is becoming more common in other notebooks), two full-size USB ports, a mini FireWire port and one Type III/two Type II PC Card slots. The rear sees covered parallel and serial ports, a docking connector and PS/2. For those without a FireWire device there are composite in and out ports next to the standard D-SUB connector. There is still a digital out port present, as on the 9300LS, but this time it's co-axial rather than optical.

Considering its low price, this notebook is a very good effort and is a worthy contender if you are looking for a desktop replacement. It would have to be kept on a desktop, though, as it is tremendously heavy, at 3.91kg. There's no way you will want to transport this much further than from one room to the next, unless you happen to be the world's strongest man. With a larger keyboard, it would be a winner, but as it is it just misses out on the full five-star treatment.

JASON JENKINS

DETAILS

★★★★

PRICE £2,583.83 (£2,199 ex VAT)
CONTACT Gateway 0800 552 000
www.gateway.com/uk
PROS Highly specified; large high-resolution screen; keen price
CONS Keyboard could be improved; no LAN; heavy
OVERALL It could be better, but for the money this desktop replacement is certainly worth a look

PERFORMANCE RESULTS

Hi-Grade UltiNote AS8300

A notebook with room for expansion that can give some desktop systems a run for their money.

Whenever we review a PC, expandability is one of the first things we look for. When you're shelling out a lot of cash for a computer, you rightly expect your machine to grow with your needs in the months and years to come. Unfortunately, when it comes to notebooks, expandability is often sacrificed to make a smaller, lighter or cheaper machine. That's why this top-performer from Hi-Grade came as a breath of fresh air as there are more expansion opportunities than even we know what to do with.

The unit has a 650MHz SpeedStep Pentium III chip at its heart and, as its score of 122 in our SYSmark 2000 test proves, it's a very capable performer. There's also a healthy 128MB of RAM (expandable to 160MB) so running several applications at once doesn't slow the system too badly. A 12GB hard drive is included for storage.

The AS8300 doesn't fare badly when it comes to graphics either, with a Silicon Motion Lynx3DM chipset backed by 8MB of video memory. That said, you won't be able to while away hours playing Quake III.

The UltiNote definitely looks the part with its metallic finish and it isn't all that heavy either, weighing in at just 2.2kg. In fact, it's barely much taller than the six-speed DVD-ROM drive, which can be removed from the bottom of the unit, or wider than the 13.3in TFT screen. Crucially, the screen is a good one, capable of a maximum resolution of 1,024 x 768 and displaying a clear and vibrant image.

The unit's keyboard has been improved over previous offerings we've seen from Hi-Grade, with this one ranking among the better ones we have tested.

As with all portable computers its battery life is key. The unit holds a single lithium-ion battery and Hi-Grade claims a battery life of about three and a half hours in normal use – a claim we find hard to dispute. We managed about four hours of word processing from a single charge.

The notebook itself boasts a parallel, serial and USB port for expansion and if that isn't enough you can connect a break-out box to increase expandability still further. The box boasts a serial port, parallel port, two PS/2 ports, a VGA connector and two USB ports.

Although not all that practical for use on the road, for desktop use it's a valuable addition. Unfortunately there's just one Type II PC Card slot but as there's a built-in 56K modem and onboard network connection it shouldn't prove too much of a problem. There's also no FireWire connector, so if you've got your eye on the next generation of peripherals, think again.

Just in case you need more ports, the 'port dock' boasts serial, parallel, VGA and two PS/2 ports. There's also an audio jack to hook up some headphones or speakers. The dock comes with a removable floppy drive and there's a free bay for a CD-ROM, DVD-ROM or hard disk drive. There's even a set of built-in speakers and an amplifier. Using the controls on the top of the unit you can use it as a CD player although, as it draws power from the notebook, this needs to be switched on. The dock works well but the cable that connects to the notebook is a little short, which means you can't easily place the unit next to the notebook. It's also worth pointing out that you can't use the break-out box at the same time as the 'port dock'.

The UltiNote is a keenly priced machine, and you're getting a well-connected laptop with a certain degree of future proofing built-in. It would make an excellent desktop replacement and our only real qualm would be the solitary Type II PC card slot, although as there's a modem and network capability built in, it shouldn't be too much of a problem. Some people may prefer the neater solution of a removable docking bay but Hi-Grade's break-out box and 'port dock' do the job just as well.

RICHARD MCPARTLAND

DETAILS

★★★★

PRICE £1,938.75 (£1,650 ex VAT)
CONTACT Hi-Grade 0800 0740 402
www.higrade.com
PROS Good-looking, capable performer. Great screen, keyboard and touchpad. Additional expansion opportunities with the break-out box and 'port dock'
CONS You may not want to pay for ports you never use
OVERALL A good looking, capable performer with more connections than a BT switchboard

PERFORMANCE RESULTS

Bush Internet TV

A cheap way to get onto the web if you don't want to use a PC, and you can watch the footie too.

At first glance it looks just like any other television, but this one has a little surprise up its sleeve: you can use it to browse the Internet and email your friends. As a television, it is very average. The 14in screen is quite reflective, but the picture is clear and bright enough. The sound is mono, and there is a SCART socket on the rear to connect the television to other devices.

When you come to use the box's more advanced facilities, though, you can't help but be impressed, although Bush still has some way to go before people start abandoning their traditional PC for an Internet television.

There are only four buttons on the set itself – on/off, volume up and down and channel up. The rest is controlled by the television's mammoth remote control. This is about a foot long, and is heavier than a standard remote. It takes four AAA batteries. At the top is a circular pressure pad that moves your mouse pointer – but more on that in a minute. All the standard channel and volume controls are there, together with a selection of buttons help you set up the TV in the first place. Underneath the main panel, however, is a mini QWERTY keyboard, and a yellow function button that activates certain features tied to letters and numbers. The infra-red window curves around the top left of the control so you can transmit while holding it longways or sideways.

To access the Internet, you simply press the Internet button on the remote and confirm that you want to connect. The set dials the ISP, Bush Internet via Telinco, and, if it is your first time dialling, takes you through a standard sign-up procedure. Once this is complete, you don't need to remember your username and password to browse – the server uses CLI (caller line identification) to determine who you are and does the rest.

From here, you are taken to Bush's home page, which is optimised for viewing on a television. This contains links to other sites, some of which have also been optimised for this kind of browsing. As with any other browser, you can simply type in the URL to view the page. It is here, though, that one of the problems with the TV, and other products like it, shows itself. Web pages are generally not designed to be viewed on a low-resolution 14in screen. Moreover, if you want to view video, listen to MP3s, or look at Shockwave or Flash stuff, forget it.

The browser, developed by Ant, supports Javascripts, HTML 3.2 and has HTML 4.0 extensions together with SSL, so you'll be able to buy items over the Internet using your credit or debit card with confidence that the information is being encrypted. One thing that we found a bit cheeky was the fact that the Teletext facilities have been removed, on the basis that you don't need it with Internet access. We would still have liked to have seen it on the basis that Teletext is free and doesn't tie up your phone line.

Navigating web pages was slightly more difficult than with a PC and mouse, especially when it came to scrolling. Sometimes you can simply move your mouse pointer to the bottom of the page to see the rest of it, and sometimes you have to hold the select button and move the pointer. We found this a bit difficult, as our pointer kept disappearing off the side of the screen. With a bit of practice, though, we expect that you would get used to the TV's eccentricities.

The email facility allows you to have up to four separate accounts. You have to specify a username and password to log in. Once there, you can look at your stored and new messages, and there's an address book too. You can also specify a signature to round off each message. Unfortunately, the email facility is text only – you won't be able to open any attachments (except text files) that you receive. It is all very easy to use, but here another problem rears its head. The mini keyboard is simply not the best to type on – you can get a message out, sure, but it is not a very comfortable typing experience. Ideally, we would have preferred Bush to have bundled a wireless keyboard and a separate, smaller, lighter remote controller specifically for channel changing and the like. Bush will address this in September with a £29 wireless keyboard.

Although this TV is far from a perfect browser and email client, it is not half bad. There's even a printer port, although only a few printers are officially supported. What struck us was how simple it was to set up and use – just plug it in to your phone line and you are off. For someone that does not own a PC and just wants basic browsing and email facilities, this could be the answer, but you'll probably want the wireless keyboard. You certainly would not get a PC and monitor worth switching on for this price, but its limitations probably mean we won't see hoards of people flocking to abandon their PCs. Watch this space, though – with a few improvements, this could be a force to contend with.

JASON JENKINS

DETAILS

★★★

PRICE £199 (£169.36)
CONTACT Bush 01923 859777
www.bushinternet.com
PROS Very easy to use, low-cost email and Internet solution
CONS Browser and email program have comparatively limited functionality; you'll need a wireless keyboard
OVERALL If £200 is all you have, then this would be a good way to get on the Internet quickly and easily, but it can't yet compete with a PC browser and email client

EXCLUSIVE

Sony NW-MS7 Walkman

MP3 is so passé, especially when you're in possession of Sony's sleek new solid-state Walkman.

There's been a great deal of media debate about MP3 lately, especially with the legal proceedings against Napster bubbling away. It seems that what Diamond started over a year ago with its Rio portable MP3 player is coming of age.

The music on these units is stored on solid-state media, such as Smart Media, so it won't jump, no matter how active you are. Also, the lack of moving parts means the devices are both small and light.

It was only a matter of time before Sony threw its hat into the ring and turned its almost legendary design talents to this emerging market.

Before you think that Sony is just jumping on the bandwagon, there are a couple things that should be pointed out. First, the Memory Stick Walkman employs Sony's proprietary Memory Stick solid-state storage. Second, it is not an MP3 player.

Sony decided that the MP3 standard did not produce high enough quality results, so it opted for its own ATRAC (Adaptive Transform Acoustic Coding) system. ATRAC is extensively used as the compression algorithm for MiniDisc, so adapting it for the MS Walkman was not a problem. Differing amounts of compression can be applied to either increase capacity on the Memory Stick or improve the quality of the output. We were impressed by the output quality when coding a track from a CD. The depth and soundstage created were excellent and far superior to any MP3 player we had listened to. This doesn't mean you can't drop MP3 files onto the NW-MS7 – you can, although they do have to be converted to ATRAC first.

As with all things Sony, the design of the unit is superb. It's smaller and lighter than almost any other solid-state memory music device and is extremely desirable. The dimensions are only 37 x 96 x 19mm (w x h x d) and it weighs an amazing 70g. The Memory Stick used with the device is different to the versions we've seen before. Besides the obvious difference in colour (it's white instead of purple), it is called MagicGate Memory Stick and has inbuilt copy protection to stop you pirating music from it. Subsequently, any other Memory Sticks you have can't be used with the Walkman, although MagicGate sticks can be used in other devices.

The Memory Stick is a generous 64MB which will give you around two hours of playback at the lowest quality, one hour at the highest and 80 minutes at the middle setting. The middle setting of 105Kbits/sec is generally the best option, providing decent capacity while maintaining high audio quality.

The supplied software, OpenMG Jukebox, allows you to pull tracks from CD and convert them to ATRAC as well as converting MP3 files. The files you convert are stored in albums from where songs can be dragged and dropped onto the Walkman. We were disappointed that you could not drag and drop MP3 files straight to the device and have them converted on the fly. Having to convert the audio first not only takes longer, but also uses up double the space on your hard disk. That said, conversion doesn't take long, and even ripping a track from CD is incredibly quick.

When a song is taken from a CD it can be checked out three times to an external device. If after the third time the song has not been checked back into the computer, you will no longer be able to use it. This is an attempt to stop piracy, but is not very successful since, if you can no longer check a song out, the OpenMG Jukebox is happy to let you rip it from the CD again and have three more goes.

A small docking bar is supplied in the box which connects both to the PC via USB and to the mains via the supplied transformer. When the Walkman is connected to the docking bar it is ready to receive data from the PC while charging its battery at the same time. Download time is pretty speedy through the USB connection.

The device produces first-class music playback that is unaffected by what the user is doing. We ran and cycled on an exercise bike and playback was flawless.

There were, however, a couple of issues. First, was the lack of a remote control. Anyone who's used to listening to a Sony MiniDisc Walkman knows how invaluable this is. With the remote clipped to your shirt or jacket you don't have to dig around in your pocket to control the device. The second problem was the selection beep. Every time you enter the menu and select an option a beep is emitted, but the music stops momentarily when the beep is sounded. That said, the beep can be turned off.

On the whole, Sony has come up with a great product, but a couple of points stop it being the perfect solid-state music solution. The lack of a remote control is a big issue, although this was more than likely to keep costs down, but the inability to drag and drop MP3 files straight to the device is disappointing.

Ultimately, if you want a solid-state music player, then this is the best there is. It might seem pricey, but it is head and shoulders above the competition.

RIYAD EMERAN

DETAILS

★★★★

PRICE £299 (£254.46 ex VAT)
CONTACT Sony 0990 111 999
www.sony.co.uk
PROS Very small; very light; very sexy; great sound
CONS No remote; no on-the-fly MP3 conversion
OVERALL A great product that's only a step away from being perfect. It's still the best in its class by a long way, though

Compaq iPAQ H3600

Pocket PC PDA with astounding speed and good looks, but no built-in Compact Flash or PC Card.

The first thing that hits you about the iPAQ H3600 is its stylish look. It's about time someone broke away from the angular lines and boxy looks of previous PDAs. The iPAQ really does look like it has been created by a designer rather than knocked up in a CAD package by a bored engineer. However, the style isn't to everyone's taste and, while Compaq should be praised for throwing away the boxy mould, you get the impression the unit just misses the mark slightly in the cool stakes. The *PCW* office was split on this one, with half really loving the stylish look and the other half thinking the machine looked like a naff prop from a bad sci-fi movie.

The second thing that hits you, or rather smacks you around the face like a English soccer thug on the rampage, is the sheer speed of the processor. We thought the Casio E-105 was speedy, but the iPAQ is like the Casio on steroids in comparison. This is not surprising as the iPAQ uses a StrongARM SA1110 running at a whopping 206MHz compared to the Casio's MIPS clocked at 131MHz.

We loaded a copy of PocketTV from www.mpegtv.com that allows you to play MPEG files on PDA devices. The iPAQ not only handled the video playback with ease, but could also play back an MP3 file at the same time – impressive.

The TFT screen is also worthy of praise. Measuring 240 x 320 pixels, it looks fantastic with the backlight on, but even without the backlight there is enough contrast to be able to read it reasonably easily in normal office light. Not only this, but the unit has an automatic brightness sensor, visible only as a tiny hole on the front of the fascia, that checks the light level in the room and adjusts the display's brightness accordingly.

Most of the usual buttons that have appeared on previous Windows CE devices are present on the iPAQ, with quick-launch buttons for the voice recorder, calendar, contacts, program menu and one assigned to Compaq's quick-launch utility. One omission, though, is the rocker switch that's present on the Aero models, but the new dpad (that also houses the speaker) more than makes up for its absence.

Compaq is making a big hullabaloo about the expansion slot at the rear of the unit. This is a proprietary interface much like the Springboard slot on the Handspring PDAs. Modules slot over the back of the iPAQ and grip its sides to stay in place. Unfortunately, Compaq didn't have any modules available at the time of writing, so we couldn't try out this feature. However, PC Card and Compact Flash modules should be available soon, and more interesting modules such as a GPS (Global Positioning System) unit and a combination Bluetooth/Compact Flash expansion pack should follow some time in the near future.

There is an open source initiative, backed by Compaq, to put Linux on the H3600. A version of Linux can be downloaded and run on the device, but once it is installed there is currently no way to reload the Pocket PC OS. This problem should be fixed soon. Check out www.handhelds.org for more information. Despite all the plus points, there are a number of issues we have with the device. While the iPAQ doesn't skimp on memory, having 32MB of RAM and, like all new Pocket PC devices, 16MB of ROM, there are no built-in Compact Flash or PC Card slots for additional storage. This is totally unforgivable and misses the point of Pocket PC being a multimedia OS. What's the use in having multimedia capabilities such as the WMA and MP3 playback facilities when you have to use a bulky add-on to give the device the storage space to hold the multimedia files?

Secondly, no matter how much better Pocket PC is than Windows CE as an OS – and it is way ahead of its older brother – it's still not as easy to use as Palm OS. It's a bit like Windows 3 in comparison to MacOS. It looks and feels similar, but it's just more fiddly to use and still has its annoying idiosyncrasies. That said, Pocket PC has a big edge when it comes to multimedia and Internet facilities.

Also, we did manage to repeatedly crash the device while trying to delete some MP3 files from memory. The crashes were so bad that the unit wouldn't even respond to the off button. We had to repeatedly reset the iPAQ before we finally managed to free the file from the grips of the Pocket PC media player. We're not sure if this is a fault with the iPAQ or with the Pocket PC OS, but it was extremely frustrating.

That said, the iPAQ is a very cute device. It's reasonably stylish, not too bulky and has a ferociously powerful CPU, but the lack of a built-in Compact Flash or PC Card slot brings it down a notch or two.

NIALL MAGENNIS

DETAILS

★★★★

PRICE £399 (£339.60 ex VAT)
CONTACT 0845 270 4000
www.compaq.co.uk
PROS Very fast processor; great screen; distinctive design
CONS The lack of a built-in Compact Flash or PC Card slot is unforgivable
OVERALL A stylish unit with a great screen and processor, but let down by the lack of built-in support for Compact Flash and PC Cards

Sony CMD-Z5

A well-designed phone with extras including WAP, email access and answerphone capabilities.

The Sony CMD-Z5 is quite simply a stunning mobile phone, resplendent in silver and small enough to fit even the tightest of pockets. The Z5 measures only 88 x 49 x 21.5mm (h x w x d) and weighs an incredible 82.5g. The styling is rounded and it actually looks like a toy phone rather than the real thing, but it does start to grow on you after a while. The only thing that really spoils the shape is the large antenna fixed to the top right corner, but then with a device this small there probably wasn't enough room for an internal aerial.

A large active flip covers all the buttons and half of the screen, so there's little chance of accidental key activation while it's in your pocket or bag.

The display is superb with multiple shades of grey for handling graphics and full resolution for improved detail. It's usually possible to view the whole of an SMS message on the screen at once without having to scroll through it. That said, even if you do need to scroll through anything, it's the simplest of manoeuvres with the Z5. Located at the top left corner of the phone is a jog dial, but not just any jog dial. Anyone who has used a device like this will be familiar with the ability to scroll up and down by turning the wheel and selecting by pressing the wheel inward, but Sony has taken this idea a step further. As well as being able to press the wheel inwards it can also be pressed towards or away from the user, making an already versatile tool even more so.

The one gripe that we did have about the jog dial was its position. We would have preferred to have seen it at the top right-hand corner to allow for easy thumb manipulation with the phone in your right hand, although we're sure that left-handed users will be grateful for the design.

Although the Z5's size is one of its key selling points, anyone with big hands may find it hard to press the keys without unwanted keystrokes appearing at random. But then any of the very small phones on the market suffer from the same problem.

Opening the phone and pressing the jog dial inwards brings up the menus. These are displayed beautifully as 3D tabs that can be scrolled through using the dial. Navigation is simple and intuitive with the extra jog dial functions coming in very handy. Pulling the dial towards you will jump back one menu level, while pushing it away from you will give you a brief explanation of the option that's currently highlighted.

There's a memo recording facility, which is nothing new with a mobile phone, but what's interesting about this one is that you can use it as an answerphone. You can record an answerphone message and then set the phone up to play that to incoming callers and then record their message for you to listen to later. This is a great idea because you avoid the costs incurred by retrieving voicemail from your service provider.

It's not just the design of this phone that's impressive though, it's also a very advanced mobile data communication device. This is the first phone we've seen that uses the Microsoft browser that allows you to use both WAP and HTML standards. The results were impressive with faster download times than any of the other Internet phones we've seen, although setup wasn't easy and there was practically no help in the manual. You can also use the Z5 for accessing your POP3 email. Simply input the dialup and account details of your POP3 mail provider and you can read and send email from your standard POP3 account without the limitations of SMS email.

Another great design feature is the inclusion of a power cradle. This means that the phone can be placed in the cradle when you get to work where it will happily charge while you sit at your desk, and can then be simply picked up when you leave. Don't worry about having to carry the cradle with you when you travel though, since the power cable that connects to the cradle also connects to the phone.

So, is this the perfect mobile solution for the new millennium? Unfortunately, not quite; there are a couple of issues that tarnish the package. First is the lack of an infra-red modem. It may be said that a phone with features like this doesn't need to connect to a PDA or notebook, but many mobile users will still prefer to type emails on an external device. Another disappointment is the lack of GSM1900 support (it's a 900/1800 dual-band unit), rendering the phone useless if you travel to the US.

It's a shame that Sony chose to leave out two such useful mobile features that could have made the Z5 the ultimate mobile solution, although as it stands it's still a stylish and feature-packed product.

RIYAD EMERAN

DETAILS

★★★★

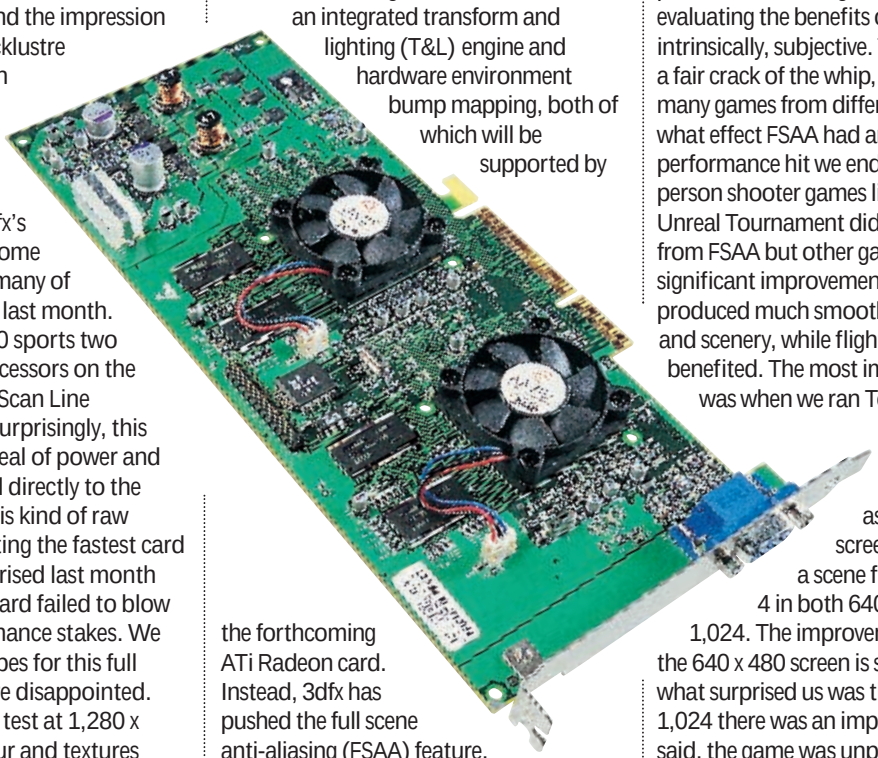
PRICE Approx £149 with a contract (£126.80 ex VAT)
CONTACT Sony 0990 111 999
www.sony.co.uk
PROS Very small; feature packed; great design
CONS No IR modem or GSM1900 support
OVERALL This could have been the perfect phone for so many users but for a couple of omissions. It's still a great product though

3dfx Voodoo5 5500

The full production graphics card still has problems, but FSAA is worth checking out for games.

We looked at a pre-production version of this board last month and the impression was of a somewhat lacklustre graphics solution when compared with the competition. However, after closer inspection of the full production board, 3dfx's new baby does show some potential, but retains many of the problems outlined last month.

The Voodoo5 5500 sports two VSA-100 graphics processors on the board running in SLI (Scan Line Interleave) mode. Unsurprisingly, this board draws a great deal of power and needs to be connected directly to the power supply. With this kind of raw power, we were expecting the fastest card around and were surprised last month when the reference board failed to blow us away in the performance stakes. We therefore had high hopes for this full retail card, but we were disappointed. Running the Quake III test at 1,280 x 1,024 with 32bit colour and textures resulted in a score of 40fps, which was comparable to last month's two GeForce2 cards that scored 41fps. The Voodoo didn't fare as well on Direct3D though. Running 3DMark in 1,280 x 1,024 with 32bit colour brought in a score of 2,277 compared with 3,084 on the Asus V770 GeForce2 card.



3dfx has also ignored features such as an integrated transform and lighting (T&L) engine and hardware environment bump mapping, both of which will be supported by the forthcoming ATi Radeon card. Instead, 3dfx has pushed the full scene anti-aliasing (FSAA) feature. This improves the image quality of a scene by smoothing the edges and eliminating 'jaggies' that surround curved and diagonal surfaces. It works very well, but the performance hit is significant, to the extent that a 3DMark score of 3,418 at 1,280 x 1,024 in 16bit colour drops to 874 with four-sample FSAA enabled. But raw performance testing isn't a fair way of evaluating the benefits of FSAA since it is, intrinsically, subjective. To give the Voodoo a fair crack of the whip, we loaded up many games from differing genres to see what effect FSAA had and how much of a performance hit we ended up with. First-person shooter games like Quake III and Unreal Tournament didn't benefit too well from FSAA but other games showed a significant improvement. Racing games produced much smoother backgrounds and scenery, while flight simulators also benefited. The most impressive example was when we ran Tomb Raider games. The difference in the image quality was astounding. The screenshots (left) show a scene from Tomb Raider 4 in both 640 x 480 and 1,280 x 1,024. The improvement with FSAA on the 640 x 480 screen is significant, but what surprised us was that even at 1,280 x 1,024 there was an improvement. That said, the game was unplayable at 1,280 x 1,024 with FSAA enabled. Games like Tomb Raider still look great even at lower resolutions with FSAA turned on, making it ideal for users with small monitors.

The Voodoo5 5500 doesn't perform as well as we'd hoped but FSAA can be applied to any game in your library without the need for native support.

RIYAD EMERAN

Top left: Tomb Raider 4 at 1,280 x 1,024 with FSAA enabled; top right with no FSAA
Bottom left: TR4 at 640 x 480 with FSAA; bottom right without FSAA

DETAILS

★★★★

PRICE £249 (£211.91 ex VAT)
CONTACT 3dfx 01753 502 800
www.3dfx.com
PROS FSAA can be applied to any game with some stunning results
CONS Lacks T&L, not as fast as a GeForce2
OVERALL The lack of features and under par performance are disappointing, but the FSAA is great when used with the right game

PERFORMANCE RESULTS

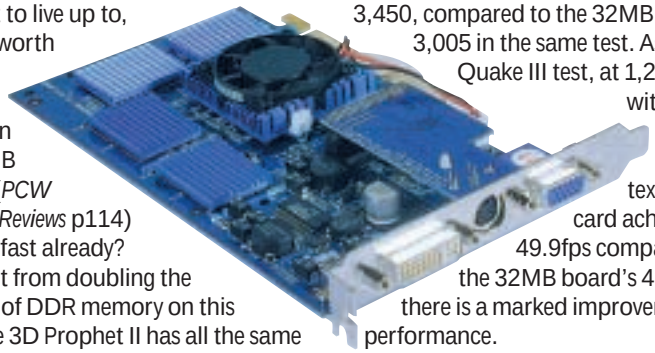
Quake III 1,280 x 1,024 32bit

3DMark 2000 1,280 x 1,024 32bit

Hercules 3D Prophet II

If you need the extra frames per second this 64MB graphics card can offer this could be for you.

The GeForce II GTS is currently the force to be reckoned with in the 3D graphics cards arena, although as last month's preview of the ATi Radeon shows, the tide may be about to turn. We got hold of the 64MB version of the Hercules 3D Prophet II to see how it performs. Billed as '3D speed beyond imagination', the card has a lot to live up to, but is it worth shelling out for this when the 32MB version (*PCW* August, *Reviews* p114) is pretty fast already?



Apart from doubling the amount of DDR memory on this card, the 3D Prophet II has all the same functions as its sibling. The board does look different as all the memory chips on this model sit on the top of the card and instead of each RAM chip having individual heatsinks, two chips share a larger heatsink between them. There is also a second PCB riser above the first to deal with the S-Video electronics as well as a DVI output.

The Prophet performed as expected, beating the scores of the 32MB variant in both 3DMark 2000 and the Quake III tests. The 64MB's 3DMark 2000 score at 1,280 x 1,024 with 32bit colour was 3,450, compared to the 32MB variant's 3,005 in the same test. As for the Quake III test, at 1,280 x 1,024 with 32bit colour and textures, the card achieved 49.9fps compared to the 32MB board's 41.1fps. So there is a marked improvement in performance.

The real issue is cost. With a street price of £319 inc VAT, it's a fair bit more expensive than the 32MB card, but if you are prepared to break the bank for slightly better performance, then at least you can be sure you have one of the fastest graphics boards on the block.

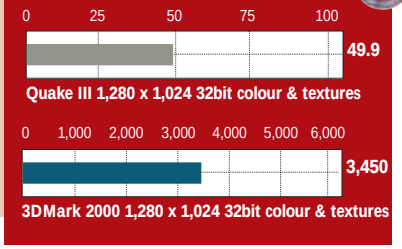
SCOTT MONTGOMERY

DETAILS

★★★★★

PRICE £319 (£271.49 ex VAT)
CONTACT Hercules 020 8686 5600
www.hercules.com
PROS Even more speed from a GeForce II GTS-based card
CONS Even more cash
OVERALL If money is no object this is the one to buy. But for the less affluent, the 32MB version will be more than adequate

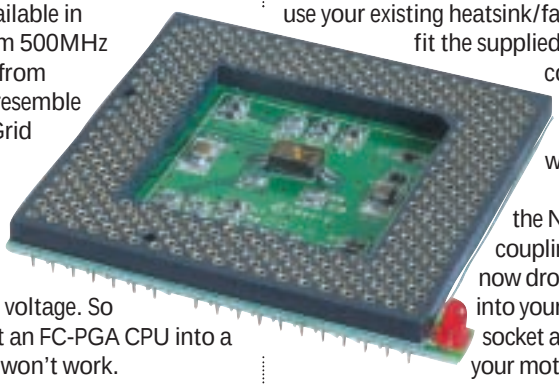
PERFORMANCE RESULTS



PowerLeap Neo-S370

A workaround for chip compatibility problems appears to have some difficulties of its own.

Upgrading your CPU is not straightforward. Intel's latest Flip Chip Pin Grid Array (FC-PGA) CPUs (available in Pentium IIIs from 500MHz and Celeron IIs from 566MHz) may resemble old Plastic Pin Grid Array (PPGA) models, but the pins are different and the CPU die requires a lower voltage. So while you can fit an FC-PGA CPU into a PPGA socket, it won't work.



Enter PowerLeap's Neo-S370, which promises to let new FC-PGA CPUs work on old PPGA motherboards, effectively letting you swap your sub-500MHz socketed Celeron for the fastest FC-PGA Pentium III on the market.

After setting two jumpers for the desired FSB (front-side bus), you must carefully insert the CPU into the adaptor – scary stuff, but not as bad as having to slide a razor blade in between to separate them again. Since the chip is now twice as thick as before, you can't use your existing heatsink/fan and must fit the supplied PowerLeap combo, which is far from the best we've seen.

In theory, the Neo/FC-PGA coupling should now drop straight into your PPGA socket and work, but your motherboard must be able to support lower 1.65 core voltages. We tried an 866MHz PIII on an Abit BP6 and, while the system started up okay, it was too flaky to run any tests.

We had, in fact, bought a pair of adaptors in the hope of dual-PIII action, but now our BP6 didn't even wake up, so it was back to the dual 366 Celerons. At the www.bp6.com enthusiast site, they'd successfully got one PIII working, but no joy with dual CPUs. Note that only FC-PGAs employing Intel's cB0 'stepping' are certified for dual operation.

Despite costing only $25 each, our pair came to £70 after postage and import tax, which is not far off a new motherboard. We're expecting to see several genuine dual-FC-PGA motherboards launched this summer which, to be honest, is a better buy.

GORDON LAING

DETAILS

★★

PRICE $25 plus postage and import tax (approx £35)
CONTACT PowerLeap
www.powerleap.com
PROS FC-PGA compatibility on legacy PPGA motherboards
CONS Ours were flaky and expensive to import
OVERALL You may be better off buying a new motherboard

Pioneer DVR-S201

DVD authors and companies that need to back up a lot of data will love this piece of kit.

A few years ago a DVD-R drive would have set you back over £13,000. Things have moved on since then, but these devices are still not cheap at £3,000 ex VAT. That said, it wasn't just the cost of DVD-R that put off potential buyers, it was also the capacity. The problem with DVD-R is that the capacity is only 3.95GB, which means that DVD discs cannot be mastered from them. Well, that's not exactly true, you could press a DVD 5 from a DVD-R disc, but you'd be wasting 800MB of capacity. However, the solution to this problem is close at hand, with the 4.7GB DVD-R standard due for implementation in September.

With 4.7GB recordable DVDs available, the process of creating DVDs for distribution has just got a lot easier.

As things stand, if you want to create a DVD you'll probably have to send your data off on DLT tape and hope that the disc comes out as you want it. However, if you could create a DVD exactly the way you want it yourself, you'd know that when your distribution discs are pressed there will be no mistakes.

The DVR-S201 is an external DVD-R drive from Pioneer. The company has been a big player in the DVD market since its inception, so it's no surprise that it's the main supplier of DVD-R devices. The drive uses the SCSI interface and the rear of the case sports two Centronics SCSI connectors, a device ID selector, a power socket and a terminator switch. At the front of the box is a power switch, an eject button and two lights indicating when a disc is loaded and when it's being read or written to.

Connecting up the device is simple, as it usually is with SCSI peripherals. There is no SCSI cable supplied, but since there's no way of knowing what SCSI card it will be connected to this makes sense.

The discs are not particularly cheap, considering they can only be written to once, but any company that needs this kind of device isn't likely to be put off by the media cost. A 3.95GB disc will set you back between £20 and £24 while a 4.7GB disc will cost between £25 and £28.

Companies that need to archive a lot of data on a regular basis will benefit greatly from a DVD-R drive, especially since only records stored on write-once media are admissible in court.

That said, the main use of a drive like this will be for video. MPEG2 encoding has dropped in price so much that anyone dealing with multimedia or video is likely to want to code their output using it. Of course, anyone with a DVD player will already have experienced the high-quality video of MPEG2 when watching movies, so distributing video and multimedia on a DVD-R disc seems like the natural choice.

Using the DVR-S201 was simple and intuitive with the drive operating like a high-capacity CD-R drive. We connected the drive to a 733MHz Intel Pentium III system with 128MB of RAM and a standard Adaptec PCI Narrow SCSI card. The burn times were long, but that's hardly surprising considering the amount of data that's being written. We wrote 3.5GB of data directly from a DVD-ROM disc to a blank 3.95GB DVD-R disc. The operation took 45 minutes and 30 seconds.

It's easy to dismiss DVD-R as being too expensive compared to a DVD-RAM drive at under £400, but they really are entirely different products. The DVD-RAM discs may be rewritable, but you can only squeeze 2.6GB on each side, although the 4.7GB per side discs have been just around the corner for several months now. Also, DVD-RAM discs can only be read by another DVD-RAM drive, whereas DVD-R discs can be read by any DVD drive.

There is some serious competition on the horizon for DVD-R, however. DVD+RW is the rewritable standard supported by Philips, Sony and HP. This alternative to DVD-RAM is due for release early next year with a 4.7GB capacity and the ability to read the discs in any DVD drive, just like DVD-R. However, whether we see DVD+RW next year remains to be seen, and in the meantime DVD-R is definitely the best solution for pre-mastering DVD discs.

The company that supplied the drive, Map 2000, is offering a bundle with the drive which includes Pioneer Crosswriter pre-mastering software as well as DVD-REP from Prassi (best known for its packet-writing CD-RW software). Rounding off the package is a box of 10 blank 3.95GB DVD-R discs to get you started.

This is a very expensive device that you either need or you don't. But if you do need it, it's well worth the money.

RIYAD EMERAN

DETAILS

★★★★

PRICE £3,525 (£3,000 ex VAT)
CONTACT Map 2000 01344 845 626
www.pioneer.co.uk
PROS Great for pre-mastering DVDs; easy to use
CONS Expensive
OVERALL A great unit if you're in the business of creating DVD discs. If you're not a DVD author, DVD-RAM may be a better option

Canon Digital Ixus

A digital camera, so compact and stylish, that the snap-happy will want to take it everywhere.

The one rule for any portable equipment is that if it's too big and heavy, you simply won't use it. This particularly applies to cameras – a big one may offer better facilities or quality, but if you can't be bothered to take it out, then you're better off buying a cardboard disposable, as at least you'll come home with some pictures.

Canon understands this philosophy perfectly and complements its higher-end SLRs with increasingly smaller compact cameras. The evolution peaked a couple of years ago with the tiny but perfectly formed Ixus camera, designed to use the new smaller APS film format. Sure, it couldn't match the quality of even some larger compacts in many circumstances, but its small size ensured it never stayed at home and missed an event. Now Canon has done what many thought would be impossible: meet the Digital Ixus.

Measuring a mere 57 x 87 x 27mm and weighing only 190g (without battery), the Digital Ixus really is the same size as the original 24-48mm zoom Ixus; suddenly Canon's earlier S10/S20 at 69 x 105 x 34mm and 270g doesn't seem so compact any more. When powered down, the only thing to protrude from the silver case is the slim zoom lever that surrounds the shutter release button on the top.

As with the S10/S20 and original Ixus, there's only room in such a small space to accommodate a 2x optical zoom lens, equivalent in focal length to 35-70mm on a 35mm camera; the actual specification is 5.4-10.8mm, f2.8~4.0 and the closest macro focusing distance is 10cm.

Before you get too excited, the Digital Ixus does not boast a 3.3megapixel CCD – after all, if it did, there'd be no point buying the more expensive S20. Instead Canon has fitted a 2.1megapixel chip, operating at 1,600 x 1,200 pixels. With most colour inkjets liking to be fed around 200 pixels per printed inch, the Digital Ixus will easily deliver 8 x 6in prints, although even at 10 x 8in, image quality was acceptable (especially with subsequent software interpolation to smooth the jaggies).

You'd be forgiven for thinking Canon had employed built-in memory but, remarkably, the company has found room for a Type I Compact Flash slot and supplied an 8MB card as standard. Understandably, the slot won't accommodate IBM's MicroDrive. Like earlier Canon Digital cameras, the Digital Ixus employs relatively light compression at its best quality setting, resulting in files measuring around 1.6MB each. You'll get around four or five of these on the 8MB card, 12 using higher compression, or 46 in 640 x 480 pixel mode. There's no uncompressed TIFF mode.

The supplied lithium-ion battery fully recharges in around 120 minutes and is good for an average day's shooting – Canon reckons it's good for around 85 shots using the LCD monitor. Speaking of which, the Digital Ixus has a 1.5in TFT display, in addition to an optical viewfinder. The 1.5in may look small alongside the 1.8 and 2in displays on other digital cameras, but it works well. About the only downside is that you have to use it to check battery life, shooting mode and number of shots left, as there's no room for the traditional mono LCD status panel on the top.

Like the S10 and S20 before it, the Digital Ixus is almost entirely automatic, with a couple of overrides thrown in for good measure. Shutter speeds range from one second to 1/500, but there's no manual control over these, the aperture or the focus beyond a basic lock.

You can however, choose a black and white mode, set the white balance and adjust exposure compensation from +/-2EV in 1/3 EV steps, which is considerably more than on an average film compact. The flash can also be forced on or off, you can reduce red-eye, or use slow-syncro to complement long exposures. There's also TV output, but no video capture mode. Finally, a neat stitch-assist mode helps you align multiple frames to create panoramic effects.

Connection is across USB only, and Canon's supplied ImageBrowser software lets you browse, manage and download images – best-quality JPEGs take around six seconds to transfer.

Image quality was pretty good, but there was a little electronic noise apparent on smooth coloured graduations such as blue skies. So saying, in our tests, the Digital Ixus panned the original film Ixus in terms of image quality, along with boasting more control.

The bottom line is that while there are certainly better quality cameras around, none are as small as the Digital Ixus and its results are more than acceptable for the environments in which it will be used. It's so small you'll take it everywhere and, because it's digital, you'll keep snapping without a care. There's even a waterproof case available, at £149, that's good to five metres. In many ways, this makes the Digital Ixus the perfect compact camera – so long as you're never more than a day away from mains electricity or additional storage, of course.

GORDON LAING

DETAILS

★★★★★

RECOMMENDED Personal COMPUTER WORLD

PRICE £599 (£509.79 ex VAT)
CONTACT Canon 0121 666 6262
www.canon.co.uk
PROS Tiny, gorgeous and more than good enough for snappy situations
CONS Not 3.3megapixel; slight noise on images; need to use main display to check status
OVERALL Small and of sufficiently good quality to replace many compacts

Epson PhotoPC 3000Z

A chunky, high-quality 3.3megapixel camera that promises to rival its competitors.

Now it's Epson's turn to join the 3.3megapixel fray with its PhotoPC 3000Z; a camera that, like its four major competitors from Canon, Sony, Olympus and Nikon, seems to have been carefully researched.

The 3000Z is a fairly chunky camera, measuring 89 x 108 x 65mm and weighing a relatively heavy 368g without batteries. Like Nikon and Olympus, Epson is sticking with four AA batteries and supplies a set of rechargeables and a charger. AAs are cheap and readily available, but they take around half a day to fully charge and rarely match the lifespan of the best lithium-ion rechargeables.

Like the earlier 850Z model, Epson has fitted the 3000Z with a 'HyPict' mode. This interpolates the standard 3.3megapixel resolution of 2,048 x 1,536 up to 2,544 x 1,904 pixels. Interpolation is where intermediate values are created by software to increase the apparent resolution of an image. It won't reveal any additional detail that wasn't originally captured, but can be quite effective at smoothing edges and hiding jaggies in big enlargements – but why build it in the camera when you can do it in software later?

We presume the answer is for situations where there's no PC, such as popping the memory card directly into a suitable photo printer. In-camera interpolation also allows you to work with raw data before it has been compressed. So saying, we took several identical compositions in both normal and HyPict modes, but when printed at A4 on Epson's Stylus Photo 1270, both looked virtually identical. At A3 there's a slight visible difference, but no-one yet produces an A3 printer with a memory card slot. Consequently we recommend you stick with the normal mode and fit more images on the memory card.

Epson supplies the 3000Z with a 16MB Compact Flash card, although the slot is not certified for the IBM MicroDrive CF hard disk. Interestingly, Epson has used the most severe standard compression out of all the 3.3megapixel cameras tested, resulting in files typically measuring only 780KB at best quality (compared to between 1 and 2MB on the others); even the interpolated HyPict mode only produces files around 1MB. There's the option of an uncompressed 9MB TIFF mode, along with a 640 x 480 and cropped 2,048 x 768 panoramic setting.

The 3x optical zoom lens is equivalent to 34-102mm on a 35mm film camera; the specification is 7-21mm, f2.0~2.5 and the closest macro focusing distance a reasonable 6cm. There's a manual focus option, but only three steps to choose from compared to seven on the Sony S70 and an impressive 50 on the Nikon 990.

Round the back is the choice of an optical viewfinder or a clear, bright 1.8in TFT display – out of all the 3.3megapixel models only the Sony S70 has a 2in screen. Seven buttons surrounding Epson's screen activate or confirm options displayed alongside, and you can zoom in by a factor of two during playback.

Flash options are particularly good, with an external hotshoe and a welcome rear-curtain mode that fires the flash at the end of a long exposure to trail the action behind. An aperture priority mode offers six steps from f2.0 to f8.0, while fully manual offers 42 shutter speeds between eight seconds and 1/750. A time lapse function can automatically snap at intervals between 10 seconds and 24 hours. Exposure compensation is available from +/-2EV in 1/3 or impressively fine 1/5 EV steps.

The now common movie mode can capture up to 25 seconds of 320 x 240 video with mono audio in the QuickTime M-JPEG format, and play back full-screen on your TV; you can also record descriptive audio clips with each picture. Epson's software lets you view and transfer images (standard JPEGs in approx three seconds), and even configure and control the camera over the USB connection.

Image quality is excellent, with sufficient pixels to make a great looking A4 inkjet print. The high level of compression even on the best-quality JPEG setting slightly softened ultimate detail, but it's nothing you'd worry about.

On the downside, the 3000Z takes 55 or 15 seconds to save a TIFF or HyPict image, and 30 or five seconds respectively to open them. A 15-second video clip takes over 20 seconds to save and the same again to buffer before playing.

The 3000Z is most comparable to Sony's S70 and Olympus' 3030. Our favourite 3.3megapixel camera remains the S70 for being slightly smaller and lighter while boasting a much longer battery life, but it's an extremely close run thing – all will do you proud.

GORDON LAING

DETAILS

★★★★

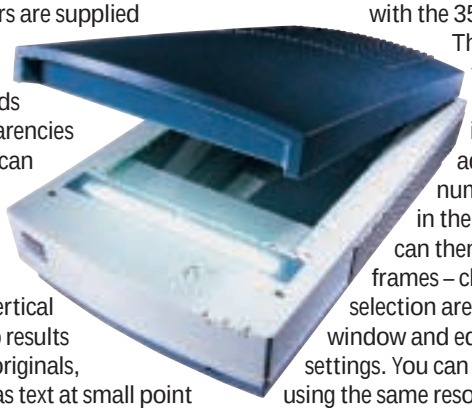
PRICE £799 (£680 ex VAT)
CONTACT Epson 0800 220546
www.epson.co.uk
PROS Good quality; PC remote control of camera; time lapse function
CONS HyPict appears to be a white elephant; slightly high compression
OVERALL Another great 3.3megapixel camera where the choice between it, the Sony S70 and Olympus 3030 is entirely personal

Umax Powerlook 1100

A FireWire scanner that will give you good results if you work with transparencies.

The Powerlook 1100 is a FireWire scanner, so data transfer to your PC will occur faster than over most SCSI links. There are two FireWire ports, so you can daisychain devices, but you'll need a FireWire card or integrated port for your PC.

Three film holders are supplied for 35mm, 120 and 5 x 4 film. The 35mm slide tray holds 12 mounted transparencies at once so you can scan lots of trannies in a short time.



The optical resolution of 1,200 horizontal x 2,400 vertical provides good sharp results and, with reflective originals, resolves detail such as text at small point sizes cleanly, though at resolutions above this the interpolation introduces a noticeable softening of edges.

The quality of scans from 35mm trannies is reasonable, with vibrant colours, but falls well short of the standard required for most print reproduction purposes. The 1100 fared better with large format trannies, though.

The batch and auto scanning features make light work of many originals and are put to effective use in combination with the 35mm slide tray. The preview scans the entire tray and selects the image areas, adding them as numbered 'frames' in the scan job list. You can then edit individual frames – changing the selection area in the preview window and editing scan settings. You can batch scan – using the same resolution and scan settings for each slide, or multiple scan with different settings. Batch scanning of a half-loaded tray with seven images all at 1,200dpi output resolution took a little over one minute, multiple scanning the same set with resolutions from 150 to 2,400dpi took just two minutes.

At this price the Powerlook is a good option for small design businesses that deal primarily with reflective originals, but occasionally need to deal with trannies in quantity, at moderate output sizes, resolution and quality.

KEN MCMAHON

DETAILS

★★★

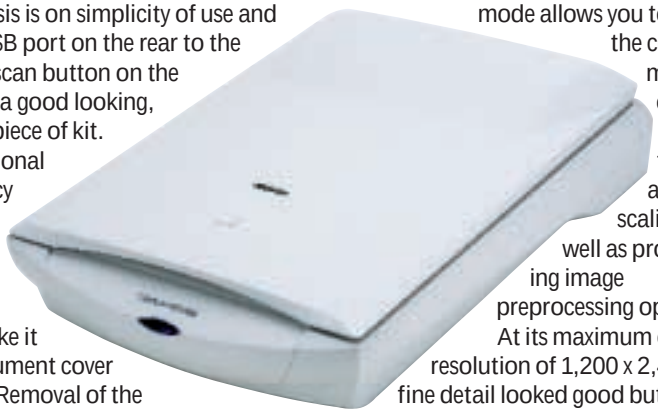
PRICE £938.82 (£799 ex VAT)
CONTACT IMC 01344 871329
www.umax.com
PROS Batch and multiple scanning; good-quality optics
CONS 35mm scan quality; poor documentation
OVERALL For almost four times the price of the Canon (below) you get a slightly bigger scan area, FireWire, noticeably higher quality, colour management and batch and multiple scanning features. Is that worth £600 to you?

CanoScan FB1210U

Sleek, simple-to-use scanner that offers one-touch processing and speedy action.

Small, light, and sleek, this is the design antithesis of the Umax Powerlook 1100 reviewed above. The emphasis is on simplicity of use and from the USB port on the rear to the one-touch scan button on the front this is a good looking, functional piece of kit.

The optional transparency adaptor is so slim and lightweight you could easily mistake it for the document cover it replaces. Removal of the protective cover, however, reveals a 5 x 4in diffuser light that illuminates the slides from above.



Scangear CS-U, a TWAIN plug-in, provides access to the scanner from your image editor.

The TWAIN module has two modes, simple and advanced. With the first you choose from a selection of document types – colour photo, line art and so on, set the paper size and image source, preview, crop and scan. Advanced mode allows you to set the colour mode, output resolution and scaling, as well as providing image preprocessing options. At its maximum optical resolution of 1,200 x 2,400, fine detail looked good but, as you'd expect from a scanner costing a quarter of the price, it was inferior to the Umax (above). Quality of transparency scans was terrific at the larger sizes, but really quite poor from 35mm originals. This might be something to do with the holder, which is fiddly to say the least.

The bundled Scangear toolbox app provides a desktop button bar that gives one-touch processing for a variety of destinations. You can set colour mode, resolution and so on in each button's preferences and nominate one to activate when the start button is pressed.

Despite the bandwidth limitations of USB, even big scans are completed fairly quickly – a slightly undersized A4 RGB page at 300dpi, producing a 22MB file, took one minute and 10 seconds.

KEN MCMAHON

DETAILS

★★★

PRICE £292.57 (£249 ex VAT) with transparency unit
CONTACT Canon 0121 666 6262
www.canon.co.uk
PROS Stylish; simple
CONS Poor-quality 35mm transparency scans; fiddly
OVERALL Good option for automated front-panel control, for 35mm transparencies in volume look elsewhere

CTX EX1300

A 21in shadow-mask monitor that offers fine quality at a budget price, but the world is going flat.

Although CTX is going flat for the majority of CRT displays, the company is also still plugging away at the top end with 21in monitors based on shadow-mask tubes. The EX1300 is the latest in the line.

Short-necked the EX1300 is not: at 540mm deep, you need plenty of desk space. And, at 30kg, unpacking and positioning is a two-person job.

Styling and control layout conforms to the usual CTX standards – three buttons on the fascia provide access to three on-screen menus for picture, colour and status information, while four others provide for navigation within them. Not the most intuitive system, but there is at least a dedicated OSD exit button, which also serves to switch between D-SUB and BNC inputs when the OSD isn't active.

The EX1300 has a USB hub, with one upstream and four downstream connectors, which are tucked away on the back panel.

Progress hasn't completely halted on improvements to shadow-mask displays: the picture is admirably sharp, although it's inevitably less beguiling than the richness and vibrancy of an aperture grille. Power regulation is rock-steady, with better resolution characteristics than we'd expect, along with a fine performance in the video bandwidth tests, which indicates good electronics. Maximum claimed resolution is 1,800 x 1,440 at 76Hz, although that's not really a practical resolution: 1,600 x 1,200 at 85Hz is the highest we'd attempt for normal use, at which it's very usable.

The EX1300 is a fine unit, but the world is moving toward flat screens, and going back to the curved surface of a shadow-mask display is a price most people upgrading from a smaller, flat-screen unit will be unwilling to pay. But, if you still prefer the look of a shadow mask, the price and quality of the EX1300 make it one to consider.

DAVID FEARON

DETAILS

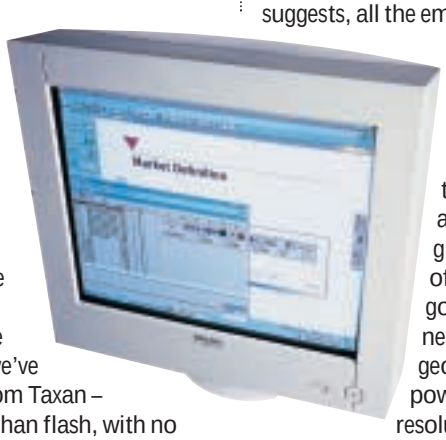
★★★★

PRICE £586 (£499 ex VAT)
CONTACT CTX 01923 810 800
www.ctxmonitors.com
PROS Fine quality for a shadow mask; comprehensive features
CONS Most don't go for curvy screens any more
OVERALL A good choice for those who need a lot of screen area on a budget

Taxan Ergovision 985

Another entrant into the 19in monitor race, this is a fine product but can it beat the competition?

The Ergovision 985 TCO99 is Taxan's latest entrant into the hotly-contested 19in monitor fray. There are no surprises as far as the tube goes: it sports a flat-screen aperture-grille unit in the form of a Mitsubishi-made Diamondtron NF, with 18in viewable diagonal



The look of the 985 is also what we've come to expect from Taxan – functional rather than flash, with no over-the-top styling. In common with most other flat-screen CRTs, the unit is fairly deep, but not unmanageable at around 475mm. The OSD menu system is the biggest departure from previous models, and it's a huge improvement. The single button and digital rotary control make finding the adjustment you want quick and simple: just twirl the knob and it'll scroll through the available adjustments page by page. As the name suggests, all the emissions, ergonomics and environmental bases are covered by the 985's TCO99 certification.

As usual, we tested the Taxan using a Matrox G400 graphics card. In terms of image quality, it's a good performer, with next to flawless image geometry and very good power regulation. At a resolution of 1,024 x 768 and a vertical refresh of 75Hz, focus and sharpness are adequate, but it doesn't possess the superb clarity and contrast of CTX's excellent, and cheaper, PR960F (*PCW* April 2000). This may be down to the variable 0.25-0.27mm aperture-grille pitch of the Diamondtron NF, compared to the constant 0.24mm pitch of the CTX's Sony FD Trinitron tube. There's no USB facility, which the CTX has as standard. Quality is good enough for the display to remain usable if you want to switch up to 1,280 x 1,024, but go over 75Hz refresh at this resolution and the drop-off in clarity becomes obvious.

We have no major complaints about the 985 – it's a fine monitor with good controls and image quality. But at this price, the competition from CTX and Mitsubishi is a little too stiff.

DAVID FEARON

DETAILS

★★★★

PRICE £390 (£331 ex VAT)
CONTACT Taxan 01344 484 646
www.taxan.co.uk
PROS Great OSD; good quality
CONS Not as sharp or as cheap as some of the competition; no USB
OVERALL It's good, but not good enough to break clear of the pack

Kodak V600 Zoom

Mobile presenters on a budget should focus in on this LCD projector for its vivid reproduction.

This LCD projector from the imaging giant Kodak is a lot more affordable than Infocus' DLP-based LP335 we reviewed last issue, but to a certain extent you get what you pay for. Having said that, the V600 Zoom would suffice for some mobile presenters.

This 800-lumens model displays an acceptable picture at 800 x 600 with, typically of LCD models, very vibrant colour reproduction. The picture was noticeably grainy, though, but if all you are doing is showing one PowerPoint slide after another, this will not be a big issue. The image can be viewed with the lights on, although not quite to the same degree as a 1,000-lumens version. For the best performance, though, keep the lights off.

Inside the case is a healthy supply of connectors: British, European and US plugs, S-Video, Composite, D-SUB, audio and even a Mac adaptor. The projector has the appropriate ports for these cables. The control system is adequate, but could be improved slightly. Five buttons allow you to navigate through the menu. However, the positioning of the buttons is a bit confusing, and we kept mistaking the up, down and select buttons for something else. You have a fairly large degree of control over the picture, and there are a few pre-sets in Kodak's Image Manager that make the picture look a little better for photos, rich colours, spreadsheets and graphics. A remote is also provided with the same buttons as the top of the projector.

Turning the lens adjusts the focus, and there's also a manual 1.3x zoom on this model, although if you don't need this, a cheaper version comes without it. You can't adjust the keystone correction manually, which is a big minus. Overall, this projector is not as feature rich and does not have such a high-quality image as more expensive models, but it is light (3.4kg) and would suit the mobile professional on a budget.

JASON JENKINS

DETAILS

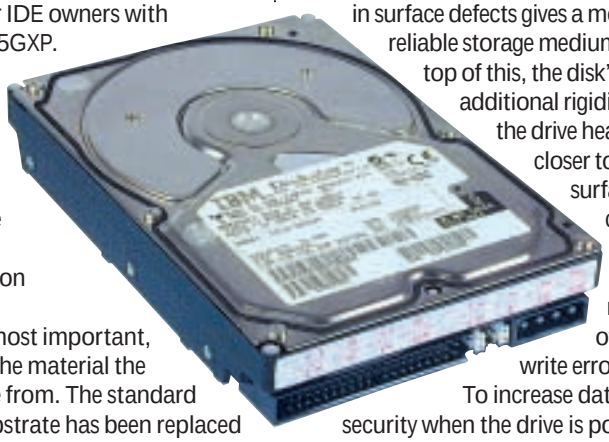
★★★

PRICE £1,996.33 (£1,699 ex VAT)
CONTACT Kodak 0870 6061031
www.kodak.co.uk
PROS Inexpensive; light; lots of ports; vivid colour reproduction
CONS No remote mouse; menu could be better; no manual keystone correction
OVERALL Not suitable for a home cinema enthusiast, but presenters could check it out

IBM Deskstar 75GXP

For IDE fans, this hard drive is full of features and can store 75GB in its high-capacity body.

The grass was always greener on the SCSI owner's side of the fence, but IBM is about to change this for IDE owners with the Deskstar 75GXP. It's a drive that manages to squeeze 75GB into a 1in high form factor. Despite this, though, it doesn't skimp on features.



First, and most important, is a change in the material the disks are made from. The standard aluminium substrate has been replaced with a more rigid glass version. Combined with fifth-generation GMR (Giant Magneto Resistive) heads, higher areal densities can be reached. This gives the 75GXP a density with a very impressive 11GB/sq in. This means that the 75GB capacity is spread across five disks, and 10 sides.

The glass substrate also undergoes a manufacturing process to create a smoother disk. The subsequent reduction in surface defects gives a more reliable storage medium. On top of this, the disk's additional rigidity allows the drive heads to fly closer to the surface, cutting down the number of read/write errors.

To increase data security when the drive is powered down, the load/unload technology is built in. Previously only seen in IBM's mobile drives, it moves the heads off the surface of the disk, and onto a safe area, when the drive powers down.

From the technical specs - a spindle speed of 7,200rpm, a 2MB data buffer, a UltraDMA100 interface, and an average seek time of 8.5ms – everything looks good in terms of performance.

We put the drive to the test with a 1GB file copy, and a random file read/write test using Iometer version 1998.10.01. It took 73 seconds to do the file copy, while the read/write test gave a result of 0.78Mbytes/second. The seek time was slightly slower than the 36GB IBM hard drive featured in our April group test. So, it's not the fastest drive, but for the price you get an awful lot of storage.

DAVID LUDLOW

DETAILS

★★★★

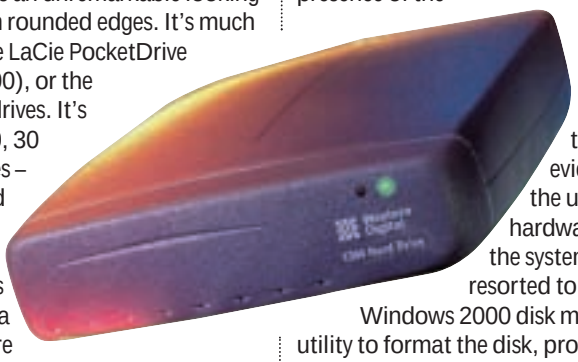
PRICE £499.38 (£425 ex VAT)
CONTACT IBM 01475 898125
www.storage.ibm.com
PROS Massive capacity; reliability should be better
CONS Average seek time is a little slow
OVERALL If you're looking for a lot of storage at a reasonable price then this is a great drive

Western Digital 1394

An external FireWire drive that performs well – even when the cable was removed!

External FireWire drives are now becoming more commonplace and the market is approaching the level at which there is a real choice. For portable video storage and indeed any other activity that requires unfussy large-capacity drives these units are ideal.

This drive is an unremarkable looking black box with rounded edges. It's much larger than the LaCie PocketDrive (*PCW* July 2000), or the popular VST drives. It's available in 20, 30 and 45GB sizes – we've reviewed the entry-level option.



The drive is supplied with a six-pin FireWire cable and power supply that we didn't expect to have to use. The unit was connected to an ADS pyro 1394 card – a space previously happily occupied by a 16GB VST drive that took its power from the card. The WD drive, however, would not function without the power cable. If you don't already have a 1394 card Western Digital sells one for £69 inc VAT.

Setup software for Windows and MacOS, which installs 1394 driver updates and formats the disk, is provided on CD, but refused to acknowledge the presence of the drive. Windows 2000 knew it was there though – as evidenced by the unplug hardware icon in the system tray. We resorted to the Windows 2000 disk management utility to format the disk, providing 19.1GB of formatted space.

In use the drive operated reliably. Given the much-vaunted hot plugability of FireWire devices it's irresistible, if a little foolhardy, to see what will happen if you pull the cable during a read operation and the drive's performance in this respect was impressive. Playback of an AVI file in Widows Media Player stopped when the cable was removed – and resumed when plugged back in!

Despite the ease with which you can plug and unplug these products, manufacturers seem to be cagey about their resilience and Western Digital is no exception. All the same, the case is robust and should easily stand up to transit in a well-padded computer bag.

KEN MCMAHON

DETAILS

★★★

PRICE £299 (£254.47 ex VAT)
CONTACT Western Digital 01372 360 055
www.westerndigital.com
PROS Reliable; quiet; good value
CONS Needs a power cable; difficult setup
OVERALL There are smaller, better looking FireWire drives on the market, but this does the job and is competitively priced

HP DeskJet 350C Series

If you need to print on the move, this mobile printer could be just what you're looking for.

The first thing you notice about the new DeskJet 350C Series is its size – small enough to be called 'mobile'. The basic 350C comes with high-volume mono and colour cartridges while the 350CBi also includes a rechargeable battery pack and infra-red adaptor. The battery charges in a little over an hour and a half and will then go on to print up to 130 pages of standard-quality black text.

As with all things mobile, though, there's a payoff. With the 350C it's the print quality. Mono graphics aren't too bad, graininess aside. Detailed colour graphics, though, even on HP's own photo paper and at the highest quality setting are extremely grainy.

To be fair, though, if you're buying a portable printer you can't really expect photo quality output, and at least transitions and general levels of detail were good. The printer weighs in at 5.4lb with the portable sheet feeder attached, so is quite heavy for a mobile device. It is, however, robust and well made. HP claims to have drop tested it from 2.5 feet.

Text printing is sharp, with very little feathering. Holding only one cartridge at a time, though, you have to make a choice between colour or black and with the colour cartridge installed, composite text is slightly grey. That said, spot colour content is vibrant, if grainy. The print speed is good, and it managed a steady five pages a minute when we switched to draft quality. Standard quality printing of a single page of text took 38 seconds.

The 350C is an adequate mobile printer. Text quality is sharp and graphics, although not first class, are acceptable.

SCOTT MONTGOMERY

DETAILS

★★★★

PRICE £179 (£152.34 ex VAT)
CONTACT Hewlett-Packard 0990 474 747
www.hp.com
PROS Good text printing at reasonable speed; vibrant colours
CONS Graphics are very grainy; unit is heavy
OVERALL A mobile printer that adequately covers all on-the-move printing needs

HP OfficeJet G85

The multifunction device returns and this does a good job as a printer, fax and photocopier.

It may not be the most attractive printer around but it is versatile, combining four of the most common business products in one unit with a footprint about the size of the average desktop PC. Its functions are printing, scanning, copying and colour faxing.

We got off to a good start with the G85. Its driver, like all of them from HP, is well written and extensive, and when you're printing it offers an impressive range of options. There are three print qualities to choose from and the G85 deals easily with banner printing, 23 media types and 18 paper sizes, including a set of user-defined dimensions.

Cartridge installation is a little less well thought out, requiring you to reach well into the unit, but this is not as awkward as at first you might think. We liked the paper release door around the back that is fast becoming an HP trademark, practically eliminating the chance of jammed paper requiring an engineer call-out.

To test its raw print speed, we subjected it to the tests used in our July issue printers group test. A total of 50 'normal' quality pages of plain text arrived in 13 minutes 27 seconds, putting it ahead of even the fastest printer tested back then, the HP PhotoSmart P1100, and a full 20 minutes faster than Canon's ponderous BJC-8200 Photo. This impressive speed was not achieved by compromising on quality. On photocopy paper the characters were dark and firm with only minimal feathering.

A good driver feature is the ability to vary the amount of ink laid down on each pass, so if, like most of us, you use this sort of low-grade paper regardless of the printing technology, you can avoid saturation. If you're a stats junkie, black text is printed at 600 x 600dpi while colour printing achieves a respectable 2,400 x 1,200dpi.

Our vector graphic test image was well rendered with smooth curves and transitions, although the colours were slightly less vibrant than those seen from other printers, even on Hewlett-Packard's own inkjet paper. There was no such problem when it came to photo reproduction. Colours were vibrant and skin tones realistic.

Two things caught our eye here, though. In one complex area there was a rather high contrast between dark and light areas, so much so that you could be forgiven for thinking we'd enabled trapping on a publishing document, and in several other parts of the image there was visible stepping where we would have expected smooth curves. From hitting print to holding the finished photo took eight minutes 10 seconds, which would have put it somewhere around the middle of the pack in our group test.

The G85's scanning performance was fair, although it demonstrated some loss of definition in areas of shadow, recognising only 19 distinct tones of grey from a range of 22 on a test target. That said, when we used it to produce a copy of the same target using HP's proprietary photo paper we were pleased with the results. It was still easy to tell the two apart but the colours were close right across the spectrum. Maximum optical scanning resolution is 600 x 3,600dpi, although this can be upped to 9,600dpi through interpolation trickery.

Copying a full A4 page at 'normal' quality took 21 seconds in monochrome and 49 in colour, which makes it far slower than a photocopier, but dropping the quality a notch cut this to 17 and 21 seconds respectively without having too detrimental an effect on the results. Helping it more closely mimic a high-end photocopier, there's an automatic document feeder, so you'll not have to watch over it on long jobs.

Of course, you shouldn't feel compelled to plug the G85 into your PC. Its fascia has more than enough buttons to brag about, providing for fax speed dialling, direct copying, magnification adjustment and even manually tweaking the print margins. Even so, there are USB and parallel connection points around the back, although no inbuilt networking features. If networking is your thing it'll happily work with an external Jet Direct unit, but that's an optional extra.

Multifunction devices have been criticised in the past for being jacks of all trades but masters of none. We're pleased to see HP has borne this in mind and in the G85 has come up with something well suited to the jobs at hand. It's keenly priced but you'll need to take into consideration that running an inkjet is a little more pricey than a laser, especially if you mainly print black text.

NIK RAWLINSON

DETAILS

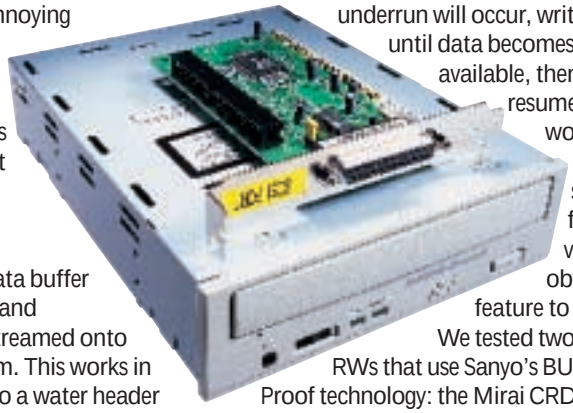
★★★★

PRICE £499 (£424.68 ex VAT)
CONTACT Hewlett-Packard 0990 474 747
www.hp.com
PROS All-in-one unit, so good for the home office; fast text printing
CONS Photo printing could be slightly better, but it's nothing serious
OVERALL The multifunction device has been reborn and the G85 should do much to give the family a good name

BURN-Proof CD-RWs

Sanyo's technology boasts more efficient CD burning, so we put Plextor and Mirai drives to the test.

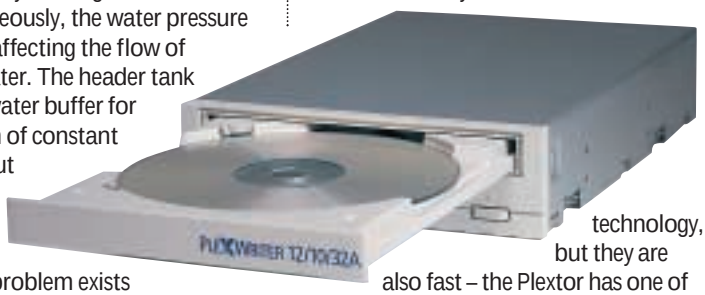
Hands up who's thrown away a CD-R because the CD writer suddenly stopped writing only part way through the operation? This is one of the most annoying problems with CD writers, and is caused by Buffer Underrun, which is where data cannot be delivered fast enough to the CD writer. The writer therefore uses a data buffer to ensure smooth and constant data is streamed onto the writing medium. This works in a similar manner to a water header tank in a house, which fills up, regulating in-house water flow, regardless of how many people on your street are running their taps. If the header tank were not in place, when all your neighbours ran their taps simultaneously, the water pressure would drop, affecting the flow of everyone's water. The header tank is in effect a water buffer for the regulation of constant water flow. But how does this relate to CD writers?



A similar problem exists with a PC. Each application and peripheral utilises the processor for operations; and, as one application is using it another cannot. So the processor shares its cycles between operations to keep everything moving. This is problematic for CD writing which needs constant data flow; so a CD writer uses the aforementioned buffer to smooth the data fluctuation, allowing constant rate writing. What is incredible is that if during the writing operation the buffer has less data in it than the writer requires for writing, the writer will stop and the disc being written will become unusable.

BURN-Proof drives stop the writing process before an underrun occurs. So when the buffer level drops to within 10 per cent of the point where an underrun will occur, writing stops until data becomes available, then writing resumes. You wonder why it's taken so long for this very obvious feature to appear.

We tested two CD-RWs that use Sanyo's BURN-Proof technology: the Mirai CRD-BP2-M, a 12-speed write, four-speed rewrite, 32-speed read SCSI drive, and the Plextor PX-W1210TA, a 12-speed write, 10-speed rewrite, 32-speed read EIDE unit. Not only do both drives use the



technology, but they are also fast – the Plextor has one of the fastest rewrite speeds around. We compared the AOpen CRW-9624 (a six-speed write, four-speed rewrite, 24-speed read drive), and the Sony CRX 145E-RP (10-speed write, four-speed rewrite, 32-speed read) to the two BURN-Proof units.

Their performance was impressive, although the Sony unit is still champion of CD-RW formatting, which took a mere five minutes 49 seconds, compared to the Mirai's 20 minutes and two seconds, and the Plextor's more respectable eight minutes 13 seconds. Copying mixed files to a CD-R (490MB), both BURN-Proof drives managed to complete the task in five minutes 33 seconds, compared to the Sony's six minutes 27 seconds and the AOpen's 10 minutes 21 seconds. As for drag and drop to a CD-RW, the Plextor managed to blow the competition out of the water with scores for copying a cover CD (490MB) in six minutes 59 seconds, and for the video CD (495MB), seven minutes nine seconds. The Mirai managed only 19 minutes 56 seconds and 17 minutes 41 seconds respectively, with the Sony and AOpen drives achieving times similar to the Mirai.

The performance is at least equal, and sometimes far better, than other fast CD-RW drives. But more importantly, the BURN-Proof technology makes CD burning more efficient and less prone to media destruction. It may finally be time to say goodbye to the bad old days, and hello to the joys of BURN-Proof.

SCOTT MONTGOMERY

DETAILS

★★★★

MIRAI CDR-BP2-M

PRICE £269.08 (£229 ex VAT)
CONTACT Armari 020 8993 4111
www.mirai-technologies.com
PROS BURN-Proof technology
CONS Rewriting is not as fast as the Plextor
OVERALL A SCSI unit comparable in speed to others on the market, but the BURN-Proof technology means writing is easier than ever

★★★★★

PLEXTOR PX-W1210TA

PRICE £210.33 (£179 ex VAT)
CONTACT Dabs Direct 0800 674 467
www.plextor.com
PROS Fast rewriting with BURN-Proof
CONS The latest technology comes with a small price premium
OVERALL With the BURN-Proof technology, and the fast read and write times, CD burning has never been as much fun

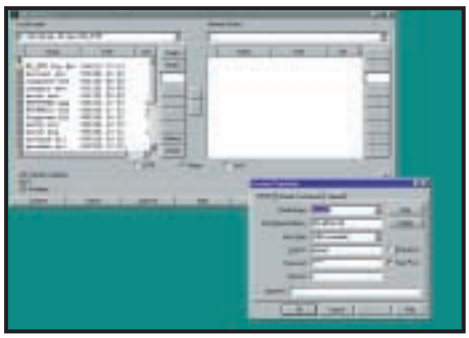
Ipswitch WS_FTP Pro 6.5

A suite offering greater flexibility and Windows Explorer integration to web authoring.

Ipswitch proudly proclaims its new suite to be the world's most popular FTP client for Windows, which is quite an assertion considering the easy availability of competitors such as Cute FTP through magazine cover discs and library downloads.

If your file transfer requirements run to nothing more than monthly changes to your website, then you'll probably not have a great need for a standalone product like WS_FTP Pro. However, unlike the FTP capabilities of your authoring software, WS_FTP Pro will integrate with Windows Explorer, making it possible to drag and drop files between the server and local PC.

As with previous releases, WS_FTP will store your settings for a range of sites so logging on becomes a simple matter of selecting the appropriate server from a drop-down list and clicking to connect. If you regularly check a range of sites for updates and patches this can quickly become a real time saver.



WS_FTP Pro can be extensively customised

The Properties dialog is extensive, allowing you to customise virtually every aspect of the package, including file sorting order and how status information should be displayed. WS_FTP Pro will intelligently switch between binary and ASCII transfer modes by referring to a user-defined list of ASCII file type extensions. It will also generate a log of all transfers in either direction, although this tends to litter every directory you touch.

Most users will have little need for FTP software, being happy with that offered by their browser and web authoring software, but if you need something a little more flexible, WS_FTP Pro remains one of the best.

NIK RAWLINSON

DETAILS

★★★★★

PRICE £33 (£28.09 ex VAT)
CONTACT Unosoft 01483 888 150
www.ipswitch.co.uk
SYSTEM REQUIREMENTS Windows 3.1/95/98/NT/2000, 16MB of RAM (32MB for Windows NT/2000), 3MB of hard drive space
PROS Flexible; good integration with Windows Explorer
CONS None to speak of
OVERALL Easy to use and customise; a good choice if you need standalone FTP utilities

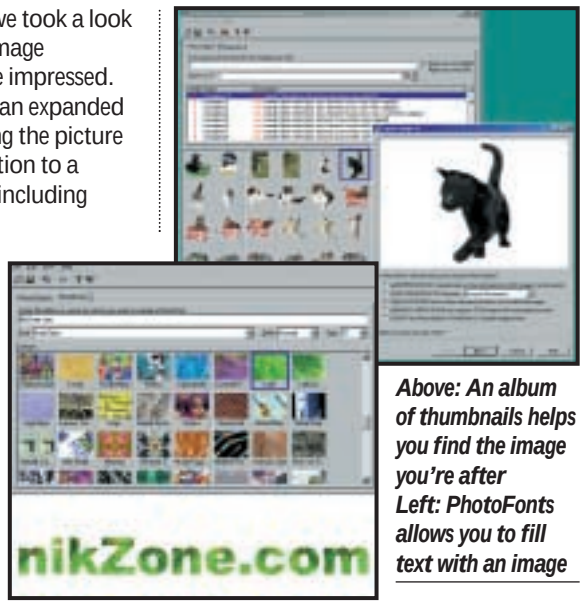
Hemera Photo Objects

A library of 50,000 pictures with a simple approach to give your web page a professional look.

It's about a year since we took a look at Hemera's original image collection and we were impressed. The company has released an expanded version, more than doubling the picture count of the original collection to a whopping 50,000 images, including 30,000 brand new ones.

Split into over 80 categories, the package uses a customised search tool. This includes an input box for entering keywords, but you'll probably find it just as easy to scroll through the categories and the images within each. There's also an accompanying book showing a thumbnail of each image so you can browse the collection without having to stare at the screen for hours.

This tool also takes care of retrieving the images from the library. It keeps track of which of the six CD-ROMs your chosen image calls home and prompts you to insert the appropriate disc. You then specify its use – web, word processing, on-screen presentation and so forth – and it gives you options for resizing and flipping the image before saving it to your chosen destination. Image quality is first class, easily matching that found in 'professional' photo libraries.



Above: An album of thumbnails helps you find the image you're after
Left: PhotoFonts allows you to fill text with an image

A bonus is the added PhotoFonts function that will use photos as the fill texture of characters. It was once necessary to resort to Photoshop to achieve this sort of effect, but here it's simple, quick and cheap.

NIK RAWLINSON

DETAILS

★★★★★

PRICE £59.99 (£51.06 ex VAT)
CONTACT Koch Distribution 01256 707 767
www.hemera.com
SYSTEM REQUIREMENTS 486 processor, 16MB of RAM, Windows 95 and above, 20MB of free hard drive space, CD-ROM drive, 256 colour display
PROS So many photos; high quality; affordable
CONS None
OVERALL A must-have product for the amateur web designer

FileMaker Pro 5

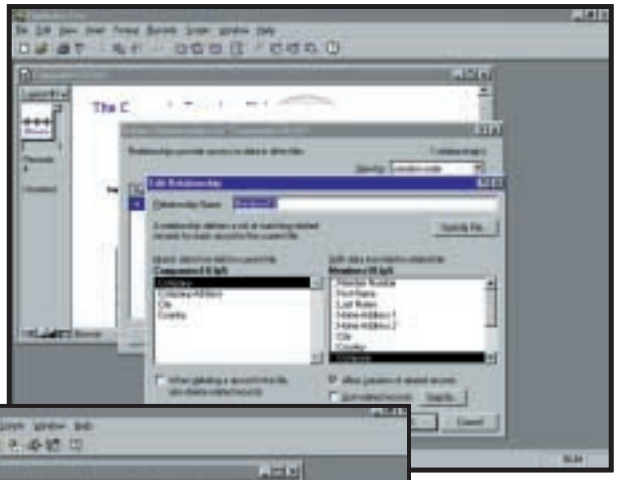
This user-friendly database management system bridges the Windows/Mac divide.

Over the years, FileMaker Pro has developed into a competent database management system (DBMS) with a good range of features. One of its greatest strengths is support for both Windows and Mac operating systems. It's one of those rare products with which you can develop cross-platform applications. This alone is reason enough to choose it if you work with both environments.

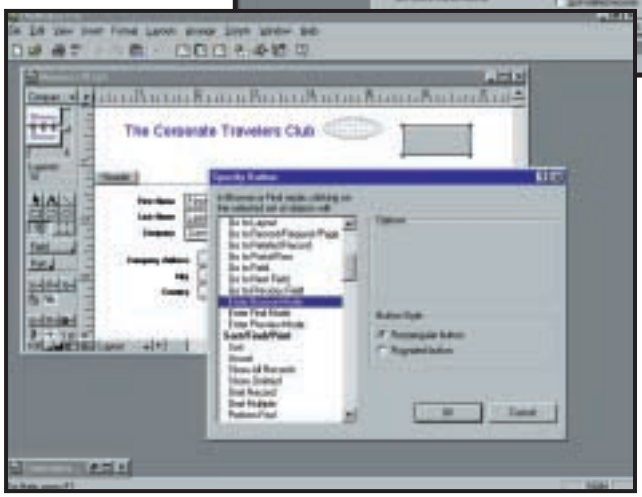
FileMaker has made great strides towards being intuitive and user-friendly so that designing your first single-table database is a doddle. There are 16 predefined database templates to get both home and business users off to a quick start: for example, Recipes, Collections, Personnel Records and Purchase Orders. Alternatively, starting from a blank database is straightforward.

Each FileMaker Pro table inhabits a file with the .fp5 extension and once a table is defined, you work with various layouts to determine what appears on the screen. Layouts take the place of the objects often known as forms and reports in other DBMSs. FileMaker can run in one of four modes: Browse, for inspecting existing records and adding new ones; Find, for locating a record or a subset thereof; Layout, for creating new views of your data; and Preview, for checking the appearance of printed output.

When creating a database, eight field types are at your disposal. Four of these are the familiar text, number, date and time types, and four are slightly more exotic. The container field type can hold image, audio or video files, OLE objects (such as spreadsheets or documents from other applications) and QuickTime file types are also supported. A calculation field holds values calculated from data in the current record or from other records, and a summary field holds summarised data from records in the current file. Finally, there's a global field for values to be used in all records in the current file, for example the rate of VAT to be used in price calculations.

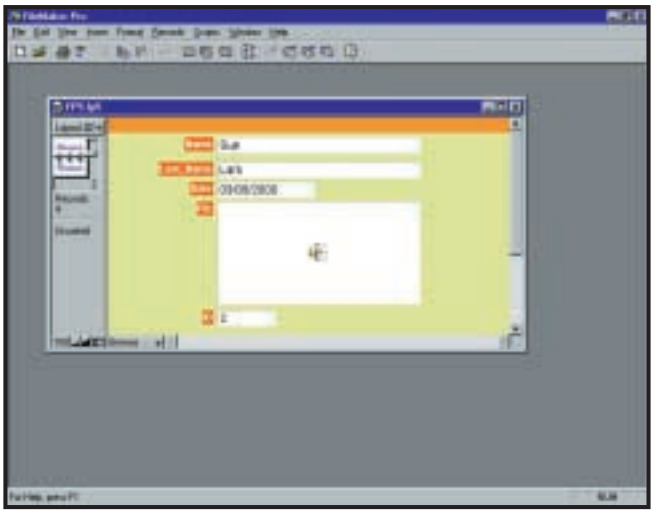


Left: Editing a relationship between two tables in FileMaker Pro. Screen handling is not always as tidy as it could be: moving the dialog box chews away part of the text of the underlying layout



ScriptMaker scripts are built by making selections from a list of available actions

Entering records requires only a click on the New Record button. Pasting .wav and .avi files into a container field is easy, and in Browse mode double clicking on the icon or thumbnail that's placed into the container field plays the sound bite or video. Container fields cannot be searched so you have to add a text field by which to identify them.



A layout with an icon indicating that a sound bite is stored – double clicking will play it

Once fields have been defined, a standard layout is generated automatically, showing all fields. The New Layout/Report assistant eases the production of further layouts for viewing data, for printing as a report and for 'mailmerge' form letters. Buttons can be added to layouts for application control; steps are selected from the ScriptMaker macro-writing tool to navigate between layouts, modes or fields and control structures such as If, Else and Loop are also available.

FileMaker Pro started life as a flat-file DBMS and has since acquired some degree of relational capabilities in response to the universal acceptance of the relational model as a means of storing all but the simplest sets of data. That's the good news. Unfortunately, instead of embracing the recognised RDBMS (relational DBMS) terminology, for reasons never made clear, FileMaker has invented its own. Terms like 'master file', 'related file', 'related record' and 'related field' seem destined to cause confusion, and when introducing the 'match field', it's simply perverse for the manual to say 'sometimes called the key field or primary key'.

Lookups cause confusion too, because defining a lookup causes data to be copied into the 'master file' from a 'related file'. No link is maintained between the two, so if data is updated in the related file, these changes are not reflected in the master.

Apart from terminology and implementation idiosyncrasies, the adherence to the relational model is somewhat tenuous. There is no easy way of employing the checks and constraints for ensuring referential integrity of data nor of dealing with null values – incomplete records can be entered into the sample database provided so that incomplete and mis-interpretable data can be retrieved.

FileMaker databases can be published on the web using the Web Companion plug-in that comes as part of version 5, though some features, notably scripts, are not available in a published database.

Existing users will find that version 5 arrives with widespread changes, especially to the interface that has been redesigned with Microsoft Office users in mind.

There's now a New Layout/Report assistant, a table view of your data, improved ODBC support for sharing data with other ODBC-enabled applications, improved conversion from Excel spreadsheets and a range of styles to apply to your web pages.

MARK WHITEHORN

DETAILS

★★★

PRICE £205.63(£175 ex VAT)
CONTACT FileMaker 0845 603 9100
www.filemaker.co.uk
SYSTEM REQUIREMENTS 486 processor, 16MB of RAM, Windows 95, 98 or NT4 (SP3)
PROS Dual Mac/Windows support is invaluable to those in a mixed environment. Ease of use for simple databases and for handling media
CONS The product makes a poor fist of implementing the relational method of data handling
OVERALL Existing users will be delighted with this latest version and new users are likely to find it great for single-table databases. If you need multi-table data to be held securely with full use made of the data integrity constraints offered by an RDBMS, look elsewhere

Elsa AirLancer

Wireless LANs have come of age and this is simpler and cheaper to install than traditional wire.

Wireless LANs aren't new: the very first systems were proprietary and, at 1.5Mbits/sec, offered painfully slow network links. The new 802.11b IEEE standard and the Wireless Ethernet Compatibility Alliance (aka WECA), a manufacturing consortium, have created products that break the speed barrier, guarantee interoperability among vendors and carry lower prices. Wireless networking is now a practical way to extend the wired network. IEEE 802.11b is an extension to the original 802.11 standard that supported only 2Mbits/sec data rates. The 802.11b spec calls for a data rate of 11Mbits/sec, with fallback rates of 5.5Mbits/sec, 2Mbits/sec and 1Mbit/sec as distance from the access point increases. Kit supporting 22Mbits/sec is in the pipeline.

Multimedia specialist Elsa is one of a handful of vendors that have launched wireless LAN products on the back of the new 802.11b standard. The product consists of a LANCOM base station or 'access point' and the AirLancer client LAN adaptor. This is in fact a PC Card network transceiver, with a rubbery aerial that juts out about an inch from a PC Card slot. As well as plugging into notebooks, it also plugs in to the LANCOM access point or into a PCI adaptor for desktop PCs.

The access point is a device about the size of a largish modem that connects to the wired LAN and translates between the cabled Ethernet LAN and the radio link. It contains a 10BaseT port that connects to the LAN's hub, communications and encryption software and a radio transceiver. The front is adorned with a series of status LEDs indicating LAN and WLAN connectivity. We were supplied with the ISDN router version of the LANCOM, so there were two additional LEDs for each ISDN B channel.

The coverage afforded by the LANCOM access point varies with the type of building – if you want your wireless LAN to cover more than a few thousand square feet, you'll need more than one access point. As a rule of thumb, expect to achieve transmission distances of 100m in fresh air but no more than 20m indoors.

As the client moves, its radio connection transfers to another access point, a process called roaming. A software utility monitors the broadcast quality and, as reception worsens, the bandwidth is progressively throttled back. Throughput at 11Mbits/sec is comparable to a conventionally cabled 10BaseT network.

Wireless LANs have several unique advantages. For a start, they allow roaming in a building, for example letting you take a notebook into a meeting while remaining logged onto your network. Wiring costs form a significant proportion of network installation costs and a wireless LAN needs very little. This makes networking feasible in many buildings that can't take a conventionally cabled LAN, such as historic or listed buildings, those with thick concrete floors or very large buildings. It's also easy to link buildings without recourse to ducting or wires. Wireless also makes it easy to set up *ad hoc* networks in schools or universities.

However, the freedom brought about by wireless comes at a price: it has a high per-node cost, (between £250 to £300), while access points (the server's transmitters and receivers) are double this. And at a time when networks are shifting to 100Mbits/sec, the 11Mbits/sec offered by the latest WLANs looks a little meagre. There's also a risk of interference from other devices – it's even possible to disrupt transmissions by using a microwave oven or a cordless phone. Bluetooth devices share the same 2.4GHz waveband and this may cause problems – this band is limited to only 60 to 80 discrete channels at 1Mbit/sec, dropping to only three channels at 11Mbits/sec. Security is another issue since anyone with a scanner can eavesdrop. But most wireless LANs incorporate 128bit WEP encryption.

Installing the LANCOM and AirLancer ought to have been straightforward but turned out to be a bit fraught, with the complicated configuration software clearly being aimed at the technically competent network techie rather than a home user. Nevertheless once we'd swapped over the PC Cards and cold booted our notebook a couple of times, all the requisite LEDs lit up and we were able to surf away to our heart's content completely wire-less.

At long last wireless LANs have come of age. However, there remain some issues to be resolved, such as inter-operability and security. But for the most part it worked very well. So long as you source all your wireless LAN kit from the same vendor you should be OK.

ROGER GANN

DETAILS

★★★★

PRICE LANCOM base station £525 (£446.80 ex VAT), with ISDN router £625 (£531.91 ex VAT), PC Card £150 (£127.66 ex VAT)

CONTACT Elsa 08000 563445

www.elsa.co.uk

PROS Cheaper and easier to install than traditional wire; secure

CONS Throughput varies; product is for Windows environments only; physical obstacles affect transmission; configuration software overly technical

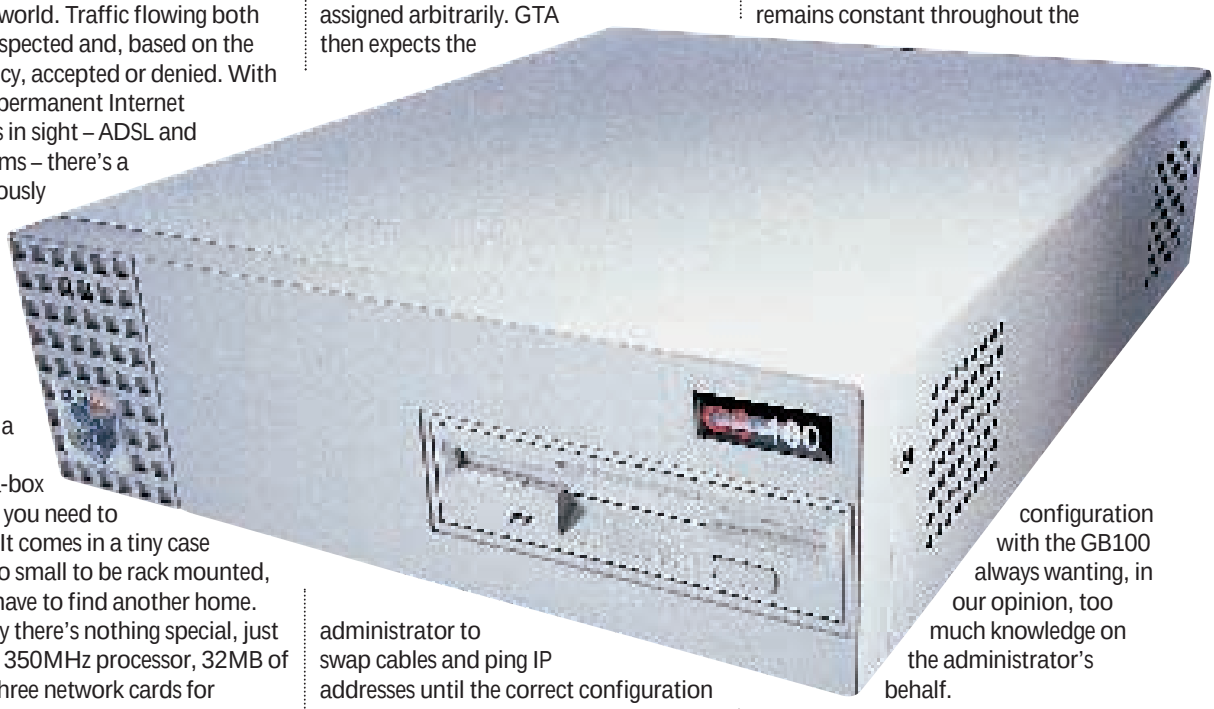
OVERALL A good product with a few niggles, but a sound option for those that need it

GNAT Box GB100

If security is getting you hot under the collar, let this firewall in a box cool you down.

A network without a firewall is the digital equivalent of leaving your house unlocked; anybody can get in and do what they like. Installation of a firewall effectively helps put access control on the network. Firewalls work by sitting between the internal network and the outside world. Traffic flowing both ways gets inspected and, based on the security policy, accepted or denied. With high-speed permanent Internet connections in sight – ADSL and cable modems – there's a need to seriously consider security.

Global Technology Associates' GNAT Box GB100 is designed as a complete firewall-in-a-box – everything you need to get started. It comes in a tiny case that's far too small to be rack mounted, and so will have to find another home.



Internally there's nothing special, just an AMD K6 350MHz processor, 32MB of RAM, and three network cards for internal, external, and demilitarised zone (DMZ) networks. The DMZ is a special case that, while protected by the firewall, is also blocked from the internal network. Typically externally accessible machines, such as web servers, should sit on the DMZ. If they're breached the rest of the network remains protected.

The appliance runs a modified version of Linux, on top of which runs the GNAT Box software. Version 3.0, in addition to firewall facilities, offers Virtual Private Networking (VPN). This allows encrypted links to be made to the firewall, enabling secure remote access across the Internet to take place. This tends to be a better, cheaper, way of letting remote users gain access to the local network.

The GB100 has its roots in PC land, and so it is no surprise that the initial configuration is achieved by plugging in a mouse, keyboard – strangely the old five-pin DIN AT – and a monitor. After typing in one of the longest authorisation codes that we've ever seen, we were taken to a set of screens designed to get the GB100 onto the network. These included assigning IP addresses to each of the network cards, and deciding which ones should act as the internal, external and DMZ.

This procedure should have been a lot easier than it was. None of the cards were labelled, and the on-screen notation didn't make a lot of sense. The setup screens suggested that IP addresses be assigned arbitrarily. GTA then expects the administrator to swap cables and ping IP addresses until the correct configuration is found. Then the cards can be manually labelled in the correct way. This is a lot of hassle and really should not be done this way.

With installation completed we had to set up the firewall policy. Two methods can be used: direct control of the GB100, or a web-based management interface. We prefer the web management as it offers a better interface.

Connection through an ordinary web browser displays a tree structure of management tasks that allowed us to drill down to the task that we wanted to perform, for example changing network settings.

The main task is likely to be to define rules stating which traffic is allowed and denied. Rules operate in list order, so it's important to get it right. For example, creating a rule to deny all traffic, and then creating a rule to allow outbound web traffic, would mean that no traffic would be allowed to pass through. Annoyingly there's no way of moving a rule's position, although it's possible to choose positioning at creation.

By default the firewall is configured to allow all outbound traffic, but to deny all inbound traffic. However, this isn't likely to be suitable as it blocks incoming email. Unfortunately, the configuration software requires that you know on which TCP port that email – SMTP – works before a suitable filter can be written. This problem remains constant throughout the configuration with the GB100 always wanting, in our opinion, too much knowledge on the administrator's behalf.

There is a better system in the Gauntlet firewall from Axent. This has a configuration wizard that creates a policy for outgoing email, FTP, and web traffic, and for incoming email. This firewall does not rely on the administrator knowing port numbers.

Overall the GNAT Box GB100 is a fairly good device for the money. If the company sorted out the initial configuration and made the interface more user-friendly, this would be a top-notch product.

DAVID LUDLOW

DETAILS

★★★

PRICE £2,344.13 (£1,995 ex VAT)
CONTACT Global Technology Associates 01903 205 151 **www.globaltech.co.uk**
PROS VPN as well as firewall; large range of functions
CONS Annoying initial setup; can require too much information for defining rules
OVERALL A well-priced product with a large range of features, but beware that it can be tricky to use